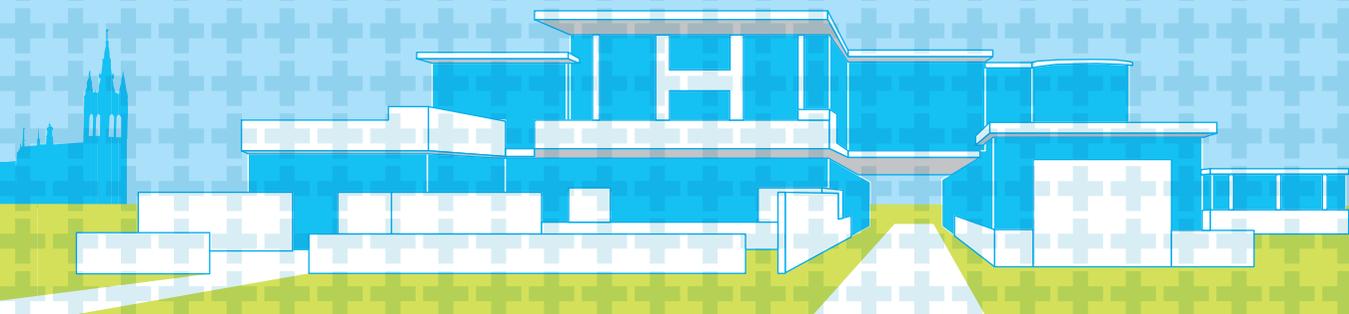


Architecture
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Built environment

#13

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Building for a better hospital
value-adding management & design
of healthcare real estate

Johan van der zwart



Building for a better hospital

value-adding management & design of healthcare real estate

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Building for a better hospital

value-adding management & design of healthcare real estate

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Management summary

Recent deregulation of laws on hospital real estate in the Netherlands implies that healthcare institutions have more opportunities to make independent accommodation choices, but at the same time have themselves become responsible for the risks associated with the investment. In addition, accommodation costs have become an integral part of the costs of healthcare. This sheds new light on the alignment between the organisation of healthcare and accommodation: care institutions themselves bear the risk of recouping their investment in real estate and high accommodation costs lead to higher rates for healthcare compared to competing institutions.

In this thesis, the ideas and concepts of Corporate Real Estate Management (CREM) are examined in terms of the contribution they could make to the process of accommodation decision by using recent cases in Dutch hospitals. CREM can be defined as the management of the real estate portfolio of a corporation by aligning the portfolio and services with the needs of the core business in order to obtain maximum added value for the business and an optimal contribution to the overall performance of the organisation. This definition assumes that accommodation can add value to the organisation and contribute to its overall achievement. Elaborating on the added value of real estate in addition to quantifying these added values and making them applicable to hospital real estate management is therefore central to this study. The added values determine the transition between the different phases in the cycle of the initiation, design, construction and occupancy of the accommodation. In addition, the added value of real estate functions as a common language between the disciplines involved in the design and construction of hospital accommodation, such as the healthcare institution, healthcare manager, real estate manager and architect.

In four sub-studies (1) Context, (2) Management, (3) Value and, (4) Design several concepts that contribute to a more informed decision-making on accommodation aligned with the organisation of healthcare are made applicable by elaborating on, and connecting, existing conceptual frameworks. Conceptual models from different disciplines are aligned in order to achieve an integral approach by both organisation and accommodation management. In addition to the conclusions and recommendations of the separate studies (1-4), the final result is a toolbox (PART 5) that can be used to support a decision-making process that results in a better informed real estate strategy. The instruments are tested by an assessment of recently completed hospital construction projects.

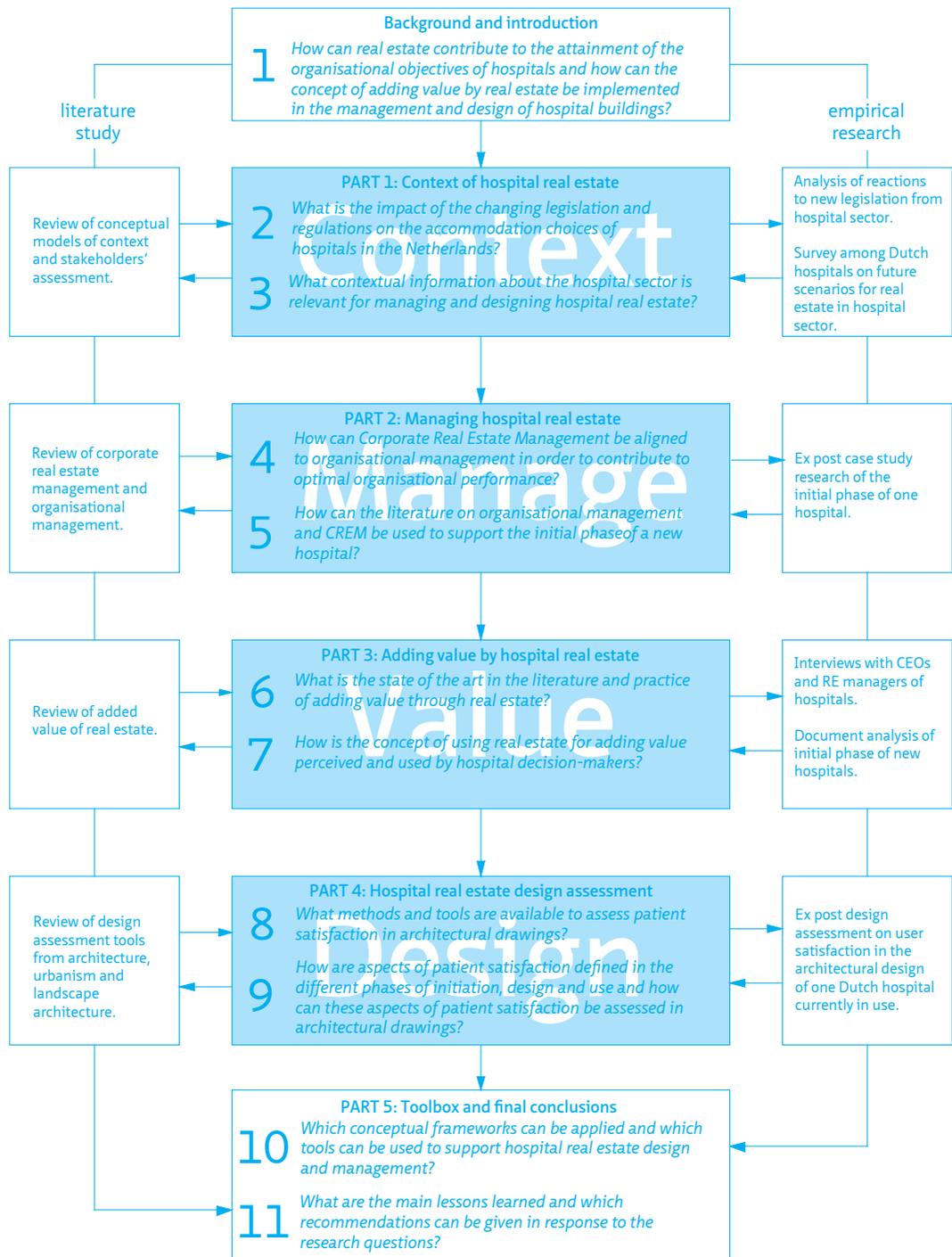


Figure 1 Research design.

The context of hospital real estate

The context in which hospitals have to make long-term decisions on their investment in accommodation is determined by political, demographic, economic, social and technological factors. Hospitals need to determine their position in relation to these environmental factors on the one hand and the interests of their internal and external stakeholders on the other. Context-mapping (Figure 2) is an instrument to analyse these stakeholder interests, the factors relating to the external environment and sector-specific trends and scenarios.

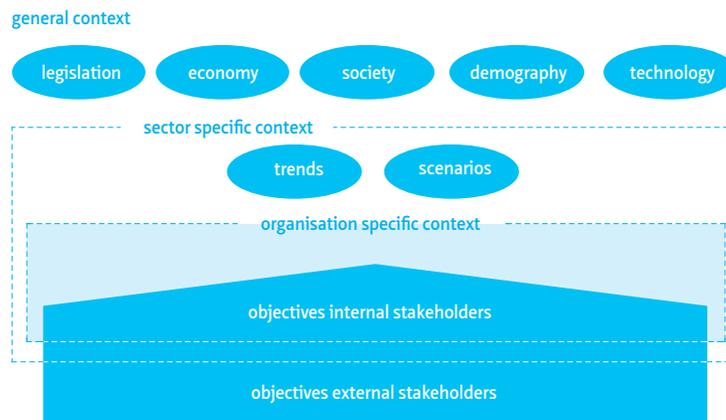


Figure 2 Context-mapping.

The analysis of the hospital sector shows that recent changes in the political context has led to hospitals having to determine their own strengths and opportunities, thereby also taking responsibility for the risks and threats in recouping their investment in accommodation. The transfer of responsibilities implies that the real estate-related risks are transferred too, which immediately has implications for the financial position of the organisation and the access to loans and venture capital. Organisations must maintain reasonable access to the financial markets at all times in order to be able to invest when necessary. Since the deregulation of investment decisions and the implementation of integrated rates in healthcare, hospitals have become more aware of their competitive position in the healthcare market as well as their position in the region. In addition, the influence of various external stakeholders has changed. The decrease of the government's direct influence on investment decisions and the related capacity of healthcare institutions meant an increasing influence of health insurance companies in purchasing healthcare (capacity) and banks in the financing of accommodation investment. Consequences of the changing context of

accommodation decisions for hospitals are: a new positioning of the hospital within the community with associated location choices; need for accommodation choices that contribute to labour-saving innovations; need to add value by real estate to the organisation and; possibilities for anticipating changes in the organisation of healthcare.

Managing hospital real estate

How hospital real estate can be optimally aligned to organisational objectives is examined by paralleling existing conceptual models of CREM models that control the quality of the organisational processes. The basic conceptual model for this is an abstraction of the European Foundation for Quality Management (EFQM) model in four steps: (1) stakeholders' objectives, (2) the organisation's key issues for success, (3) managing the organisation's structure and resources; (4) improvement of the primary process. The plan-do-check-act cycle as common ground in quality management is also included in this basic conceptual model.

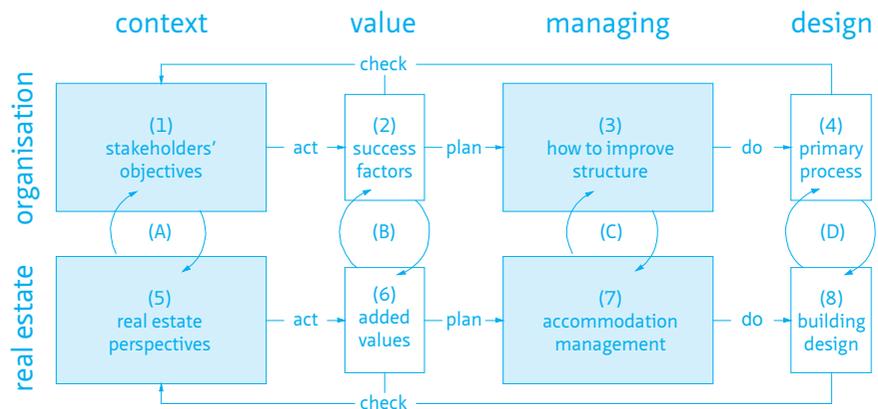


Figure 3 Meta-model real estate management.

The meta-model (Figure 3) shows how the parallel management of organisation and accommodation in three sequential steps (context, value and management) results in the design of a process (4) and a building (8) in four steps of alignment between: (A) the outcomes for stakeholders (1) and the perspectives on real estate (5); (B) the organisation's key issues for success (2) and the added value of real estate (6); (C) managing structure and resources (3) and managing real estate (7); (D) the primary process (4), and the design of the building (8).

The integrating framework (Figure 4) for managing hospital real estate is a further elaboration of the meta-model.

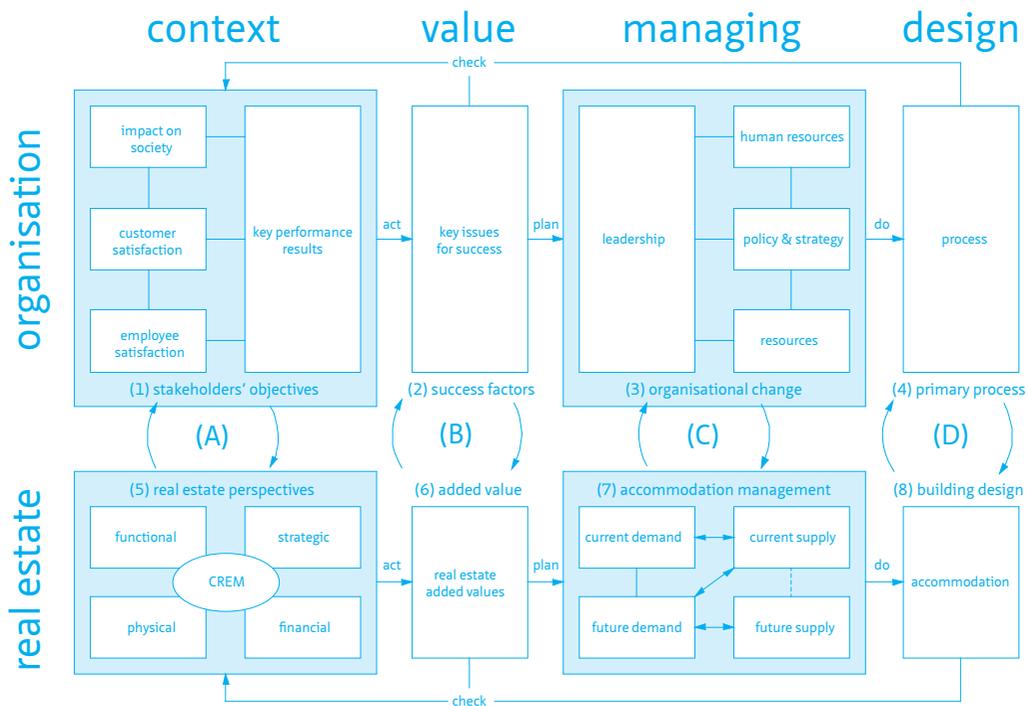


Figure 4 Integrating framework.

In the integrating framework, the steps at the level of the organisation are completed by the steps of the EFQM model. The strategic, financial, functional and physical perspectives on real estate (5) can be positioned parallel to the stakeholders' objectives (1) that are described in the EFQM-INK model. In this way stakeholder management is part of the organisational management and is translated into real estate perspectives on CREM. The perspectives on real estate are translated into real estate added values (6) as the common language that in all phases of the real estate lifecycle can be assessed. This concept of adding value by real estate is connected to the key issues for success (2) that result from the demands and wishes of society, employees, customers and the organisation's management at an organisational level. Both the key issues for success and the added values of real estate provide input into the change management process of the organisation (3) and its real estate (7). The organisation's change management (3) is directed by leadership and is about policy & management of the resources, including human resources and real estate. In this part of the model, different resources for production have to be balanced against each other. This results in a process that has to be implemented in a physical environment.

In this model, the Designing an Accommodation strategy (DAS)-Frame is the basis for real estate change management (7). In an iterative process a match is made between demand and supply, now and in the future, resulting in a building which can support organisational primary processes. Paralleling the management of accommodation with organisational change thus leads logically to a step-by-step plan for the transformation of the accommodation. Both the processes and the building are compared with the stakeholder demands and related perspectives on real estate.

In addition, a five-point scale for all items in the integrating framework is developed for a triple assessment on the stage of development of the organisation and its accommodation decisions. This triple assessment of the organisation and accommodation shows where the organisation stands, how real estate is controlled and the pursued level of ambition with a corresponding focus on product, process, system, chain or society.

EFQM-INK		five organisational configurations		evolutionary stages of real estate	
product oriented	<ul style="list-style-type: none"> * hierarchical organisation * craftsmanship * top down communication * task culture 	simple structure	<ul style="list-style-type: none"> * strategic top * direct supervision * vertical and horizontal centralisation 	task manager	<ul style="list-style-type: none"> * technical focus * supply needs for real estate * engineering buildings
process oriented	<ul style="list-style-type: none"> * primary process identified * leadership focus on process * horizontal communication * process improvement 	machine bureaucracy	<ul style="list-style-type: none"> * technostructure * standardisation of processes * horizontal decentralisation 	controller	<ul style="list-style-type: none"> * cost reduction * analytical approach * information on RE objects * benchmark
system oriented	<ul style="list-style-type: none"> * secondary processes described * targets and goals * indicators in process * optimising services 	professional bureaucracy	<ul style="list-style-type: none"> * operational core * standardisation of skills * vertical and horizontal decentralisation 	dealmaker	<ul style="list-style-type: none"> * create financial value * problem solving * standardisation of real estate * flexible internal RE market
chain oriented	<ul style="list-style-type: none"> * chain of subcontractors and customers is analysed * insourcing / outsourcing 	divisionalised form	<ul style="list-style-type: none"> * middle line * standardisation of output * vertical decentralisation 	intrapreneur	<ul style="list-style-type: none"> * internal RE company * proposing solutions * external market options
society oriented	<ul style="list-style-type: none"> * open dialogue with society * front runner in development * shared values with society 	adhocracy	<ul style="list-style-type: none"> * support staff * informal communication * selective decentralisation 	business strategist	<ul style="list-style-type: none"> * anticipate trends in society * measuring and monitoring results * contribute value to organisational objectives

Table 1 Triple assessment.

Adding value through hospital real estate

Value is defined in this study as the valued performance of a product or service that contributes to the achievement of the goals set by the stakeholders. As a consequence, value depends on the (subjective) assessment of the stakeholders. Added values of real estate have to be defined in advance (ex-ante) to pre-set the goals of the stakeholders in order to be able to test them afterwards (ex-post) in the design.

The research into the added values of hospital real estate shows that the concept of adding value through real estate fits the practice of hospitals that have recently designed and constructed a new hospital building. Applying the added values of real estate from the CREM literature to the construction of new hospitals in the Netherlands has resulted in a sector-specific definition of the added values of hospital real estate and a categorisation into three clusters. The first cluster consists of user-values such as the promotion of organisational culture and patient and employee satisfaction. This cluster is followed by the more tactically oriented production-values such as improving productivity, reducing accommodation costs and the flexibility to adapt the physical environment to new healthcare processes. The third cluster consists of future-values, e.g. the image of the building, sustainability, real estate related risks and the opportunities to use the financial value of real estate for financing primary processes.

cluster	definition hospital real estate added value		
user-value	The way the physical environment is experienced by people and evaluated in daily use. This connects directly to the organisation as a form of cooperation between different people who want to achieve their goals.	organisational culture & innovation	Encouraging communication and innovation by improving interpersonal relationships within the organisation.
		patient satisfaction & healing environment	Positively influencing the healing process with pleasant accommodation facilities for patients.
		employee satisfaction	Functional, enjoyable and comfortable work space for employees.
production-value	Functional suitability and effectiveness in use means that a building is effective in a functional sense and meets the desired usage. Appropriate dimensions, positioning of the program and routing within the complex are important aspects.	reduce accommodation costs	Reduction of accommodation costs such as investment, capital, operating and maintenance.
		increase productivity	Increasing productivity through more effective and efficient use of the accommodation.
		use flexibility	Spatial and technical flexibility to adapt the accommodation to changes in primary processes.
future-value	Efficiency in time, which implies sustainability of the design and suitability for re-use so that the building can maintain quality and value.	support image	Propagating organisational values by using the building as an icon of the organisational culture.
		reduce risk and increase financial possibilities	Anticipating future technical and financial risks by considering real estate as an asset.
		sustainability	Reducing energy, water and materials usage to maintain affordable healthcare with increasing commodity prices.

Table 2 Hospital real estate added values.

		perspective on real estate			
		strategic	financial	functional	physical
user-value	organisational culture & innovation				
	patient satisfaction & healing environment				
	employee satisfaction				
production-value	reduce costs of accommodation				
	increase productivity				
	use flexibility				
future-value	support image				
	Reduce risk & increase financial possibilities				
	sustainability				

Table 3 Value-impact-matrix.

		perspective on real estate			
		strategic	financial	functional	physical
		adding value to organisational goals: how and to what extent are strategic or organisational objectives achieved or obstructed by real estate?	value, resources and costs: financial consequences of the accommodation on resources, real estate value, and life cycle costs.	fitness for use: how and to what extent is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
user-value	patient satisfaction & healing environment	Patient satisfaction is related to the welfare of patients and the contribution of the physical environment to the healing process. Aspects of patient satisfaction are: view of nature, light, materials, noise, orientation & routing, privacy in doctor's offices and nursing rooms.			
	Positively influencing the healing process by pleasant accommodation facilities for patients.	The building contributes to the healing of patients and as such contributes to a better positioning of the hospital in the healthcare market.	Higher accommodation costs are recovered through a shorter hospital stay and higher occupancy due to higher patient satisfaction.	The built environment contribute to a smoother healing process by reducing stress for patients.	Architectural quality of patient areas such as surgery, (individual) nursing room with extra attention for a view on nature, natural light, materials, noise reduction, privacy and orientation and routing.

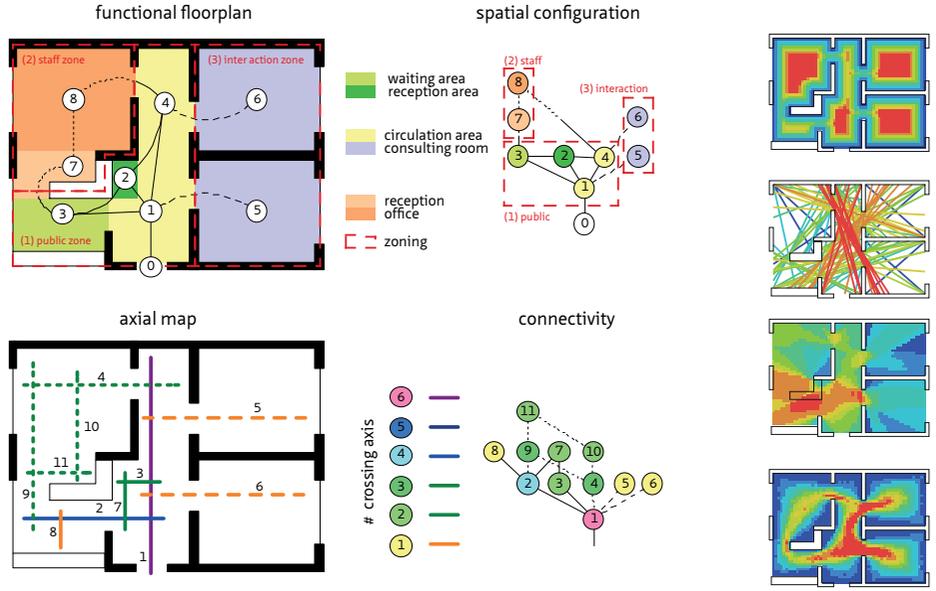
Table 4 Value-impact-matrix of patient satisfaction & healing environment.

In addition to defining the added values of hospital real estate, the value-impact-matrix (Table 3) has been developed that links nine types of added value (Table 2) to the interests and needs of the stakeholders by four perspectives on real estate: strategic, financial, functional and physical. The value-impact-matrix was developed to support the alignment between the organisation's key issues for success, the added values of real estate and stakeholders different perspectives of real estate. This instrument makes it possible to highlight the added values of real estate from different perspectives on real estate (strategic, financial, functional and physical). Table 4 shows an example of possible connections between one of the values – patient satisfaction and healing environment – to four different perspectives.

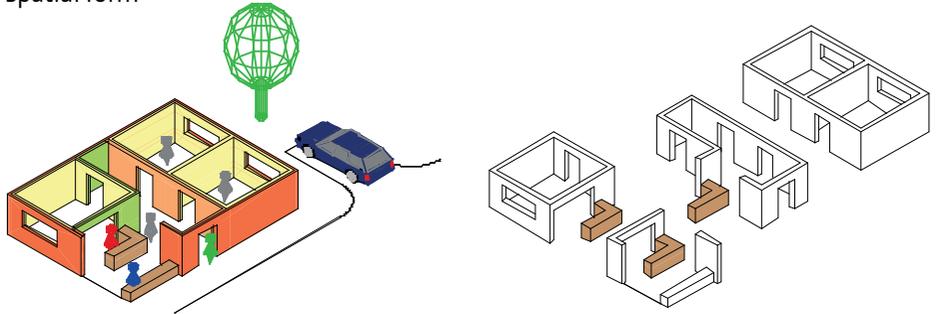
Hospital real estate design assessment

Only those design decisions that are incorporated into the final design contribute to achieving the objectives set, so the translation of accommodation targets into the architectural design is a crucial step in achieving added value by real estate. In addition to defining these values in advance, applying added value as a framework also requires an assessment to measure these values in the design and use phase. Different analytical drawing techniques used in this part of the research show how the attainment of these values in the architectural design can be tested for different aspects of patient satisfaction. Pre-set values are visualised and different design solutions compared. In particular techniques that come from space syntax provide opportunities to study aspects of user-value in the architectural design drawings. The results are promising, despite the fact that PART 4 of the study is a first exploration of the possibilities of design-assessment. The graphs that can be produced seem to give good insight into the consequences of spatial design, although the analyses are still indicative and as yet unvalidated. More validating research is needed to examine the extent to which the results of the analyses are representative in the physical built environment of hospitals. This is possible by comparing the results of design assessment with measures of user experiences in actual buildings, e.g. by building-in-use studies or so-called Post-Occupancy Evaluations (POE).

basic form



spatial form



visible form

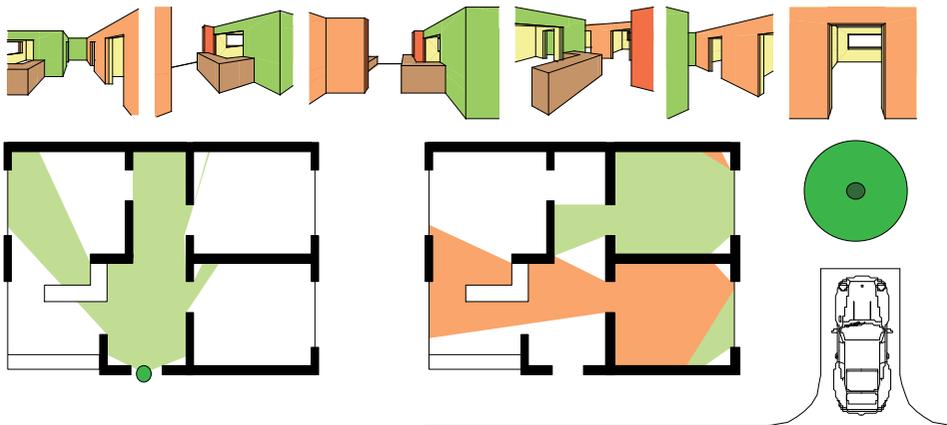


Figure 5 Design assessment.

Toolbox to support value adding management & design

One of the results of this research is the design of a toolbox that can contribute to the decision-making regarding accommodation for hospitals. This toolbox provides a structure for the context, value, design and management of accommodation and is intended as a reference for the alignment between real estate and the organisation of healthcare. The instruments can be used independently of each other, but can also be combined. As such, the toolbox provides guidelines for the distribution of responsibilities and tasks between the hospital board, real estate manager, healthcare managers and architects in various phases of occupancy, initiative and design.

Existing frameworks as the starting point

The case studies demonstrate the usefulness of the conceptual models of CREM in matching accommodation for hospitals and the organisation of healthcare. The model for context-mapping provides a starting point for getting a grip on the position of real estate in the dynamic context of hospitals. The arrangement of different conceptual models in the meta-model and the link to the EFQM model as an abstract description of the organisation results in a roadmap in which the accommodation and organisation of healthcare can be coordinated iteratively. While the meta-model at the level of the CEO provides an overview and outline of the considerations to be made, the integrating framework is a comprehensive tool for real estate managers to further elaborate on these various steps. Generic values from the literature are discussed and translated into the sector-specific added value of hospital real estate. In addition, design assessment makes it possible to test various aspects of pre-set values already before the design is actually constructed.

Transdisciplinary approach to accommodation and organisation of healthcare

Another important contribution made by this research to the scientific debate is making the link between existing CREM models and conceptual frameworks from quality management and spatial quality. The toolbox supports decisions on real estate for hospitals in making connections between existing knowledge from different disciplines. The addition to existing frameworks is therefore aimed at connecting the various disciplines, creating a new basis in which every professional such as real estate managers, healthcare managers, medical specialists and the hospital board can contribute to a better balance between accommodation and healthcare. On a conceptual level common principles from real estate management and the organisation of healthcare are aligned in the meta-model in four steps (context, value, manage, design). On a practical level the added values of real estate are to be regarded as a common language between the different disciplines.

Focus on quality of organisation, accommodation and spatial design

The connection between the disciplines and conceptual models is found by looking at the quality of both the organisation, accommodation management and spatial design. First, quality models are used to conceptualise, characterise and describe the organisation and its processes. In addition, existing models from the CREM literature are positioned relative to each other by using two basic principles of quality management and in this way implicitly looking at the quality of the accommodation parallel to the organisation and its primary processes. How the added value of real estate can be connected to spatial quality is then examined. The classification of added value in user-value, production-value and future-value turns out to be a useful clustering. This opens a window to considering the added value of real estate as the realisation of quality, as perceived by the stakeholders. With this in mind, consciously managing and integrating the added values of real estate with a focus on the quality of the organisation, accommodation and spatial design can be seen as the answer to the main research question of this thesis.

Recommendations

In the dynamic context in which hospitals make real estate investments, the hospital board as central stakeholder is responsible for balancing the interests of the different stakeholders; the establishment of accommodation goals; the alignment of accommodation goals to the organisation's mission and vision; and the assessment of whether all these goals are achieved in the design of the hospital building.

- 1 An integrated development of organisational management and real estate management is recommended in order to align accommodation management to the vision, mission and goals of the hospital organisation.
- 2 Managing hospital accommodation requires a balanced analysis of the potential added value of real estate. Important values include: user-values such as improving the organisational culture and satisfaction of patients and employees; production-values such as reducing accommodation costs and increasing productivity and use-flexibility; future-values such as reducing real estate risks and increasing financial possibilities, supporting the image of the organisation and sustainability.
- 3 Managing hospital accommodation requires careful consideration of the interests, preferences and requirements of all stakeholders and perspectives on strategic choices, financial considerations, user perspective and the physical possibilities of real estate.
- 4 Achieving added value from real estate requires the ex-ante formulation of accommodation targets and ex-post assessment of whether these objectives have been met. This assessment of accommodation goals in an architectural design demands pre-construction design research by floor plan analysis in which the values are made visible and measurable and as such part of the design decision process.

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1 Introduction

§ 1.1 Research field

This thesis examines how real estate can contribute to the attainment of the organisational objectives of hospitals and the subsequent implications for the management and design of hospital real estate. It shows how the management and design of real estate by hospital organisations can contribute to the overall organisational performance. Following the literature on Corporate Real Estate Management, hospital real estate is regarded as one of the five resources for production that could add value to the organisation (Joroff, Louargand, Lambert, & Becker, 1993).

Corporate Real Estate Management (CREM) can be defined as the management of the real estate portfolio of a corporation by aligning the portfolio and services with the needs of the core business in order to obtain maximum added value for the business and to contribute optimally to the overall performance of the organisation (Dewulf, Krumm, & De Jonge, 2000). Figure 7 represents how Corporate Real Estate Management is perceived by the Department of Real Estate & Housing at Delft University of Technology.

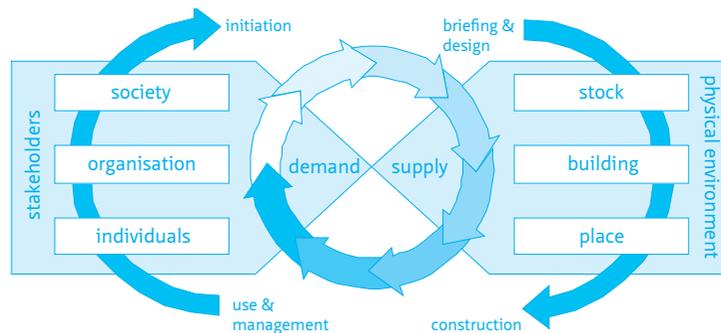


Figure 6 Conceptualisation of CREM.

Central to this view is the real estate lifecycle that consists of four phases: initiation, briefing & design, construction and use & management. In this cycle the demand and supply of real estate are brought together. The left side of the diagram represents the stakeholders' wishes from society, organisations and individuals which determine the demand for real estate. The phases where the stakeholders are most prominent are the

use & management phase and the initiation phase. On the right side this demand is translated into a physical environment, resulting in real estate supply. This is done by transforming the real estate stock, buildings and places in the briefing & design phase and construction phase.

CREM aims to find the best possible match between demand and supply. This is influenced by the appreciation, preferences and interests of real estate by the stakeholders on the one hand and the possibility of changing the real estate supply on the other hand. Several authors have described how the match between real estate demand and supply can be optimised. From this research four topics can be distinguished which relate to the real estate lifecycle as presented in Figure 6:

- 1 the perspectives on Corporate Real Estate as perceived by stakeholders;
- 2 the way real estate management can be aligned to organisational management;
- 3 the main stakeholders' objectives in each phase of the real estate lifecycle;
- 4 the way real estate supply can be transformed to match the demand for real estate.

Bearing these four topics in mind, this thesis describes conceptual models on CREM from the last 20 years in order to integrate the different models into an integrating framework for the management and design of hospital real estate in a changing context.

This introduction describes the research background and the method used in the research. First, the concept of adding value by real estate and the context of hospital real estate is described briefly, leading to a problem statement and the formulation of the main research questions. The research design is presented after the research questions. A short description of the methodology follows, while the research methods are discussed more thoroughly in the subsequent relevant chapters.

§ 1.1.1 Adding value by real estate

The concept of adding value by real estate is the core of this thesis and therefore developing knowledge about the contribution of real estate to attaining organisational objectives is a fundamental part of this research. These real estate added values are explored and elaborated. The impact of corporate strategy on real estate strategy and the consequences for the management and design of hospital real estate are studied. Searching for integration between real estate and the organisational objectives of hospitals, this research can be positioned between organisational management, Corporate Real Estate Management and architecture.

Several authors have tried to operationalize the concept of adding value by defining its principles, starting with a definition of the term 'value'. 'Added value', 'adding value' or

'value-added', is a multidimensional construct, playing diverse roles, and interpreted in different ways by different people (De Chernatony & Harris, 2000; Jensen, Van der Voordt, & Coenen, 2012). The term is predominantly mentioned in trade publications and is far less mentioned in academic journals.

Most definitions and descriptions of 'value' and 'added value' in the literature include customers' valuation of product and/or services and define adding value as a construct that relates the input to the output or outcome as perceived by the customer. For real estate decision processes, this implies that the stakeholders' perspectives are the starting point for the valuation of the output, based on the stakeholders' goals and preferences. Attainment of values therefore depends on what is perceived as desirable by stakeholders in relation to their overall objectives. This perspective on adding value leads to a definition of the concept of adding value by real estate as used in this thesis: the attainment of organisational objectives by real estate that are perceived as desirable by stakeholders in relation to their overall goals and objectives.

In the field of corporate real estate management the concept of adding value is usually linked to several lists of possible real estate strategies that could contribute to organisational performance goals (Nourse & Roulac, 1993; De Jonge, 1996; Lindholm, Gibler, & Leviäinen, 2006; Lindholm, 2008; De Vries, De Jonge, & Van der Voordt, 2008; Den Heijer, 2011; Jensen, Van der Voordt, & Coenen, 2012). Following these authors, this thesis explores the concept of adding value by real estate in connection to the organisational goals and objectives of hospitals, and how this concept could be applied to the decision-making processes regarding new hospital real estate or adapting existing hospital real estate.

§ 1.1.2 Hospital real estate

Healthcare is precious and at the same time expensive and will become even more expensive in the future, due to the increasing need for care of an aging society, the increasing demand for quality of life and new opportunities for care and cure due to technical and medical innovation. Real estate, implicitly or explicitly, has always been a resource for production in healthcare and is becoming an increasingly important part of corporate strategy. Consequently the significance of a healthcare organisation's real estate strategy has increased.

A comparison of different healthcare systems in Europe shows that different systems of financing healthcare lead to different real estate strategies by hospital organisations (Van der Zwart, Van der Voordt, & De Jonge, 2010). As the healthcare system has a great impact on the accommodation strategies of hospitals, the choice was made to study hospital real estate strategies within one healthcare system i.e. the Dutch situation.

Recent deregulation concerning hospital real estate in the Netherlands makes the Dutch healthcare sector a context in which the position of real estate has changed rapidly over the last decade. In the Netherlands there used to be a centrally directed budget system of healthcare real estate investment. To keep healthcare affordable in the future, the Dutch government has changed its legislation from a centrally directed system into a regulated market system. The goal of this alteration is better healthcare for lower costs. Abolishment of the centrally managed budget system of healthcare real estate gives healthcare organisations more opportunities to make their own autonomous decisions about their investments. With a reduction in the rules for investments comes an increase in the responsibility of healthcare organisations for the risks associated with those investments. The termination of guaranteed financial support by the government also means that real estate investments have to be financed by production and the delivery of healthcare services. As a consequence, financial risks and the need for competitive advantage increases.

The introduction of a regulated market system and the transfer of responsibility for risks and profits of healthcare real estate mean that healthcare organisations have had to rethink their corporate strategy in relation to real estate. The financial and economic position of real estate within the healthcare organisation increases and therefore also the influence of real estate decisions on the competing healthcare tariffs. It is this changing context that makes the hospital sector in the Netherlands an interesting subject for evaluating real estate decision making.

§ 1.2 Problem definition

Since the introduction of a regulated healthcare market system and deregulation of investment decisions in the Netherlands, decision-making on hospital real estate has increased in complexity with more opportunities and threats to consider. Due to deregulation with decreasing public involvement and funding, hospital organisations are themselves responsible for their own investment decisions. In this changing context, hospital decision makers have to manage and design real estate in order to match the real estate supply and stakeholders' demands. In order to make this match, hospitals have to weigh real estate investments against investments in other resources which influence production, like human resources and ICT. As a consequence, real estate investments are compared with alternatives like investing in staff or technology. At the same time, hospital real estate is aging, both technically and functionally, and is in need of reinvestment, whilst the changing context causes more uncertainty. In addition, the demand for added value of hospital real estate to the performance of the institution is also increasing. Most real estate related decisions are made in a design decision process during the initiation, briefing and design of a new building. In this

initial phase, a lot of accommodation choices are made over a short period of time. This argues the need for evidence-based design and management of hospital real estate during the initiative phase, briefing, design and management processes. For the design of a new hospital building, there is a relatively short period of time between the initial phase and the actual visible result of a constructed building. Therefore, in this thesis the choice is made to use mainly empirical research data from the initial and design phase for new hospitals. Nonetheless, generalised conceptual models and tools from this research are also applicable to the renovation and redesign of existing hospitals, because when in use, aging of the building and all kinds of contextual changes resulting from demography, politics, techniques and society will be the drivers to change the physical environment as well.

§ 1.3 Research goals and main research questions

The aim of this research is to increase knowledge of the added value of hospital real estate in a changing context and how this concept of adding value could be applied to design and management processes. This aim combines four fields of research:

- 1 the context of hospital real estate investment decisions;
- 2 the management of hospital real estate;
- 3 the concept of adding value by real estate;
- 4 the applicability of the added value in an architectural design.

This research therefore comprises four partial studies. PART 1 focuses on the context of hospital real estate and the applicable conceptual models of context analysis. PART 2 focusses on the alignment of corporate real estate management with organisational management. PART 3 elaborates on the concept of adding value through hospital real estate and how this contributes to the realisation of organisational objectives of hospitals. In PART 4 tools to assess the added values in hospital real estate design are discussed. The four partial studies correspond to the four main sections of the book following this introduction.

The aim of this book is to produce a toolbox that supports hospital decision makers to translate organisational objectives into real estate added value and facilitates the assessment of the real estate added value in a hospital's architectural design by ex-ante design research. The toolbox consists of four instruments: (1) a model of the context of hospital real estate; (2) a model that aligns CREM to organisational management; (3) the translation of organisational objectives into the added value of real estate and; (4) analytical instruments to assess the added value in an architectural design.

These research goals lead to the following main research question and sub-questions for each part of the study:

- 1 *How can real estate contribute to the attainment of the organisational objectives of hospitals and how can the concept of adding value by real estate be implemented in the management and design of hospital buildings?*

PART 1 Context of hospital real estate

- 2 *What is the impact of the changing legislation and regulations on the accommodation choices of hospitals in the Netherlands?*
- 3 *What contextual information about the hospital sector is relevant for managing and designing hospital real estate?*

PART 2 Managing hospital real estate

- 4 *How can Corporate Real Estate Management be aligned to organisational management in order to contribute to optimal organisational performance?*
- 5 *How can the literature on organisational management and CREM be used to support the initial phase of a new hospital?*

PART 3 Adding value by hospital real estate

- 6 *What is the state of the art in the literature and practice of adding value through real estate?*
- 7 *How is the concept of using real estate for adding value perceived and used by hospital decision-makers?*

PART 4 Hospital real estate design assessment

- 8 *What methods and tools are available to assess patient satisfaction in architectural drawings?*
- 9 *How are aspects of patient satisfaction defined in the different phases of initiation, design and use and how can these aspects of patient satisfaction be assessed in architectural drawings?*

PART 5 Toolbox and final conclusions

- 10 *Which conceptual frameworks can be applied and which tools can be used to support hospital real estate design and management?*
- 11 *What are the main lessons learned and which recommendations can be given in response to the research questions?*

§ 1.4 Research methodology

§ 1.4.1 Research strategies and research design

Given the complexity in both real estate decision-making and the hospital sector, a research strategy was chosen that connects the literature research and empirical research on different levels. The essence of this connection is the applicability of CREM in the domain of hospital real estate decision-making. The research questions are therefore first considered from a conceptual point of view by means of a literature review on CREM. Concepts from CREM are then tested in empirical research. The conclusions from the empirical research are used to improve the applicability of CREM in the domain of hospital real estate. This research strategy makes it possible to consider the separate research questions in a variety of ways using different research methods. Another consequence of this strategy is that the case studies in the separate parts of this dissertation can be selected to best fit with the specific research questions.

The research design presented in Figure 7 describes the structure of the PhD research. Hospital real estate is studied in the four main parts of this book. The first part (1) describes the context in which decision makers make choices regarding hospital real estate in the Netherlands. The second part (2) on managing hospital real estate aligns real estate management with organisational management. A conceptual framework is developed resulting from a literature review of Corporate Real Estate Management and the organisational management of hospitals. This conceptual framework is the starting point for PART 3 which studies using hospital real estate for adding value and how organisational objectives are, or can be, translated into real estate decisions. In PART 4, the results of both the literature review and the empirical studies are used in a case study where a hospital design is analysed in order to explore possible tools for using the concept of real estate added value in assessing patient satisfaction in the architectural design drawings. After the four main parts, the research concludes with a design for a toolbox (PART 5) to support value-adding management and design of hospital real estate and a reflection on scientific insights that this research adds to the literature on Corporate Real Estate Management.

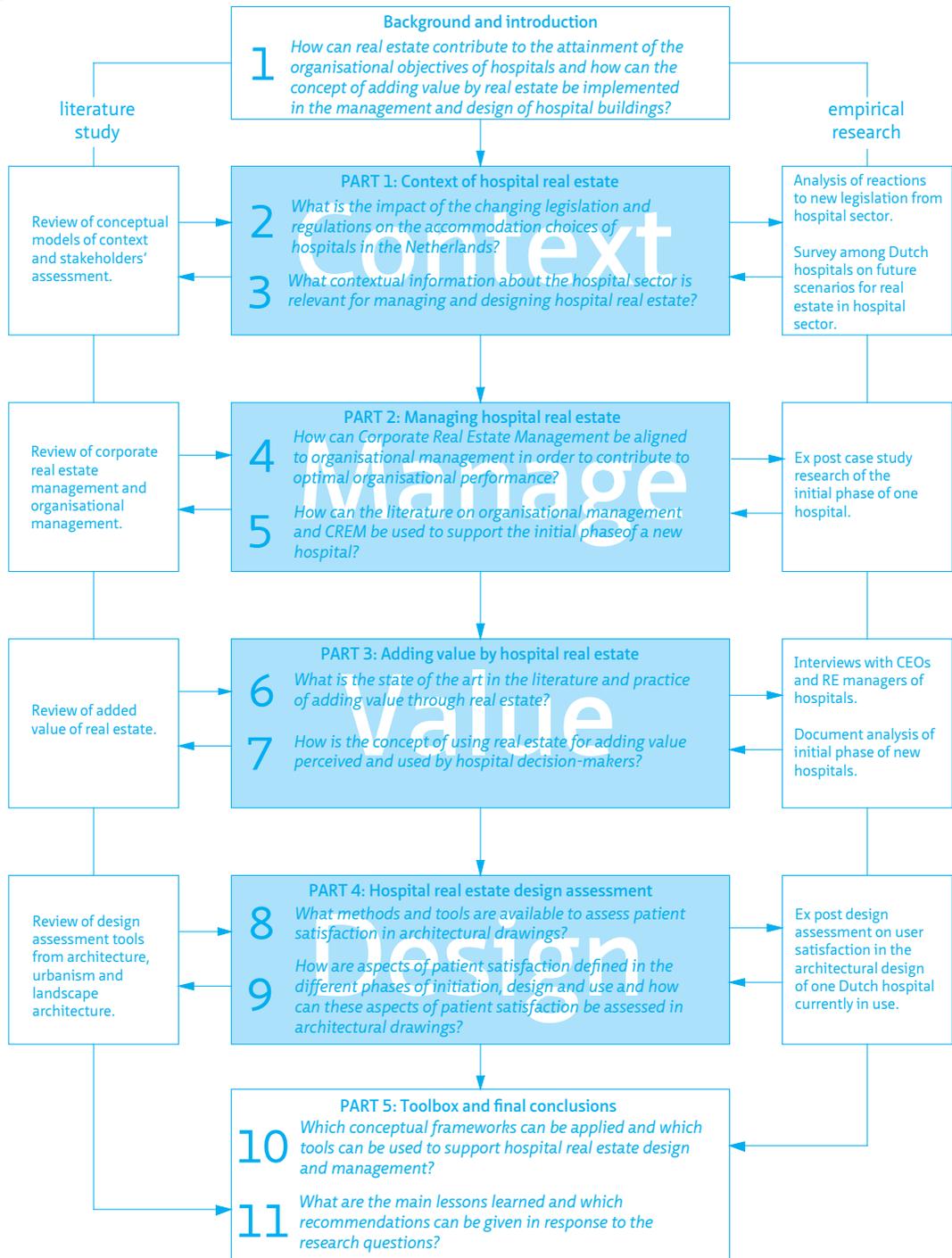


Figure 7 Research design.

§ 1.4.2 System of inquiry

There are no standard approaches to philosophy, methodology and methods (Knight & Ruddock, 2008) in the field of research into the built environment. It is therefore important that researchers in this field make clear what their methodological, ontological and epistemological assumptions are. Ontology refers to conceptions of reality (Knight & Ruddock, 2008) and epistemology refers to what should be regarded as the acceptable level of knowledge in a discipline (Bryman & Bell, 2003). The choice for a particular research approach is framed by the researcher's own assumptions about 'the nature of reality' and 'how one can come to apprehend it'. Terms used for describing these assumptions are 'system of inquiry' or 'paradigm' (Groat & Wang, 2002). Bryman (1988) describes paradigm as a cluster of beliefs that dictates what should be studied in a particular discipline and how research should be done. Within this perspective different research paradigms are incommensurable and will inevitably result in the generation of different kinds of knowledge about reality. Another perspective is that of methodological pluralism, where the use of different conceptual models and methodological approaches is legitimate and desirable if established conceptual models are tested in practise to elaborate existing knowledge (Knight & Ruddock, 2008). In this perspective quantitative and qualitative research strategies should be combined in order to distinguish the relationships with 'hard data' and explain these relations with 'soft data' (Loosemore, Hall, & Dainty, 1996). This holistic view, in which methodological perspectives are combined in order to 'gain richer insights and a more complete understanding of social phenomena' (Knight & Ruddock, 2008), are persuasive in the context of real estate management.

To answer the ontological question about the nature of reality as perceived in this research, a choice has to be made between an objective approach to reality or reality as a social construct. Although some elements of reality in terms of hospital real estate like costs, floor area or even walking distances can be measured and described objectively, this does not guarantee reliability (Den Heijer, 2011). In particular when researching 'adding value' and 'design decision process' reality as a social construct seems to be more logical, because how adding value by real estate and these other concepts are appreciated and prioritized depends largely on the perception of the involved stakeholders. This leads to 'reality as a social construction' (Groat & Wang, 2002) as the main ontological assumption of this research.

For the epistemological assumption, 'the relationship of the researcher to what is being researched' (Groat & Wang, 2002), it is important to mention the broad perspective on research and design that follows from the researcher's background. With a Masters in Architecture, five years scientific research analysing landscape architectural designs in the Department of Urbanism at Delft University of Technology followed by research for a PhD into hospital real estate at the department of Real Estate &

Housing at the same university, the researcher brings a variety of different perspectives on architecture and real estate. In addition, the researcher followed an intensive one-year healthcare management course at the Healthcare Management and Policy Institute at the Erasmus University Rotterdam during his PhD study, which added new perspectives such as organisational management, economics, law and healthcare sciences. The different approaches resulting from this background in architecture, real estate management and hospital policy and management are visible in the four parts of this study. Parts 1 and 2, which describe the context in which hospital real estate decisions have to be made and connect corporate real estate management and hospital organisational management, provides an integral approach to the conceptual frameworks of these fields of scientific research. One could say that this research adds real estate as the fifth perspective to the original four perspectives of healthcare management. Part 3 of this thesis, in which the added value of real estate in hospitals is researched, connects most to the research perspectives of Corporate Real Estate Management, whereas the basis for part 4 is the background as an architect and analysing designs in landscape architecture. In this way, searching for connections between organisational management, corporate real estate management and architecture is part of this research.

Combining the ontological and epistemological perspectives used in this study, the 'system of inquiry' chosen for this research is primarily based on the naturalistic paradigm, also known as interpretive, constructivist and qualitative (Groat & Wang, 2002). The naturalistic paradigm allows multiple, socially constructed realities and acknowledges that the researcher is also a factor in the research. This also matches the experiences of prior research about management and integrating stakeholders' perspectives which conclude that value-free objectivity is not possible.

Within this paradigm, a researcher can still choose various research strategies, methods and tactics. This research comprises four partial studies, each using different research strategies and different research methods and tactics, which results in a multi-strategy research. Hammersley (2002) linked multi-strategy research to three important characteristics. 'Triangulation' refers to the use of qualitative research to corroborate quantitative research (or vice versa), 'facilitation' is where one research strategy is applied in order to support research using another approach; and 'complementarity' is where two strategies are employed in order to dovetail different aspects of an investigation (Hammersley, 1996; cited in Knight and Ruddock, 2008). The combination of these methodologies offers specific advantages, not least the possibility of using one approach to overcome the weaknesses of another.

The research as a whole is built up as a phased research design; the four partial studies are defined separately and chronologically and the findings of one phase are used as input for the next phase. As a whole and within each part, combined research strategies are applied, both deductive and inductive. The basic model of the

empirical cycle moving from literature research to empirical research and vice versa was applied in each partial study. In the conclusion this empirical cycle is also applied to the whole study by reflecting on the implications of the insights for Corporate Real Estate Management. Frameworks, models and tools from literature on organisational management, Corporate Real Estate Management and design assessment are used to define, analyse and assess hospital real estate in different phases of the real estate life cycle. This application of frameworks and models in practice is described as a deductive approach. Besides this deductive approach, an inductive approach is also used, when results from the empirical studies are used to reflect and elaborate on the literature discussed.

Although the research design of this dissertation suggests a chronological piece of research, the process of doing research and writing a dissertation is cyclical and iterative. Developing a conceptual framework, testing this through literature and empirical studies and redefining the concepts all took place during the six years within which this research was performed.

§ 1.4.3 Research methods

The research methods used result mainly from a qualitative research strategy because of the opportunity this provides for understanding and explaining the complexity inherent to adding value by real estate in connection to architectural design. Besides qualitative research as a main research method, principles of quantitative research are also used to combine quantitative data with qualitative information. In addition, research by design is used to integrate the analytical findings in the design of a toolbox for value-adding management and design of hospital real estate. In each partial study a combination of different research strategies is used: literature study, document analysis, empirical research and tool design. In the literature study, the theoretical background is discussed and the concepts and models from literature that can be applied to real estate management in general are presented. The document analyses contribute to the implementation and translation of these concepts and models to the hospital sector. Case studies are used to illustrate, test and provide a first validation of the tool design. Research strategies and methods used are presented in Table 5 and described in more detail at the start of each partial study.

	PART 1 - Context	PART 2 - Manage	PART 3 - Value	PART 4 - Design
	Context of hospital real estate	Managing hospital real estate	Adding value by hospital real estate	Design assessment of hospital real estate
literature study	models of context and stakeholders.	Corporate Real Estate and organisational management	added value of real estate	architectural and urban design analysis instruments
document analysis	analysis of more than 100 articles from professional journals on hospital real estate legislation	publicly available publications and documents of initial phase of case study hospital	publicly available publications and documents of initial phase of interviewed hospitals	initial documents and post occupancy evaluations of case study hospital
empirical research	survey among 80 Dutch hospitals (response rate 20%).	ex post analysis of initial phase of one Dutch hospital.	15 interviews with CEOs and RE project managers on added values of real estate	ex post assessment of added values of real estate in architectural design of one Dutch hospital
tool design	model of context of hospital real estate	framework of alignment between CREM and hospital organisational management	translation of hospitals' organisational objectives into added values of real estate	assessment of added values in final design drawings of hospitals.

Table 5 Partial studies and research methods used.

Literature study

Each partial study starts with a literature review of the topic. Literature research in PART 1 focusses on models on context and stakeholders. In PART 2 literature on CREM and organisational management is discussed and aligned in a framework on managing hospital real estate. The literature review in PART 3 focusses on the added values of real estate. PART 4 searches for architectural and urban analytical instruments that are applicable to assess user satisfaction in the design phase.

Document analysis

In the different sections the literature study is supported by a document analysis. In PART 1, these documents are reports on the healthcare system, the hospital sector and hospital real estate. In PART 2, available documentation of the initial phase of a hospital that designed and built a new hospital is analysed. In PART 3, the analysed documents are project descriptions of newly built hospitals, Long Term Accommodation Plans, initial documents and briefs for new hospital buildings of the 15 interviewed hospitals. In PART 4, the analysed documents contain the preliminary documents of the initial phase and post occupancy evaluations.

Empirical research

The case studies included in this study constitute the empirical assessment of the literature and the testing and first validation of the tools for managing and designing hospital real estate. The case studies have a deductive, descriptive, illustrative, testing and/or validating purpose, depending on the particular topic. Within each sub-study the most appropriate case to test and illustrate that part of the literature in the hospital sector is selected. The availability of research data and the cooperation of the organisations also determined the case selection.

Hospital	city	category	survey PART 1	interview PART 3	case study
Admiraal de Ruyter Hospital	Goes / Vlissingen	general		reflective	
Albert Schweitzer Hospital	Dordrecht	top clinical	yes	structured	
Amstelland Hospital	Amstelveen	general	yes		
Atrium Medical Centre	Heerlen	top clinical	yes		
Bernhoven Hospital	Uden	general	yes		
Deventer Hospital	Deventer	top clinical		structured	PART 4
Diaconessenhuis Meppel	Meppel	general	yes	reflective	
Erasmus UMC	Rotterdam	UMC	yes	structured	
Gelre Hospital	Zutphen	general		structured	PART 1
Gemini Hospital	Den Helder	general		structured	
Haaglanden Hospital	Den Haag	top clinical		explorative	
Haga Hospital	Den Haag	top clinical	yes		
Ijsselland Hospital	Cappelle aan de ijssel	general	yes		
Jansdal Hospital	Emmeloord	general	yes		
Laurentius Hospital	Roermond	general	yes		
Leids UMC	Leiden	UMC	yes		
Maasland Hospital	Sittard	general		explorative	PART 2
Maasstad Hospital	Rotterdam	top clinical		structured	
Martini Hospital	Groningen	top clinical	yes		
Meander Medical Centre	Amersfoort	top clinical	yes	structured	
Medical Spectrum Twente	Enschede	top clinical		structured	
Reinier de Graaf Hospital	Delft	top clinical	yes	structured	
Rotterdam Eye Hospital	Rotterdam	categorical			PART 2
UMC Groningen	Groningen	UMC	yes	structured	
Van Weel-Bethesda Hospital	Hellevoetssluis	general	yes		
Vlietland Hospital	Schiedam	general		structured	
Zaans Medical Centre	Zaanstad	general		reflective	

Table 6 List of participating hospitals.

In PART 1, the whole hospital sector including all hospitals in the Netherlands are perceived as a “case” to explore future scenarios for real estate. This is done by using an internet survey and analysing news posts of a professional journal that informs hospitals on relevant developments in their sector in the period 2004 until 2012. The survey of 80 hospitals had a response rate of 20%. Furthermore the Gelre hospital in Zutphen is used to illustrate a context mapping model that builds on former PhD research. PART 2 uses one case study to test the integrating framework for managing hospital real estate by an ex-post analysis of the initial phase of Orbis Medical Centre in Sittard. The integrating framework is tested on its applicability by describing the design decision process of this hospital. In PART 3, hospitals that were initiating, designing or

building a new hospital in the period 2004 to 2012 in the Netherlands were perceived as a case. A total of 15 hospitals participated in this study through an interview about the added values of real estate. This is 50% of all the hospitals that were constructing a new facility in that period. The scope of these cases gives an adequate idea about accommodation decisions in the hospital sector in that period. In PART 4, a design assessment of the Deventer hospital is conducted using patient satisfaction as one of the possible added values of real estate. The results of this design assessment are compared with the findings of Post Occupancy Evaluations. Table 6 gives a brief overview of all the hospitals that participated in this research in the successive parts of this thesis.

Three cases that participated in the interviews are also examined in a case study. Deventer Hospital, Gelre Hospital in Zutphen and Maasland Hospital in Sittard were selected because they represent typical hospitals for the period in which they were built. Deventer Hospital is one of the last hospitals to be fully designed and constructed under the former regulations for hospital investment. The building was rewarded with a nomination for the Hedy d' Ancona prize for outstanding healthcare architecture. The Maasland Hospital is an example of a hospital that was confronted with the new legislation during design and construction of the building. This hospital was also used as a model project for the hospital of the 21st Century. The Gelre Hospital in Zutphen was the first hospital designed and constructed under the new laws and regulations, and thus the first example of a hospital building that is entirely realised at the risk and responsibility of the hospital organisation. In this way the case interviews and case studies contribute to a retrospective on a dynamic period for the hospital sector in the Netherlands.

Tool design

Each partial study results in the design of one or more models and tools and together these tools form a toolbox that supports hospitals in real estate management and design. These tools are elaborated upon in chapter 10 which discusses the practical insight for real estate management and the design of hospitals. The tool that results from PART 1 is an adaption of an existing model on real estate management that is made applicable to the context of the hospital sector. The tools that result from PART 2 are a meta-model and an integrating framework that connect models of organisational management with models of Corporate Real Estate Management in order to be able to respond to a changing context by both organisational measurements and real estate alterations. The tools that result from PART 3 enables the translation of organisational objectives into real estate added values. This translation is based on the perception of added values by hospital decision makers. In PART 4 several analytical tools from architectural design research are used and made applicable for the assessment of patient satisfaction as one of the added values of real estate in hospital design.

§ 1.5 Reading guide

Although the partial studies of this thesis are connected to each other in order to find answers to the main research question and all sub questions, each part can also be read separately. PART 2, 3 and 4 have a similar structure. The first chapter in each part describes the findings from literature, which is then reflected upon in the light of the data obtained from practice in the second chapter.

The first part (1) of this thesis describes the context of hospital real estate. People who are unfamiliar with the Dutch healthcare system can find background information in chapter 2 on changes in legislation and regulation during the period 2004 until 2012 and the impact on hospital real estate. Chapter 3 analyses trends in the hospital sector related to accommodation decisions. This chapter presents an existing model that has been made applicable to the healthcare sector and tested by a case study of the Gelre Hospital in Zutphen.

In PART 2, chapter 4 describes literature on Corporate Real Estate Management and how existing models can be aligned to models of organisational management. In this chapter, the Rotterdam Eye Hospital is used as an explorative case study. Chapter 4 results in a meta-model on the alignment of CREM to organisational management. This meta-model is tested for its applicability in chapter 5 by an ex-post analysis of the initial phase of the Maasland Hospital in Sittard.

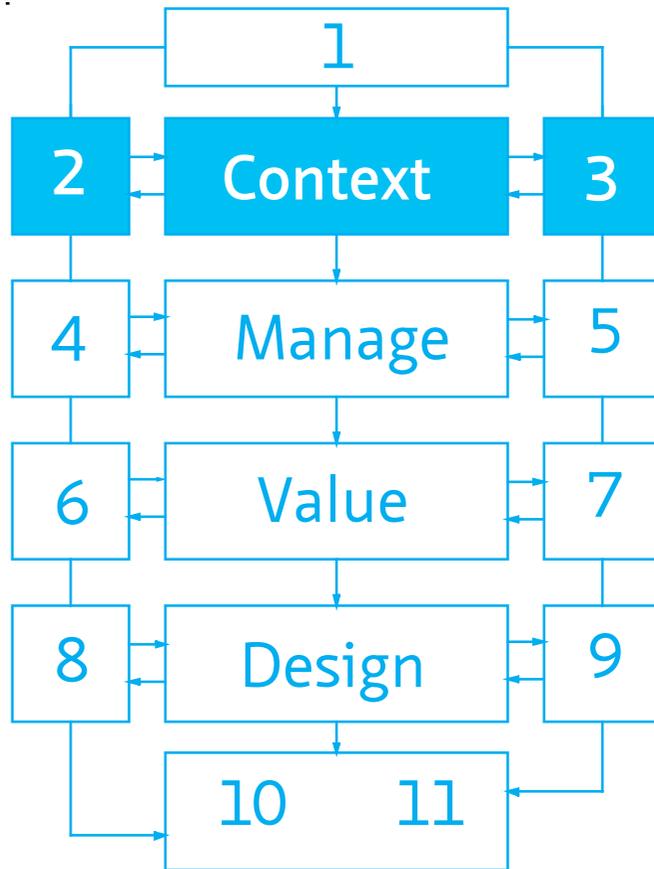
PART 3 studies the state of the art of the added value of real estate from CREM literature in chapter 6 and makes this concept applicable for the hospital sector in chapter 7. Empirical results of the interviews on hospital real estate added value are described in chapter 7.

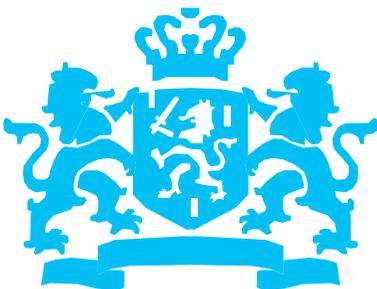
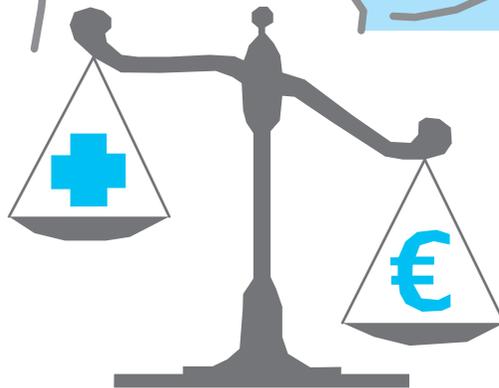
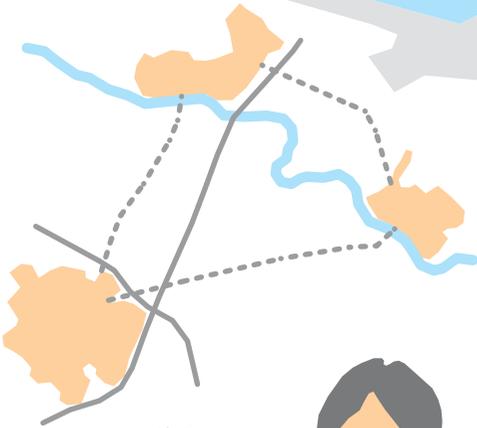
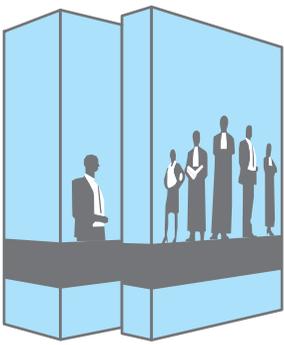
PART 4 first explores possible architectural and urban design analysis methods and how these drawing techniques can be applied to assess added values in the design phase. These drawing techniques are visualised in chapter 9 in a case study of the Deventer Hospital.

PART 5 concludes this thesis by reflecting on the practical insights and implications of this research for both the hospital sector and Corporate Real Estate Management in general. In chapter 10 the social relevance of this research is discussed by presenting the design of the toolbox with models and instruments to support real estate decisions regarding hospitals. Chapter 11 summarizes the answers to all research questions and reflects on the scientific relevance and the added value of this thesis to the literature on Corporate Real Estate Management.



PART 1 Context





2 Dutch hospitals in transition

What is the impact of the changing legislation and regulations on the accommodation choices of hospitals in the Netherlands?

Abstract

Purpose: This chapter discusses the political context in which hospitals have to make decisions about their accommodation strategy. To this end, this chapter is a retrospective of the period from 2004 to 2012 which involved the transition from a centrally directed real estate budget system with ex-ante testing of building plans into a performance based and output driven finance system.

Literature study: Literature review of the Dutch healthcare system and regulations on hospital real estate investment.

Empirical research: An analysis of 111 internet news publications of a professional journal in the Netherlands during the period 2004-2012 that informs hospital boards and CEOs of new developments in hospital real estate regulations and discusses the responses from the healthcare sector.

Findings: The analysis of the hospital sector shows that recent changes in the political context have resulted in hospitals determining their own strengths and opportunities and realising their new responsibility for the risks and threats associated with recovering the real estate investment costs. Another important lesson is that it is important that the government provides a clear policy during the period in which the responsibility for real estate is transferred to private parties. The transfer of responsibilities and risks should also imply a fair assessment of the current value of the hospital building and access to loans and venture capital. As a consequence, the influence of various external stakeholders changes. The decrease of the government's direct influence on investment decisions and the related capacity of healthcare institutions means an increasing influence of the health insurance companies in purchasing healthcare (capacity) and the banks in the financing of accommodation investment. Deregulation of the construction standards gives hospital CEOs the opportunity to determine themselves the organisational goals which have to be attained by the accommodation. Due to the removal of the review of construction plans, hospital managers are also responsible for assessing whether these values are incorporated into the design. This requires (1) a management model in which accommodation is linked to the organisational strategy; (2) an understanding of real estate added values and; (3) opportunities to test these values in the design of new hospitals.

Introduction

Governmental regulation and legislation is part of the general context in which hospitals have to make decisions about investments in accommodation. Understanding both the past and current healthcare legislation and planning systems is therefore relevant for any accommodation investment decision made by a hospital. Although much has been written on this subject, a comprehensive overview of all the rules and regulations and the consequences for hospital organisations regarding accommodation decisions is missing. This chapter aims to explain healthcare legislation in relation to real estate in the Netherlands and gives insight into the role of government in accommodation decisions made by hospital organisations alongside the consequences of this governmental regulatory role for individual hospital organisations making real estate decisions in a constantly changing context. Firstly the former and new healthcare system in relation to accommodation investment in the Netherlands is described and positioned within international trends in healthcare systems in developed countries. In addition, the transition period from the former system to the new regulated market system with deregulated healthcare accommodation decisions is analysed. Three important moments in this transition period are: the first announcement of the new legislation in 2004; the first of January 2008 when the new law for hospital accommodation came into force and 2012, intended as the end of this transition period. The analysis of this period shows how governmental regulations have influenced the accommodation decisions of individual hospitals during this transition period. This description shows the political context in which hospitals have had to make accommodation choices.

The analysis of this specific period reveals a timeframe in which a lot of former certainties ceased to exist. This can be regarded as an example for many other sectors who since 2008 have also been coping with new realities as a result of the credit crisis, the recession and financial crisis. Not only hospitals, but also organisations in other sectors and even society as a whole, are coping with a totally new context in which individual organisations still have to make long term accommodation investment decisions.

Whereas this chapter gives a retrospective of the transition period, chapter 3 describes the trends in the hospital sector based on reports with future explorations until 2025. The accommodation choices on the organisational level are further analysed in PART 2 and PART 3 of this thesis.

§ 2.1 Dutch healthcare system

Since 1983, article 22 of the Dutch Constitution states that the government has to take measures to improve the health for the nation. This implies that the government has a responsibility to create the right circumstances for healthcare services. Main objectives are quality, physical and financial accessibility and affordability. Quality is first of all effectiveness, safety and an increasing role for patient-oriented healthcare. Financial accessibility implies the same level and quality of healthcare regardless of income. Affordability means that all these objectives have to fit within governmental financial constraints.

This governmental responsibility is executed in different ways in different countries. In developed countries healthcare systems differ in the way the healthcare is financed and organised by public and private parties, but all these systems originate from two basic healthcare financing models: the Beveridge model and the Bismarck model. In a healthcare system based on the Beveridge model, healthcare is provided and financed by the government and paid for through taxes. Healthcare providers within this model are mostly public institutions with restricted budgets set by the government. In the Bismarck model, healthcare is paid for by not-for-profit social insurances funds. Social insurance funds negotiate arrangements with private healthcare suppliers regarding the supply of healthcare products and services. The government has a regulatory role to control capacity, price and quality.

The healthcare system in the Netherlands originates from a Bismarck model and is unique in the world because of its specific separation of public and private responsibilities. In the Netherlands, private not-for-profit organisations have always been the driving force behind the healthcare capacity of cure and care, paid for by for-profit healthcare insurance companies. In this system the Dutch government used to have a direct regulatory role, but since the introduction of competitive elements into the system this role has become a more supervisory role for the whole system. Governmental supervision is still focused on affordability, guaranteeing quality and the physical and financial accessibility of healthcare.

Increasing costs of healthcare (Schut & Rutten, 2009)

An increasing amount of treatments caused by an aging society, lifestyle, demanding patients and new technologies leads to increased clinical healthcare expenses. As a result, an increasingly larger share of the Gross Domestic Product has to be spent on hospital care. This increasing growth in hospital care comes at a time when the growth of the Dutch economy is expected to decrease as a result of the financial crisis and following recession.

Turnover in hospital healthcare is determined by volume and price. Increased prices and production in hospital care means that the turnover of Dutch hospitals grows more quickly than the economy in general.

Only a small part of the increasing volume in clinical healthcare is related to demographical developments. Increasing volume can be divided into intrinsic and exogenous growth. Exogenous growth is increased volume as a result of demographic circumstances such as an aging society. Intrinsic growth is the result of individuals, on average, utilising more healthcare. Since 2000 the intrinsic volume has increased faster than the demographical trend, mostly due to access to healthcare being made part of the constitution in 1986 and the resulting banning of waiting lists.

Schut and Rutten (2009) describe different factors that causes the increase of healthcare expenses. On the demand side these factors are:

- Increasing quality of life stimulates healthcare demand; prosperous people proportionally spend a larger part of their budget on healthcare.
- Increasing share of the elderly in society caused by an aging society; older people proportionally make more use of healthcare facilities.
- Medicalization of daily life; more complaints are seen as a medical problem.
- Increasing demand for quality; consumers assume a right to a healthy life, without pain or physical complains.
- Absence of financial barriers on healthcare demand.

On the supply side these factors are:

- Increasing possibilities of medicine to help patients.
- High cost of technical medical innovations and new medicines
- Information gap between healthcare suppliers and healthcare insurers; healthcare suppliers can partly create their own demand.
- Strong position of healthcare suppliers in the tariff negotiations with healthcare insurers as a result of the capacity planning of specialist education programs.
- Labour-intensive service; improvements in efficiency is hardly possible and cannot be used to compensate increasing salaries.

This last factor is also known as the Baumol-effect. Labour costs increase faster than productivity in the healthcare sector. Therefore the healthcare sector becomes more expensive than other sectors of the economy. In other sectors, salaries can be raised by the same percentage as the increase in labour productivity, resulting in stable or even lower prices per product. Use of innovative technologies makes this possible.

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To reduce healthcare costs, many countries have chosen to introduce elements of competition into their healthcare systems. This tendency towards increasing competition is described by Cutler (2002) in his historical study of healthcare systems in seven important OECD-countries. In this study Cutler concludes that countries follow three phases in the development of a healthcare system. The first phase of these 'three waves of healthcare reform' is universal accessibility to healthcare facilities for all citizens. The consequence of this phase is that healthcare becomes a privilege instead of a tradable service (Schut & Rutten, 2009). The main objective in the second phase is controlling costs and price regulation by budgeting and proportioning healthcare delivery. The consequences of this second phase are waiting lists and inefficiency in healthcare delivery. In the last and third phase efficiency becomes more important and elements of competition are introduced.

The 'three waves of healthcare reform' are also visible in the development of the healthcare system in the Netherlands. The first phase with a focus on accessibility of healthcare for all citizens was achieved in 1940 with the introduction of the first healthcare insurance law for all citizens. Elements of the second phase became visible in the Netherlands between 1960 and 1970. In this period the government controlled healthcare expenses by introducing legislation and regulation on prices and capacity. Two important laws for controlling healthcare expenses in that time were the Healthcare Tariffs Law (Wet Tarieven Gezondheidszorg: WTG (1980)) and the Hospital Facilities Law (Wet Ziekenhuis Voorzieningen: WZV (1971)). With the WTG the cost of healthcare services was regulated. Production capacity was regulated in the WZV by a system of building regulation. Governmental approval was necessary for the construction and expansion of healthcare facilities. Approval was only given to projects that did not exceed a governmental granted amount of hospital beds and specialist places. On a national level all projects were restricted to a yearly budget for healthcare real estate investments.

Since 2000 the third phase of Cutler's three waves of healthcare reform has become visible with the introduction of elements of competition into the Dutch healthcare system (Schut en Van de Ven, 2005). On the first of January 2006 new legislation on healthcare insurance was a fact (Zorgverzekeringswet: Zvw (2006)). This new law was the starting point of a healthcare system with a new balance between healthcare insurance companies, healthcare suppliers and patients, all under governmental supervision. To make competition on costs and quality between healthcare suppliers possible in this new system, both regulation laws (WTG and WZV) were changed into market oriented laws: the Admission Healthcare Facilities Law (Wet Toelating Zorgvoorzieningen: WTZi (2005)) and Healthcare Market Arrangement Law (Wet Marktordening Gezondheidszorg, WMG (2006)).

Although different elements of competition in healthcare have been introduced in recent years, a healthcare system cannot function as a totally free market, as explained

by Arrow (1963) in the American Economic Review. Arrow's main statement is that different specific governmental rules and regulations in a healthcare system are a direct consequence of the failure of the healthcare system to operate as a free market. In a well-functioning and balanced free market, demand and supply are independent mechanisms and both parties are equally informed about costs and the quality of products and services. Uncertainty about the time and amount of healthcare consumption and differences in the level of information and knowledge between healthcare organisations (supply) and patients (demand) make governmental regulation necessary.

The new health insurance law (Zvw) in 2006, restricts the regulatory role of the government in the Netherlands to supervision of the healthcare system and setting the rules for competition between the market parties in healthcare. Therefore, competition for patients within the Dutch healthcare system, comprising both insurance companies and healthcare suppliers, is organised into three markets: the healthcare insurance market, healthcare trade market and healthcare delivery market (see Figure 8). The main objective behind this system is that patients, healthcare insurance companies and healthcare suppliers keep each other in balance in terms of these three markets. Patients are free to choose an insurance company and are permitted to change insurer at least once a year. Insurance companies compete for patients on conditions and prices, which itself implies arranging and efficiently buying healthcare services from healthcare providers on the healthcare trade market. This again should lead to competition between healthcare suppliers for patients in terms of quality, costs and efficiency. Patients are free to choose their medical specialists within the healthcare delivery market. With this new legislation the government's role has changed from an active regulator of capacity and costs with the ability to directly intervene into a regulatory supervisor of the healthcare market.

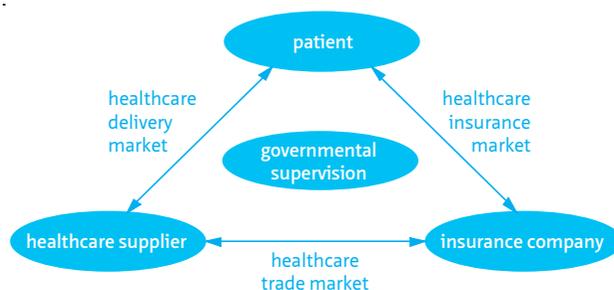


Figure 8 Healthcare market in the Netherlands.

As in any competitive market, transparency in terms of the quality and products is important for price-setting in a healthcare system with competitive incentives. Therefore, many countries have introduced some kind of diagnosis and treatment-

related payment system within the healthcare system in order to enable performance-based payment. All these systems comprise products that are defined in terms of diagnostic groups and one price is paid per diagnostic group, independent of the amount of healthcare delivered. In such a system healthcare suppliers can therefore profit from efficient delivery.

Besides transparency, integral prices received by healthcare suppliers for their products and services are also important in a competitive market. Integral pricing means that both variable costs and fixed costs are integrated into the cost of healthcare products and services. Variable costs of healthcare are for example, medicines, human resources and the use of equipment and materials. Fixed costs of integral healthcare prices include for example depreciation of medical devices, real estate capital costs such as yearly depreciation of real estate investments made in the past and interest to be paid for credit as well as energy and building maintenance costs.

In the healthcare demand market in the Netherlands, healthcare insurance companies and healthcare organisations trade healthcare products and services defined in Diagnosis Treatment Combinations (Diagnose Behandel Combinatie, DBC). This DBC system was introduced in the Netherlands in 2005. The objective of the DBC system is to make healthcare products and services transparent and comparable for both insurance companies and patients. Besides, the DBC system encourages healthcare suppliers to deliver healthcare efficiently in two ways: firstly, the DBC system uses integral prices for healthcare products, including hospital costs, specialist honoraria and capital costs. This gives hospitals the possibility to gain efficiency profit. Secondly, the DBC system defines the activities that, on average, are expected with a specific diagnosis. Because the average costs are connected with a diagnosis, hospitals are able to profit if they can deliver their products and services against lower costs than average.

Since the introduction of the regulated market system the Dutch government, as regulating supervisor, has incrementally increased the competition between healthcare suppliers. For this purpose the DBC system has been divided into two segments: an A-segment with regulated production and fixed prizes and a B-segment with free prices and production. In the B-segment prices and production are a result of negotiation between insurance companies and healthcare suppliers. In 2005 this freely negotiable B-segment was 10% of medical healthcare; in 2008 it had increased to 20%. Since the first of January 2009 34% of all healthcare in the cure sector was freely negotiable. This means that from then on the B-segment included 50% of all elective healthcare that is potentially freely negotiable. Since the first of January 2012 70% of all treatments are freely negotiable.

A widespread assumption is that competition between healthcare providers or insurers increases efficiency for a given level of quality. While the positive effect of competition on the efficiency of hospital care has been recognised in economic literature,

theoretical predictions about the relationship between competition and quality are ambiguous. Increased competition can either lower or raise quality, depending on price regulation, the preferences of consumers and the level of transparency in the market (Gaynor, 2006).

§ 2.1.1 Hospital organisations in the Netherlands

Hospitals are relatively new phenomena. Hospitals in their current form have only existed since the 1950s. At that time, medical science and medical technology had developed to such a level that the concentration of knowledge and equipment became necessary. This concentration had a direct influence on hospital accommodation. Since then, new hospitals have been continuously built and existing hospitals and outpatient clinics have been transformed to accommodate new technologies (Bos, Koevoets, & Oosterwaal, 2011). At the beginning of the 21st Century, technology is developing as never before. Equipment is decreasing in size and becoming more mobile. One consequence is that services that used to be located in hospitals are now becoming available in General Practitioners' practices or even in patients' homes. Combined with increasing information and communication technologies (ICT) and internet, the question even arises as to whether in the future the hospital building will be the best place to deliver medical healthcare (Duchateau & Vink, 2011).

The Dutch healthcare system anno 2012 consists of three echelons. The first echelon includes all the directly accessible healthcare services for which no referral is needed. This echelon includes General Practitioners (GP), dentists, first-line psychologists, physiotherapy and Acute Healthcare. The second echelon includes all healthcare for which a referral is needed. The third echelon includes all top-referred healthcare. All hospitals belong to the second and/or third echelon. GPs have a crucial role in the first echelon, as they are perceived as the gatekeeper to the second echelon. It is this role that makes the Dutch healthcare system internationally famous for keeping healthcare costs low (RVZ, 2011).

Dutch hospital healthcare can be categorised using five characteristics (RVZ, 2011):

- **Acute, chronic and elective healthcare.** Acute healthcare requires good accessibility, treatment time and triage capabilities. Important aspects of chronic care are continuity, integrated healthcare, close to the community and with a focus on prevention. Elective healthcare includes all healthcare that is easy to schedule and flexible in supply.
- **General and specialised hospitals.** Specialised hospitals benefit from a concentration of knowledge, but with increasing co-morbidity, making integrated healthcare more important.

- **Complexity and Volume.** Medical interventions can be high or low in complexity and are sometimes, regular or often applied. This makes it possible to divide healthcare into a matrix of high/low complexity and high/low volume. Based on this matrix, one can decide to centralise or de-centralise healthcare.
- **Healthcare infrastructure.** Not all medical interventions are restricted to large-scale healthcare infrastructures. Some interventions can also be executed outside traditional hospitals.
- **Phases in the process of health and illness.** Public healthcare, prevention, screening, diagnostics, medical intervention, treatment and after-care are different phases and each phase requires a specific organisation of the healthcare.

Hospitals in the Netherlands are divided into regular hospitals, independent treatment centres and private clinics. Regular hospitals are subdivided into general hospitals, top clinical hospitals, specialised hospitals and academic centres. Specialist hospitals are general hospitals that focus on one discipline, e.g. the Rotterdam Eye Hospital. Top Clinical hospitals provide top clinical or top referred healthcare, besides the general patient care that is also delivered at general hospitals. Top clinical healthcare is highly specialised and relatively expensive healthcare. Top referred healthcare is highly specialised healthcare for patients with no other referral possibilities. Besides this top referred healthcare, top clinical hospitals also deliver education. Academic hospitals combine basic patient healthcare, top clinical and top referred healthcare with scientific research and education. Besides regular hospitals, there are also Independent Treatment Centres (zelfstandige behandel centra: ZBC) and private clinics. Private clinics are not allowed to deliver insured healthcare, ZBCs do have such an allowance for certain, outpatient, treatments. In the Netherlands, both regular hospitals and ZBCs are not-for-profit organisations (Bos et al., 2011).

§ 2.1.2 Hospital real estate regulation in the Netherlands up to 2008

The consequences that the structure of the Dutch healthcare system has on hospital accommodation strategies can only be understood within a historical perspective. In the first years after World War II all building activities, including healthcare facilities, were regulated by and restricted to government rebuilding programmes. Between 1960 and 1970 the government started to regulate hospital real estate investments for another reason – to create a closed planning system of rules and legislation combining accessibility and quality with affordability. For this purpose the government introduced the Hospital Facilities Law (Wet Ziekenhuis Voorzieningen: WZV) in 1971. The WZV was part of a closed regulation system based on an economic formula in which costs were the result of the available facilities multiplied by the healthcare tariffs:

Costs = Facilities X Tariffs.

All of the elements of this formula were regulated in different Laws. The WZV regulated the amount of available facilities, the Healthcare Tariffs Law (Wet Tarieven gezondheidszorg: WTG) regulated the tariffs, financial costs were regulated in several insurance legislations laws. The total costs determined the insurance premium to be paid by all citizens.

With the WZV and the WTG, the Dutch government had a strict approval system to regulate the capacity and costs of hospital healthcare. Therefore, hospital organisations were restricted by a detailed system of gaining permission as well as planning and dispersal of capacity within the Netherlands. The main objective of this supply-driven budget system was to realise high quality facilities for the lowest possible costs, improve efficient use of scarce resources and manpower, good dispersal of capacity and a precise estimation of future demands. The increasing costs of healthcare are also mentioned in the guidelines to the WZV (Memorie van toelichting, WZV). According to this law-explanation, healthcare costs increase due to increasing salaries, progression of medical science, increasing number of the elderly, increasing prosperity illness and the relation between prosperity and the use of medical facilities.

One of the disadvantages of the WZV that came to light soon after the introduction of the law was its focus on building aspects and not on the functions of the hospital itself. All private initiatives to build, renovate or demolish a hospital building were tested in terms of their fit with a regulated overall capacity per service area, square metre guidelines per hospital bed and function, and a maximum standard of costs per square metre. Approval was granted by the Minister of Health, Welfare and Sports, on advice from the Netherlands Board of Healthcare Institutions. In return the real estate capital costs (e.g. depreciation, rent and maintenance costs) were guaranteed by the government. The healthcare provider's real estate budget was independent of the production of healthcare services. The payments of both healthcare services and the budget for real estate investments and running costs were executed by healthcare insurance companies. In this former system, hospital organisations bore no risks regarding the real estate investments, nor were they responsible for the running costs and possible deficit if production decreased. As a consequence, healthcare organisations always tried to obtain the maximum amount of square metres and were not encouraged to provide cost efficiency.

Although the disadvantages of the WZV are often mentioned in the literature, there were also some benefits of this system, for example governable supply, multifunctional facilities, favourable price-quality ratio and legal security for hospitals. Disadvantages were the possibility of averting financial risks, bureaucracy, time-consuming planning procedures, an insufficient match between demand and supply, scarce financial resources and governmental cost reductions.

In the nineties and the first decade of this century, the centrally steered real estate budget system with governmental ex-ante testing of building plans and investment proposals has been changed into a performance-based and output driven financial system. This process is part of the transition from the second phase of governmental regulation of healthcare capacity and costs into the third phase with elements of competition in a regulated market system as described by Cutler (2002). This transition has had several consequences on the position of real estate and real estate investments in hospital organisations. First the WZV was gradually deregulated by making hospital organisations themselves responsible for the maintenance of investments and loosening the building regulation procedures. Since 1996 organisations were allowed to make their own investment decisions as long as it was (1) not building a completely new hospital and (2) all investments were recorded and integrated in the organisation's Long Term Accommodation Plan (Lange Termijn Huisvestingsplan: LTHP).

Another stimulant for deregulating hospital real estate decisions in order to make organisations responsible for their own decisions was the proposal of the Exploitation Hospital Facilities Law (Wet Exploitatie Ziekenhuisvoorzieningen: WEZ). Eventually this proposal became the Healthcare Facilities Admission Law (Wet Toelating Ziekenhuisvoorzieningen: WTZi). According to the WTZi organisations in the Netherlands wanting to deliver specialised medical healthcare covered by the healthcare insurance are obliged to gain governmental permission. The Dutch Minister of Health, Welfare and Sports grants permission to organisations which then have the right to deliver insured medical specialised healthcare. In the former supply driven system, capacity was regulated by the government. In the new demand driven system, capacity results from an organisations' own decisions and is therefore the responsibility of healthcare organisations. The main alteration between the former and the new system is that the focus has moved from investment in facilities towards exploitation of facilities. The WZV was based on investment decisions, whereas the WTZi takes the process of healthcare delivery itself as the starting point, rather than building investments. Real estate is just one of the necessary resources in that process.

In the so-called February-letter of 8 March 2005, the Dutch Minister of Health, Welfare and Sports announced the alteration of this real estate budget system and the introduction of a regulated market system in healthcare (Hoogervorst, 2005). As in the old system, private not-for-profit initiatives are still the driving force behind the capacity of hospital healthcare, but in the new system healthcare organisations are themselves responsible for the return on real estate investment and the consequences of real estate decisions on utility value, investment costs and running costs. The main objective of the new system is to keep healthcare affordable by stimulating competition and reducing healthcare costs. "Deregulation" gives healthcare organisations more freedom in the briefing, design and management of hospital buildings and real estate investments.

§ 2.1.3 Deregulation hospital real estate since 2008

On the first of January 2008 the Healthcare Facilities Law (Wet Toelating Ziekenhuisvoorzieningen: WTZi) came into force transferring the financial responsibility for real estate to the hospitals. Because both ownership of the real estate and the provision of cure and care was already in private hands the transfer involved the latter institutions taking responsibility for the imbursement of future capital costs by the provision of care services, rather than a fixed budget for all accommodation costs approved by the government and paid for by the insurers over the building's lifespan.

Through a Normative Accommodation Component (normative huisvesting component: nhc), fees for capital costs are included in the tariffs for healthcare services and products. This means that capital costs are no longer autonomous fixed amounts in the institution's budget. In addition, the space for free price negotiations with insurance companies on tariffs for healthcare services and products has increased incrementally over the years. "By introducing more financial risks in the area of investment, relationships between healthcare institutions changes. Institutions with a largely depreciated real estate stock have lower capital costs than institutions that have recently invested in new buildings or renovations. Reference data for the government are investments dating from before 2005, because from that year on, institutions have been made aware by several announcements on the planned gradual introduction of integrated prices." (Schut & Rutten, 2009).

With the responsibility for reimbursing the real estate investment having been transferred, the regulatory role of government in building plans has also been deregulated. Institutions no longer need permission from the government to perform construction and renovation plans. From 2012, the responsibility and freedom to invest in hospital real estate are in the hands of hospital organisations. This creates a level playing field for old and new providers, both new and existing institutions competing under equal conditions for the favours of the care recipient. More responsibilities also means that healthcare institutions themselves bear the consequences of their own decisions. Table 7 summarises the main differences between the former and the new system.

	former situation until 2008	transition process 2008 - 2012	new situation after 2012
characteristics healthcare organisation	not-for-profit private institution	not-for-profit private organisation, first limited companies due to takeovers of existing hospitals	private organisations with a regulated form of profit
payment products and services	set and regulated tariffs for products and services	introduction of DBCs with an A-segment and B-segment. A-segment with set tariffs and B-segment free negotiable prices with healthcare insurers.	increasing B-segment with free negotiable prices
risk on production	hospitals bear no risk regarding production due to contract obligation between healthcare supplier and healthcare insurers	abolishment of contract obligation and influence of healthcare insurers on hospital portfolio and production settlements leads to risks for production	
ownership real estate	hospitals own real estate	hospitals own real estate, in some cases included in a limited company	
reimbursement real estate	healthcare insurers pay a fixed budget guaranteed by the government, based on the actual costs of all real estate related costs, including depreciation, maintenance and energy costs.	capital costs are part of tariffs of healthcare products and services due to the nhc (nominal accommodation component) as part of a DBC	integrated tariffs in which capital costs are included in prices for healthcare products in performance based payment
risk on real estate financing	low risks on real estate finance due to governmental guarantee on accommodation costs ensures profitable private loans	abolishment of governmental guarantees results in funding risk, banks are reluctant to finance projects	new opportunities for attracting foreign capital due to distribution opportunities
risk on capacity	capacity has to fit within governmental norms focussed on capacity planning. This implies no capacity risk for the individual hospitals.	hospitals are individually responsible for capacity planning and can go bankrupt due to wrong investments	
initiative for accommodation changes	initiative comes from individual hospitals that seek approval from the Netherlands' Board for Health Institutes	initiative comes from individual hospitals that seek finance possibilities based on a business plan.	
authorisation real estate investment	besides regular building laws, accommodation has to fit governmental norms for hospital buildings.	regular building laws, safety assessment afterwards by the Healthcare Inspectorate	
procurement	traditional procurement	experiments with integrated projects and living building concept.	hospital real estate as investment opportunity

Table 7 Main differences between former and new legislation.

§ 2.2 Facts and figures hospital real estate in the Netherlands

In March 2007, the Netherlands' Board for Healthcare Institutions (College Bouw Zorginstellingen: CBZ), published a report on the quality and quantity of general hospitals in the Netherlands. This report provides an insight on a macro level into the quantity and quality of hospital real estate, just before hospital real estate responsibility was transferred from the government to the hospitals on the first of January 2008. The description of the hospital real estate portfolio in this chapter is based on this report (Vroon, 2007).

§ 2.2.1 Quantity of hospital real estate

On the reference date of the report in 2007, there were 89 general hospitals in the Netherlands. Three hospitals, two small and one top clinical hospital were all part of one legal entity. The other 86 hospitals were governed at that time by 86 separate legal entities.

dutch hospitals	total	small hospitals	medium hospitals	large hospitals
institutions	89	42	48	47
buildings > 3,000 m ²	147	48	53	46
full hospitals	127	47	48	32
locations	177	n.a.	n.a.	n.a.
buildings	283	n.a.	n.a.	n.a.

Table 8 Hospitals in the Netherlands (source: Vroon, 2007).

The 89 institutions comprised 177 locations with 283 buildings (Table 8). These are buildings of all shapes and sizes, ranging from 'full hospitals', to offices, pharmacies and warehouses. Of the 283 buildings, 147 are greater than 3000 m² and 127 of these are characterized as complete hospitals with nursing, outpatient clinics, imaging and diagnostics, surgery departments, maternity ward and emergency rooms.

In terms of buildings and sites, there are very large differences between the institutions. The simplest model is that of one institution with one location and one building. However, many institutions are more complicated, partly as a result of mergers. Of the 89 institutions, 26 institutions are located at two sites and 25 are spread over 3 or more locations.

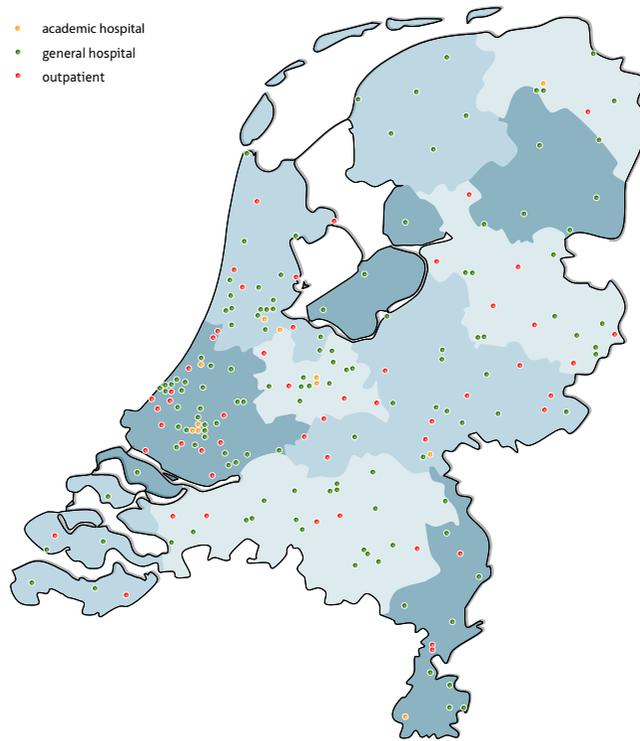


Figure 9 Hospitals in the Netherlands (source: RIVM).

There are 40,500 beds in the 127 hospital buildings of the general hospitals, of which almost half of the beds are housed in buildings of up to 300 beds. The total floor area of the 283 buildings (Figure 10) is more than 4.9 million m², of which 4.8 million m² is in buildings larger than 3000 m². Based on the production and financial data of the NZA, the 127 'full hospitals' are divided into 47 small hospitals, 48 large hospitals and 32 top clinical hospitals.

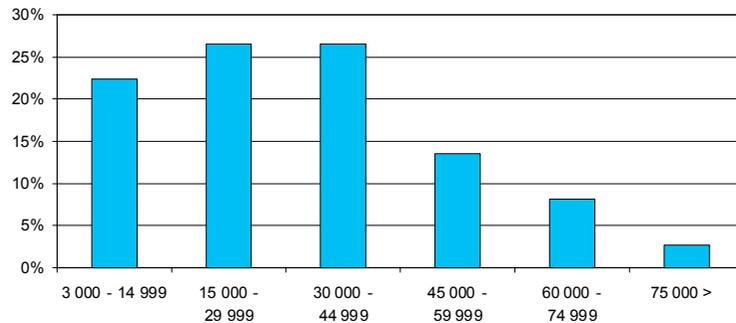


Figure 10 Total floor area of hospitals > 3,000 m² (source: Vroon, 2007).

On the reference date, 70% of the real estate stock of general hospitals was older than 25 years, of which 45% was older than 35 years Figure 11. This means that for this part of the portfolio an interim renovation (under the old legislation usually after 25 years) or even building replacement is needed in the foreseeable future. Building replacement was under the old legislation after 50 years, but because of functional obsolescence this was in practice usually earlier: 35 to 40 years after construction.

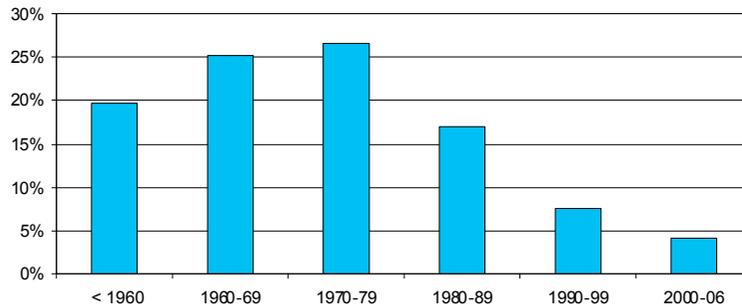


Figure 11 Year of construction of hospital buildings > 3,000 m² (source: Vroon, 2007).

§ 2.2.2 Quality of hospital real estate

The report qualitatively investigates two thirds of the building stock of Dutch hospitals. The remaining buildings were at that time either under major renovation or were being replaced by new buildings. Most of the qualitatively investigated buildings can be characterized as a hospital building which provides all the patient-related functions included in the basic insurance package. The buildings are examined on functionality, structural state and adaptability / flexibility. The structural state is assessed on the basis of the condition method as described in NEN 2767 of the Dutch Standardisation Institute.

According to the report from 2007, the surveyed hospitals are structurally in a good state. Overall, the internal structural condition of the buildings is excellent. In comparison with other elements, it is relatively easy to keep the internal structure of a building in good condition, and because it is less invasive, this takes place more frequently. Adjustments to and relocation of departments, which occurs with some frequency, also contributes to the condition of the internal structure.

External architectural elements score mostly good or excellent. More variation was found on the level of building components. This has to do with longer periods between renovations, wherein at the end of such a period, there may be decreased quality.

Condition of the equipment is quite good, although shows little differentiation. In some hospitals, the installations are in moderate to poor condition. This may be caused by the fact that the life cycle and maintenance of equipment and structural elements do not run parallel.

Of the investigated buildings, the construction is usually a concrete frame with concrete floors. Further facilities have predominantly a ceiling height of at least 3.40 m. Both factors together provide good opportunities for changes within the building's construction (internal flexibility).

Factors that could affect the internal flexibility further are the grid pattern, the building depth, and the presence of a technical layer and sufficient technical shafts. The grid pattern is generally regarded as a positive contribution to the internal flexibility. The influence of other factors on the internal flexibility is much more difficult to determine because the buildings score more diversely on these factors. It appears that older buildings / components in particular often have smaller technical shafts, which limits the capabilities for change in the respective buildings / components.

The possibility of expanding the buildings both vertically and horizontally seemed to be limited. Regarding this last point, it is noted that the site is often considered as a given fact and the impact of zoning has not been considered at all. In practice, however, the demolition of existing components and the outplacement of supportive and facilitating functions outside the site can often create enough 'air' in the building or on the ground for expansion of the primary process.

§ 2.3 Transition hospital real estate

What seems to have been a clear transition of the risks and responsibilities of real estate from the public authorities to privately organised hospitals was in fact a period of decreasing certainties and increasing vagueness about the consequences of the new legislation for individual hospitals. The transition of legislation and deregulation of hospital real estate that took place in the Netherlands from 2004 until 2012, started with a first informal announcement in 2004. From that moment on, a discussion on impact and consequences of the new regulations took place between the government and hospital interest groups and individual hospitals. This discussion has been examined by analysing 111 posts on "zorgvisie.nl" that were found under the search terms "real estate" and "hospitals" in the period 2004-2012.

Zorgvisie is one of the two journals in the Netherlands that informs healthcare decision makers about new developments in the sector on relevant topics for the healthcare

organisations. The analysis of the transition period is based on reports from the digital archive of Zorgvisie from the period 2004-2012, found under <http://archieff.zorgvisie.nl>, retrieved on 03 June 2012. This analysis shows a retrospective of the way the CEOs of healthcare institutions and hospital interest groups have responded to new developments. As such, these posts on Zorgvisie.nl can be considered as an empirical indicator of the reactions of the sector to the introduction of the new legislation on real estate in healthcare. Table 9 shows the announcements on Zorgvisie.nl related to hospital real estate during this period. In the following section, the announced legislation is discussed in the light of these reactions from the sector.

dates of announcements on zorgvisie.nl related to hospital real estate in the period 2004-2012							
12/1/2004	7/28/2006	11/1/2007	10/17/2008	6/23/2009	1/8/2010	6/21/2010	3/18/2011
3/25/2005	8/25/2006	11/13/2007	10/21/2008	6/29/2009	1/27/2010	6/28/2010	4/11/2011
9/16/2005	9/2/2006	1/2/2008	11/4/2008	7/1/2009	2/5/2010	9/16/2010	5/9/2011
9/30/2005	4/6/2007	1/8/2008	11/11/2008	7/2/2009	2/11/2010	9/13/2010	5/27/2011
10/21/2005	6/1/2007	3/1/2008	11/27/2008	8/3/2009	2/18/2010	9/17/2010	6/17/2011
10/28/2005	6/22/2007	4/11/2008	2/27/2009	8/10/2009	2/22/2010	10/1/2010	8/4/2011
11/11/2005	7/13/2007	6/12/2008	3/27/2009	10/3/2009	2/23/2010	11/1/2010	8/22/2011
12/1/2005	8/14/2007	6/27/2008	4/8/2009	10/23/2009	3/18/2010	12/1/2010	9/21/2011
12/2/2005	9/21/2007	8/12/2008	5/19/2009	11/25/2009	3/19/2010	12/5/2010	11/2/2011
12/9/2005	9/24/2007	8/28/2008	5/28/2009	11/30/2009	4/2/2010	1/7/2011	11/9/2011
3/1/2006	9/28/2007	9/1/2008	6/1/2009	12/1/2009	4/14/2010	1/19/2011	11/17/2011
3/17/2006	10/11/2007	9/8/2008	6/4/2009	12/16/2009	4/26/2010	2/25/2011	11/23/2011
5/1/2006	10/15/2007	9/9/2008	6/19/2009	12/28/2009	4/28/2010	3/4/2011	2/9/2012
7/1/2006	10/19/2007	9/17/2008	6/22/2009	12/30/2009	4/29/2010	3/10/2011	

Table 9 Announcements on zorgvisie.nl related to hospital real estate.

The first announcement of the new Healthcare Facilities Admission Law (Wet Toelating Ziekenhuisvoorzieningen: WTZi) was published in Zorgvisie in December 2004, outlining the perspective that by about 2020 institutions would have to pay for their own real estate from the production of care products and services. Banks, insurance companies, consulting firms and healthcare organisations were all positive about the direction chosen by the Government. All parties expected that real estate would become more effective and efficient and that the actual cost of real estate would become more visible by including the capital costs into the healthcare tariffs. From that moment on, the articles on hospital real estate in Zorgvisie can be divided into five themes. These five themes are not isolated developments but continuously interfere and influence each other. Nevertheless, each theme in itself clarifies a part of the transition process from the former budgetary funding system of real estate to the new system of integral rates in healthcare.

- **Laws and regulations**, describing the announcements and changes in laws and policies and the debate between field parties and government from March 2005 when the law WTZi was first announced to the effective implementation of the Act on 1 January 2008.
- **Compensation and balance sheet value**, dealing with the financial settlement of the transition from the old to the new system of real estate financing.
- **Property and autonomy**, dealing with the legal ownership, control and decision competence with respect to real estate during the deregulation of the building regime.
- **Financing and risk**, focussing on how property is financed and the role of lenders such as banks and investors.
- **Funding and entrepreneurship**, looking at the way in which the institutions have to earn money for the capital costs through the production of health services.

§ 2.3.1 Laws and regulations

The first theme describes the laws and regulations. Below, the blue printed texts refer to documents presented in the Houses of Parliament and the black text presents the responses from the health care sector based on the posts on zorgvisie.nl.

In March 2005, the capital costs letter “integral tariffs in healthcare” (Hoogervorst, 2005) was sent to Parliament. In this letter, the Minister announced the integration of accommodation costs into healthcare tariffs. As a result, the ex-ante authorisation of healthcare real estate investment by the Netherlands’ Board for Healthcare Institutions (College Bouw Zorginstellingen: CBZ) would cease to exist.

The Dutch Association of Hospitals (Nederlandse Vereniging van Ziekenhuizen: NVZ) and Council for Health and Care (Raad voor Volksgezondheid & Zorg: RVZ) advised the Minister to introduce the integral tariffs as soon as possible by making healthcare organisations responsible for their own real estate, enabling hospitals to act decisively. A study by the CBZ indicated that the introduction of integral tariffs would increase capital costs by an expected € 54 million. Integral rates affect the depreciation, interest on real estate and interest on working capital.

In the policy letters “appreciation for better care” (Klink, 2007a) and “careful entrepreneurship” (Klink, 2007b) the Minister confirmed the introduction of integral tariffs, starting with a transitional period of four years in which institutions gradually become responsible for their real estate. The Minister also declared that healthcare institutions that are running into financial problems due to deregulation of real estate investments rules, could count on the support of the Ministry of Healthcare. The government wanted to focus on the further deregulation of real estate investment in healthcare and be careful with free pricing and therefore set a ceiling to free pricing within the regulated market system, to counteract undesirable side effects. As a result, on the first of January 2008, the assessment and guaranteeing of capital expenditure by the government would cease to exist, but integral tariffs would be introduced a year later, on the first of January 2009.

In reaction to the letters of the Minister, the Guarantee Fund for Healthcare Assets (Garantiefonds Zorginstellingen) tolls the alarm bells. Due to the cumulative risks that accompany ownership of real estate and the price ceiling in healthcare tariffs, hospitals could get into trouble. In particular, the fact that the capacity of hospitals for financial absorption is relatively low makes them vulnerable to financial setbacks.

On the first of September 2008, it was clear that it would take until 2010 before the real estate costs were integrated into the DBCs, a year later than originally planned. It was intended that the introduction of integrated tariffs would be accompanied by a simplified system of financing healthcare. Until that time, accommodation costs were reimbursed according to actual costs. In this way the Minister opted for the gradual introduction of the risks of accommodation costs.

In the spring of 2009 uncertainty reigned within the healthcare sector, because hospitals encountered financial difficulties caused by the uncertainty of how the policy should be applied in practice. The NVZ therefore requested clarity from the government regarding the building regulations. The CBZ stated that the government should have organised the transition more carefully and the Dutch Banking Association (Nederlandse Vereniging van Banken: NVB) claimed that a stagnation had occurred in construction projects in the healthcare sector. According to the NVB, this stagnation was not a consequence of the credit crisis, but of the transition to the new building regime.

The clear course that was announced in the 'capital costs letter' from Minister Hoogervorst, resulted in an even more cautious policy by his successor Minister Klink. One consequence is that hospitals got into financial trouble. "An important part of these risks for hospitals comes from the uncertainty that is maintained by the government. Especially the uncertainty about healthcare real estate brings some hospitals to the brink of trouble"(PWC, in Zorgvisie, December 2009).

§ 2.3.2 Compensation and balance sheet value

Immediately after the announcement of the integral tariffs in healthcare by Minister Hoogervorst, the NVZ favoured the rapid introduction of integral tariffs, provided that 10% of hospitals for which this rapid introduction causes problems are taken into consideration. These are mainly 10 hospitals that have recently received approval for construction under the old regime. In addition, the NVZ stated that there was a problem in the balance sheet value because the 50 years depreciation period of capital costs in the old budgetary funding system was higher than the usual depreciation period of 30-40 years. This means that in the old system the government dictated rules which structurally overestimated the balance sheet value of healthcare real estate. This balance sheet value problem is visible in new and existing hospitals, especially in those built in the 1980s. Those buildings were originally worth tens of millions of Euros on the balance sheet, but from one day to the next depreciate almost entirely due to the new real estate regulations. Therefore, the Guarantee Fund for Health Assets states that "continuing this policy is only justified if the government is financially accountable for those hospitals that get into trouble."

In the policy letter "taking care" ('met zorg ondernemen', Klink, 2007b), the Minister noted that institutions that run into trouble due to the transition from the regime, can count on the support of the Ministry of Health on condition that the financial value in healthcare real estate is maintained for healthcare production. The starting point is the value at the time the new legal regime came into force. In addition, institutions must prove that no unreasonable risks had been taken since the new regime was announced in 2005.

Initially, the discussion between the government on the one side and healthcare institutions and interest groups on the other side focused on compensation for newly built hospitals. This discussion shifted to solving the problems of the real estate's balance sheet value. Both discussions were essentially about the financial settlement of the change of the budgetary funding system of real estate towards integrated tariffs in healthcare in conjunction with the financial condition of the real estate portfolio at the time of transfer.

Compensation

Hospitals involved in a project for new accommodation during the transition period found themselves in an impossible position because they did not have time to respond to the new legislation. These hospitals still had to meet the former regulations and rules for authorization, but for reimbursement were dependent on the new regulations. Therefore these hospitals encountered mainly disadvantages of the transition to the new system rather than benefits. The first years after construction, the capital costs were not adequately covered by the normative accommodation component (nhc) and therefore institutions foresaw problems with the repayment of construction costs.

The Minister (Klink, 2008b) concluded that a Committee of Wise Men should assess whether the new regulations on real estate had caused problems for hospitals. He describes three principles: (1) hospitals must demonstrate a causal link between the problems and the new way of capital expenditure funding, particularly for investment after 2005, for which investments were inevitable and could not be postponed; (2) hospitals should first try to solve the problems as much as possible within their own budget, (3) there must be a structural deterioration of the solvency, e.g. revaluation of real estate or a shortening of the depreciation period.

Compensation refers to compensation for damage resulting from lawful acts (abolishing the building regime), where the damage is disproportionately large. This is the case if the damage is beyond normal entrepreneurial risks and disproportionately disadvantages one (or more) organisations compared to others. As a result, compensation for individual hospitals is on a case by case basis.

The comments from the sector on the proposal of the Minister were overwhelmingly negative. The Committee of Wise Men assessed the situation with hindsight, the hospitals were first meant to take care of business themselves. Doing this, the minister paralyzed entrepreneurship. Several accommodation plans come to a halt due to the political uncertainty and instability. Healthcare organisations awaited the decisions of the Committee of Wise Men.

The Committee of Wise Men notes that during the on-going work of the committee, the political context changed (Klink, 2008a). At the beginning of the Committee's work, implementation of integrated tariffs was aimed for 1 January 2009. This was not possible, resulting in reimbursement according to actual costs continuing. The Committee advised the Minister to create a transitional arrangement with a guarantee clause, so that the transition to bear real estate risk is spread over several years. The guarantee clause is an important part of the transitional arrangements, giving substance to the remark "that no hospital will get into insurmountable problems as a result of the abolition of the construction regime". Regarding compensation, the Committee recommends that this is a capstone, which is used at the end of the transition process by compensating institutions disproportionately disadvantaged in their competitiveness.

From that moment on the uncertainty about the further development of the guarantee clause remained. Meanwhile the credit crisis of 2008 began to hit the real economy. Early in 2009 the government allowed a budget of € 320 million to be made available to help building plans in healthcare that are stuck as a result of the changed construction regime back on track.

In the summer of 2009 the Vlietland Hospital was the first hospital to successfully utilise the guarantee clause. The construction costs of the Vlietland Hospital were higher than estimated due to a problem with the foundations during construction. In the annual report, the Vlietland hospital included a receivable from the government of € 60 million. In the summer of 2009, 10 hospitals included such a claim from the government in their annual reports on the basis of the guarantee clause. Together the claims amounted to several hundred million euros.

In October 2009, Minister Klink stated that, "given the financial crisis and anticipating the introduction of integrated tariffs in 2011, his opinion was that he could not further elaborate on any specific guarantee clause."

The guarantee clause was put on the back burner and a transitional arrangement was made for healthcare organisations that ran into trouble due to the new regime of accommodation costs (Zorgvisie, October 2009). As an additional aid, the Minister made € 160 million available, half of the original € 320 million. The Minister gave no further statements on how this budget would be applied.

Balance sheet value

The Problems of the real estate's balance sheet value were caused by the abolition of the healthcare accommodation regime in 2009, which implied that the governmental guarantee on the repayment of interest and amortization ceased to exist. All hospitals were therefore expected to use the same rules as any other businesses for the valuation of their real estate in the annual reports. This means a reduction of the depreciation period (50 years as dictated in the former law) to a maximum period of 30 to 40 years. In addition, organisations had to demonstrate that the capital costs could be paid from the proceeds of the production during the depreciation period. However, writing-off surplus value meant withdrawing money from healthcare budgets. Hospitals that had to write-off surplus value immediately created a huge financial burden. Hospitals were faced with the possibility of bankruptcy as a result of the impairment test that auditors applied: if the production value did not match the balance sheet value, then real estate had to be depreciated, or the difference had to be included on the balance sheet on the basis of the guarantee clause as a receivable from the government.

Banks that had always been involved in the financing of healthcare real estate, proposed that healthcare organisations had the opportunity to go 'clean through the gate'. "Because of the revaluation of real estate, there are buildings on the balance sheet of which the value is too highly estimated. The effects of the former system should first be cleared." Otherwise the banks threatened to cut funding, because the institutions increasingly had to cope with risks without space and money to manage the problems.

In October 2009, the Dutch Healthcare Authority (Nederlandse Zorg Autoriteit: NZa) started to map the balance sheet value problem of hospital real estate. As a solution, the NZa proposed accelerating the writing-off of overvalue on the balance sheets and that the government compensated the cost of the shortened depreciation of hospitals real estate. This solution would cost money in the short term, but would be budget-neutral in the long term (Nederlandse Zorg autoriteit NZa, 2009a).

The NVZ concluded that the real estate balance sheet value had become a major bottleneck and that as a consequence construction of hospitals was stagnating. In the spring of 2010, several hospitals were still hoping for support from the Ministry of Health. However, in March 2010, the Minister stated that European rules on state aid makes compensation for individual hospitals impossible. Hospitals involved in construction activities who were also in financial need as a result of this, should not expect additional compensation.

The minister wanted to solve the balance sheet value problem, estimated at more than € 715 million by the Dutch Healthcare Authority (Nederlandse Zorg autoriteit: NZa), with a generic transition. From 2011 hospitals constructing new facilities would receive a yearly steadily decreasing allowance for capital expenditure for up to 6 years. This could be budget-neutral introduced with the previously announced construction boost of € 160 million as a single payment on the balance of 2010. In addition there was a budget of € 260 million guarantee available for the period 2011 to 2016. If a hospital was unable to meet a certain minimum on its payments of the capital, the debit would be paid by the government (Nederlandse Zorg autoriteit NZa, 2009b).

§ 2.3.3 Property and autonomy

In the capital costs letter Hoogervorst (2005) also announced that the governmental approval for real estate investments by the Netherlands' Board for Healthcare Institutions (College Bouw Zorginstellingen: CBZ) would cease to exist. For a period of 35 years, this Board had supervised construction and investment projects in healthcare. Under the new Healthcare Facilities Admission Law (Wet Toelating Ziekenhuisvoorzieningen: WTZi), healthcare institutions are individually responsible for their own building policy. Although the NVZ claims that land and buildings are owned by the hospitals as private organisations, the government wanted to retain control over the accumulated capital value in healthcare real estate. The main argument for this was that this capital value was paid out of health insurance premiums and it was not desirable that this value was transferred to commercial parties.

With the implementation decision WTZi (Klink, 2007a), the Parliament was informed in July 2007 that as from 1 January 2008 the former real estate investment regime for hospitals would be abolished. As a consequence, new construction plans would not be eligible for recalculation. To preserve the capital value of real estate for healthcare, the College Remediation Healthcare (College Sanering Zorgsector: CSZ) continued monitoring the financial transactions of hospital real estate.

This creates a pad count: because, until 2012, the surplus value would be creamed off by the government, institutions were unable to sell their real estate in order to reinvest the surplus value in their own organisation. This shows that ownership of real estate had become a point of discussion. Who could call themselves the owner of the buildings and land in the healthcare sector? Due to the uncertainty about the legal ownership and control of real estate and the potential for, or even the prohibition of, the distribution of capital to third parties, the healthcare sector remained unapproachable to investors. At the same time hospitals were confronted with higher capital requirements to be eligible for loans due to changing regulations.

In the autumn of 2007, interest groups, including the NVZ, protested against the policy letter "taking care". With this policy, hospitals were responsible for their own real estate, but could not freely dispose of the proceeds of their real estate. Since the real estate was formally owned by the institutions, this comes down to property expropriation without compensation. Healthcare institutions argued that with the former regulations they had been hampered in building capacity. It was clear that the issue of legal ownership was still not answered. Banks warned that continuing governmental intervention would scare off external investors. Given an economic boost in the end of 2007, hospitals were also confronted with higher procurement costs for new construction, making the price level rise by up to 4.3%. Therefore, the CBZ reversed a previous tariff reduction on construction standards. Nevertheless several hospitals reconsidered their plans because of the uncertainty of whether investment costs could be recouped by future income from the production of health services.

Hospital organisations reacted in different ways to this uncertainty. The Reinier de Graaf Hospital chose to assess the risks and to reconsider the plans that had been approved under the old regime. The conclusion of this assessment was that continuation of the formally authorised plans would lead to a loss-making operation once the new building was in use. Therefore, the old plan was abolished and a new initiative phase was started.

The Maas Clinic in Boxmeer was the first hospital since the credit crisis to receive financing from the banks for a new hospital building. For that purpose the contractor guaranteed that no extra cost overruns would occur during construction. In addition, subcontractors took on the long-term maintenance. To make this possible, ownership of the hospital real estate was by two private companies, one for the hospital building and the other for the development of the remaining properties.

The Hofpoort Hospital in Woerden considered attracting new private investors, with the option that the real estate would be organised in a separate company to enable possible transfer to an investor later on.

On 19 November 2008 the State Council (Raad van state: RvS) determined that healthcare organisations should receive the proceeds from their land and buildings without the intervention of the government. The RvS dismissed the regulations of the Ministry of Healthcare as lacking an adequate legal basis. Although the RvS vindicated the healthcare institutions in their opposition, this was on procedural grounds. The article in the WTZi was not enough legal ground for the policy on which the capital restriction was based. The Minister still had the opportunity to modify the law so that the government will have more influence on real estate transactions.

The Minister of Healthcare announced an emergency act in order to preserve the capital value of real estate for healthcare. In this emergency act, the Remediation Healthcare Committee (CSZ) was made the guardian of the public interests and was given more tools to monitor real estate transactions in healthcare.

According to critics, this emergency act was unnecessary, since most healthcare institutions were organised as foundations that have statutes in which the provision of healthcare is included as their only objective. In these foundations, any proceeds, including real estate, have to be reinvested in the foundation's objective: the provision of healthcare. Due to the emergency act, healthcare institutions were given the burden (full responsibility for their real estate) without the rewards (free disposal of value). The result was that institutions were more likely to bear higher risks without the space and financial resources to manage the problems. Eventually it took until early 2010 before there was any clarity about the ownership position of real estate within the healthcare sector. From that moment on the sale of real estate became a component of the financing for new construction plans and healthcare real estate could be seen as an opportunity to do business by making unprofitable property profitable again. Even external investors started to become interested in investing in healthcare real estate.

§ 2.3.4 Financing and risk

At the end of 2005, banks announce that due to changing regulations, other rules would also be applied for the provision of capital to healthcare institutions. Where previously governmental approval was enough to get funding, banks now required a well-designed business plan. Especially a good long-term strategy was important, due to the increasing risk of healthcare as a result of market forces. The financial reserves of hospitals, approximately 8%, had to be increased up to a solvency of 20 to 25%. These larger reserves were required for investment. In addition, it was now expected that

banks would eventually attribute a risk premium, calculated at € 280 million per year. The margins in hospitals of 1 or 2 per cent were also too low. Given the new financing of real estate from the production of healthcare, the margins were expected to reach 15 to 20 per cent.

All this implies that hospitals and care institutions encountered increasingly difficulties raising money for new real estate investments. Banks were only willing to loan money into a consortium including other banks and thereby asked higher interest rates to be paid for increased risks. The credit crisis began to play a role and also the Guarantee Fund for Health Assets did not automatically guarantee a loan for hospital real estate investments.

A report commissioned by the Ministry of Health conducted by Finance Ideas in 2007 concluded that in a system where hospitals bear all risks, market-based fees should be expected for financing real estate. Furthermore, hospitals could only function in a market environment if they had complete ownership of the real estate. If this was not the case, it would be very difficult to find financiers. Given the fact that investment in real estate has a long maturity, certainty regarding the corresponding fees was essential. It was also important that the system of fees for healthcare products and services would be maintained for a long period of time.

In January 2009, PWC (PriceWaterhouseCoopers, 2009) reported to the Minister the factual findings of specific activities agreed on financing general hospitals. This report states that, due to the uncertainty in the regulatory capital charges for compensation, healthcare organisations had been reluctant to invest in previous years. Hospitals indicated that the banks asked for higher financial resistance requirements; no loans were provided with a term longer than 20 years; shorter interest maturities; loans were only provided under the guarantee of the Guarantee Fund for Health Assets; funding did not cover the entire investment and; applied interest rates were above the standard rate of the NZa.

A consequence of the abolition of state guarantees on real estate is that the banks ultimately alter the criteria for funding healthcare real estate. To obtain a loan, healthcare organisations are asked to provide (1) the strategy and plans for monitoring continuity; (2) quality of management with energetic directors and medical specialists committed to the plan; (3) financial indicators such as liquidity, solvency and profitability but also the relationship between cash flows and capital costs; (4) flexibility of real estate with effective use of space and alternative usability.

It is clear that the banks are reluctant to assess the credit-worthiness of healthcare organisations. Real estate investments should be incorporated into business plans, quality of management, alternative usability. In addition, the commitment of medical specialists and insurers is also required. The banks are involved earlier in the decision process because the sector's risk profile has changed.

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In the implementation assessment "from budget to performance" (Nederlandse Zorg autoriteit NZa, 2009b) it is stated that an adequate level of remuneration for capital costs is an essential element for the success of performance based funding. The transition problems in capital investment play a major role. Performance based funding should only be provided once disproportionate financial problems resulting from capital expenditure problems in the past have been solved. Regulatory certainty has become increasingly important to minimize the risks for healthcare providers and health insurers. This implies a predictable government and consistent legislation. Regulatory certainty is crucial for obtaining loans from external financiers, which implies a commitment from the Ministry of Health and NZa to the decisions taken regarding the introduction of performance based payment to provide certainty for the healthcare providers.

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§ 2.3.5 Funding and entrepreneurship

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In the midst of all these events, the purpose behind all these alterations was almost forgotten: more freedom and responsibilities for the healthcare organisations.

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The government's objective behind deregulation of real estate investment was to remove the governmental regulation of capacity and to enable healthcare organisations to make their own investment decisions. Institutions were enabled to decide themselves how the capital costs resulting from accommodation decisions were reimbursed by the sale of healthcare services in the form of integrated performance funding (Hoogervorst, 2005).

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This link between the two dossiers, integrated tariffs and the introduction of market forces in healthcare through performance based funding, meant that hospital organisations had to deal with their business in a completely different way than previously. This gives entrepreneurship in healthcare a totally new meaning.

For the introduction of performance based funding, the capital costs needed to be fully integrated in the rates and prices of healthcare products and services. The diagnosis-treatment combination (Diagnose-Behandel-Combinaties: DBC) were therefore introduced as the transfer unit. A DBC stands for a diagnosis and treatment package for which a certain tariff or price is set. For this purpose, medical operations are divided into an A-segment and a B-segment. The A-segment has fixed regulated tariffs set by the NZa whereas medical operations in the B-segment are freely negotiable between hospital and insurer (Hoogervorst, 2005).

At the introduction of the regulated market in healthcare, the B-segment covered 10% of all operations. This increased to 20% in 2008 and 34% in 2009. As a result of a normative accommodation component (normatieve huisvestings component: nhc), set by the NZa at 12.5%, capital costs are an integral part of the fees for transactions in the A-segment. In the freely negotiable prices of the B-segment, insurance companies and hospitals agree on compensation for depreciation of real estate.

It soon became clear that the role of the medical specialists in the hospital changed due to the changes in laws and regulations. Doctors are usually self-employed, but play a role in determining the policies of an organisation. In the traditional hospital medical specialists had power but little responsibility. In the new situation, doctors were made more accountable for their overall financial results.

In order to counteract unwanted side effects of free pricing by market forces, the government introduced a new instrument: yardstick competition. The yardstick is based on the national average cost for each DBC and serves as a mandatory maximum price. Below this maximum prices are freely negotiable between hospitals and insurance companies.

In 2008, the B-segment with freely negotiable prices increased from 10% to 20%. This allowed hospitals to compete on price earlier than originally indicated. The yardstick competition was then used as a transitional instrument for approximately half of the treatments. Critics feared that yardstick competition was an economy measure in disguise. This fear became evident as the Minister indicated that in determining the yardstick, the government would explicitly take measures of economy into account.

The risks for the institutions of the yardstick competition were that the actual costs of real estate would be higher than the fixed price ceiling. This implies that institutions had to cut costs to remain within budget. Yardstick competition and integral capital costs, in combination with the continuation of the overall Health Care Budget (Budgettair Kader Zorg) had serious financial consequences and led to risks for individual hospitals.

While the Commission Havermans worked on its advice, it became clear that the yardstick competition could not be implemented and that the function-oriented budget could not be abolished on the first of January 2009. The step to full funding under a yardstick was considered to be too big. Instead, the free negotiable B-segment was extended to 35%. For the remaining part of the hospital's revenue, the function-oriented budget remained, implying that reimbursement according to actual costs for the A-segment was still maintained.

Mid-2009, there was much uncertainty about the further introduction of the regulated market, and in particular about which treatments would remain in the regulated A-segment and which treatments would be moved to the B-segment prices with freely negotiable rates. In the spring of 2010, the NVZ stated that hospitals were in need of an increase of the B-segment in order to improve their financial position. The downside of an increasing B-segment is that auditors required hospitals to base their real estate balance sheet value on economic value.

Entrepreneurship

Regarding entrepreneurship and real estate, the position of real estate in relation to the hospital organisation was re-examined during the transition from the old to the new system by different parties. Soon, the first initiatives for Public Private Partnership (PPP) were presented by the banks, building contractors and corporations from the facility sector. These PPPs were already applied by the government in the infrastructure of roads and waterways.

At the end of 2005, the first real estate limited companies were established and in this way real estate was separately organised under the wings of the healthcare organisations. This was seen as the first step towards fully autonomous management of real estate without governmental interference. In this period, more hospitals were considering transforming into a limited company, instead of the usual foundation structure, in order to have more opportunities to attract private capital. Continuing uncertainty about the ownership of the real estate and the potential for, or even prohibition of, the proceeds being distributed to third parties proved to be obstacles in raising additional capital. In addition, usual contract periods of 1 year with insurers were too short to make a good business case, for which long-term agreements with insurers were required.

When in April 2010 the problems with the real estate balance sheet value was solved by the government and the lack of clarity about the legal ownership of real estate was clarified, the first projects for new hospitals in cooperation with investors appeared. It was clear that investors saw opportunities in healthcare real estate for future ownership. Because of the growth potential, healthcare real estate market was seen as a promising market for investors.

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In the spring of 2011, the Minister of finance stated that PPP in healthcare is no longer actively supported by the government. So far, no PPP project had manifested itself in healthcare. According to the Minister this was caused by uncertainties surrounding the introduction of performance based funding in healthcare. The Minister expected opportunities for PPP to increase if these uncertainties were resolved and in particular once the Ministry of Health made it possible to attract venture capital in healthcare.

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It is clear that real estate appears permanently high on the agenda of the healthcare CEOs. “Wrongly, CEOs only have eyes for starting new projects when the quality or the image of buildings lacks.” Different “future explorations” of the hospital sector that appear in late 2010 and early 2011 show that the Dutch healthcare landscape will radically change in the near future. Hospitals have to make choices and determine their position in a competitive landscape. This also has implications for accommodation choices, such as local walk-in health centres as satellites of centralised large hospital complexes. This is particularly relevant for hospitals that have to make large-scale accommodation choices in the near future and thus are able to manage their own real estate portfolio.

§ 2.4 Conclusions on real estate in a changing healthcare system

The two main objectives of the changes in healthcare were: (1) introducing more efficiency incentives by not covering all risks of real estate beforehand and; (2) more freedom and responsibility for healthcare organisations. With the introduction of integral tariffs, and also through the transition process, the institutions did indeed become more aware of the costs and risks associated with healthcare real estate. The problems with the real estate balance sheet value of hospitals showed that lengthy amortization periods in the years before the transition had resulted in a too low depreciation of real estate value. Under pressure from the financial sector, the government supplemented this deficit with a payment of € 160 million and a guarantee of € 450 million for organisations that had recently built a new hospital. This ensured that the balance sheet value of the real estate was more in line with the companies' economic value in order to be able to find financing at the time of construction. This financing problem also existed in the old system, but was usually overcome by an approval for construction by the Netherlands Board for Healthcare Institutions (CBZ).

The new system significantly reduced the lead times for new construction. This contributed to more efficient construction and management processes. Hospitals built under the new regime have a lead time of 5-7 years for preparation and construction, compared to a usual lead time of 10-15 years in the old system.

A disadvantage of the new system is that financing from investments is higher due to increased risks, which lead to higher interest rates. Where financing was simple in the former system, banks have become more cautious in the new system. An advantage is that the critical attitude of the financial sector forces organisations to make a well-founded business plan, in which the repayment potential and efficiency of investment are explicitly considered.

Because healthcare organisations in the new system are no longer able to pass risks on to the government, the guarantee that hospitals will continue to exist has disappeared. The disadvantage is that hospitals can go bankrupt. So far, this has not happened. Conversely, the advantage of the loss of this guarantee is that organisations are optimising internal operations.

Creating more transparency in tariffs for healthcare is another objective of the reforms. Due to the complex settlements with an A- and B-segment and DBCs that have recently been transformed into DOTs (DBC op weg naar Transparantie: DOT), the settlement of transactions in the healthcare system is still far from transparent. This also means that the capital costs as an integral part of the rates and prices have not yet become clear. It appears that this objective has not yet been achieved.

§ 2.4.1 Lessons learned on transfer of responsibility for real estate

From the description of the transition period from the old to the new system, the following lessons can be learned:

Laws & regulations

- The combination of the introduction of integral tariffs and responsibility for real estate on the one hand and the introduction of a different way of funding healthcare through performance based funding on the other hand has led to cumulative risks for the institutions.
- Uncertainty about the adoption process meant that institutions were unable to anticipate changes. The first announcement was that from 2012 the real estate expenses would gradually become an integral part of tariffs. Later, suggestions were made for a complete and sudden introduction, like a big bang. This “big bang” was continually opposed by the Ministry, even though eventually it was the chosen method for introducing the new system.
- The clear perspective described at the beginning of the transition process in the capital costs letter was later transformed into more cautious policy. This led to much confusion and uncertainty among the institutions, which resulted in delays in construction projects.
- During the transition process many new policies were announced, reversed and withdrawn, especially when it came to the financial settlement and compensation for individual institutions because of the changing regime. This policy uncertainty has paralyzed construction. Investors were deterred and banks were reluctant to give loans.
- Initially, the Minister announced that institutions that got into difficulty could count on financial compensation from the government. Enduring uncertainty about financial compensation and the eventual withdrawal due to European regulations on state aid brought several institutions into financial difficulties.

Compensation & balance sheet value

- Changes in the funding of real estate and the transfer of financial risks also means that real estate is included in the financial reporting and on the balance sheets in a different way. This has implications for the organisations’ financial position.
- The role of financial institutions and investors is large when risk profiles change. When the banks threatened to stop financing hospital real estate the government had to compensate for the transfer of responsibilities and risks.
- “Clean through the gate principle” means that the government has to ensure a fair financial settlement at the time of the transfer of real estate, so that individual institutions stay connected to the capital market. This means that in addition to a quantitative and qualitative analysis of real estate, a financial analysis of the portfolio at the time of transfer is equally important.

Property & autonomy

- The issue of legal ownership and ability to use hidden reserves in real estate need to be clearly answered at the time of transfer, in order to have access to the market of real estate investors. It is important that institutions have access to the benefits of real estate when they have to deal with the risks. Enduring confusion on this issue has unnecessarily delayed investments.
- Due to changed regulations, institutions organise real estate in a different way. Real estate is positioned in separate foundations and limited companies in order to be able to attract external funding.

Financing & Risk

- Due to changes in the system, the role of the banks changed significantly. Previously, governmental approval and guarantee was sufficient to find financing. Since the transfer of responsibilities, banks have required well-designed business plans as a basis for the loan. An important part of this business plan is how capital costs are reimbursed by production and sales.
- Equity and solvency of the institutions should be sufficient to obtain loans for the investment required. Due to changing risk profiles banks demand higher interest rates which has financial consequences for the institutions.
- A consequence of the abolition of the real estate investment regime is that the lead time of new projects has been shortened. However, confusion during the transition period has delayed many construction projects.
- In addition to the uncertainty about the financial settlement of the transition in the new regime, there was also uncertainty about the implementation of a regulated market and performance based funding. The intermediate introduction of management tools to counteract undesirable side-effects by the government made the field distrustful.

Funding & entrepreneurship

- Changing legislation also changed the role of the medical specialists in the hospital. As a consequence, medical specialists have become accountable for financial results. In addition, banks require support by the medical staff in the form of co-financing as a condition when making a financing application for new accommodation.
- If institutions themselves bear responsibility for their real estate and exploitation, they must also have opportunities to include these costs in their prices and tariffs to ensure that organisations can “grow out of trouble” by a higher production or adjustment of prices
- Transfer of responsibilities for real estate requires continuity and reliability. It is up to the government to ensure frameworks that do not contradict but rather confirm that reliability.

§ 2.4.2 Consequences for individual hospital organisations

In retrospect the conclusion can be drawn that during the period 2004 – 2012, a lot of former certainties have ceased to exist. For individual hospital organisations, this period came with a lot of uncertainties about the impact and consequences of new regulations on accommodation choices. In time, it became clear that hospitals were fully responsible for their own real estate decisions and financial consequences, without any compensation from the government for individual hospitals that found themselves in financial difficulties due to the new legislation. In the end, only in extraordinarily insurmountable situations were hospital organisations financially supported by the government.

Besides the developments in the hospital sector, this chapter has also described a period in time in which certainties and paradigms have changed, been replaced by other paradigms or even disappeared, not only for hospitals, but for society as a whole. It was a time in which on the one side healthcare became more market-oriented and the government loosened its grip on the hospital sector and on the other side private banks ran into trouble due to the financial crisis and were financially supported by the same government. In this dramatically changing context, several hospitals had to make long term strategic decisions on their accommodation.

Besides background information about the context in which these individual hospitals had to make strategic accommodation choices during the transition period, the analysis of this period in the hospital sector can also be regarded as an example for other sectors. This makes this study also interesting for every sector or country that has to cope with comparable transitions of responsibilities and risks regarding real estate from public authorities to private organisations.

For the hospitals in the Netherlands, the transition of responsibilities and risks of real estate imply that they have to build on their own strength and opportunities more than ever before and have to deal with their own threats and weaknesses. As a consequence, hospitals have to be very aware of their own qualities as an organisation and the local context in which they operate.

3 Context of hospital real estate

What contextual information about the hospital sector is relevant for managing and designing hospital real estate?

Abstract

Purpose: Central in this thesis are Dutch hospitals, referring to the 82 general hospitals in the Netherlands. This chapter discusses the context and trends in which these hospitals have to make decisions on organisational strategy and related accommodation strategy.

Literature study: Based on several reports, including explorations of future scenarios in the hospital sector, an analysis is made of stakeholders and demographical, economic, political, social and medical technological developments that have to be taken into account when considering long term accommodation investments.

Empirical research: Survey among 80 Dutch hospitals with a response of 20% on future scenarios for hospital real estate.

Findings: Hospital organisations have to cope with many contextual changes both social and demographic as well as medical technological innovations. On the one hand is the political uncertainty about how government will further shape the healthcare system. On the other hand there is a growing and changing demand for medical care and more technological capabilities. In addition, the labour force is shrinking, leaving fewer people to do the work. The consequences of these trends and future scenarios for accommodation choices of hospitals are: (1) the need to re-position hospitals within society and accordingly make coherent location choices, (2) the need for labour-saving innovations in accommodation; (3) the need for value creation through accommodation and; (4) the ability to anticipate changes in the organisation of healthcare processes within the design of the accommodation. Therefore, in addition to providing optimal support for the healthcare process, labour-saving innovations and increasing labour productivity are important topics when considering hospital real estate.

Introduction

Within the rapidly and continuously changing political context, hospitals have to make long-term investment decisions about real estate. For this reason hospital CEOs have to understand the contextual developments that are of interest for the organisation's

long term strategy. This requires a conceptual model that describes contextual factors on the one hand and on the other hand positions these factors in relation to the organisation.

In the same way as the previous chapter described the political background of the hospital sector during the transition from the former to the new legislation on hospital real estate in retrospect, this chapter focusses on future scenarios of the context in which individual hospitals will have to make long term accommodation decisions. Reports on future explorations of the Dutch hospital landscape up to 2025 are utilised to describe and discuss this context. Commonly used methods in literature to describe contextual factors are PESTEL and DESTEP. These methods effectively describe the external demographic, political, economic, societal, technological, environmental and legal factors that have an impact on an organisation but make no logical connection between these factors and the organisation and its stakeholders.

In her PhD research on the real estate of higher professional education in the Netherlands, De Vries (2007); (De Vries et al., 2008) proposes a model which illustrates the relation between the organisation and a number of factors from the DESTEP and PESTEL methods (Figure 12). This model of using real estate to add value can be used to conceptualise the context and shows how, as one of five production factors, real estate can contribute to the overall performance of the organisation.

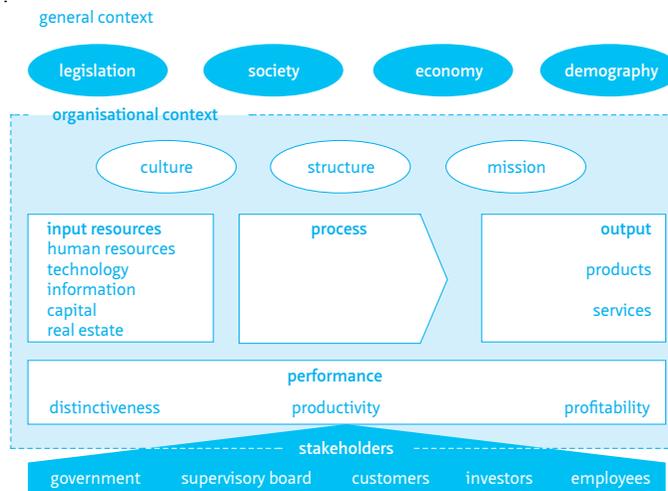


Figure 12 Conceptual model De Vries (2007).

Within the model the organisation is conceived as an open structure that is both influenced by and can exert influence on its environment, the interests of the stakeholders being maintaining the existence and activities of the organisation.

Within this organisation-specific context, an organisation has influence and control over all decisions. The general context is beyond the direct control of individual organisations. Other important components of the organisation are the input-throughput-output process and the performance as perceived by different stakeholders.

According to De Vries (2007), the organisation-specific context consists of the organisation's culture, structure and mission. These factors guide the process in which the input of resources by means of a process (throughput) is converted into an output of products and services. The organisation-specific context consists of endogenous factors within the organisation. The existence of organisations arises from an awareness that the needs of several individuals are better met through partnership. This implies that all different individuals (owner, employee and customer) have their own interests in relation to the organisation and can be described as stakeholders of the organisation. Interested in the performance of the organisation, this performance is also reviewed by the stakeholders. De Vries (2007) divided organisational performance into distinctiveness, productivity and profitability. The general context consists of developments in legislation and regulations, economics, culture and demography.

Conceptual model De Vries (2007) as applied to the hospital sector

Figure 12 illustrates that input, process and output results in organisational performance, divided into distinctiveness, productivity and profitability. This model makes clear that organisations use different resources as input for realising output of products and services. Examples of input resources in healthcare are: specialists, nurses and other healthcare professionals (human resources); MRI scanner (technology); patient records (information); financing and insurance (capital); and real estate. In connection with current developments, real estate is becoming more and more important. Due to its static character, today's decisions on real estate will define the context of processes for the next 20 years and longer.

In hospitals, the output is described in terms of the number and types of Diagnosis Treatment Combinations (Diagnose Behandel Combinatie: DBC) and a budget for acute cure stand-by obligation. Input for processing this output are the salaries of employees, including medical staff, implementation costs of new technologies, education costs, budget for operational government and real estate. Hospital's productivity can be measured by the DBC price – DBC costs and the amount of DBCs. Profitability consists of the financial position and capacity of the organisation. Distinctiveness at an organisational level can be measured by means of the proportional market position, the range of DBCs and patient satisfaction compared to similar data from other healthcare organisations.

Organisations exist for the benefit of their stakeholders. Examples of stakeholders in healthcare are patients as customers and healthcare professionals as employees. Besides these two stakeholders that are directly connected to the primary process of delivering healthcare, other stakeholders of a hospital are the supervisory board, investors and the government.

An organisational culture with sometimes troubling relationships between the board of management and the medical staff is part of the corporate-specific context of hospitals. The medical staff at Dutch hospitals consist of different discipline-groups that are more or less autonomous organisations within the hospital organisation. This means that the executive board, responsible for the continuity of the hospital, has little or no influence on production decisions within a discipline-group. Another part of the corporate specific context of Dutch Hospitals is the structure of a private not-for-profit organisation, which makes it difficult to find private investment capital because payment of interest to possible shareholders is still prohibited.

Part of the general context of hospitals in the Netherlands is the change in legislation resulting in an increase in the opportunities, responsibilities and risks regarding real estate investment (see chapter 2). The government, as a stakeholder, is responsible for organising appropriate and accessible healthcare for their citizens and as legislator it is responsible for the rules defining how the healthcare system should function. Societal processes and the quest for quality of life lead to an increasing demand for healthcare. Additionally, demographical developments result in an increasing demand – the aging society contributes to an increase in demand for healthcare and the decrease in the available workforce for future healthcare.

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The transformation of De Vries (2007) conceptual model into a contextual model provides a first insight into the complexity of the changing context within which hospital administrators have to make decisions about real estate. This model shows how the organisation is one of the players within a sector that has to cope with changing demands from stakeholders on one side and developments in legislation, economy, society and demography on the other side. Based on this perception of the context, this chapter describes: the position of different stakeholders regarding hospital real estate (3.1); trends in the hospital sector that result from the general context (3.2) and; future scenarios of how the hospital sector seems to react to these trends and changing demands (3.3). All these developments, trends and scenarios are outside the direct sphere of influence of an individual hospital organisation and therefore essentially equal for all hospitals.

First different aspects of the model such as stakeholders and developments in legislation, society, economy and demography are further elaborated. Therefore, hospital's stakeholders and their objectives and perspective on real estate are assessed, as well as the trends that result from developments in the general context and future scenarios for the hospital sector that have impact on accommodation choices. This assessment is based on several reports on the hospital sector that are published in the period 2008 to 2012.

Assessed reports on hospital sector 2008 to 2012

- BDO Branchegroup Healthcare. (2009). BDO-Benchmark hospitals 2009. Utrecht: BDO Accountants & Advisors.
 - BDO Branchegroup Healthcare. (2010). Guard against uncertain times (wapenen tegen onzeker tijden), BDO-Benchmark hospitals 2010. Utrecht: BDO Accountants & Advisors.
 - BDO Branchegroup Healthcare. (2011). Quiet for the storm (stilte voor de storm), BDO-Benchmark ziekenhuizen 2011. Utrecht: BDO Accountants & adviseurs.
 - BDO Branchegroup Healthcare. (2012). Without desiciveness no future (Zonder daadkracht geen toekomst), BDO-Benchmark hospitals 2012. Utrecht: BDO Accountants & Advisors.
 - CBS. (2011). Healthcare in numbers (Gezondheidszorg in cijfers) 2011. Den Haag: Centraal Bureau voor de Statistiek.
 - Duchateau, D. C., & Vink, M. D. H. (2011). Medical technological innovations in healthcare 20/20 (Medisch technologische ontwikkelingen zorg 20/20). Den Haag: Raad voor Volksgezondheid en Zorg.
 - Inspectorate Finance. (2010). Report broad reconsiderations curative care 2.0 (Rapport brede heroverwegingen Curatieve zorg 2.0) Den Haag: inspectie der rijksfinanciën, bureau beleidsonderzoek.
 - KPMG. (2011). Hospital landscape 20/20, no man's land or dreamland (Ziekenhuislandschap 20/20, Niemandslaan of Droomland). Den Haag: Raad voor de Volksgezondheid en Zorg.
 - Prismant. (2008). Work in health and social care (Arbeid in zorg en welzijn) 2008. Utrecht: Raad voor Volksgezondheid en Zorg.
 - RVZ. (2010). Take care of your health! Behavior and health: the new order (Zorg voor je gezondheid! Gedrag en gezondheid: de nieuwe ordening). Den Haag: Raad voor de Volksgezondheid en Zorg.
 - RVZ. (2011). Medical specialist care 20/20, nearby and far away (Medisch-specialistische zorg 20/20, dichtbij en ver weg). Den Haag: Raad voor de Volksgezondheid en Zorg.
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These reports describe developments within the hospital sector. The trends that are revealed by analysis of these reports result in an exploration of future scenarios for the hospital sector. In the last section of this chapter, these future scenarios for the hospital sector are further discussed by means of a survey among hospital CEOs and real estate project managers on accommodation choices in a changing context. The question of how the management of real estate on the scale of the hospital organisation can contribute to dealing with this changing context is discussed further in the following chapters (PART 2) of this dissertation. This implies decisions concerning investment options, participation in initiatives and healthcare portfolio decisions.

§ 3.1 Stakeholders

A stakeholder is a person, group or organisation with a direct or indirect vested interest in the success of an organisation and the environment within which the organisation operates. The stakeholder can affect or be affected by the organisation's actions, objectives and policies. In other words: a stakeholder is 'any group or individual who can affect or who is affected by the achievement of the company's objectives' (Freeman, 1984).

Stakeholders can be divided into two major categories: (1) internal stakeholders within the organisation with a legal contract with the organisation at stake and; (2) external stakeholders with direct or indirect interests (Winch, 2010). Different stakeholders may have commonality of goals at a general level, but at a more detailed level they often impose different purposes and priorities. This implies that goals and priorities emerge from the political interplay between different stakeholders (Ambrosini & Scholes, 1989). Therefore, Ambrosini and Scholes (1989) introduced a method for stakeholder mapping based on a power-interest matrix. Each stakeholder is assessed on the interest they have on the topic and the sources of power these stakeholders represent. The mixture between interest and power determines the willingness and likelihood of a stakeholder influencing decision-making on this topic. Interest in a topic is based on the stakeholders' objectives and purposes and determines whether a stakeholder is willing to use the possessed resources of power in the decision-making process. Assessment of power and interests can make clear in what way a certain stakeholder could influence the decision-making process, both in the obstruction or stimulation of a positive outcome. Sources of power for internal stakeholders are: hierarchy or formal power; influence or informal power; control of strategic resources; possession of knowledge and skills; control of environment and; involvement in strategy and implementation. Sources of power for external stakeholders are: control of strategic resources; involvement in strategy; possession of knowledge and skills and; through internal links by informal influence.

	stakeholder	position	interest	power	real estate
internal	patients	healthcare consumer	good quality healthcare, clean and safe hospitals	choice for healthcare provider	functional
	doctors / medical staff	healthcare delivery	good practise of medical treatment of patients, working environment	choice for working environment	functional
	healthcare professionals / nurses	healthcare delivery	good practise of medical treatment of patients, working environment, good employer	choice for working environment	functional
	pharmacy	delivery support	service oriented delivery of medicine	supply chain	functional
	facility management and ICT	delivery support	support primary process	supply chain	functional / physical
	hospital board	policy and management	daily management considering quality and efficiency	company strategy and vision	strategic / financial
	supervisory board	policy and management	overall performance organisation, end results	company strategy and mission	strategic / financial
external	national government	policymaker	safeguard healthcare system in quality, affordability and accessibility	setting legislation	strategic
	Mimistry of Health, Welfare and Sports (VWS)	policymaker	healthcare legislation and regulation	setting regulation	strategic
	municipality	policymaker	social welfare and satisfaction citizens, hospital as large employer in society	regional policy	strategic
	health insurer	financial controller, funding healthcare	offering healthcare packages, profitable business, quantity and quality of healthcare	choice for preferred provider	financial
	banks / investors	financers of real estate investments	profit on loan, return of investment	business case approval investment	financial
	Dutch Council for public healthcare (RVZ)	controller quality	promote change in healthcare sector for cost effectiveness and good quality	advisory	strategic
	National Institute for Health and Environment (RIVM)	controller safety	safety of healthcare	directing hospital, closing facility	functional
	Inspectorate of civil health (Inspectie volksgezondheid)	controller safety	safety of healthcare	directing hospital, closing facility	functional
	general practitioner (first line healthcare)	healthcare delivery	referrer of patients	choice for healthcare provider	functional
	elderly homes / nursing homes / homecare	healthcare delivery	chain partner in healthcare delivery	chain partner	functional
	citizens	healthcare consumer	accessability of healthcare and cheaper healthcare insurance	choice for healthcare provider	functional
	patient organisations	interest group for patients	the best healthcare for the target group and raising profile of disease	choice for healthcare provider	functional

Table 10 Internal and external stakeholders of a hospital organisation.

Table 10 summarises the internal and external stakeholders of a hospital and their overall interest, power and perspective regarding accommodation decisions. These stakeholder groups are retrieved from several reports on the hospital sector published over recent years.

Regarding real estate, Den Heijer (2011) describes a stakeholder model that identifies four types of stakeholders and matching perspectives. This model originates from the CREM model defined by De Jonge (1996) and Krumm (1999). Described stakeholders are: the policy maker with a strategic perspective on real estate; the controller with a financial perspective; the users with a functional perspective and the technical managers with a physical perspective. These stakeholders are distinguished in four quadrants, either with a focus on the institution or real estate and on the strategic or operational level.

Stakeholders have a direct interest in the organisation. Their interest in the organisation's real estate, however, is indirect. A patient's interest in good quality healthcare has consequences for the real estate, although their primary interest remains in good quality healthcare. In order to provide that good quality healthcare, an appropriate physical environment is necessary. Patients go to a hospital to get treated for their illness, specialists go there to treat their patients and healthcare professionals go there to assist in the patient's treatment. The main interests of these stakeholders are related to these activities. From these stakeholders' organisational objectives, one can formulate perspectives on real estate.

The pace and direction of the contextual changes of hospitals depend on two conditions. The first condition is sound governmental steering instruments and policy, described in the previous chapter and summarised below. The second condition is the expected behaviour of key actors in the sector: patients, healthcare professionals, hospital administrators, insurance companies and banks. Besides the position of the government as stakeholder, the position of these stakeholders is assessed further in the following section of this chapter.

§ 3.1.1 Government

The government has the constitutional duty to provide accessible, affordable and qualitatively good healthcare. The government fulfils this duty by establishing the rules between patients, healthcare providers and health insurers with laws and regulations. In the Netherlands, the government has a regulatory and controlling role, leaving the execution to private health insurers and private hospitals. In order to ensure better healthcare and control cost, healthcare is organised as close as possible to the patient. In achieving this, the government has focused on different aspects (KPMG, 2011):

- The introduction of performance based funding, which makes demand driven healthcare possible and reduces the disadvantages of the current supply-controlled healthcare. This implies for hospitals that only a limited part of their budget consists of a fixed fee. For the most part of the budget, hospitals have to negotiate with insurers on price and volume.
- More freely negotiable tariffs, in 2011 34% of the treatments were freely negotiable between hospital and health care, in early 2012 this increased to 70%.
- Expanding health insurance coverage, more treatments are covered by health insurance, such as mental health which was transferred to the Health Insurance Act (Zvw) in 2009.
- Increased risks to providers and insurers, the government has encouraged a regulated market in healthcare which transfers the risks for capacity and costs to providers and insurers.
- Improving the transparency of healthcare quality. A new quality institute introduced by the government provides more transparency about quality, effectiveness and appropriate use of health care in the Netherlands. Quality standards will be developed and transparency created by measuring and publishing results.

Regarding real estate, the government transferred her interest and responsibility to the healthcare institutions. Deregulation of healthcare real estate investment makes hospitals individually responsible for their real estate. The consequence is that real estate related risks have shifted from governmental public authorities to private hospital organisations. Another consequence is that the government has no longer a direct influence on the capacity of healthcare infrastructure.

§ 3.1.2 Patients

From the patient's perspective good healthcare requires availability of healthcare close to the patient's daily environment if possible and far away if concentration of expertise makes this necessary. Another way of improving healthcare from the patient's perspective is breaking up the echelons of care. Resolving the strict division into primary and secondary healthcare makes that patients need to go to a hospital less often, as more treatments can be executed by General Practitioners. Professional healthcare can be substituted by self-management due to the potentials of e-health. All of the above described developments are supported by publicly available quality standards which lead to the provision of care which conforms with the standards issued by patients and professionals. This allows patients to opt for certain types of healthcare providers, in which a patient's choice eventually focusses on the healthcare professional rather than on the institution (RVZ, 2011).

Patients have no direct interest in the hospital's real estate but the building can be a factor in determining the patient's choice for a specific organisation. The quality of care is the priority when making this choice, although the way in which the accommodation contributes to providing proper care can be an important issue. From the patient's perspective, ensuring healthcare as nearby as possible, and far if necessary also requires an accommodation strategy that supports this objective.

§ 3.1.3 Healthcare professionals

Healthcare professionals can be subdivided into General Practitioners (GPs) as gatekeepers of healthcare, medical specialists and nursing and medical support staff. The relationship between medical specialists and hospitals is set to change substantially and different directions are conceivable, such as the employment of medical specialists by the hospital organisation, financial participation in hospital organisation, or development towards a fiscal organisation (KPMG, 2011).

Medical professionals are increasingly organising themselves horizontally, often disease-oriented in regional healthcare networks. In addition to considerations regarding medical issues, the requirements for higher minimum volumes per operation play a stimulating role. This is also strongly stimulated by social media. Internet communication leads to a 2.0-professional who has intensive and interactive relationships with patients and colleagues and a looser relationship with the hospital.

Real estate is an essential production factor for specialists and healthcare professionals. For them, the accommodation is the daily physical environment in which they deliver care to their patients. The way the building supports them in their work helps to determine the choice of, and commitment to, the hospital organisation in which they wish to work. From this perspective, it is expected that specialists, as one of the key internal stakeholders, will exploit their power and opportunities to influence the design of this physical environment.

§ 3.1.4 Hospital administrators

Regarding strategic real estate investment decisions of the hospital organisation, the CEO as the main hospital administrator is the person who has to balance the interests of all the stakeholders. This means that many of the decisions on real estate investments are ultimately taken by the hospital's directory board.

Hospital directors are faced with the behaviour of patients and health professionals. They also see that the demands and preferences of patients change. At the same time they are confronted with increasing financial risks due to the combination of governmental policy and the hospital's financial position (see also chapter 2). It is clear that risks for hospitals increase. There is an accumulation of risks, while the predictability decreases. All this requires more strategically oriented investment decisions and a business strategy in which choices are made in production range, enhancing distinctiveness, reducing costs and spreading risks. Every individual hospital's context (competitiveness, financial position, size and performance) therefore requires specific behaviour (RVZ, 2011).

§ 3.1.5 Health insurers

The role of health insurers in the healthcare system is that they sell insurances on the one hand and on the other hand have to purchase qualitatively good and cheap healthcare for their clients. There are two reasons that makes it plausible that the focus will shift to purchasing qualitatively good healthcare, and so fulfil their role in the system logic of the Health Insurance Act (Zvw). Firstly, health insurers are becoming increasingly cost-consciousness due to increasing business risk. Secondly, pressure from the political world on insurers to contribute to the sustainability of the system is increasing. Insurers have to prove their value in the system. As a consequence, insurers are guided by the preferences of their clients. The insurers' goal is to create synergies between healthcare insurance market and healthcare demand market. This is done by selectively purchasing healthcare in addition to sending their policyholders to preferred suppliers. Therefore, the insurers' focus is on strengthening alliances with primary care and prevention; healthcare according to pre-determined standards, shifting from healthcare in large-scale real estate to the first line; concentrating high complexity / low volume surgery (RVZ, 2011).

From the perspective of health insurers, real estate is the responsibility of the healthcare organisations. Provided that regional continuity is not compromised, the primary interest of insurers is quality and affordable healthcare and not the funding of investments in real estate. Therefore, health insurers, who annually have the opportunity to negotiate new contracts with healthcare suppliers, do not easily make long-term agreements with hospitals. This complicates the financing of a long-term investment in hospital real estate. As a consequence the healthcare organisations have no assurance that long-term real estate investments in healthcare facilities can be reimbursed from healthcare production.

§ 3.1.6 Financers

Traditionally, banks are the financiers of real estate investments in healthcare. Since accommodation expenditure is an integral part of performance based funding, banks as investors in hospital real estate are more cautious due to the increasing risks. Besides, rapidly increasing specialization of hospitals means that real estate is becoming less generic and more specific. This has an impact on the future usability of real estate. Therefore, banks are increasingly critical in their assessment of applications for the financing of large-scale developments in hospital real estate.

§ 3.2 General context

§ 3.2.1 Legislation

The political context of the hospital sector is described in detail in chapter 2. This section summarises the consequences for individual hospitals. Although regulation in the Dutch healthcare system seems to be inconsistent, there is a continuity of objectives visible. Trends that are visible are increasing competition in the cure sector, increasing responsibilities for hospitals as a consequence of real estate decisions, empowering CEOs in their position towards medical staff and more transparency in the quality of healthcare organisations, products and services.

Increasing competition is a result of the new Healthcare Insurance Act (Zvw) and is visible in the increasing B-segment with free negotiable tariffs and production. Another consequence of the Zvw is the changing relationship between patients, insurers and healthcare suppliers. Once a year patients can choose an insurer and when a consultation or treatment is necessary they can choose the hospital. Insurers are allowed to steer patients to preferred suppliers, but patients are not obliged to follow these suggestions. This means that hospitals can compete with each other for the patients and this also results in increasing competition between hospitals. As a consequence the level of production for a hospital is not as predictable and secure as it used to be.

Including capital costs in tariffs of Diagnose Treatment Combinations (DBC's) and the termination of the regulation of building have contributed to increasing the hospital's responsibility for the consequences of their real estate decisions. Instead of a fixed and guaranteed budget for real estate costs, hospitals have to reimburse their investments with the production of healthcare products and services.

Insecure production in a competitive market and increasing risks on real estate investments make it necessary for hospital's CEOs to have a clear vision for the organisation. This means strengthening the position of CEOs towards the medical staff. The integration of specialists' honoraria in the hospital budget in 1994 -1995 and the inclusion of the specialists' honoraria in the DBCs in 2006 are examples of greater empowerment of CEOs' decision making.

Increasing transparency of prices and quality is necessary in any kind of market. The introduction of the DBC system, the obligation for yearly reports on the quality of the delivered healthcare and the annually published performance indicators are examples of this increasing transparency of hospital healthcare.

In 2010 a government study suggested that alteration of the healthcare system had contributed to the realisation of public objectives (inspectie der rijksfinanciën, 2010). Accessibility had been approved and efficiency had increased. The question arose as to whether the collective affordability was not threatened because recent reforms were mostly focussed on efficiency. The study concluded that, with elements of the (former) budgetary regulated A-segment still present alongside the newly deregulated B-segment the Dutch healthcare system was in a transition phase. New governmental policy seemed to have incorporated elements of both systems with no clear vision of the preferred ultimate end situation. The cure sector seems to be '*stuck in the middle*' between healthcare capacity regulation and a regulated market system. This situation is described as particularly difficult for hospitals that are expected to make long-term investment decisions, given an insecure future (inspectie der rijksfinanciën, 2010).

§ 3.2.2 Economy

Since the termination of real estate investment regulation and the accompanying governmental guarantee on real estate investments in 2008 Dutch hospitals have themselves become responsible for the risk on the return of investment in real estate. From that moment on, the financial position of a hospital organisation is one of the factors that has influenced the access to financial credits for necessary investments in real estate. The financial solvency and liquidity of hospital organisations have become more important in a period where the banks are hesitant to grant credits due to the credit crisis. Since 2008 a benchmark of the financial results of hospitals in the Netherlands has been published annually by BDO Branch Group Healthcare (BDO Branchegroep Zorg, 2009, 2010, 2011, 2012).

In these reports the financial situation of hospitals is assessed, based on the previous year's report. Table 11 lists the financial position of general hospitals in the Netherlands. The UMCs (University Medical Centres) are excluded from this table as

they have a different financial construction for real estate. The increase in depreciation charges from € 840 million in 2008 until € 1.08 billion in 2011 is clearly visible. This is mainly caused by newly built hospitals and the related increase in repayments. Capital costs (repayments and interest) have a relatively low influence on the overall result, even though real estate is by far the largest post on the balance sheet. This is a consequence of the large proportion of Human Resources in the production of healthcare.

financial results hospitals 2008 until 2011		2008	2009	2010	2011
revenue	billion €	11.25	12.08	13.33	13.15
total balance sheet	billion €	12.80	13.20	13.35	13.21
equity	billion €	1.33	1.59	1.92	2.17
result	billion €	0.12	0.21	0.26	0.25
operating expenses	billion €	10.84	11.60	12.82	12.66
depreciation charges	billion €	0.84	0.94	1.56	1.08
intangible assets	billion €	8.07	8.42	8.68	9.07
percentage assets from total balance sheet	assets / total balance sheet * 100%	63.00	63.76	65.02	68.66
resistance	equity / revenue * 100%	11.87	13.15	14.40	16.50
solvency	equity /total assets * 100%	10.40	12.00	14.00	14.90
income ratio	result / revenue * 100%	1.10	1.76	1.94	1.89

Table 11 Financial position of general hospitals in the Netherlands 2008 - 2011.

§ 3.2.3 Society

Being healthy and healthy growing old is becoming increasingly more important in society (RVZ, 2010). The consumers of healthcare are therefore becoming more critical about healthcare supply. This attitude increases demand on healthcare services and leads to an intrinsic increase in production.

In contrast to an exogenous increase of healthcare production caused by a demographically aging society, the intrinsic increase in production is a result of cultural changes in society. At the same time, developments are hampered by the insufficient human and financial resources, which results in a demand which is greater than the available supply. The consequence is a quantitatively and qualitatively changing demand: healthcare demand does not only increase but also changes in character.

This change of character is caused by demography (aging society), epidemiology (more chronic diseases) economy (increasing standard of living) and culture (education and access to information by using different media). For example, the accessibility of information on the internet increases patients' countervailing power in their relationship with a medical specialist. Another example of a changing demand is that patients relate healthcare expenses to the profitability of personal health. Increasing insurance premiums enforces this cost-effect judgment even further.

To summarise, the view of healthcare over the coming years is one of substantially increasing but at the same time changing demand; more medical possibilities alongside patients' knowledge of these possibilities; critical patients chasing a healthy life and too little human and financial resources slowing developments down.

§ 3.2.4 Demography

The Dutch population is aging: a larger group is aging, while the average birth rate is decreasing. Life expectancy is increasing faster than healthy life expectancy, which implies that a significant number of the years that people are living longer they are not in good health (RVZ, 2011). Figure 13 shows the demographic development in the Netherlands from 2010 until 2050.

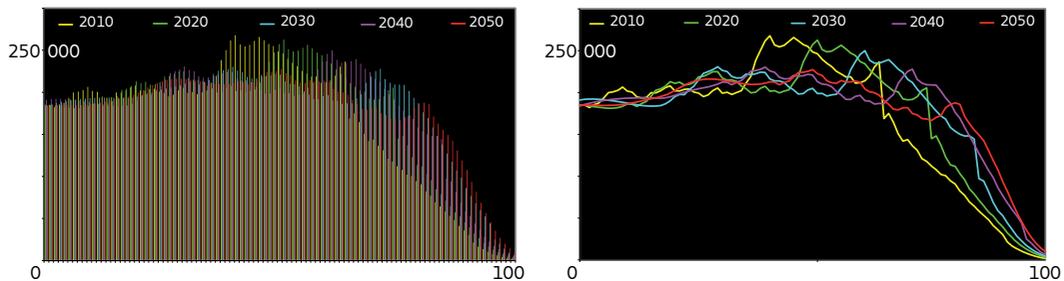


Figure 13 Demography of the Netherlands 2010-2050 (source: CBS StatLine, 2012, adapted by author). The horizontal axis represents age from 0 to 100 years, the vertical columns in the diagram on the left represent the amount of persons of that age (male and female). The lines in the diagram on the right is the cumulative number of persons according to age in each decade..

Classically with life expectancy, the length of life is considered and not the quality of life. Very often, part of life is spent in poor health. Increase in life expectancy as a result of improved survival of the elderly is associated with an increase in chronic diseases and disabilities.

In the 1970s, healthy life expectancy was developed as a new health indicator. This indicator combined the classic life expectancy with health status. In 1984, a group of experts proposed a model, which distinguishes life expectancy, healthy life expectancy and life expectancy without chronic illness. There are several ways in which healthy life expectancy can be determined. In the Netherlands, the Central Office for Statistics (Centraal Bureau statistiek: CBS) uses three ways: (1) life expectancy in perceived good health, (2) Life expectancy without chronic diseases and, (3) life expectancy without disability (CBS, 2011). Figure 14 shows the experienced health according to age in the Netherlands.

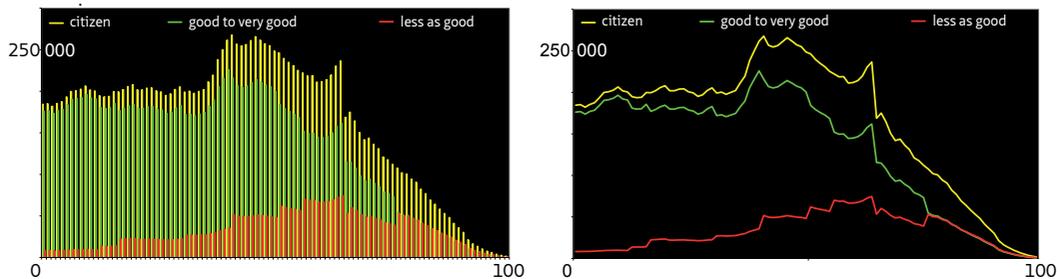


Figure 14 Experienced health 2010 (source: CBS StatLine, 2012, adapted by author). The horizontal axis represents age from 0 to 100. People under the red line in the diagram on the right are feeling less than good, people above the green line qualify their health as better than very good.

It is estimated that half of the increase in life expectancy is not in good health which means that there is an increase in the number of years that people make use of healthcare. Healthcare costs therefore increase with age. As age increases, the costs covered by the Health Insurance Law (Ziektkostenwet: Zvw) increases steadily, the costs for elderly care (AWBZ) rise exponentially from the 70th year of life and thus the total healthcare costs (KPMG, 2011).

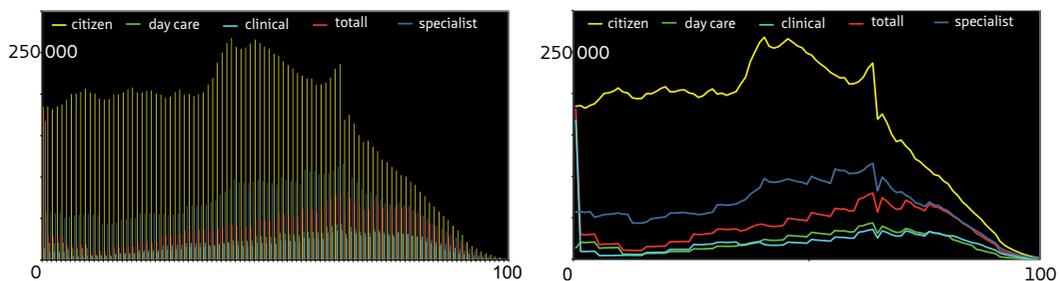


Figure 15 Use of hospital facilities 2010 (source: CBS StatLine, 2012, adapted by author). The horizontal axis shows the age, the vertical axis the use of hospital facilities (day care, clinical, total and contact medical specialist).

Figure 15 represents the use of hospital facilities in the Netherlands according to the age of the citizens. Compared to Figure 14, one can see that the individual perception of health as less than good appears to be an appropriate criteria for the total use of hospital facilities.

It is expected that in the coming years the demand for healthcare will increase as the Dutch population ages and life expectancy increases, implying that older people will make use of healthcare for a longer period of time. As people get older, demand for care increases. Moreover, healthcare demand is also changing: there are more chronic diseases and more people with simultaneously multiple disorders (comorbidity) (RVZ, 2011). Figure 16 shows the number of nursing days according to the age of the citizen in the Netherlands.

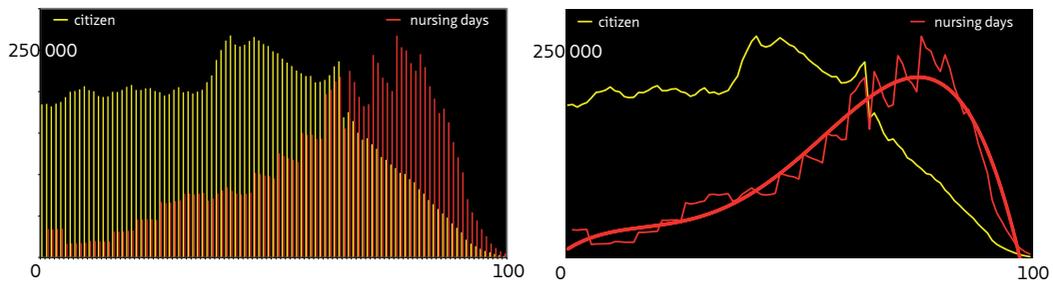


Figure 16 Nursing days 2010 (source: CBS StatLine, 2012, adapted by author). As in all previous graphs, the yellow lines represents the number of citizens. The red line in this diagram represents the average number of nursing days per age.

If the current nursing days according to the age of the citizens (Figure 16) is multiplied with the demography from 2010 until 2050 in the Netherlands (Figure 13), a prognosis can be made of the number of nursing days hospitals will require in the coming four decades. This is illustrated in Figure 17.

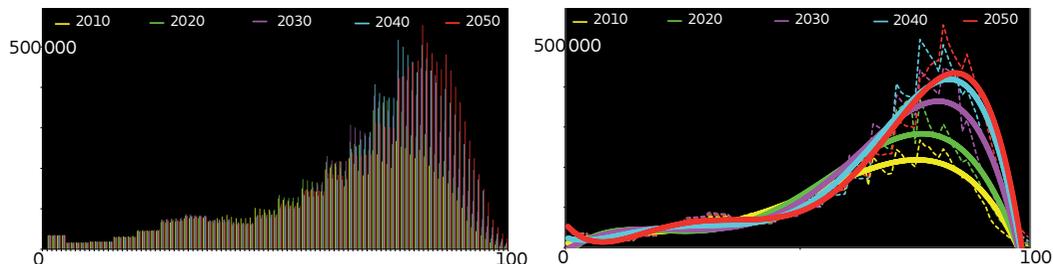


Figure 17 Nursing days 2010 multiplied with demography 2010-2050 (source: CBS StatLine, 2012, adapted by author). The yellow line represents the nursing days in 2010 and the red line is the projected number of nursing days in 2050 if nothing changes in policy or the use of healthcare facilities.

One of the complications is that in the same period the available workforce will shrink due to an aging society, leading to labour shortages. It will therefore become more difficult to recruit staff who can satisfy the increasing demand for care. On the other hand, aging and the outflow of healthcare professionals from the labour market will increase in the foreseeable future. The combination of these factors could lead to a shortage of medical staff in the coming years (CBS, 2011). Figure 18 shows the workforce compared to the elderly. This diagram shows that in 2010 there are 4 working people for each elderly person. In 2040 this has decreased to 2 working persons for each person over 65 years old.

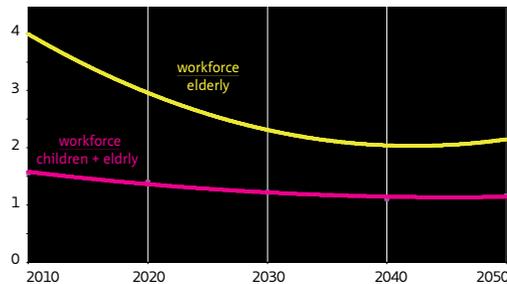


Figure 18 Workforce compared to elderly and children 2010-2050 (source: CBS StatLine, 2012). The yellow line is the workforce in the Netherlands compared to the elderly, the purple line represents the workforce compared to children and elderly.

Between 2010 and 2040, the number of people nationwide over 65 will increase from 2.4 million to 4.6 million. Between 2012 and 2016 the first group of baby boomers retires, there will be half a million people over 65. The percentage of elderly people in the Netherlands increase from 15% of the population in 2013 to 26% in 2040. The potential labour force will start to decrease nationwide from 2011 onwards, from 2025 the decline will increase. Between 2010-2040 the potential labour force will decrease by nearly 900,000 people alongside an increase in the total population of over 800,000 people. The demographic pressure - young plus elderly versus the potential labour force - is mainly determined by the increase in the number of elderly people, and much less by the decrease in the number of young people (van Otterdijk, 2011).

Moreover, the proportion of registered nurses over 50 sharply increases. In 1999, 16% of the nurses were 50-plus, in 2008 this proportion had risen to over 35%. This proportion is also higher than the entire Dutch population, of which over 29% is older than 50 years. The workforce of nurses is aging faster than the average workforce in the Netherlands. In 2008, there were 5,590 nurses aged between 60 and 65 in health care and who will retire in the period up to 2013. Conversely, an influx of more than 6,000 nurses is expected, but not all of them will work in the healthcare sector. The next cohort, that of nurses aged between 55 and 60 in 2008, however, includes 19,600 nurses working in health care who will retire in the next 10 years (CBS, 2011).

The retirement of the nurses currently above 50 in 10 to 15 years could lead to problems with the available human resources. This means that in addition to the influx of new nurses, the efficiency of the available workforce and increasing productivity of nurses working in health care needs to take place (CBS, 2011).

Healthcare and the welfare sector is one of the largest employment sectors in the Netherlands with over a million jobs (16% of total employment) and has the largest volume growth (three times higher than the national average). Investigations by CBS and Prismatic predict that in 2025 a quarter of the population will be employed within healthcare to meet the rising demand for care (Prismatic, 2008). The tight labour market will lead to an increase in wages. This also increases the need for labour-saving innovations in healthcare (KPMG, 2011).

§ 3.2.5 Technology

Another important factor resulting from the general context in the hospital sector is technological developments that bring medical science rapidly to a higher level. Better treatment is available for diseases, digitization continues and diagnoses are more precise. The flip side of the coin is that technological developments also lead to an increase in the provision of healthcare and thus an increase in demand and cost (CBS, 2011; KPMG, 2011). This is firstly because medical developments make more treatments possible. Health comes first: if treatments are possible, people want to be treated. Second, medical developments make it possible to treat diseases that previously were life threatening, which increases chronic healthcare. In summary, technological developments provide many benefits and opportunities, although these developments also lead to an explosive rise in healthcare costs (KPMG, 2011).

Developments in medical technology are described as P4 Medicine: Personalized, Predictive, Preventive / Pre-emptive, Participatory. Personalized medicine focuses on an integrated diagnosis and treatment alongside prevention of disease for individual patients. There is a shift from medicine focused on standard treatments using generic drugs to individual operations in which the individual genetic predisposition stands central. Predictive medicine is concerned with determination of the a priori probability of a given disease and taking the associated preventive measures. The goal is to prevent disease or reduce the chance of it occurring. Preventive medicine focuses on early diagnosis and early intervention, even before the clinical signs are visible. Pre-emptive medicine focuses on the prevention of diseases instead of curing or treating symptoms. Participatory means that the role of patients changes through the available information and technology (Hood & Friend, 2011).

Within the foreseeable future, in particular the developments in the field of ICT will have a major impact on the way hospitals in the Netherlands are organised. Firstly, many medical innovations are much more gradual in nature and mainly affect what happens in the consulting or treatment room, but less on where or by whom. Secondly, and this is perhaps the main reason, ICT is not about the technology of tomorrow, but about the use of technologies that are available today.

Developments in medical technology reinforce the need for the concentration of hospitals. This need may be financial, such as capital-intensive diagnostic equipment or expensive treatment infrastructure, or motivated by the increasing demand for quality due to increasing experience through concentration. In contrast, the above described developments in ICT also allow the decentralisation of healthcare to the environment of the patient. Hence both concentration and decentralisation is possible on the basis of necessary expertise, experience and necessary infrastructure in each specific phase of diagnosis or treatment.

§ 3.3 Future scenarios

According to the background study 'Hospital Landscape 20/20: No Man's Land or Dreamland (Ziekenhuislandschap 2020, niemandsland of droomland) by KPMG (2011), the Dutch hospital landscape in 2020 as a whole (in numbers, types, dependencies) is mainly determined by three major movements:

- Neighbourhood health: shift from healthcare in the second and third echelons to locally organised healthcare in the first echelon. This movement offers great advantages in quality and cost but in practice also encounters significant barriers.
- Portfolio choices: concentration and distribution of hospital care. Again both the potential and the practical obstacles are large. Current practice does not offer much perspective.
- Risk capital: there will be more private capital (through equity) in healthcare, but how and where can differ greatly. Different investors have different business models that lead to different investment options. It is clear that if the regular supply is better organised, private investment becomes less attractive.

In the background study by KPMG (2011), the decentralisation of healthcare to neighbourhood health centres and the degree of centralisation of highly specialised care in the Netherlands results in four possible future scenarios. The current situation

and the four future scenarios are described as: Today land, No Man’s Land, Dreamland, Far away land and the Land of Islands.

“For the achievement of optimum high quality and optimally low costs, two major movements are essential: a maximum move to healthcare nearby on the one hand, and a maximum move to the concentration of specialised medical care on the other hand” (KPMG, 2011). The guiding idea is that care is supplied as close as possible to the patient’s daily environment and only organised further away for quality or efficiency reasons. This goal can be achieved through decentralisation, as high volume / low complexity medical healthcare can be offered in the first echelon. However, for more complex and low volume medical care, specialisation – and thus concentration – is necessary in order to develop and maintain knowledge and skills. (RVZ, 2011).

No Man’s Land or Dreamland (KPMG, 2011)

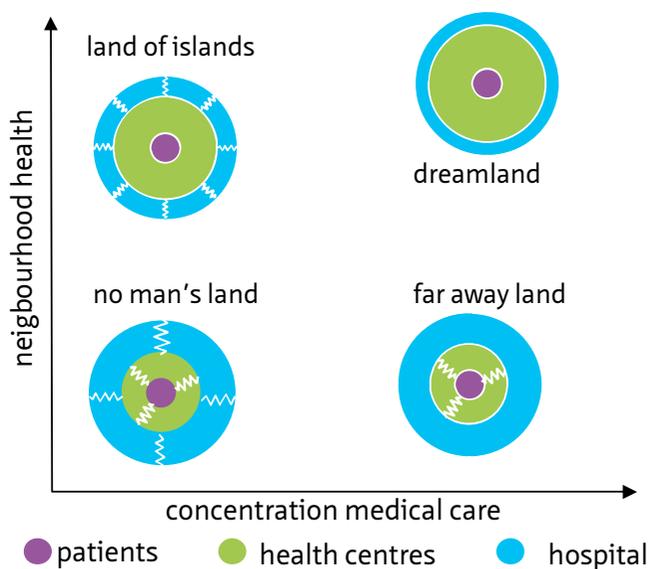


Figure 19 Four future scenarios for the hospital sector (KPMG, 2011).

Today land is the current situation where not much medical healthcare is offered close to the patient’s daily environment, there is little concentration and dispersion so there is great potential for gains on cost and quality. There is also little risk-bearing of the capital and commercial care within the basic health insurance package.

No Man's Land is the situation where both decentralisation of health and concentration of highly specialized care is not established. In this situation, there is still little care offered nearby and there is fragmentation and disintegration of the hospital. The result is that few cost and quality gains are realised, thus there is ample opportunity for venture capital and commercial care within the basic package. In this situation, a clear direction is lacking, cooperation is difficult and venture capital brings the structure that the mutual parties themselves are not able to achieve.

In **Dreamland** both the decentralisation of healthcare in neighbourhood health centres and the concentration of highly specialized medical care is achieved. Therefore, a wide range of healthcare is organised around the patient. For specific interventions patients are willing to travel further away to well-organised large hospitals where the best care and quality of this intervention is delivered. This makes it possible that both cost and quality gains are achieved and there are few opportunities for venture capital and commercial care.

Far away land is the scenario where the concentration of hospitals is successful, but neighbourhood health centres are hardly realised. Healthcare is orderly and efficient, but lacks the great opportunities associated with healthcare closer to the patient daily environment. This leads to reasonable cost and quality gains and limited opportunities for commercial care.

Land of Islands occurs when General Practitioners (GPs) manage to get their practices in order to create healthcare centres in the neighbourhoods, but hospitals do not want to participate. Some healthcare is organised around the patient, but the connection with hospitals is not optimal because the hospitals, and therefore the healthcare offered, are fragmented.

“It is not difficult to imagine the ideal landscape, the giant and difficult step is to get there. Whether or not serious dispersion and concentration in the hospital landscape succeeds is crucial. If that fails, it is also very difficult to establish high-density neighbourhood health centres (KPMG, 2011).”

.....

In the described future scenarios, neighbourhood health centres are the new gatekeepers of health care and are the hospitals' outposts. Specialised knowledge must be available in and around this gateway, due to the importance of the early detection of chronic diseases. The role of GPs here is threefold: to distinguish the medical / non-medical complaints of patients, first integral screening, medical care in a broad sense and the coordination of the medical process (medication). Nurse specialists are case managers for the chronically ill. The medical specialist is available in the vicinity for

medical consultation and additional diagnostics in case of complications. Conversely, medical specialists make much more use of the knowledge of the GP (RVZ, 2010).

The concentration of medical expertise could lead to 40-60 networks of specialized medical knowledge centres in UMC's and top clinical hospitals in the Netherlands. These networks coincide with ICT-driven cores for intensive care. These networks are increasingly digitalized and are seamlessly connected to the gatekeeper function of the healthcare sector through outpatient facilities. In this healthcare context location and distance have less meaning and the importance of real estate will decline.

This shift of second- and third echelon to the first echelon in neighbourhood health centres, requires a different way of working, and new collaborations between general practitioners, nurse specialists and medical specialists. The opportunities provided by Information and Communication Technology (ICT), such as videoconferencing and digital diagnostics, are enormous (RVZ, 2010). Developments in the field of ICT will soon have a major impact on the healthcare landscape through the application of technologies available today (Duchateau & Vink, 2011).

This shift is a trend that has already occurred within the walls of some hospitals. The medical specialist has exchanged his own combined work-consult and treatment room for a patient-oriented consult and treatment room, together with a back office workplace for the specialist. The back office is the area for preparation and coordination of healthcare that is performed wherever possible by nurse and medical specialists. The next step is that the consult and treatment rooms are placed outside the walls of the traditional hospital in neighbourhood health centres, connected by ICT to the core hospital. This new way of working is essential for the establishment of good cooperation within the network hospitals.

The real estate of general hospitals will pursue these scenarios in two directions: concentration in large hospitals and decentralized health centres.

On the one hand there will be a concentration of medical specialties and high quality medical technology around major hospitals. According to the study of the RVZ (2010) approximately 40 to 60 hospitals are needed in the Netherlands. The real estate of these locations is largely owned by the institutions and will be amortized over the useful commercial lifespan of the building, due to the specific requirements that medical processes impose on real estate. Because these core hospitals are focused on patients in the region and beyond, these locations are easily accessible at regional sites, near roads and mostly outside the city centres and residential areas.

On the other hand, neighbourhood health centres in residential areas are being realised, near shopping centres, schools and other public facilities with diverse usability because these centres also offer accommodation to General Practitioners and paramedics.

In these health centres, the demand of medical processes on real estate is less specific than the large scale hospital locations. This kind of real estate can therefore be more generic, allowing more possibilities of future alternative usability. Depreciation of real estate can be based on the economic lifespan of the building, which is longer due to possible alternative usability. Health centres may therefore become suitable real estate investment projects for investors in the near future. Hospitals are already utilising such locations as outpatient clinics.

§ 3.4 Trends

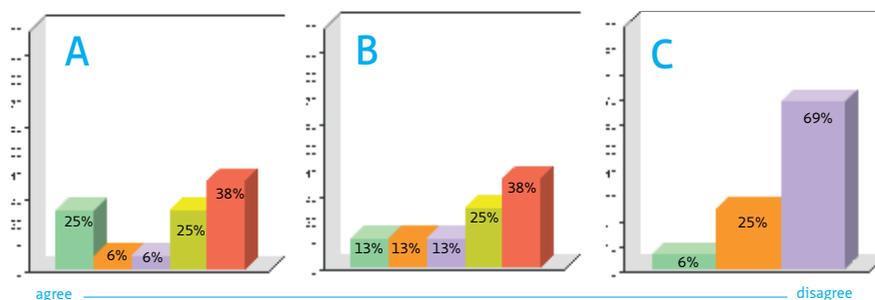
As a result of the social, demographic, technological and medical developments, different future scenarios are becoming visible in the hospital sector. This has important strategic implications for the accommodation of hospital organisations. To gain more insight into this subject, a survey was distributed among directors, real estate managers and project managers of hospitals in the Netherlands. The questions focused on the developments that determine future scenarios for specialised medical care, as recently described in reports of the Council for Public Health and Health Care (Raad voor Volksgezondheid en Zorg: RVZ). In these future scenarios, important strategic choices on the level of the hospital organisation are labour-saving innovation and centralization versus decentralization of hospital locations.

The questionnaire was sent to 80 different hospital organisations with a response rate of 20%. The respondents consisted of members of the Board of Directors (3), construction project managers (6) and real estate / facility managers (7). Among the respondents there are 3 University Medical Centres (UMC), 3 large top clinical hospitals, 5 medium sized hospitals and 5 small general hospitals. Regarding different characterisations of the institutions (large, medium, small, general, top clinical, academic), the spread of the institutions that responded to the questionnaire is comparable to the national average.

§ 3.4.1 Concentration of specialised medical care

From the answers to the questions regarding concentration of highly specialised medical care, it appears that the majority of respondents expect that in 2025 patients will have to travel further for specialised healthcare (Figure 20 A). An equally large proportion of respondents expected that in 2025 their hospital will consist of a highly specialised central hospital with multiple decentralised consultation and treatment centres (Figure 20 B) and the vast majority of respondents indicated that market forces in healthcare have created pressure to make choices in their portfolio of specialised medical care (Figure 20 C).

While the reports of the RVZ indicated that the number of independent hospital sites in 2025 is expected to decline from about 90 to about 40, the perspective of the respondents is divided on this issue. An equal number of respondents (6 of the 16) expected the number of hospital sites in 2025 to be half the current number as expected that this would not happen.

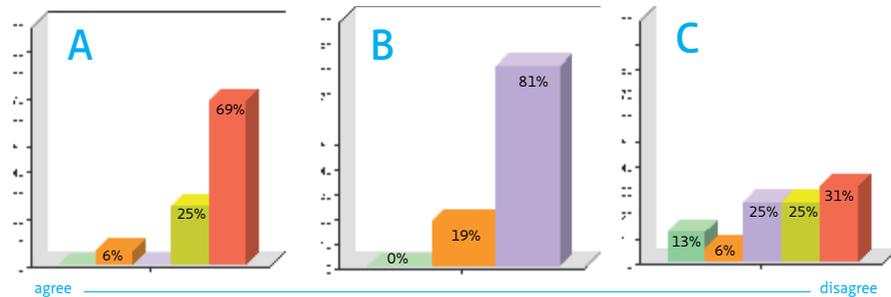


- A) Patients have to travel further for specialised medical care in 2025.
- B) Hospitals in 2025 are highly specialised and centralised with decentred consultation centres.
- C) Market forces result in hospitals making choices in medical specialised healthcare.

Figure 20 Concentration of specialised medical care.

§ 3.4.2 Decentralisation of consulting / treatment centres

Nearly all respondents expect that medical specialist consultations will be held in decentralized consult/treatment facilities (Figure 21 A) in 2025. An almost equal proportion of the respondents regarded it in the interest of the hospital to work with local GPs to realise decentralized consult/treatment facilities (Figure 21 B).



- A) It is in the hospital's interest to cooperate with GPs to realise decentralised medical centres.
- B) Medical specialists have consultancies in decentralised medical centres.
- C) Low chronic healthcare will be mainly carried out by GPs in 2025.

Figure 21 Decentralisation consultation / treatment centres.

A similar percentage of institutions expected to be involved in implementing decentralized consult/treatment facilities over the next 10 years and indicated that it would participate in GP initiatives for this purpose. Renting spaces is perceived as a real option. Most of the institutions that expected to be involved in realising decentralized consulting/treatment facilities in the next ten years considered it likely that these rooms would be rented. To summarise, most institutions expect that in 2025 their hospital will consist of a central hospital location with decentralized consulting/ treatment facilities.

Intensifying the cooperation between hospital and GP is seen as one of the options in order to cope with the demographic decline in the number of nurses. A slight majority of respondents expects that low chronic medical care will mainly be carried out by GPs in 2025 (Figure 21 C).

§ 3.4.3 Organisation of medical specialised care

Different answers are given by the respondents on the question of which developments are most likely to be applied to cope with the demographic decline in the number of nurses. Striking is that the solutions related to Information and Communication Technology (ICT) are considered highly important (Figure 22 A). This includes ICT in work processes, Electronic Patient Records (EPR), e-consultation and e-medication.

The possibilities that ICT offers to reduce the administrative burden in the workplace environment is also seen as an opportunity. The second category of possible developments highlights HRM-related policies such as recruitment and selection and task specialisation of nurses (Figure 22 B). After that, intensification of the cooperation with GPs is considered as a viable option to cope with the demographic decline in the

number of nurses (Figure 22 C). Technical solutions in the hospital building, such as robotics and automation of logistics are considered less important solutions to the problem (Figure 22 D).

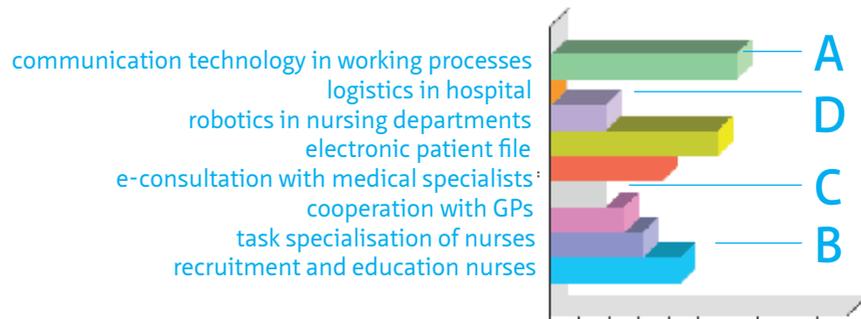


Figure 22 Potential developments in healthcare to cope with the demographical decline of workforce of nurses.

Three quarters of hospitals indicate that they utilise a new way of working, separating the front and back office, although only one-third felt that this separation functioned to such an extent that consult-/treatment rooms could be outside their own hospital building. When asked whether this separation is a prerequisite to realising decentralized consult-/treatment centres, the answer is evenly distributed.

§ 3.4.4 Expectations regarding hospital accommodation

Regarding their accommodation, almost 70% of the institutions that responded to the questionnaire indicated that they are sufficiently prepared for the growing and changing demand of healthcare. All the hospitals which indicated not being sufficiently prepared for this change, are involved in recent or upcoming construction and / or major renovations. There is an almost equal distribution between new construction, renovation and new construction in combination with renovation. Four-fifths of the institutions are expected to be involved in the realisation of decentralised consult/treatment centres over the next 10 years and indicate that they will participate in GP initiatives for this purpose. Renting space is seen as a real option by most of the institutions. Hospitals that expect to be involved in these projects consider it likely that these rooms will be rented.

§ 3.5 Context-mapping

Based on the review of reports on developments in the hospital sector, the conceptual model of the context of an organisation as presented by De Vries (2007) can be adapted to the hospital sector. The first alteration is to perceive the organisation as a black box with its own hidden structure and processes. This makes the model more oriented to the context around the organisation in terms of describing the influences on the organisation. The second alteration includes scenarios for the future and trends that are visible in the hospital sector. These trends and scenarios describe the way hospital organisations react to the developments in the general context. In the general context of hospitals, one important factor to be added is technology because of the large influence it has on both healthcare processes and costs. The last alteration is separating the stakeholders into internal and external stakeholders. Internal stakeholders are directly related to the primary process of healthcare delivery. External stakeholders are more positioned outside the organisational context.

§ 3.5.1 Model for context-mapping

In Figure 23 the adapted conceptual model for the hospital context is presented. Context-mapping is a tool that can give insight into the complex context in which hospitals make decisions about their accommodation. Context-mapping makes it possible to describe and analyse contextual factors related to these accommodation choices.

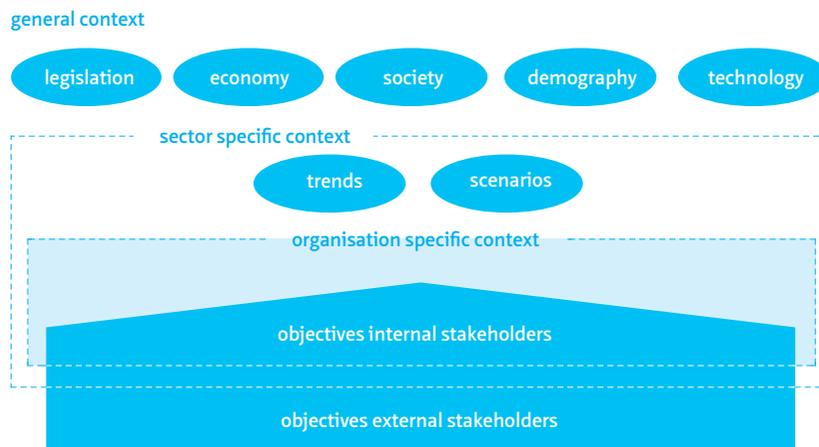


Figure 23 Model for context-mapping.

From the perspective of the Dutch government, health insurers and banks, real estate is the responsibility of the hospitals. Therefore, the responsibility for the repayment of investments in hospital real estate is in the hands of the hospital's board of directors. This makes the CEO of a hospital the central stakeholder who has to balance and take into account all the different interests of both the external and internal stakeholders. Within the hospital organisation, the hospital board has to cope with an organisational structure in which the medical specialists have great influence on the primary process (this is further described in chapter 4). The demands of patients also have to be taken into account as they themselves can choose the hospital where they want to be treated. Besides qualitatively good healthcare, the physical environment is one of the factors that patients use to determine their choice. It is the hospital board who has to balance all these different interests.

Besides these stakeholders' interest, political, economic, societal and demographical developments result in an increasing and changing demand for healthcare. Demand for healthcare increases due to an aging society, medical technological developments that make more treatments possible and a society in which health is perceived as one of the most important aspects of life. Demand for healthcare changes are mainly due to the increasing life expectancy, which results in more co-morbidity and chronic diseases. The increasing and changing demand for healthcare means that the hospital sector is a growing market in which the question arises as to whether the necessary healthcare can be provided in the future. This holds especially true considering that the number of medical- and healthcare professionals is decreasing, due to an aging workforce. This increases the demand for labour-saving innovations in hospitals.

Despite the low number of respondents in the survey (16), some trends are visible within the hospital sector. In addition, the perception of the developments within the hospital sector can be seen alongside future scenarios and where, according to these decision makers, medical care will be supplied within the foreseeable future. The survey among hospital CEOs and real estate project managers describes the two developments that are the basis for the four future scenarios as presented by KPMG (2011). On the one hand, it is the respondents' expectation that hospitals will concentrate knowledge and expertise in centralised locations. On the other hand, hospitals are interested in participating in a decentralised health facility in the vicinity of the patients' daily environment. As a result, hospitals are becoming network organisations that are less dependent on their real estate. Also the impact of ICT on healthcare delivery is described by the respondents.

§ 3.5.2 Case study Gelre hospital Zutphen

The applicability of context-mapping as an instrument for context analysis for hospitals is illustrated by the initial phase of the Gelre Hospital in Zutphen. Gelre Hospital is a regional hospital with a main location in Apeldoorn and a second location in Zutphen and stems from a merger of two hospitals in Apeldoorn in 1986. In the mid-nineties, the opportunity arose to relocate the two existing sites to one location in Apeldoorn, with partly new construction and partly renovation of one location and abolishing the other one. Along with the Maasland Hospital in Sittard and Meander Medical Centre in Amersfoort, Gelre Hospital was appointed by the Minister of Health as one of the three core hospitals for the development of new high-level healthcare concepts. The renovation in Apeldoorn was initiated, designed and constructed between 2002 and 2009 in a traditional process under the rules of the former regime on real estate investments in healthcare.

Initiating, designing and constructing a new hospital facility in four years

In the construction of the Gelre Hospital in Zutphen during the seventies, sprayed asbestos was used as a fireproofing material. Renovation in 1999 revealed that asbestos was still present in the technical spaces. As a consequence any alteration work in the technical installations had to be carried out under asbestos conditions. A second asbestos renovation would amount to €30 million and the demolition of the building another €14 million. Continuing to use the same building would lead to €3.5 million a year in additional costs for asbestos actions.

The asbestos problem prompted Gelre Hospital to request an allowance from the Ministry of Health for a new hospital in Zutphen. After discussions and an initial-letter from the Ministry of Health in December 2005 the project new Gelre Hospital Zutphen was started on 2 January 2006. The main condition of The ministry of Health was that the Gelre Hospital was itself responsible for the real estate investment, in anticipation of the upcoming deregulation of healthcare investment decisions. In addition, the minister took financial responsibility for the extra costs of the asbestos removal in the demolition of the old building. The Gelre Hospital Zutphen was therefore the first project in the Netherlands that was independently responsible for the design, financing and construction of a new hospital facility. Permission to construct was no guarantee of funding for the capital costs resulting from the investment. The implementation of the new building was thus entirely dependent on the ability of the hospital to recoup the investment through the delivery of healthcare services and products in the future. The technical installations in the former building were expected to becoming unusable as of January 1, 2010, resulting in the aim of initiating, financing, designing and constructing the new accommodation within four years. The new building was brought into use in August 2010.

This case study is a descriptive analysis of the business plan (Gelre Ziekenhuizen, 2006) by using the context-mapping model. The business plan was written for submission to banks and insurance companies for the financing and funding of the new building. The business plan includes a stakeholder analysis, market research and scenario analysis on which the choice of a healthcare concept for the location Zutphen is based. In the business plan, the necessary investment burden and the expected operating effects are calculated for different scenarios. It takes into account the new legislation on the financing of hospital facilities in which there are no longer guarantees on the funding of capital expenditure.

General context

Legislation

The deregulation of the healthcare system, the position of the Dutch Healthcare Authority (Nederlandse Zorg Autoriteit: Nza), changes in healthcare funding and political guidance on the use of healthcare have had a major influence on the choice of healthcare concept. Also of influence is the degree of deregulation regarding the scope of private initiatives; the effects of the Law WTZi which regulates future healthcare real estate investments; the Law WTG which determines the rates for healthcare services; and the development of the Social Support Act (Wet Maatschappelijke Ondersteuning: WMO (2006)) in which municipalities become more responsible for the non-medical care of their residents. The position of the NZa is determined by the effects of the Competition Authority Act (Wet Mededingings Autoriteit: WMA (2004)). Regarding the changes in the funding of healthcare, the size of the B-segment in the Diagnosis-Treatment-Combination (Diagnose Behandel Combinatie: DBC) is the most decisive for the calculated rates for treatment. The constellation of the basic package of healthcare insurance and governmental guidance regarding the criteria for healthcare interventions is described in the business plan as the main instrument of government to control the use of healthcare.

Economy

In choosing the healthcare concept, factors such as economic growth, private healthcare expenditure, employment, regional competitiveness and the policies of the insurance companies are of interest. Economic growth can be divided into regional and national growth. Growth of private healthcare expenditure depends on developments in the health insurance policies and the willingness of patients to contribute to their healthcare costs. Regional competitiveness focuses on consolidation compared to surrounding hospitals, independent treatment centres (Zelfstandige Behandel Centra: ZBC) and future foreign providers in the region. The job market of medical specialists and nursing staff demands an increase in productivity. Health insurance policies focus on prevention and the limitation of healthcare demand and costs.

Society

Socially, a trend is visible in the attitude of patients who are increasingly better informed as a result of the Internet and who make their own selection and choice of provider and the required care process. In addition, demographical trends are described as the most important social factor. Also of influence is the epidemiological trend of a changing lifestyle leading to greater vitality amongst the elderly.

Demography

An analysis of demographical trends on spending in healthcare shows that spending on "old age diseases" will increase greatly due to an aging population, which will also increase co-morbidity. The business plan outlines an estimation of the impact of demographics on the demand for healthcare in the region by translating the prevalence of disease to the local demographical population in the catchment area.

Technology

These factors include medical innovation, developments in the first, second and third echelon, collaboration/integrated care, ICT and transparency. Medical innovations such as immunization, disease management, personalized medicine, reduction of clinical beds and multidisciplinary clinics are analysed during the development of the business plan. Developments in the first echelon focuses on capacity and task differentiation allowing more treatments to take place outside the walls of the hospital. In addition, there is a visible increase in the number of trans-mural projects which is supported by e-health and telemedicine.

Sector specific context

Trends

The business plan describes two factors as the most important trends: (1) the intensity of the (regional) competition between hospitals and; (2) economic growth. Based on these two trends four scenarios are described: (a) uphill battle; (b) booming healthcare market; (c) stagnation in healthcare and; (d) open playing field. The consequences of these four scenarios for the location of the Gelre Hospital Zutphen are examined and on this basis a business concept is chosen that best provides an answer to the contextual factors and trends.

Scenarios

Uphill battle takes account of the low growth in wealth and a small increasing demand for healthcare. In this situation where financial resources are limited, the government continues to rely on an effective market in healthcare and the health insurance companies compete hard to reduce costs. Patient flows are central. For Gelre hospital, this means a highly competitive market in which an acceptable quality at a low price for basic care and a good relationship with the fastest growing healthcare insurance company is crucial.

Booming healthcare market assumes high prosperity and a large increase in the demand for healthcare where the basic insurance package remains broad and there is also a visible growth in private healthcare. Competition comes from many sides, including national hospital groups growing as a result of receiving money from private investment. For Gelre hospital this means that the healthcare market is big enough. A distinctive profile compared to the independent clinics is needed for healthcare beyond acute care.

Stagnation in healthcare occurs when low prosperity leads to a problem in the financing of the increasing demand for care. The health insurers do not succeed in balancing price and quality. In this scenario the government will, under pressure from public opinion, reclaim responsibility for the impact on cost and quality. For Gelre hospital this means that investments in quality are difficult to recoup because free pricing is not extended, and therefore no higher price for higher quality can be asked.

Open playing field is the scenario which assumes that there is a sharp increase in healthcare spending with little competitive pressure. Current practice can be maintained and there are few incentives for quality-enhancing innovation in healthcare.

In the business plan, the investment and expected proceeds were calculated based on the scenarios '**uphill battle**' and '**booming healthcare market**'. These calculations resulted in an investment budget of up to € 55 million for the construction of the new building.

Stakeholders

Gelre Hospital's main stakeholders include patients, staff, doctors and health insurers. The hospital's Zutphen location has an overall good reputation, especially among general practitioners (GPs) in the region and representatives of the patient population. Insurers are more neutral towards the hospital. The strength of the Zutphen location is the regional availability of a wide spectrum of specialist medical healthcare: availability of choice, good quality, nearby, accessible and personal. As a future healthcare portfolio, GPs and patients expect a broad and accessible regional hospital.

Objectives of internal stakeholders

Patients should feel that they receive qualitatively good medical care in which the patient is central. The patient must have confidence in the quality of care and this care must be provided within the shortest possible time and as nearby as possible. In addition to good service, respect, openness, friendliness and attention to the patient are perceived as the most important factors.

Motivated **employees** are essential to the organisation. Employees deserve respect, openness and reliability in addition to health, safety, welfare and good working conditions. Attention should also be given to career perspectives and the possibility of staff to further develop. Staff development is essential if innovation associated with organisational changes is to succeed.

The policy of the **Hospital Board** of Gelre Hospital is focused on optimal distribution of care and optimal use of the facilities. This implies a clear choice in healthcare profiles for each location and locally organised in the patient's own environment. Although the distance between Apeldoorn and Zutphen is not large, it is experienced as large by residents, who are situated on both sides of the river IJssel. Chronic patients and short-term elective surgeries are therefore locally available at both locations. Elective interventions with longer treatment time are to be concentrated in Apeldoorn or Zutphen. Complex healthcare with a high level of aftercare takes place in Apeldoorn. In Zutphen, the emphasis is on practical work. Here Gelre hospitals excel in delivering an efficient and flexible (elective) service. Given the size and nature of both catchment areas, both locations have a 24-hour acute healthcare department.

Objectives of external stakeholders

The **government** has designated Gelre Hospitals as one of the three core hospitals challenged with necessary renewal in order to provide the healthcare of the future. For Gelre hospital this means developing a new-style hospital, in which there is limited clinical capacity, a shift from inpatient to outpatient treatment, day treatment and short-stay admissions. In order to achieve this, all outpatient treatments are redesigned from the perspective of the patient: better, faster and more efficient.

Along with the **health insurance companies**, Gelre Hospital is responsible for providing healthcare at regional level. This responsibility is partly reflected in collective choices in healthcare profiles. Insurers indicate that there is a limited focus, but appreciate the quality / price ratio. Insurers attach particular importance to a clear profile, regardless of which profile: based on the hospital's own vision with clear priorities.

The **banks** were consulted at an early stage to discuss financing the new building, based on the notion that the absence of guarantees from the government requires a different approach and support base for the plans. This consultation showed that a business plan should be drawn up including a market analysis, a determination of the company's focus based on assessment and forecasts of the potential sales and production.

Organisation-specific context: choosing a healthcare profile.

With a broad representation of medical specialists and care managers two working conferences were used to work on developing attractive options for a future healthcare concept. In a third conference, the care concepts were rated on economic attractiveness, consequences for patient flows, connecting to the needs of patients in the region, the impact on medical quality and the impact on a pleasant working environment. After a trade-off between five possible profiles, the choice was made for the profile of a “Basic Hospital with priorities in chronic and elective care.” Choosing focus points enables the hospital to distinguish and profile itself from the emerging competition.

The selected profile’s characteristics were: a basic supply and an infrastructure that is designed according to the availability requirements of acute/urgent healthcare, extended with capacity for serving the chronic healthcare needs of the region and a selection of elective healthcare. The hospital claims its role in the region for chronic healthcare and reinforces the healthcare chain through the development of trans-mural healthcare programs. Additionally, some focus points were chosen in response to the rapidly growing population of elderly people in which the criteria were interventions with high or rapidly growing volume and the necessary expertise in house. Furthermore, there was a focus on entrepreneurship including possible private initiatives within the hospital. Above all, standardisation and optimisation of logistic processes were central to the new hospital facility.

The chosen care profile for the location Zutphen was in response to the changes in context, environmental factors and the desired outcomes of various stakeholders. The context analysis of the business plan was subsequently translated into a clear perspective on the organisation and its accommodation, which was then detailed in the architectural design and construction of a new building with parallel changes in the organisation of healthcare.

§ 3.5.3 Reflections on the context-mapping model

Context-mapping can be used as an instrument especially in the beginning, or prior to, the initial phase of an adjustment of the accommodation. The clear analysis of the organisation in its context can contribute to obtaining financing and long-term healthcare arrangements with health insurance companies that are necessary for the realisation of the (re-) construction. The model for context-mapping proved to be useful for ex post reconstruction of the business plan that has formed the basis for the realisation of the first hospital under

the new laws and regulations in the Netherlands. All items in a business plan for a new hospital facility can be clearly positioned within the model for context-mapping.

The model brings four different parts of the business together: (1) contextual factors; (2) trends and scenario analysis; (3) outcomes for various stakeholders and; (4) the positioning of the organisation within this context. In this perspective, the model for context-mapping is a holistic approach that brings together the different parts of the business. On this basis, the conclusion seems justified that the context-mapping model can also be used ex-ante as a roadmap for describing and analysing the context and the positioning of the organisation within.

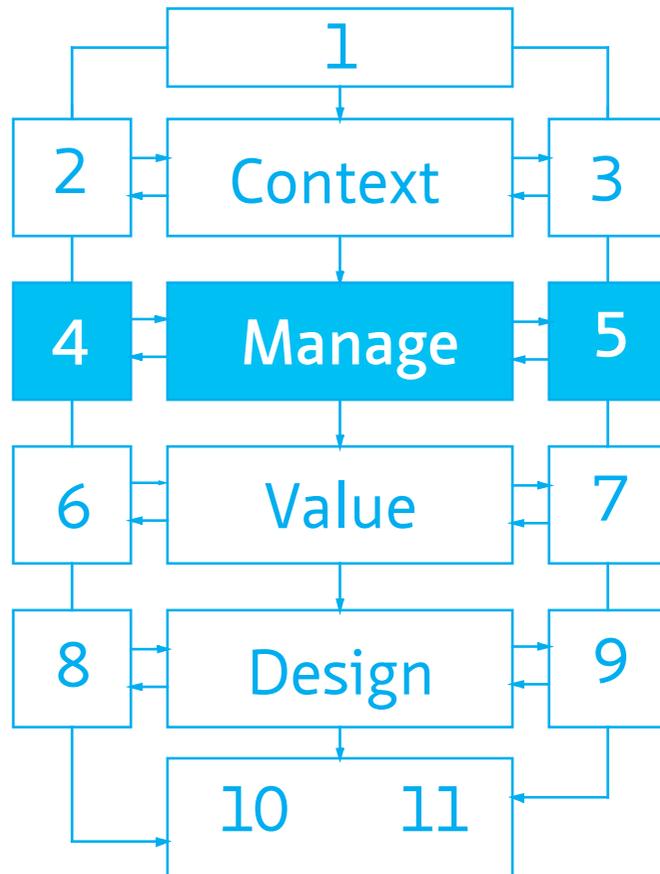
It can be concluded that hospital organisations have to cope with a lot of contextual changes due to social, demographic and medical technological innovations. On the one hand there is much political uncertainty about how the healthcare system will be further shaped by the government. On the other hand there is a growing and changing demand for medical care and more technological capabilities. Furthermore, the labour force is shrinking, leaving fewer people to do the work. Therefore, in addition to providing optimal support of the healthcare process, labour-saving innovations and increasing labour productivity are particularly important topics when considering hospital real estate.

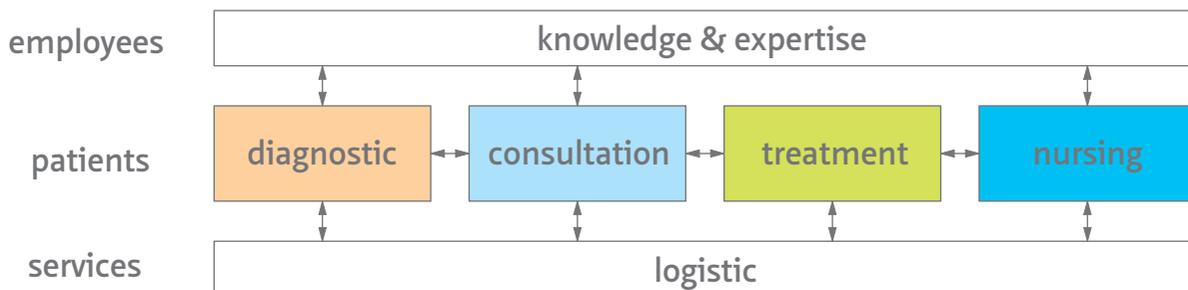
The assessment of key stakeholders in the hospital sector shows that the responsibilities for the financial affordability of real estate investments has shifted from governmental public authorities and insurers to the hospital's directors. In the end, these decision-makers have to consider and balance the interests of the different stakeholders. Health insurers and banks as lenders are nowadays more cautious and critical of large scale investment plans for hospitals.

The stakeholders' assessment also shows that the way the building supports proper care is the main objective from the perspective of patients, healthcare professionals and medical specialists. For healthcare professionals and specialists this is a direct interest because hospital real estate is their daily physical working environment. For patients, this interest in the organisation's accommodation is indirect. Appreciation of the built environment is experienced through the appreciation of the provision of good healthcare, within which real estate is one of the factors.

The consequences of the trends and future scenarios for the accommodation choices of hospitals are: (1) the need for a new positioning of the hospital in society and coherent location choices, (2) the need for labour-saving innovations in accommodation; (3) the need for value creation through accommodation and; (4) the ability to anticipate changes in the organisation of healthcare processes within the design of accommodation. Therefore, in addition to an optimal support of healthcare process, especially labour-saving innovations and increasing labour productivity are important topics regarding hospital real estate.

PART 2 **Manage**





4 Managing hospital real estate

How can Corporate Real Estate Management be aligned to organisational management in order to support organisational performance?

Abstract

Purpose: This chapter presents a conceptual framework for managing hospital real estate in order to optimally align a hospital's accommodation with the organisation.

Literature study: A review of conceptual models of CREM and organisational management in order to integrate different models into a conceptual framework for managing hospital real estate in a changing context.

Empirical research: An ex-post analysis of the accommodation strategy of The Rotterdam Eye Hospital is used to test which organisational and accommodation dimensions in CREM models are used or can be reconstructed from decision-making in practice. In addition, the applicability of the conceptual framework for managing hospital real estate is tested in chapter 5.

Findings: Understanding an organisation's structure and decision-making and understanding organisations as input-throughput-output mechanisms are two important prerequisites for aligning CREM models with organisational management models. The organisational structure defines the position of real estate decision-making in the organisation and the organisation as an input-throughput-output mechanism describes organisational processes related to the primary process. The abstraction of both the EFQM-INK Quality model and the Balanced Score Card in three steps for implementation as described by Ahaus et al (2001) seems to be a useful basic framework to align real estate models to organisational models. These three steps for implementation focus on (1) defining stakeholders' objectives; (2) assessment of critical success factors and; (3) steering on input resources to improve the primary processes.

Introduction

In addition to investigating the ways in which accommodation can contribute to the achievement of organisational goals by defining different added values of real estate (see Part 3), CREM also focuses on the conceptualisation of real estate in relation to the organisation. Different models are currently available that link real estate goals to organisational goals. The starting point of these conceptual models includes aspects of the organisation such as mission & vision, customers & markets, products & services, value

& culture (Osgood, 2004). However, many CREM models describe organisational aspects without conceptualising mutual relationships. The result is that organisational aspects are used as input for the management of real estate, but without analysing the functioning of the organisation itself and the way the organisation is being managed. To fill this gap in CREM literature, this chapter investigates how conceptual models for managing real estate in the literature can be aligned to business models. As such, organisational models are used to examine the pluralistic reality of an organisation and its processes.

This chapter focuses on the organisation's specific internal context i.e. organisational characteristics including the organisational structure, primary processes and the organisation's position in society. Within this organisational context, an organisation chooses a particular corporate strategy; this is the corporation's unique plan for the future implementation of its different resources for production. Besides human resources, capital, technology and information/communication, real estate is one of the interdependent resources for production. Real estate is by nature static. Due to the fast developments in healthcare technologies and a constantly changing context, flexibility is commonly perceived as a very important issue in healthcare real estate. Changes in a corporate strategy can imply a reconsideration of the real estate strategy. As a consequence, the real estate strategy has to be complementary to the corporate strategy in order to cope with changing circumstances. One of the main aims of CREM is to match corporate real estate with organisational objectives. In order to do so, it is necessary that an organisation's structure, processes and objectives can be described and understood in terms that can be translated into real estate strategic decisions. This demands connections between organisational management models, as an abstract representation of the organisation, and conceptual models for managing real estate.

This chapter presents the findings of a literature review on organisational and real estate management models. Various conceptual models from CREM literature have been studied, including the evolutionary stages (Joroff et al., 1993), stakeholder analysis (Den Heijer, 2011), the concept of adding value by real estate (De Jonge, 1996; De Vries et al., 2008; Den Heijer, 2011; Jensen, 2010; Jensen, Van der Voordt, & Coenen, 2012; Lindholm, 2008; Lindholm et al., 2006; Nourse & Roulac, 1993; Roulac, 2001; Scheffer, Singer, & Van Meerwijk, 2006) and Designing an Accommodation Strategy (DAS) (De Jonge et al., 2008). In addition, a fundamental understanding of organisational structures and organisational quality management as applied in healthcare organisations are discussed in terms of their capabilities to describe an organisation and the primary processes. The applicability for alignment with CREM models is also discussed in order to integrate the different models into a conceptual framework for managing hospital real estate in a changing context. The CREM models are aligned within this framework with organisational quality management models that are generally applied to hospitals, i.e. the European Foundation for Quality Management (EFQM, 1997) model, known in the Netherlands as the INK model (Instituut Nederlandse Kwaliteit).

§ 4.1 Positioning CREM in organisational management

Organisations are open systems. They affect and are affected by the environment beyond their boundaries and are in management literature often defined as social units of people, systematically structured and managed to meet a need or to pursue collective goals on a continuing basis. These units produce an output by processing a certain amount of input resources. In business economics these input resources are described as capital, communication, human resources, technology and real estate. The output of the organisation is related to the tasks for which an organisation is established.

§ 4.1.1 Organisational configuration

All organisations have an organisational structure that determines the relationships between functions and positions as well as subdividing and delegating roles, responsibilities and authority to carry out defined tasks. An organisational structure consists of formal and informal connections between the separate members of the organisation. These connections result from functional task separation and the related authorisations and responsibilities. The choice for a certain organisational structure is not always strategically determined. More often this structure is historically grown and personal and political deliberations are often also part of it. Mintzberg (1993) describes five organisational structures, each with its own characteristics regarding structural configuration, primary coordination mechanisms, the main organisational part and type of decentralisation of tasks and responsibilities. These characteristics influence the organisational culture, management styles and hierarchical relations within the organisation.

The foundation for Mintzberg's analysis of organisational structures are five basic components of a contemporary organisation (operating core, strategic top, middle line, techno-structure, and support staff) and five theories on how it functions e.g. as a system characterised by formal authority, regulated flows, informal communication, work constellations and ad hoc decision processes. The synthesis of these elements results in five configurations of organisational structures (Mintzberg, 1993): (1) Simple Structure; (2) Machine Bureaucracy; (3) Professional Bureaucracy; (4) Divisionalised Form and; (5) Adhocracy. Each of the five configurations is the result of one of the five basic parts trying to control the other parts of the organisations. 'Organisations function in complex and varying ways, due to differing flows -including flows of authority, work material, information, and decision processes. These flows depend on the age, size, and environment of the organisation; additionally, technology plays a key role because of its importance in structuring the operating core. (Mintzberg, 1993).

Five configurations of organisational structures (Mintzberg, 1993)

Simple structure is mainly characterised by what it is not: complex. Direct supervision of the primary process by the strategic top is the main coordination mechanism and all important decisions are made by the leader of the organisation. Behaviour in a simple structure is not formalised and planning, training and liaison devices are minimally used.

Machine bureaucracy is an organisational configuration that primarily focusses on the standardisation of complex operating work processes. Mintzberg states that these organisations are 'obsessed with control', as they put great emphasis on controlling the primary processes by using standardised protocols and procedures. Task, responsibilities and qualifications are strictly separated and differentiated. The techno-structure that develops these protocols and procedures emerges as the key part of the organisation.

Professional bureaucracy emphasises authority of a professional nature, or in other words "the power of expertise". The professionals are the core of the organisation and organisational strategies are mainly developed by the individual professionals within the organisation as well as of the professional associations outside. Quality is mainly controlled by highly standardised demands on the professionals' competences. Standards of the professional bureaucracy originate largely outside its own structure, especially in the self-governing association its professionals join with their colleagues from other organisations. Professionals are focussed on their contact with clients and want to be supported by the organisation.

Divisionalised form relies on the market basis for grouping units at the top of the middle line of the organisation. Divisions are created according to the markets served and they are then given control over the operating functions required to serve these markets. This configuration differs from the other four structural configurations in one important aspect: it is not a complete structure from the strategic apex to the operating core, but rather a structure superimposed on others with a central administration in the headquarter. The units are generally called divisions and each division can have its own organisational configuration.

Adhocracy might be considered as the most suitable structure for innovative organisations which hire and give power to experts - professionals whose knowledge and skills have been highly developed in training programs. As innovative organisations cannot rely on any form of standardisation for coordination, adhocracy includes a highly organic structure, with little formalisation of behaviour; job specialization based on formal training; a tendency to group the specialists in functional units for housekeeping purposes but to deploy them in small, market-based project teams to do their work.

Although Mintzberg (1993) does reveal coordination mechanisms, standardisation principles and political implications regarding these five configurations of organisational structures, this organisational theory does not disclose the variables in which an organisation can be described in terms of attainment of values by executing the tasks for which the organisation was established.

Hoendervanger, Van der Voordt, and Wijnja (2012) links accommodation management to the organisational structures of (Mintzberg, 1993). According to these authors, accommodation management in a machine bureaucracy focuses on cost, standardisation and efficiency. Communication follows clear procedures and real estate is preferably not outsourced in order to monitor the entire process.

In a professional bureaucracy, the service is focused on the support of professionals in the organisation. Accommodation management is aimed at satisfying the users and decisions about real estate have a strong political character. In a divisional structure, accommodation issues are divided between the divisions and the strategic top. Important investment decisions and shared facilities are usually taken by the strategic top. An adhocracy requires a dynamic environment which can respond to new innovative developments (Hoendervanger et al., 2012).

Considering the five configurations of organisational structures proposed by Mintzberg (1993), hospital organisations can be described as professional bureaucracies. Standardisation of competences is the main coordination mechanism in a professional bureaucracy and the trained professionals are the core of the organisation. The medical staff and other healthcare professionals belong to the operating core of the hospital. The specialists' tasks are standardised by training and intensive learning processes. Although knowledge and competences are regulated by professional standards that exceed the boundaries of their own organisation, there is still enough space for the professionals to apply these skills and knowledge according to their own experiences. The main focus of the specialists is their relation to the patient and as this relation belongs to the core process of a hospital, specialists have great influence on the organisation's decisions. Even if specialists are connected to the hospital organisation, they still have great autonomy in their relations with patients. It is important that the professionals within the organisations are kept satisfied. One consequence is that a hospital has a highly democratic and politicised organisational structure in which authority is divided among the medical specialists who act with great autonomy.

§ 4.1.2 Evolutionary stages of real estate

Managing corporate real estate has gradually changed from monitoring the technical condition of buildings and reducing costs to effectively supporting the primary processes and adding value to the institutional goals (De Jonge, 1996; De Jonge et al., 2008; De Vries et al., 2008; Den Heijer, 2011; Joroff et al., 1993; Krumm, 1999). This changing role is described by Joroff (1993) in his five evolutionary stages of corporate real estate management.

Evolutionary stages of real estate (Joroff et al., 1993).

The task manager is the first stage of real estate management. In this stage there is a technical focus on real estate and supplying the corporation's need for physical space (Den Heijer, 2011). The specific task is engineering buildings (Dewulf et al., 2000).

The controller has transparency and cost minimization of real estate as primary goals, requiring a more analytical approach to real estate information.

The deal maker is the third stage described by Joroff (1993). The dealmaker solves problems in ways that creates financial value for business units or departments (Den Heijer, 2011) and tries to standardise building use in order to get a flexible deal in its internal market (Dewulf et al., 2000).

The intrapreneur perceives the organisation as an internal real estate market. In this fourth stage of managing real estate, the real estate department operates like an independent business unit that delivers space to its clients. Alternative real estate solutions are proposed to other business units that match the real estate business plans of the units and the market options.

The business strategist anticipates trends and monitors and measures the impact of real estate on organisational objectives. The business strategist tries to contribute to the value of the company as a whole by focusing on the company's mission (Dewulf et al., 2000).

Joroff's model is additive by nature. The operational basis is extended with more strategic issues linked to the results of the company (Dewulf et al., 2000). In one organisation, a mixture of the described stages can occur. The five evolutionary stages described by Joroff et al (1993) also include three levels of decision making as described by Van Driel (2003): strategic, tactical and operational. The stages of

task manager and controller have a focus on operational level; the dealmaker and intrapreneur manage their real estate from a tactical point of view and the business strategist has a strategic view on real estate. On a strategic level, a real estate strategic plan is developed. This strategic plan includes strategic objectives for real estate policy that are supporting corporate objectives and the way these policies are implemented.

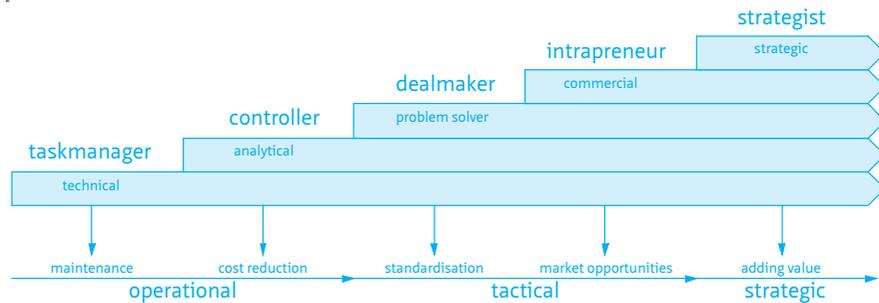


Figure 24 Evolutionary stages of real estate (Joroff et al., 1993).

On a tactical level, it is important to analyse the real estate portfolio on an object level. These analyses are assessments of the current objects and locations in the real estate portfolio on the objectives that are determined in the real estate strategic plan. On an operational level efficient, structured and demand driven daily services on administrative, technical and commercial level is the focus in order to ensure that the primary processes of the organisation are not disturbed by the real estate. This includes controller activities on real estate and infrastructure and other activities to support the primary process, such as ICT and facility management (Van Driel, 2003).

§ 4.1.3 Position of CREM in organisational management

There seems to be some similarities between the organisational structures according to Mintzberg (1993) and the evolutionary steps according Joroff et al. (1993). The task manager is a logical approach to real estate management within a simple structure with direct control from the strategic top. In a machine bureaucracy, controllers have an important position from which they steer on cost reduction and efficiency. If an organisation has developed into a professional bureaucracy a more user-centric approach to accommodation management becomes important. The dealmaker tries to meet the accommodation needs of the professionals by standardising real estate whenever possible in order to be able to achieve higher quality. Within a divisional structure, the real estate management department operates independently as an intrapreneur, providing space to internal customers. In an adhocracy, a more strategic approach to real estate is essential to respond appropriately to changes in the context.

As a hospital is best described as a professional bureaucracy, the approach to real estate management that seems the most appropriate is that of the dealmaker in satisfying the needs of the healthcare professionals.

The evolutionary stages of real estate (Joroff et al., 1993) can also be used to understand the position of real estate decision making in an organisation. The five evolutionary stages can be used as a five point scale for assessment of CREM in an organisation. A first try for such assessment was conducted by Van Hasselt (2005). She developed a so-called CREM thermometer that combines the strategic, tactical and operational levels (Van Driel, 2003) with the evolutionary stages (Joroff et al., 1993). The operational level is included in all evolutionary stages. This means that operational decisions are made in all stages and that the stage of business strategist also includes tactical and operational decisions in order to make strategic decisions operational. In her study, Van Hasselt (2005) made assessments of the real estate strategies of three hospitals by using this five point scale. The accommodation plans of these hospitals were thus studied in terms of seven aspects: productivity, costs, risk, flexibility, real estate value, marketing and culture. This research showed that CREM concepts were used in hospital real estate decisions, but that the focus should develop from an operational and tactical approach to real estate as a strategic asset. The design of the five point scale for the assessment of real estate strategies proved to be a good starting point for positioning the real estate decision-making within the organisation and determining the necessary steps to provide a more strategic approach to decision making.

Whereas Joroff's (1993) model can be used to understand the position of real estate decision-making in an organisation, it does not describe the real estate goals related to stakeholders' organisational objectives. To understand and describe the organisation's objectives, goals and means for realising these goals in relation to accommodation choices, other models were necessary.

§ 4.2 Current alignment models

This section describes conceptual models from CREM literature over the last 20 years in order to align these models with organisational management models and integrate both management activities into one framework on managing hospital real estate in a changing context.

In CREM literature different models have been developed to assess the best possible match between demand and supply on both the building and portfolio level, and to link real estate strategy with business strategy (De Jonge et al., 2008). One of these models is the Designing an Accommodation Strategy framework, in short the DAS-

Framework (Figure 25). This conceptual framework has been developed by the CREM group at the Department of Real Estate & Housing, Delft University of Technology. The DAS-framework structures the process of designing an accommodation strategy. This process is perceived as a cyclical and iterative process that moves along two axes, from demand to supply and from current to future. The process can be started at different points and is supported by a number of decision support tools and methods. There are four key issues in the framework:

- 1 'What we need' versus 'what we have': determines the mismatch between current demand and current supply;
- 2 'What we need in the future' versus 'what we have now': determines the mismatch between future demand and current supply;
- 3 'Alternatives of what we could have': design, evaluate and select solutions for the mismatch;
- 4 'Step-by-step plan to realise what we want to have in the future' i.e. how to transform the current supply into the selected future supply.

The current demand is mostly determined on a time-scale of three years. The future demand is usually determined with a time-line of 15 to 30 years. The process of designing an accommodation strategy is a combination of thinking, dreaming, deciding and doing: thinking determines the match and mismatch between current demand and current supply; dreaming determines the future supply, deciding by designing, weighing and selecting alternatives and doing by executing the step-by-step plan.

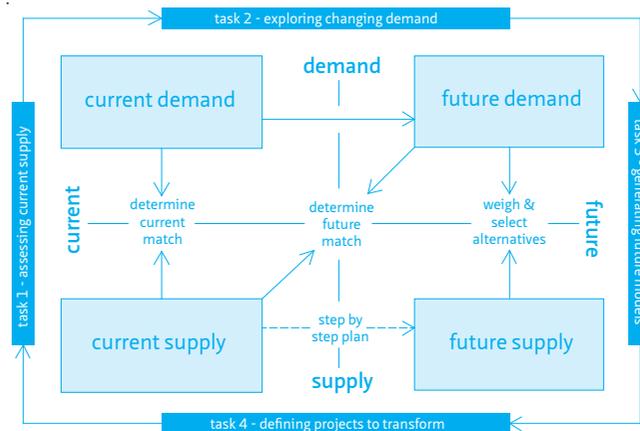


Figure 25 DAS framework (source: Den Heijer, 2011).

Den Heijer (2011) slightly redesigned the DAS frame by rephrasing the management tasks for a university campus. The first task is assessing the current supply. In this management task an assessment is made of the match between current demand

and current supply. The second task is to explore the changing demand. Based on organisational development and the general context, the current demand is translated into a future demand. The third task is generating future models. This task implies the design of possible futures and a necessary future supply to match the future demand with the future supply. The last management task is defining projects to transform. These are the operating decisions that actually should change the current supply in the direction of the future supply. Remarkably, one step of the original DAS frame is missing in these four management tasks: assessment of the (mis)match between current supply and the future demand. In this step the current supply is assessed on its usability to attain future values and objectives.

One of the strong aspects of the DAS-model is its simplicity. It shows clearly and conveniently arranged the necessary steps in designing an accommodation strategy. The DAS-framework can be used in several ways: (1) ex-ante to steer and to support decision making on present and future demand and supply as a starting point to designing an accommodation strategy that is linked to corporate business strategy; (2) ex-post to test current real estate management strategies with regard to consistency, completeness and best possible fit of organisational goals and objectives and organisational resources including real estate, both now and in the long term. And also to improve our understanding of the different choices and considerations that have been made and the way these decisions have been communicated within and outside the organisation (Van der Zwart, Arkesteijn, & Van der Voordt, 2009).

To be more explicit about what to do in every step and how, De Jonge et al (2008) conducted a literature review of other ideas, concepts and models that could support the design of an accommodation strategy. This literature review is discussed in more detail and examined in the context of hospital real estate by Van der Zwart et al. (2009). They conduct a review of strategy models published in CREM literature by using the DAS framework to analyse the steps to which these models could contribute. In addition, an analysis is conducted of the different strategy models and their main objectives in order to understand how the demand and supply of real estate both current and future are aligned. This analysis is made by describing the original strategy model as published by the author, including a figurative representation. In addition, the model is positioned in the DAS frame. This is done by determining the different steps in the strategy model and drawing these steps within the DAS framework. Aspects that are mentioned in a model, but not specifically described, are white boxes, specifically described items are marked in blue. In this way the main objectives of the different strategies are visible. The real estate strategies described in this review are Generic real estate strategies (O'Mara, 1999), Aligning corporation real property with corporate strategy (Nourse & Roulac, 1993), Accommodation assessment (Vijverberg, 2002), Scenario planning (Dewulf, Den Heijer, De Puy, & Van der Schaaf, 1999), Accommodation as a strategic resource (Fritzsche, Hoepel, Kaper, & Van Ommeren, 2004) and The Strategy alignment model (Osgood, 2004).

§ 4.2.1 Generic real estate strategies (O'Mara, 1999)

Based on case studies of the real estate strategies of different companies O'Mara (1999) traced three generic real estate strategies: incremental, value-based and standardisation. The choice depends on strategic uncertainty and the view on action i.e. rational or symbolic (Figure 26 above). An incremental strategy is mainly used by companies with a high strategic uncertainty; space is acquired in bits and pieces over time. The primary concern is to meet the physical requirements. A standardisation strategy is usually used in situations with a lower level of uncertainty and attempts to control and coordinate the facility design and real estate operations. Standards are set centrally and are applied throughout the company. A value-based strategy is possible to mediate strategic uncertainty. This strategy deliberately expresses the value and strategic orientation of the company in the real estate decision process.

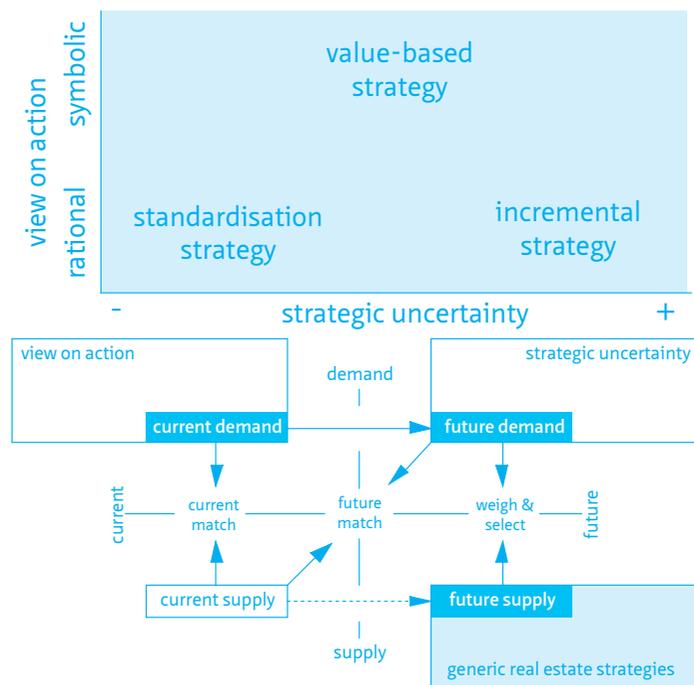


Figure 26 Generic real estate strategies (above), combined with the DAS-Framework (below).

O'Mara describes an analytical framework including industry forces, structural demands, environmental constraints, opportunities and cultural demands that can be used to analyse the organisation's business strategy. According to O'Mara future demand is uncertain. To cope with this uncertainty one (or a combination) of the three generic real estate strategies could be applied to the future supply (Figure 26 below).

§ 4.2.2 Aligning corporate real property (Nourse & Roulac, 1993)

Roulac's model for aligning corporate real property with corporate strategy (2001) relates real estate strategies to sources of competitive advantage (Figure 27). A corporate business strategy addresses critical elements such as customers, employees and processes. A corporate property strategy affects employee satisfaction, production factor economics, business opportunities (realised and foregone), risk management considerations and other impacts on enterprise value (Roulac, 2001). In a previous publication Roulac and Nourse (1993) related real estate strategies to real estate operating decisions. Cross-tables are used to link real estate strategies to overall business objectives and to real estate operating decisions (Nourse & Roulac, 1993). Roulac's cross-tables can be used to analyse the (mis)match between current demand and future demand and to link future demand to future supply.

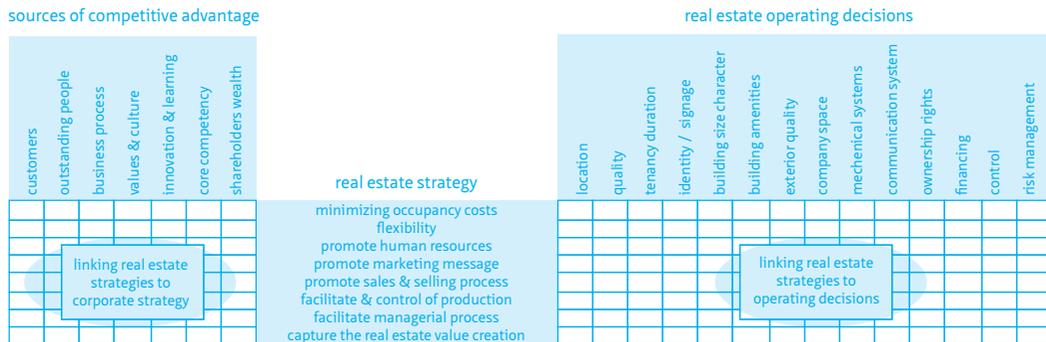


Figure 27 Linking real estate strategy with corporate strategy and real estate operating decisions.

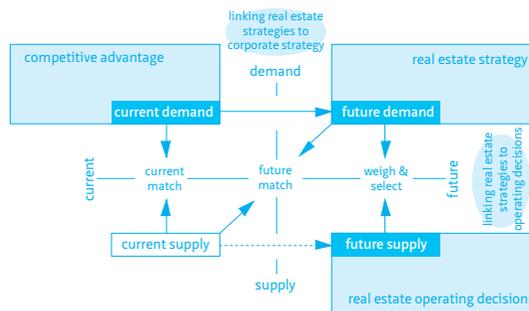


Figure 28 Roulac's concepts positioned in the DAS-framework.

§ 4.2.3 Accommodation assessment (Vijverberg, 2002)

Vijverberg (2002) shows some necessary steps in analysing the current supply as input to make a well-considered choice between six real estate strategies on building level: consolidation, refurbishment, redeployment, conversion, extension, sale/disposal, demolition. These steps include a consumer evaluation of the current supply (actually a test of match or mismatch with the current and/or future demand) and a professional assessment of operating prospects, technical condition, adaptability and expandability. The average value of these aspects gives an indication of the present and future value of the current supply. The assessment can be used as a tool to decide what to do with the current supply, as a starting point for choosing the best possible strategy to transform the current supply into the future supply (Figure 29).

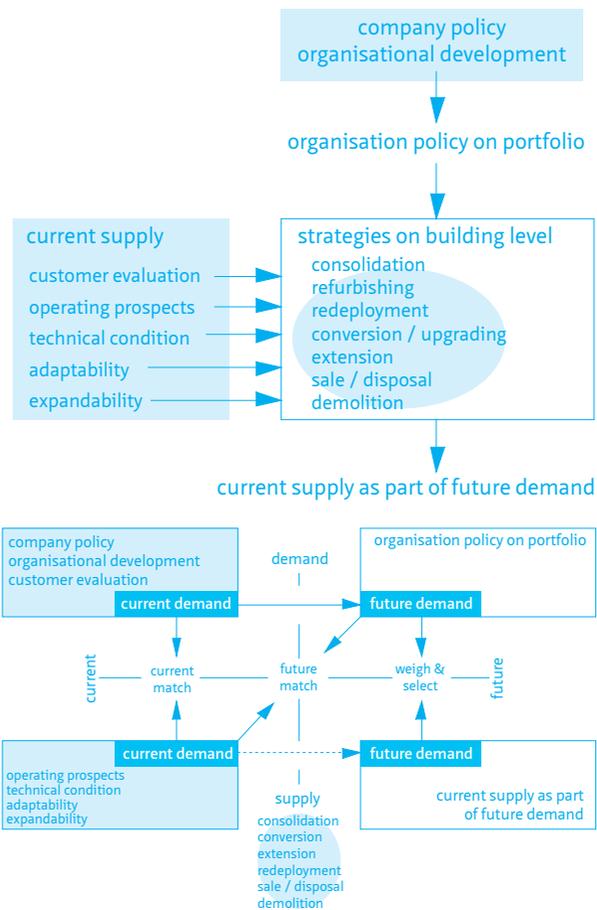


Figure 29 Accommodation assessment (above), combined with the DAS-Framework (below).

§ 4.2.4 Scenario planning (Dewulf et al., 1999)

Dewulf et al. (1999) discuss a scenario planning model that can be used in real estate management (Figure 30). This model starts with a stake-holder's analysis; the "what ... if" developments are determined and positioned in two graphs, each with two axes. In the first graph one axis is used to place the steering opportunity and the other axis to mark the impact of a possible or probable development in corporate real estate strategy. A high steering opportunity on trends with a large impact may be perceived as a strength of the organisation, a low steering capacity as a weakness. The second graph with two axes can be used to position trends with regard to predictability and impact. Scenarios with a high predictability and a large impact could be perceived as real estate opportunities, whereas low predictability and a large impact is a threat. Both graphs can be used to determine focus scenarios. The next step is to cross the real estate strategies with the focus scenarios, which results in the potential real estate strategy.

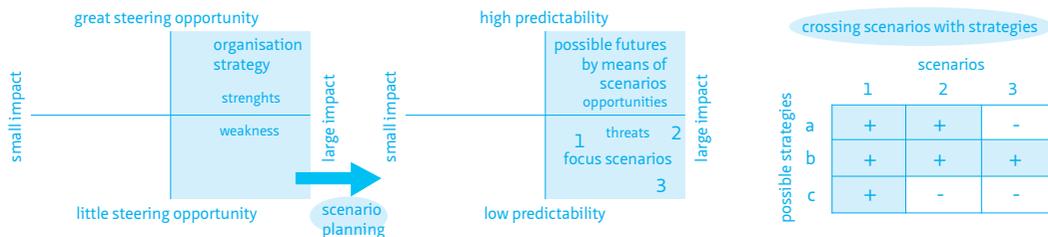


Figure 30 Scenario planning (Dewulf et al, 1999, adapted by the author).

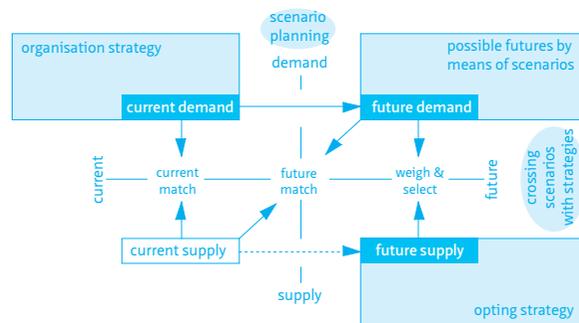


Figure 31 Scenario planning combined with the DAS-framework.

Dewulf's model of scenario planning can be used to understand the future demand and also to decide on the future supply by crossing the scenarios with the strategies (Figure 31). Dewulf et al also proposed a step by step plan to transform the current supply into the future supply, which is included in the analytical framework later on.

§ 4.2.5 Accommodation as a strategic resource (Fritzsche et al., 2004)

In “Accommodation is strategic real estate; manual for real estate management for hospitals” (Fritzsche et al., 2004) strategic corporate orientations have been linked to current real estate and real estate scenarios. The first step is to determine the corporation’s strategic orientation. According to “The discipline of market leaders” (Treacy & Wiersema, 1995), market leaders should make a clear and well considered choice for product leadership, operational excellence or customer intimacy. The choice depends on organisational characteristics such as its culture, skills and infrastructure. The second step is to link the strategic orientation with the real estate strategy, including an assessment of the functional value of the current supply and the financial possibilities for improving the match between future supply and functional and financial demands. As such Fritzsche et al contributes to both the demand and the supply side (Figure 32) although is less explicit about how to design a real estate strategy.

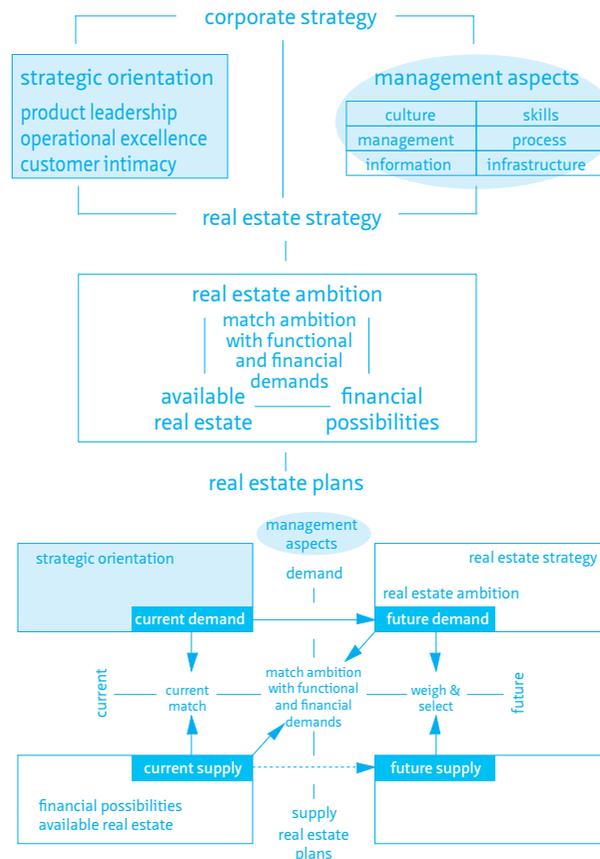


Figure 32 Fritzsche's concept (above) combined with the DAS-Framework (below).

§ 4.2.6 The Strategy alignment model (Osgood, 2004)

The Strategy Alignment Model (Osgood, 2004) describes and measures real estate initiatives in the language that businesses use to construct their strategies. In the same way that organisations describe the key elements of their business, the model is used to develop portfolio, site/facility and workplace-level concepts that are directly aligned with the core business strategy. Each alignment map describes the cause-and-effect hypotheses of how real estate can best be aligned with specific elements of that organisation's strategy. It is the unique combination of these elements - the causal relationships - that determines the strategy that will drive competitive advantage for the company in every specific situation. Osgood's model strategically aligns current demand and future demand. Real estate measures are part of the future supply although it is unclear from Osgood's model what these measures could be.

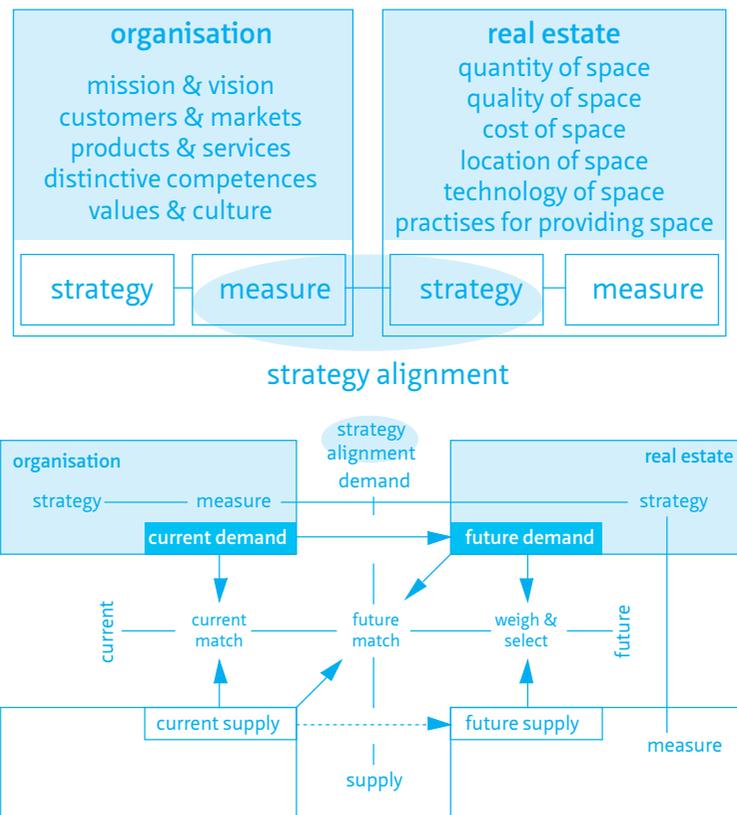


Figure 33 Strategy alignment model (above) combined with the DAS-Framework (below).

§ 4.2.7 Case study of the Rotterdam Eye Hospital

The DAS framework in combination with the above-described alignment models was used as a descriptive model to analyse the real estate strategy of the Rotterdam Eye Hospital from 1940 until 2008 by connecting the terminology from CREM alignment models to the hospital's accommodation choices (Van der Zwart et al., 2009). For this purpose real estate strategy documents such as annual reports were analysed. Furthermore an interview was conducted with the CEO, responsible for the real estate investments, as well as the finance and facilities manager.

The Rotterdam Eye Hospital's real estate strategy from 1940 until 2008

Due to the bombing of the hospital buildings in 1940 as part of World War II the Rotterdam Eye Hospital faced an acute accommodation problem. Reconstruction started in 1942. In 1948 the present location on the Schiedamse Vest opened its doors. The hospital established a research and development department at this location, which over time gained academic status. To secure the building assets against governmental influence, a strategic choice (Roulac, 2001) was made to separate the real estate investment from the healthcare delivery by means of creating the Foundation of Eye Patients. This foundation still owns and operates the building. The Eye Hospital leases the building and is responsible for delivery of healthcare.

In 1966 the nearby situated Dijkzicht Hospital also gained the status of academic hospital. As eye surgery was not included here combining the Dijkzicht Hospital and the academic Eye Hospital seemed to be a logical move. Eye surgery in hospitals is generally a relatively small discipline with short, (mostly) uncomplicated surgeries and a high capacity. The Rotterdam Eye Hospital therefore always insisted on its status as an independent specialised hospital delivering quality care for low prices. Outpatient services were started in 1967 and space was leased nearby to meet the increasing demand. The underlying real estate strategy at that time can be described as an incremental strategy (O'Mara, 1999), with a focus on costs, quantity and nearby location of space (Osgood, 2004).

In 1992 the academic chair of the Rotterdam Eye Hospital moved to the Dijkzicht Academic Hospital. This initiated a re-evaluation of the strategic position of the Eye Hospital. The Rotterdam Eye Hospital as a Centre of Excellence became the new vision and mission (Osgood, 2004) of the organisation; the aim was for state of the art medical technology, business process and patient treatment. At the medical technology level product leadership became the strategic orientation (Fritzsche et al., 2004), reflected in the decision to join the American Association of Eye and Ear Hospitals (AAEEH). The quality of medical, paramedical and nursing services were

expected to be excellent. Operational excellence (Fritzsche et al., 2004) at the business process level was achieved by analysis of the processes and comparisons with inspiring international peers. The KLM booking system of flight chairs was adopted for capacity planning and just-in-time logistics was implemented. In this way better quality could be delivered with less people. The laboratory and sterilisation departments were outsourced and outpatient treatment was introduced after comparison with an American peer. Due to these medical technological innovations (Roulac, 2001) 97% of all treatments nowadays are one-day outpatients. As a consequence the number of beds could be reduced from 120 to 8, reducing the quantity of space and occupancy costs (Roulac, 2001). A thorough renovation, a re-division of the interior and the building of an extension with a new floor enabled all the functions of the hospital once again to be housed in the original building (Ginneke, 2006). This reconstruction started in 2001 and was finished in 2004. The commercially leased building for the outpatient clinic was disposed of. The building at the Schiedamse Vest was designed by an experienced hospital architect, but the interior was designed by an interior architect with experience in museum interior design. Key terms in the interior design were fear reduction as part of patient treatment and customer intimacy (Fritzsche et al., 2004).

The underlying real estate strategy of the renovation can be described as value based (O'Mara, 1999). The identity and character of the building (Nourse & Roulac, 1993) expresses the values and culture of the organisation; a combination of tradition, modern design and art is used to support a 'healing environment' and to reassure the patient. The artistic expressions, the activity of the employees and visitors reinforce each other. In a way the artistic expressions have become a component of the medical care and service (Van Ginneke, 2006). The quality of the space (Osgood, 2004) and the marketing message (Roulac, 2001) are critical factors. The Rotterdam Eye Hospital building with its pleasant environment is also part of the concept of excellence. Together with high quality day treatment, efficient processes and an innovative human resource policy, the contemporary accommodation is one of the critical success factors of the Rotterdam Eye Hospital (Hiddema, Sol, & Vigeveno, 2007).

The Rotterdam Eye Hospital as Franchise Corporation is a future strategy, with a combination of central coordination and local integration. The franchise office organisation is situated in a nearby commercially leased building. In the franchise concept, the building at the Schiedame Vest is one of the possible locations for delivering healthcare in a network of more or less autonomous external business units. The real estate strategy behind this concept could be considered to be standardisation (O'Mara, 1999). The Rotterdam Eye Hospital is investigating the possibility of the "Shop in shop" principle in other general hospitals in the Netherlands. The location of space, practices of providing space (Osgood, 2004), sales and selling process and marketing messages (Roulac, 2001) are leading in this real estate strategy. The structure of the organisation, its culture, skills, management, processes, information and infrastructure (Fritzsche et al., 2004) have to all be aligned with this new strategy.

Lessons from the Rotterdam Eye Hospital case study

Figure 34 summarises 70 years of real estate decisions by the Rotterdam Eye Hospital. These are related to several real estate strategy models as well as the DAS frame. This figure can be read as a time line with four steps moving from the inner circle (1940) via 1965 and 1992 to the outer circle of 2008.

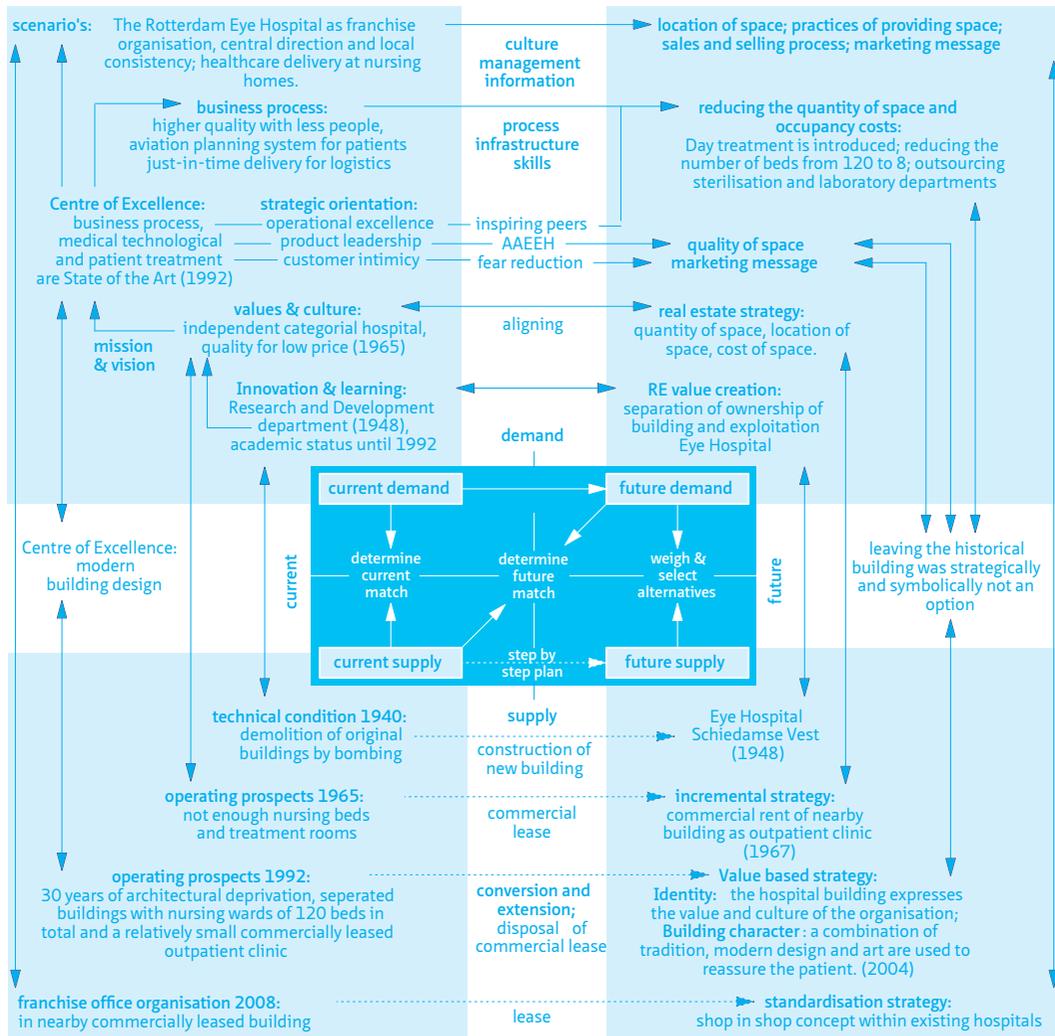


Figure 34 Analysis of the Rotterdam Eye Hospital's real estate strategy 1940-2008.

Historical organisational strategies, building prospects, added values and operating decisions are described and connected with each other per period. In each period, the current demand at that time is the starting point for the re-evaluation of the real estate strategy that, based on an analysis of current and future demand, in the end results in a new plan for the future supply. This could be a new hospital building (1948), commercial lease (1967), disposal of commercial lease (2004) and a shop-in-shop concept in 2008.

Figure 34 shows that each quadrant of the DAS framework describes other aspects of the organisation and its real estate. As current demand generally describes the organisationally strategic decisions, future demand focusses on real estate strategies that are connected to these organisational objectives. The building characteristics are described in the quadrant of current supply, whereas the operational real estate decisions are described in the quadrant of future supply. Although the items in the different quadrants can be linked to each other, they are not comparable due to the different terminology used. The mixture of organisational management terminology and real estate management terms is the most striking conclusion of this case study.

§ 4.2.8 Discussion of alignment models

Table 12 combines the focus points of the CREM strategy models that have been described in this chapter and compares the different models in terms of the described objectives. In this matrix, the described objectives in the alignment models (in the columns) are written in the cells by following the DAS frame (in the rows). As such, this table shows which objectives are described and/or defined and which are not described in each particular alignment model. By comparing the steps of the DAS frame, this table shows that the alignment models have a strong focus on organisational objectives and RE strategies. This is visible in the orientation of organisational objectives that are described in the row of current demand. Organisational strategy, sources of competitive advantage and strategic orientation give direction to real estate strategy, but are primarily linked to the organisation itself and her stakeholders' objectives. These organisational objectives are listed in the described CREM strategies, but are not connected with each other and as a consequence do not reveal interactions between different aspects on an organisational level.

	O'Mara (1999)	Nourse and Roulac (1993)	Vijverberg (2002)	Dewulf et al (1999)	Fritzsche et al (2004)	Osgood (2004)
	generic real estate strategies	alliging real property with corporate strategy	functionality assessment	scenario planning	real estate as strategic resource	strategic alignment model
current supply			real estate functionality operating prospects technical condition adaptability expandability			
step 1: assessing current supply						
current demand	strategic environment & organisational demand	source of competitive advantage	organisational strategy	organisational strategy	strategic orientation	organisational strategy & measure
	strategic uncertainty stage of industry growth technical dynamism financial resources organisational growth business processes view on strategic action senior management	customers outstanding people business process values & culture innovation & learning core competences shareholders' wealth	company policy organisational development customer evaluation		product leadership operational excellence customer intimacy	mission & vision customer & markets product & services distinctive competencies values & culture
step 2: changing demand		linking RE strategies to corporate strategies		scenario planning	management aspects	strategy alignment
					culture management information process infrastructure skills	
future demand		real estate strategies		possible futures by means of scenarios		real estate strategy
		occupancy costs flexibility human resources marketing messages sales & selling facilitate & control managerial process RE value creation				quantity quality cost location technology practices providing space
step 3: future models		linking real estate strategies to real estate operating decisions		crossing scenarios with strategies		

Table 12 Six CREM strategies positioned in the DAS-Framework.

	O'Mara (1999)	Nourse and Roulac (1993)	Vijverberg (2002)	Dewulf et al (1999)	Fritzsche et al (2004)	Osgood (2004)
future supply	generic real estate strategy	real estate operating decisions		opting strategy		measure
	incremental strategy value based strategy standardisation strategy	location quantity tenancy duration identity / signage building size building character building amenities exterior quality company space mechanical systems communication systems ownership rights financing control risk management				
step 4: transform projects			strategies on building level			
			consolidation conversion extension redeployment sale / disposal demolition			

Table 12 Six CREM strategies positioned in the DAS-Framework.

Table 12 also shows that the alignment models in combination with the DAS framework have some inconsistencies. A consequence of describing the organisational strategy as current demand is that the step between current demand and future demand is used to link real estate strategy to corporate strategy. This step should describe the changing demand on real estate based on the organisational strategy for coping with the changing context. Another consequence is that current demand is described in terms of organisational strategy and future demand more in terms of real estate strategies in order to anticipate the uncertainty of the future demand. This bias in description makes it hard to compare current and future demand.

The current supply focusses on the physical and financial characteristics of the real estate portfolio. This is not directly comparable with the organisational strategic objectives described in the current demand. This makes it hard to determine the current match. Future supply is described in terms of operational real estate decisions. The step by step plan from current supply to future supply defines the projects that are needed to transform the real estate portfolio. Most CREM models do not include the

organisational transformation required to parallel the changes in real estate. In addition, organisational models can be used to describe the interactions between input, throughput and output in terms of stakeholders' objectives.

This literature review so far and the case study of the Rotterdam Eye Hospital leads to the preliminary conclusion that a model for managing hospital real estate should focus on the alignment of real estate models that are capable of understanding real estate decision-making with organisational models that are capable of describing and transforming organisations and their processes.

§ 4.3 Organisational management

According to the former exploration, the objectives described at an organisational level in the CREM literature seem to focus on the strategic choices of management and less on organisational objectives and processes. Most CREM models describe organisational objectives from the perspective of real estate decision-making and omit an in-depth description of the organisational processes. An important question is how a hospital organisation and its crucial aspects can be described in such a way that conceptual models from CREM can be aligned to organisational management models.

The literature on hospital management includes some interesting models on quality management that might be applicable in describing an organisation's objectives and their relation to the primary process. Van Wersch, Winters-van der Meer, and Zomerplaa (2006) state that quality models are abstract representations of the organisation and/or processes and determine with which variables reality can be described and modulated. Complex processes and structures are simplified to a number of aspects. As most quality models are based on consensus in practice and less on scientific empirical research, the legitimacy of most of these models is in the experience they carry with them (Van Wersch et al., 2006). In line with this, De Leeuw (2006) states that organisational models – such as quality management models – are a magnifying glass with which to perceive the plural reality of an organisation and its processes. In other words, a quality model embodies a group of variables and the relations between these variables that: (1) describe a management system in reality as well as possible and; (2) give directions as to how performance could be improved (Ahaus & Broekhuis, 2007). Therefore, requirements for a quality model are multiple 'enablers' of good quality, multiple performance dimensions and dynamic relations between improved performance and the implementation of interventions (Minkman, Ahaus, & Huijsman, 2007). Enablers cover the processes, structure and main values of an organisation. Performance dimensions are the result or output criteria for the different stakeholders.

In recent decades, quality management has increased in importance in the hospital sector. In the early 1990s two National Conferences on 'Policy of Quality Care' played an important role in developing The Netherlands' approach to healthcare quality. These conferences were initiated by the Dutch health authorities, the financiers, the healthcare organisations and patient representatives as a reaction to the introduction of market elements in the Dutch healthcare system. The result of the first conference in 1989 was an outline for a quality policy, which stated that all healthcare organisations should develop a quality system. The Dutch Parliament enforced this intention by passing legislation in 1996.

'In order to prosper in today's dynamic healthcare systems; organisations such as hospitals must work efficiently, be innovative and organise efficiently. A focus on multiple performance measures is needed to assess the quality level reached' (Minkman et al., 2007). 'The essence of quality management is that the performance has to meet the expectations, needs and demands of the stakeholders. Quality management should focus on all activities, on all levels in an organisation and should be a continuous process to improve the performance' (Nabitz, Klazinga, & Walburg, 2000).

To achieve this quality level, different Quality Management Models have been developed that are used in hospitals. Some of these models originate from the corporate sector, other quality management models have been specially developed for the healthcare sector. Each model has its own characteristics, depending on the function and implementation possibilities at different levels of an organisation (Van Wersch et al., 2006). Some models are specific for one sector; others can be applied to more sectors, or, with some alterations, to all sectors or institutions. Healthcare organisations make use of both sector specific and generic quality models. In addition, organisations sometimes use different models for different departments, or combine different models into one overall model (Van Wersch et al., 2006). 'The ExPeRT Project, a European research project supported by the European Commission, identified four quality approaches to healthcare in Western Europe: the ISO approach, healthcare accreditation, visitation ('*visitatie*', a Dutch form of external peer review), and the EFQM Approach' (Nabitz et al., 2000).

In 1998, the Dutch Association for Quality in Healthcare ('*Nederlandse Vereniging Kwaliteit Zorg*': NVKZ), sent a questionnaire to each of their approximately 600 members (Van Wersch et al., 2006). In this questionnaire, respondents were asked which quality model(s) their organisation used and what their experience was with these models. Although Wersch et al. (2006) state that this inventory-taking was not representative of the whole Dutch healthcare sector, the results of this research give a global insight into the application of quality models in healthcare organisations. The models that are most commonly used in the healthcare sector are also described by Wersch et al. (2006). For the hospital sector these models are: ISO 9000, INK-model,

Balanced Score Card, HKZ, NIAZ-PACE, HACCP and CCKL. The last two models are specific quality models for food-delivery (HACCP) and the laboratory (CCKL). For this reason it is the other five models which are further described and assessed on their applicability for real estate decision making (see paragraph 4.3.1 until 4.3.5)

Minkman et al. (2007) report that some quality models are mainly used as management tools, e.g. at a strategic level, whereas other models are mainly used as tool to optimise the care for specific patient groups at the more operational level (Minkman et al., 2007). In addition, quality models are also used in practice as a supportive instrument for the implementation of healthcare management systems (Ahaus & Broekhuis, 2007). Both the capabilities of these models as management tools on a strategic level and the applicability for implementation within healthcare management systems, could make quality management models useable instruments in real estate decision making for describing and understanding an organisation and its objectives.

In the next section the organisational quality management models for real estate decision making are assessed using two criteria: (1) is the model generic – and therefore able to describe the different levels in the organisation – or specific for healthcare processes and; (2) does the model focus on external accountability or is it primarily used as a reference for internal quality improvement. Regarding the first criterion – generic against specific – a generic model is preferred as it describes the organisation and its performance dimensions, relevant information for its stakeholders, as well as the relation between input, throughput and output. Regarding the second criterion, the focus is on a model that is used as a reference for internal quality improvement, because several studies have shown that it is almost impossible to combine external accountability and internal organisational objectives in one quality assessment model. In addition to these two criteria, models are compared on their ability to describe an organisation's characteristics: (1) policy and management; (2) resources for production; (3) processes and; (4) stakeholders.

§ 4.3.1 ISO 9000

ISO norms originate from the British Army, where the benefits of standardisation, design and determination of the process were recognised. This was the starting point for industry to also develop these standards for civil markets using the British Standards (BS). These standards were later adopted by the International Standards Organisation (ISO) and became the ISO-norms. ISO norms include four main aspects: (1) accountability of the board; (2) structure of the quality systems; (3) human resources and equipment and; (4) clients.

ISO norms are generic and therefore usable in different sectors and organisations. They focus on mapping the processes and procedures within an organisation for external accountability. The audit process tests compliance with the standards and is not itself intended as an instrument for organisational development (Shaw, 2000). Certification is about the quality systems and not about the actual content of the work. The audit is primarily executed by experts in the ISO norms and not by experts in a particular type of organisation and is therefore not a form of peer review (Klazinga, 2000).

§ 4.3.2 EFQM-INK

The EFQM-INK (Figure 36) originates from the model of the European foundation for Quality Management (EFQM, 1997). The essence of the approach is a model with nine dimensions, called criteria: (1) leadership; (2) human resources; (3) policy and strategy; (4) resources; (5) processes; (6) employee satisfaction; (7) customer satisfaction; (8) impact on society and; (9) key performance results. These nine criteria are grouped into 'enabler' and 'result' criteria. The enablers include the process, structure and resources for production of an organisation. The results include broad aspects of performance. The most important result criteria are customer satisfaction and key performance results. The most important enablers are processes and leadership (Nabitz et al., 2000). By discerning enabler dimensions and outcome dimensions and putting them in a figure with nine boxes (see Figure 36 on page 74), the EFQM-INK operationalizes structure and outcome elements of organisations. Doing this, the EFQM-INK can also conceptualize organisations (Klazinga, 2000).

In addition to these nine criteria, the Instituut Nederlandse Kwaliteit (INK) added five phases of organisational development to the EFQM-INK model, as can be seen in the Guidelines 'Positioning and development' (EFQM, 1997). The idea of the development phases originated from the generation model for quality management of Hardjono and Hes (1993). The Product-oriented phase of an organisation represents the bottom level or the first phase, followed by the Process-oriented, the System-oriented and the Chain-oriented phase. The fifth and top phase is called 'Total Quality' (Nabitz et al., 2000).

EFQM-INK does not standardise quality systems but promotes quality management (Klazinga, 2000). 'The EFQM Model is both generic and concise, with a high level of face validity for users that are used to conceptualising organisations in terms of structure, processes and outcome. Furthermore it is related to theories on organisational change and knowledge management and innovation, rather than theories on engineering and structuring organisations' (Nabitz et al., 2000).

Phases of organisational development EFQM-INK model

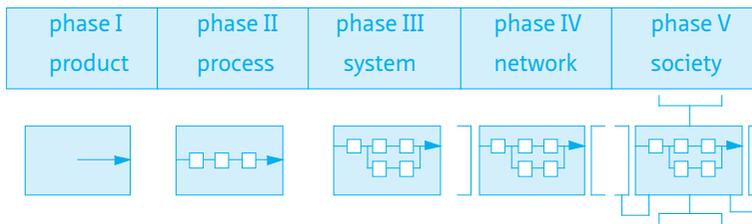


Figure 35 Phases of organisational development EFQM-INK Model (source: Instituut Nederlandse Kwaliteit).

Phase I, product-oriented: good execution of tasks is central and the focus is on reacting to - and solving - problems. The organisation has a closed system with a classic hierarchy. Quality depends on the skills and craftsmanship of the employees, communication is top-down and there is relatively low insight in the coherence between processes.

Phase II, process-oriented: controlling the primary process is central and this is visible in the knowledge about the processes and innovations for improving these processes. The primary process is identified and described. The focus of the leadership is transferred from being operationally to process-oriented and communication tends to be horizontal rather than top-down, following the primary process.

Phase III, system-oriented: the focus is on improving the primary and supporting processes of the whole organisation, with optimisation of the services as an important objective. Targets for employees and departments are based on key performance indicators that result from the processes described. Employees' qualities are optimally used.

Phase IV, chain-oriented: all the available knowledge in the chain-network of organisation and external subcontractors is utilised. Therefore not only the internal processes, but the whole chain of subcontractors and customers is analysed. Possibilities for outsourcing are assessed. As a consequence the organisation is dependent on external parties.

Phase V, Total Quality: the organisation is aware of its responsibility to society. Both society and the organisation gain by supporting the same objectives, therefore the organisation has an open dialogue with society and the organisation is a front runner in innovation and learning.

§ 4.3.3 **Balanced Score Card**

The Balanced Score Card was developed by Kaplan and Norton (1996) in cooperation with twelve corporations from a variety of mostly industrial sectors. In 1998 some healthcare organisations in the Netherlands experimented with implementing the Balanced Score Card and since then the model has gained in popularity among healthcare organisations (Van Wersch et al., 2006). The Balanced Score Card uses four perspectives: (1) the financial perspective which describes appreciation of the shares for shareholders; (2) the client perspective which focuses on clients' appreciation; (3) internal processes by determining the added value of primary processes and; (4) innovation and learning due to the capability for innovation, alteration and improvement. Based on these perspectives, performance measurements are made, the results of which are related to objectives for each perspective, formulated using the vision and strategy of the organisation (Van Wersch et al., 2006).

The Balanced Score Card is a generic model with a focus on internal improvement of processes based upon performance measurements on the four perspectives. The Balanced Score Card seems to have a stronger focus on stockholder value than on stakeholders' values compared to the EFQM-INK model which also integrates society and human resources as results criteria.

§ 4.3.4 **HKZ model**

The Association for Harmonization of Quality Assessment in Healthcare ('Stichting Harmonisatie Kwaliteitbeoordeling in de Zorgsector': SHKZ) was established in 1994 after the 1990 Leidschendam Conference in order to coordinate external quality assessment of healthcare. In the HKZ-model, the primary processes of healthcare delivery and services are central (Van Wersch et al., 2006). The model uses three objectives related to the primary process and formulated from the clients' perspective: (1) intake; (2) healthcare services and; (3) evaluation. Besides these objectives there are six objectives focussing on the organisation of healthcare: (1) policy and organisation; (2) human resources; (3) research; (4) physical environment and equipment; (5) stock and outsourcing; (6) administration of information (Ahaus & Broekhuis, 2007). Assessment using the HKZ model is based on visitation with a focus on external accountability. Visitation has its roots within the profession and is developed and executed by professionals. Emphasis is on clinical performance in terms of knowledge, skills and attitude (Klazinga, 2000).

§ 4.3.5 NIAZ-PACE

Like the HKZ model, NIAZ-PACE is a model for controlling risks in the primary processes and improving processes within the organisation. This model is specifically developed for the healthcare sector and uses 36 standards for accreditation. 'The frame of reference used in accreditation is composed of 35 department-wide standards and a hospital-wide standard quality system. All the standards have been developed by people in Dutch hospitals' (Van Gennip, Linnebank, Silleviss-Smit, & Geldof, 1999). These standards have five categories: (1) policy and organisation; (2) process management; (3) equipment and materials; (4) knowledge and skills and: (5) quality systems. Accreditation is conducted by peer review. The system is complementary to the visits organised by the medical specialist societies in the Netherlands. The primary focus of the system is identifying points for improvement rather than organisational quality (Van Gennip et al., 1999).

§ 4.3.6 Discussion of organisational management

Table 13 summarises the five quality models as described in this chapter so far. Klazinga (2000) state that, given the balance of power between parties in the healthcare system and the focus and scope of accountability, the quality system perspective of ISO, the quality management development perspective of EFQM, the healthcare organisation perspective of accreditation and the professional perspective of visitation can all be appropriate, although not all the models are applicable to real estate decision making.

Table 13 shows that of the five models the EFQM-INK model and the Balanced Score Card are both generic with a focus on internal quality improvement. Both models look for the leading drivers for success, assess the current situation and which stakeholders should be taken into account in future developments. But the INK model also includes society as a stakeholder and focuses less on shareholders as the most important stakeholder. This makes the EFQM-INK model more suitable for conceptualising hospital organisations in which both society and government as legislator have great influence.

	ISO 9000	EFQM-INK	Balanced Score Card	HKZ	NIAZ-PACE
generic - sector specific	generic	generic	generic	sector specific	sector specific
external accountability - internal quality	external accountability	internal quality	internal quality	external accountability	external accountability
policy and management	accountability of the board	leadership policy and management		policy and organisation	policy and management
resources for production	human resources and equipment	human resources		human resources	
		resources	financial perspective	physical environment and equipment outsourcing	equipment and materials
			innovation and learning	research and development	knowledge and skills
processes		processes	internal processes		process management
stakeholders		human resources results			
	customers	customer results	customer perspective	intake - healthcare services -evaluation	
		society results key performance results			
quality system	structure of quality systems			administration of information	structure of quality systems

Table 13 Summary of quality models Dutch hospitals and their main dimensions.

Of the models presented the EFQM-INK-model is most commonly used in hospitals. In 1998, a short survey of the 20 best hospitals in the Netherlands showed that 13 of the 20 hospitals used the EFQM-INK as a framework for their quality management system (Nabitz et al., 2000). Compared with EFQM-INK, ISO, accreditation and visitation put less energy into the conceptualisation and visualisation of healthcare services as organisations (Klazinga, 2000). From these four types of quality management, the EFQM-INK approach is perceived by experts as the most generic one. 'The EFQM approach covers quality management as an integral part of all professional and management functions on all levels of the institution. Furthermore, it focuses on organisational development and continuous improvement, which ISO and accreditation typically do not emphasise as much' (Nabitz et al., 2000).

Given the policy context of market oriented healthcare reforms and its consequences for quality of care initiatives, the EFQM-INK model has some attractive characteristics. Organisations can position their institution in the context of service organisations with excellent reputations. Because it is generic, the model does not interfere with

the dilemma between profession and management that is typical of healthcare organisations. The avoidance of these dilemmas can be an advantage when the aim of management is to introduce the general concepts of quality management within the organisation. The EFQM-INK approach does not represent a governmental initiative or an initiative from financiers. It is an opportunity for healthcare institutions which have to progress and develop in terms of quality management but do not want to be submitted to direct external review and control from government (Nabitz et al., 2000).

The EFQM-INK model is not specific enough to address all the areas relevant to healthcare; it does not replace the healthcare specific approaches of hospitals and professionals that ensure the quality of the clinical content of healthcare. However, if used correctly, the EFQM-INK can provide an overarching conceptual framework for quality management initiatives that is acceptable for the different groups within healthcare organisations, including professional, management and a growing number of technical and facilitative staff (Nabitz et al., 2000).

In almost all European countries the EFQM-INK approach is used for self-assessment by healthcare organisations. However only in the UK and the Netherlands is there a national institute which formally supports the practical work. The British Quality Foundation has published and adapted the EFQM-INK criteria for healthcare and the Dutch quality institute has developed specific guidelines for healthcare which are also supported by the Minister of Health. The emphasis is on improvement and organisational excellence and not on measuring and standardisation (Nabitz et al., 2000).

The Salford Royal Hospital in Manchester, supported by the University of Salford, uses the EFQM-INK approach as a framework for quality management and training. The Hospital of Tromsø in Norway conducted about 60 self-assessments with the hospital teams and as a consequence redesigned certain processes; they also won the Norwegian National Quality Award. In Germany it is also of interest that a network of private practices uses the EFQM-INK approach to assess and improve quality (Nabitz et al., 2000).

In a two-level self-assessment the EFQM-INK excellence model was carried out at Udine hospital as part of a fundamental organisational and cultural improvement program (Venero, Nabitz, Bragnozi, Rebelli, & Molinari, 2007). More than 200 managers and professionals (about 7 per cent of the total workforce) were involved in this EFQM-INK self-assessment project. The EFQM-INK model proved to be a good diagnostic tool for the organisation as a whole, as well as for individual departments. The two-level self-assessment process not only gave answers to five questions directly related to the EFQM-INK excellence model but also achieved other tangible results. Managers and directors recognised that assessing the hospital helped them look beyond the confines of their own individual wards and departments and acquire a

more systemic view of the whole organisation. Department assessment also prompted them to focus more on organisational and clinical outcomes as well as staff interaction and external customers. All participants recognised that self-assessment helped them understand the organisation's complexity and the different worlds within it. (Vernero et al., 2007).

The EFQM-INK Business Excellence Model (shown in Figure 36) highlights that customer and people satisfaction as well as an impact on society are achieved through leadership, which drives policy and strategy, people management, resources and processes leading ultimately to excellence in business results. The model is based on the concept that an organisation achieves better results by involving all the people in the organisation in continuous improvement of their processes (Naylor, 1999). The model is divided into two parts. Enablers concentrate on how the organisation is run and operated and results concentrate on what is seen to be achieved by all those who have an interest in the organisation and how achievement is measured and targeted (EFQM, 1997). The full power of the model is derived from the relationships between the enabler criteria and the results criteria. Each of the nine elements of the model is a criterion which can be used to assess an organisation's progress towards excellence (Shergold & Reed, 1996).

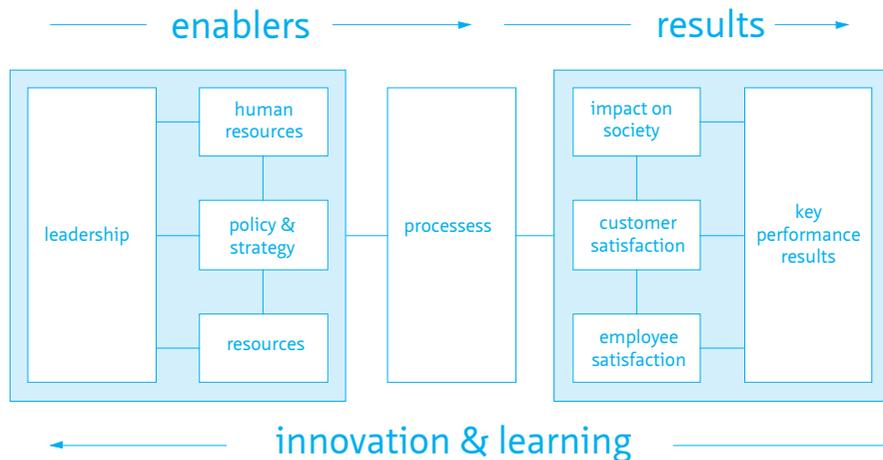


Figure 36 EFQM-INK Model (source: Instituut Nederlandse Kwaliteit)

Dimensions of the EFQM-INK model (Shergold & Reed, 1996).

Leadership relates to the behaviour of all managers, how the executive team and all other managers inspire, drive and reflect total quality as the organisation's fundamental driving force for continuous improvement. Within this category, leaders need to visibly demonstrate their commitment to excellence and continuous improvement and their support for improvement and involvement by providing the appropriate resources and assistance. How leaders recognise and appreciate the efforts and achievements of employees is also an important part of this criterion. Evidence that leaders are involved with their customers, suppliers and other external organisations is also important.

Policy and strategy reviews the organisation's mission, values, vision and strategic direction. How the organisation's policy and strategy reflect the concept of total quality and the principles of total quality are used in the formulation, deployment, review and improvement of policy and strategy. The different parts of this criterion relate to how policy and strategy are based on information which is relevant and comprehensive, how policy and strategy are developed, how policy and strategy are communicated and implemented and how policy and strategy are regularly updated and improved.

Human resources studies the management of the organisation's workforce and how the organisation realises the full potential of its workforce in order to continuously improve its business and/or service. Several areas are important within this category including the planning and improvement of people resources, the sustainment and development of employees' capabilities, the agreement of targets and continuous performance review, the involvement empowerment, recognition and care for employees and achieving an effective dialogue between the workforce and the organisation.

Resources refer to the management, utilization and preservation of resources and how the organisation's resources are effectively deployed in support of policy and strategy. Several areas are included within this criterion, including the management of financial resources, defined as the short-term funds required for the day-to-day operation of the business in addition to the capital funding from various sources; the management of information resources together with supplier relationships and materials. The other areas within this criterion include the management of buildings, equipment and other assets including technology.

Processes analyses the management of all value adding activities within the organisation, and addresses the identification, review and revision of processes to ensure continuous improvement of the organisation's business and/or service. The identification of processes key to the success of the business and the systematic management of those processes is highlighted. Reviewing the processes and setting

targets for improvement are also important as well as the improvement of processes using innovation and creativity, changes in processes and the evaluation of the subsequent benefits.

Customer satisfaction examines what the achievements of the organisation in relation to the satisfaction of its external customers. The two main areas within this criterion relate to the customers' perception of the organisation's products, services and customer relationships and additional measures relating to the satisfaction of the organisation's customers.

Employee satisfaction investigates the organisation's achievements in relation to employee satisfaction. The perception of the workforce in relation to the organisation is important as well as any other additional measures relating to employee satisfaction.

Impact on society examines the organisation's achievements in meeting the needs and expectations of the community at large. This includes society's perception of the organisation and additional indicators of the organisation's impact on society.

Key performance results reviews the organisation's achievements in relation to its planned business and/or service objectives and in satisfying the needs and expectations of everyone with an interest in the organisation. Financial measures of the organisation's performance and any additional measures of the organisation's performance should also be considered.

Ahaus, Diepman, and Van der Lugt (2001) propose one way to implement the EFQM-INK model. They divide the EFQM-INK model into several steps, the three main steps being: (1) stakeholders' objectives; (2) success factors and; (3) improvement of an organisation. In this approach the mission statement of the organisation is related to stakeholders' objectives, therefore the four result criteria of the EFQM-INK model (employee satisfaction, customer satisfaction, impact on society and key performance results) are assessed in the organisation. Based on this assessment the organisation's key issues for success are translated into key performance indicators (kpi). These success factors are the input for improving the processes in the organisation by steering the five organisation fields of the EFQM-INK model (leadership, human resources, policy and strategy, partnership and resources and; processes).

The EFQM-INK approach is general and aligns conceptually with the ideas that are formulated by Donabedian (1988). Donabedian considered the healthcare service as a whole and made a distinction between structure, process and outcome quality. The dimensions of structure, process and outcome quality fit well with the dimensions of the EFQM Model (Nabitz et al., 2000).

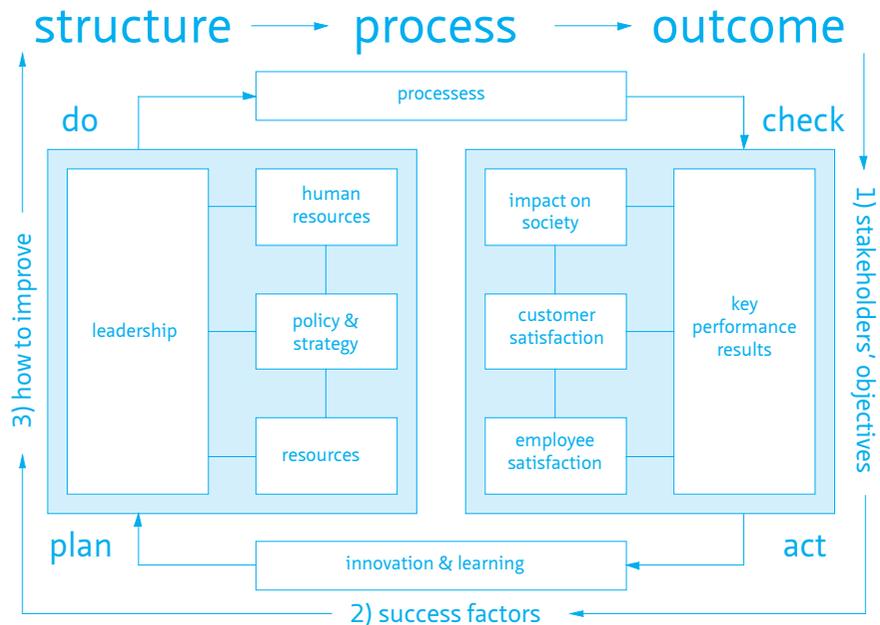


Figure 37 Three steps of implementation integrated into the EFQM-INK Model.

Within the EFQM model as restructured in Figure 37, the Plan-Do-Check-Act cycle of Deming is also recognisable (Deming, 1950). The Deming quality circle is a creative tool for quality management and problem solving developed by William Edwards Deming. The core of this vision is that every employee in a (production) process is able to develop their own procedure for assessment and improvement. Employees represent an own sub-process of the higher process. Management should analyse the higher processes, the management for the primary business. The circle describes four activities that are applicable to all improvements in organisations. The cyclical nature ensures that quality improvement occurs continuously. The classification results from the scientific process as defined by Francis Bacon (1994) (*Novum Organum*, first published in 1620): hypothesis - experiment - evaluation. The four activities in the quality circle of Deming are: (1) plan: look at current work and design a plan for the improvement of this work and expect these improvement targets; (2) do: perform the planned improvement in a controlled test environment; (3) check: measure the result of the improvement and compare it to the original position and press it against the objectives (4) act: make adjustments according to the results found in step 3.

Similar steps regarding the management of real estate can also be found in two recent dissertations about universities and hospitals. As mentioned before, Den Heijer (2011) describes four management tasks associated with the DAS-frame: (1) assessing current supply; (2) exploring changing demands; (3) generating future models and: (4) defining projects to transform the supply of real estate. The focus of these four steps is

on managing real estate and as a result, it is possible to conceptualise the organisation using real estate models. Niemeijer (2013) considers the architecture of hospitals from a business perspective. Her proposed value model on the added value of architecture in hospitals is based on four steps: (1) identifying strategic objectives, (2) determining a business diagnosis, (3) a strategic change plan by utilising a business concept and, (4) controlling and monitoring the strategic change. Niemeijer (2013) chooses a business-like approach in which business principles are directly translated into the architecture of the building. Although the basic steps seem to be useful, a different interpretation would be more useful in order to align organisational management, accommodation and architecture.

§ 4.4 **Meta-model and integrating framework for managing real estate**

This chapter has discussed several conceptual models on organisational management and CREM. What can be concluded from this analysis of organisational models is that organisational quality management models are abstract representations of the organisation. Each model has a different focus and describes specific parts and aspects of the organisation. Mintzberg's model of organisational structures helps to make sense of the organisation from the perspective of communication and the rules between the members. Other models focus more on the organisation in terms of input, process and output in general. Besides, some healthcare specific models focus on the healthcare process. From the discussed organisational models, the EFQM-INK model seems to have some advantages over the other models for examining hospital organisations in terms of real estate. The EFQM-INK model describes most aspects of an organisation and has a focus on internal quality improvement. In practice, this model is also used for organisationally strategic decisions. Stakeholder perspectives are included in the model at four levels including key performance results, society appraisal, employee and customer satisfaction. Organisational changes are described in terms of leadership and the policy & management of resources, in which employees as human resources are a separate category to the resources which include real estate. The primary process is central to this model and describes the process in itself. In addition, the EFQM-INK model also describes the phases of organisational development.

Integration of the three steps of implementation (Ahaus et al., 2001), the quality dimensions as formulated by Donabedian (1988) and the Deming Cycle (Deming, 1950) results in a basic meta quality model as represented in Figure 42. This model is the basis for aligning CREM models to organisational management models in the next section of this chapter.

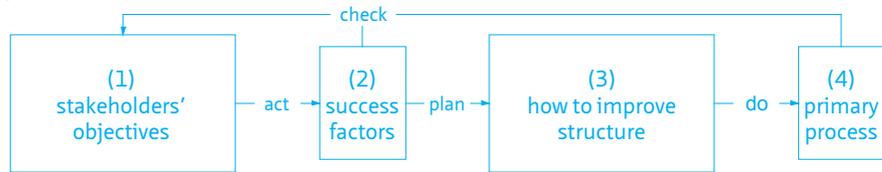


Figure 38 Basic conceptual model.

The abstraction of both the EFQM-INK model and the balanced score card in four steps for implementation as described by Ahaus et al. (2001) seems to provide a useful basic framework with which real estate models can be aligned. These three steps for implementation include: (1) stakeholders' objectives; (2) success factors and; (3) steering on input resources to improve the primary processes.

A conceptual model that aligns corporate real estate management to organisational management should cover the following three main aspects distinguished in the literature on organisational management: (1) perspectives on real estate resulting from the alignment with stakeholders' organisational objectives; (2) real estate strategies that can add value to organisational objectives and; (3) change management of real estate in order to match demand and supply, now and in the future. The first step is an assessment of the stakeholders' demands regarding real estate, resulting from the stakeholders' objectives for the overall organisation. The second step determines how organisationally key issues for success can be translated into real estate goals. The last step is changing the real estate supply in such way that it is capable of facilitating organisational processes.

The meta-model presented in Figure 39 aligns the management of real estate to organisational management and shows how the conceptualisation of managing the organisation and real estate in three steps (context, values, management) results in the design of a process and building. The cycle starts with an evaluation of the organisation and its real estate based on an assessment of the internal and external context and the stakeholders' outcome criteria derived from their objectives. Successes and failures define plans for improvement. Implementation aims to result in an improved organisational structure and more effective and efficient primary processes alongside real estate interventions that add value to the organisation and support its performance. The final step is to check whether the decisions regarding organisation and real estate result in improved outcomes for the stakeholders. If the context and/or stakeholders' objectives change, it may be necessary to repeat the quality assessment. Important steps are ex ante defining the desired values and checking whether these values are achieved in the accommodation by Design Research and Post-Occupancy Evaluation (POE) of the building-in-use.

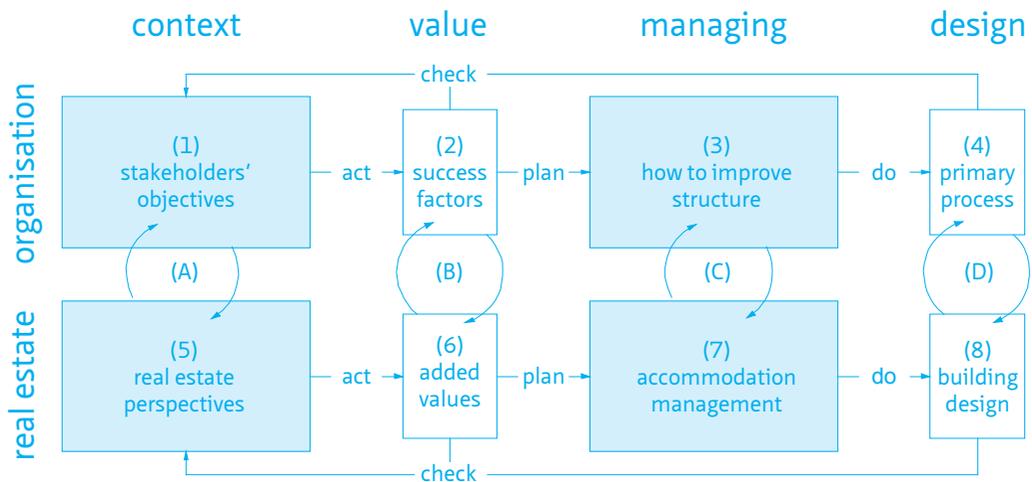


Figure 39 Meta model for the alignment of CREM with organisational management.

This meta-model can be made operational with different models of both organisational management and CREM, resulting in an integrating framework for aligning organisation and accommodation management. For example, the theories of Porter (1980) on Competitive Advantage or Treacy and Wiersema (1995) on “The disciplines of market leaders” can be used to define organisational success factors. Existing quality models such as the Balance Score Card (Kaplan & Norton, 1996) or the EFQM-INK model can be used to describe the context of the organisation and changes and management of the organisation.

The literature review of quality models of healthcare showed that the model most frequently used by hospitals both within and outside the Netherlands is the EFQM-INK. This model is a generic model also used outside the health sector and focuses on internal quality improvement and less on external accountability. In addition it describes five stages of organisational development that allow an assessment of an organisation. In this thesis therefore the EFQM-INK model is adopted for the conceptualisation of the organisation in the integrating framework (see Figure 42).

Examination of the CREM literature showed that different models are available to make the real estate section of this meta-model operational, including topics such as (1) stakeholder perspectives on property (Den Heijer, 2011), (2) the added value of real estate and, (3) designing an accommodation strategy (DAS) framework (De Jonge et al, 2008). In the integrating framework shown in Figure 42 these steps result in the architectural design of the building in which the primary process is accommodated.

§ 4.4.1 Aligning CREM perspectives on real estate with stakeholders' objectives

The first aspect to be included in the integrating framework is the alignment of stakeholders' objectives with the perspectives on real estate. Den Heijer (2011) identifies four types of stakeholders and matching perspectives. This originates from the CREM model defined by De Jonge (1996) and Krumm (1999). Identified stakeholders are: the policy maker with a strategic perspective on real estate; the controller with a financial perspective; the users with a functional perspective and the technical managers with a physical perspective. These stakeholders are distinguished in four quadrants, either with a focus on the institution or real estate and on the strategic or operational level.

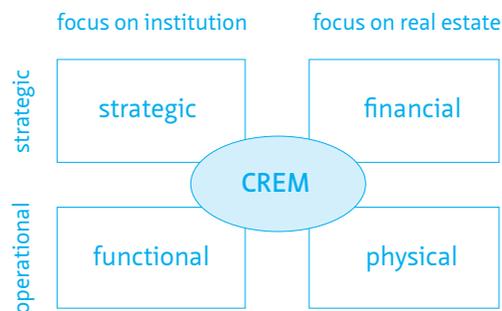


Figure 40 Four perspectives on real estate.

Stakeholders' perspectives on real estate (Den Heijer, 2011; Den Heijer & De Jonge, 2012; Hoendervanger et al., 2012)

Strategic perspective: real estate is seen as a fifth resource for production and a main variable is the institutional goals – how and to what extent are institutional goals supported and achieved or obstructed by the current real estate. The strategic perspective focusses on decisions that improve the quality and effectiveness of the primary process by e.g. improving quality of space, supporting culture or supporting the image of the organisation.

Financial perspective: real estate from the perspective of the financial controller, responsible for financing, cost and reimbursement. This perspective includes the costs of real estate investments, resources that are spent on real estate and the values that real estate represents.

Functional perspective: real estate as the facilitator of users and primary processes.

This perspective is primarily important for users and focusses on decisions that (optimally) support the user's activities by changing the quantity and quality of space. Decisions include the number and types of users that have to be accommodated, satisfaction about the current real estate and occupancy rates.

Physical perspective: real estate as a physical object that determines usability and requires the maintenance of the quantity and quality of current and future real estate, including location characteristics, types of spaces, condition and age of buildings.

Although it is questionable whether these perspectives are really linked one-to-one to specific stakeholders as described by Den Heijer (2011), these perspectives on real estate give an interesting opportunity to link real estate goals to stakeholders' interests. Normally, stakeholders have an interest in the overall performance of the organisation, and not specifically in the organisation's real estate or other input resources. Each stakeholder described in this model includes all four perspectives with a special focus on one, two or even more perspectives. A policy maker has to balance all the perspectives regarding real estate to come to a good decision and the technical manager has to find solutions that are both physically and technically possible that fit both functional and financial perspectives.

Whereas patients go to a hospital to get treated, specialists go there to treat their patients and healthcare professionals go there to assist in the patient's treatment. The main interests of these stakeholders are related to these activities. From these stakeholders' organisational objectives, one can formulate perspectives on real estate, but still these perspectives are not directly related to the different stakeholders. This implies that these perspectives on real estate (strategic, financial, functional and physical) have to be related to the stakeholders' organisational objectives as described in the literature on organisational management in order to relate to the stakeholders' interests in the overall performance of the organisation. In the EFQM-INK model, these end results depend on the appraisal of employees, customers and society. In this case, perspectives on real estate should be linked to these result criteria to add to the organisational performance.

The step initiated by Den Heijer (2011), to transform the stakeholder model with policy maker, controller, user and real estate manager into four perspectives on real estate (strategic, financial, functional and physical) makes it possible to combine these perspectives with real estate added values. Instead of assigning one added value to a certain stakeholder, the added values can be described in terms of the four perspectives, for example the strategic, financial, functional and physical consequences of improving productivity as an added value in hospital real estate could be determined.

§ 4.4.2 Added value of real estate aligned to organisational success factors

The determination of key issues for success is a crucial step in the EFQM-INK model. In this step, stakeholder objectives are translated into organisational performance criteria that are important to attain the appraisal of employees, patients and society. Key issues for success are different for each organisation and dependent on the general and sector specific context, but also on organisational strategy, culture and structure. In order to add value to organisational objectives, real estate goals should be aligned with both the organisational key issues for success and the strategic, financial, functional and physical perspectives on real estate. The way real estate can contribute to these key issues for success also depends on how the value of real estate is added to organisational objectives. This is addressed by several authors in CREM literature. These added values are described for corporations in general, but the question is whether these are also the added values of hospital real estate. It is therefore necessary to adapt the general added values in CREM literature for the hospital sector. A short general overview of added values of real estate is described in this chapter, as PART 3 elaborates in more detail on adding value with hospital real estate.

In 1993 Nourse & Roulac made an initial list with real estate strategies as possible interventions and how real estate could be linked to corporate business processes. Since then, De Jonge (1996), Lindholm (2006), Scheffer et al (2006), De Vries (2007; De Vries et al., 2008) and Den Heijer (2011) have further contributed to the research on this topic. These authors all use different names, such as real estate strategies, added values or real estate added values, although the mentioned objectives remain the same.

The different lists of added values of real estate resulting from these studies are partly overlapping. Nourse and Roulac (1993) and De Jonge (1996) give definitions of the added values of real estate, whereas Lindholm (2006) and Den Heijer (2011) also use descriptions to clarify the added values. All these authors give examples of possible real estate strategies connected to the added values. Lindholm (2006) and Scheffer (2006) also give key performance indicators (kpi) as measurable objectives.

Table 14 gives an overview of the addressed added values of real estate by these authors. This table shows that over the years the original eight alternative real estate strategies proposed by Nourse and Roulac have been redefined. Other added values have been combined or split up or added new to the list. 'Promote Human resource objectives' is divided between 'improve productivity' and 'increase employee satisfaction'. 'Facilitate managerial process and knowledge work' is divided into 'increase innovation' and 'improve culture'. 'Promote marketing message' and 'promote sales and selling processes seems to be combined into 'promote marketing and sales' and later into 'support image'. As can be concluded from Table 14, nine

added values are mentioned by most authors. These added values are: (1) reduce costs; (2) improve productivity; (3) increase user satisfaction; (4) improve flexibility; (5) support image; (6) increase innovation; (7) improve culture; (8) control risks and (9) improve financial position.

Nourse & Roulac (1993)	De Jonge (1996)	Lindholm (2006)	Scheffer et al (2006)	De Vries (2008)	Den Heijer (2011)	Niemeijer (2012)
real estate strategies	added values	real estate strategies	added values	real estate added values	added values of real estate	added value of architecture
facilitate and control production, operations and service delivery	improve productivity	increase productivity	increase productivity	increase productivity	supporting user activities	functionality of lay-out
promote human resource objectives		increase employee satisfaction		increasing satisfaction	increasing (user) satisfaction	user satisfaction
	improve culture		changing the culture		improving quality of place	
facilitate managerial process and knowledge work				improving culture	supporting culture	individual behavior of users
		increase innovation		stimulating innovation	stimulating innovation	
occupancy cost minimalisation	reduce costs	reduce costs	cost reduction	reducing costs	decreasing costs	exploitation of building
promote sales and selling proces	marketing	promote marketing and sales	PR and marketing	supporting image	supporting image	business processes
promote marketing message						
flexibility	increase flexibility	increase flexibility	increase of flexibility	enhancing flexibility	increase flexibility	flexibility
capture real estate value creation	improve availability of finance (increase of value)	increase value of assets	increase of value	expanding funding possibilities	increase real estate value	re-use possibilities
	risk management					
					reducing ecological footprint	sustainability

Table 14 Lists of added values of real estate.

§ 4.4.3 Transforming real estate aligned to organisational transformation

In addition to the organisational stakeholders' criteria, perspectives on real estate, success factors and real estate added values, steering through change processes is an important step for both organisational processes and real estate in aligning real estate decision making with organisational management. The last aspect to be included is therefore a change management model that connects to the organisational objectives of hospitals. In the EFQM-INK model these change processes are described by four organisation fields to manage the primary process of the organisation. Change processes for real estate imply the steps taken to match demand and supply, or in other words to transform the available supply of real estate into the demand and supply that matches organisational objectives.

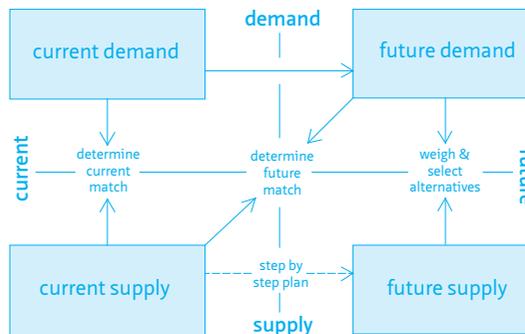


Figure 41 DAS-frame.

Both the DAS-frame and the EFQM-INK model describe a management process of change. As the EFQM-INK model describes the change management of an organisation to improve the quality of the primary processes, the DAS-frame describes the management process of real estate. As for the DAS-frame this implies that each part of the framework should describe the same comparable qualitative and quantitative criteria in order to match current and future demand and supply.

§ 4.4.4 Alignment of assessment scales

The theory of the five stages of Joroff et al (1993) in combination with Mintzberg's organisational configurations and the organisational orientation of the EFQM-INK model is useable as a five point scale to determine the focus of the real estate decisions – operational, tactical or strategic. These three assessment scales provide a triple five point scale to assess organisational development in parallel with organisational

configuration and the position of real estate decision making. The conceptual framework for this assessment is described in Table 15. Triple assessment can be used as a conceptual framework to understand an organisation's orientation, structural configuration and the position of real estate decision making.

EFQM-INK		five organisational configurations		evolutionary stages of real estate	
product oriented	<ul style="list-style-type: none"> * hierarchical organisation * craftsmanship * top down communication * task culture 	simple structure	<ul style="list-style-type: none"> * strategic top * direct supervision * vertical and horizontal centralisation 	task manager	<ul style="list-style-type: none"> * technical focus * supply needs for real estate * engineering buildings
process oriented	<ul style="list-style-type: none"> * primary process identified * leadership focus on process * horizontal communication * process improvement 	machine bureaucracy	<ul style="list-style-type: none"> * technostructure * standardisation of processes * horizontal decentralisation 	controller	<ul style="list-style-type: none"> * cost reduction * analytical approach * information on RE objects * benchmark
system oriented	<ul style="list-style-type: none"> * secondary processes described * targets and goals * indicators in process * optimising services 	professional bureaucracy	<ul style="list-style-type: none"> * operational core * standardisation of skills * vertical and horizontal decentralisation 	dealmaker	<ul style="list-style-type: none"> * create financial value * problem solving * standardisation of real estate * flexible internal RE market
chain oriented	<ul style="list-style-type: none"> * chain of subcontractors and customers is analysed * insourcing / outsourcing 	divisionalised form	<ul style="list-style-type: none"> * middle line * standardisation of output * vertical decentralisation 	intrapreneur	<ul style="list-style-type: none"> * internal RE company * proposing solutions * external market options
society oriented	<ul style="list-style-type: none"> * open dialogue with society * front runner in development * shared values with society 	adhocracy	<ul style="list-style-type: none"> * support staff * informal communication * selective decentralisation 	business strategist	<ul style="list-style-type: none"> * anticipate trends in society * measuring and monitoring results * contribute value to organisational objectives

Table 15 Triple assessment. Phases of organisational development (EFQM, 1997), organisational configurations (Mintzberg, 1993) and evolutionary stages of real estate (Joroff et al., 1993).

The triple assessment reflects the organisation and its accommodation, although all items of the assessments do not have to be at the same level. The organisation's ambition can be on a different level than the management of the accommodation. In a case such as this, the triple assessment indicates alternatives for managing the accommodation parallel to the organisation. As mentioned before, hospitals' structural configuration is best described as a professional bureaucracy in which the specialist as professional has an important role. From the perspective of the healthcare professional, the organisation is there to support him in the primary process: the delivery of healthcare to his patients. Optimising services is the main focus and therefore secondary processes also have to be described and managed. For real estate management this implies that it is important to solve problems in a way that creates added value to the primary process.

Organisational development (EFQM, 1997), organisational configurations (Mintzberg, 1993) and evolutionary stages real estate (Joroff et al., 1993)

Product-oriented - simple structure - task manager

Good execution of tasks is central and the focus is on reacting to - and solving - problems. The organisation is a closed system with a classic hierarchy. Quality depends on the skills and craftsmanship of employees. The configuration of the organisation is a simple structure with top-down communication and there is relatively little insight into the coherence between processes. Important decisions are made by the strategic top. This phase connects with the task manager as first evolutionary stage of real estate. In this stage there is a technical focus on real estate and supplying the corporation's need for physical space (Den Heijer, 2011). The specific task is engineering buildings (Dewulf et al., 2000).

Process-oriented - machine bureaucracy - controller

Controlling the primary process is central and this is visible in the knowledge about the processes and the innovations to improve these processes. The primary process is identified and described. Leadership shifts from being operationally to process-oriented and communication changes from top-down to horizontal, following the primary process. The organisational configuration is that of the machine bureaucracy in which the controller as part of the techno-structure has great influence. The consequence is that the focus on real estate is on transparency and cost minimization, requiring a more analytical approach to real estate information.

System-oriented - professional bureaucracy - dealmaker

The focus is on improving the primary and supporting processes of the whole organisation. Optimisation of services is an important objective. Targets for employees and departments are based on key performance indicators that result from the described processes. Quality of employees is optimally used, as they are perceived to be the most important part of the organisation. This phase connects to the professional bureaucracy as an organisational configuration in which 'the power of expertise' is most important. Therefore, a logical perspective on real estate is the deal maker as described in Joroff's (1993) third stage. In this stage problems are solved in ways that create financial value for the users (Den Heijer, 2011). The dealmaker tries to standardise building use in order to get a flexible deal in the internal market (Dewulf et al., 2000).

Chain-oriented – divisionalised form – intrapreneur

All available knowledge about the chain-network of the organisation and external subcontractors is used. Not only the internal processes is analysed, but the whole chain of subcontractors and customers and the possibilities for outsourcing are assessed. Consequently the organisation is also dependent on external parties. The Divisionalised Form is the most logical organisational configuration. In this stage, the real estate

department operates like an intrapreneur and the organisation is perceived as an internal real estate market, alternative real estate solutions are proposed to business units that match the real estate business plans of the units and the market options.

Total Quality – adhocracy - business strategist

The organisation is aware of its responsibility to society. Both society and the organisation gain by supporting the same objectives, therefore the organisation has an open dialogue with society and is a front runner in innovation and learning. The organisational configuration is the adhocracy, in order to be able to react fast to new developments and possibilities. The business strategist perspective on real estate anticipates trends and monitors and measures the impact of real estate on organisational objectives. The business strategist tries to contribute to the value of the company as a whole by focusing on the company's mission rather than on real estate objectives (Dewulf et al., 2000).

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§ 4.4.5 An integrating framework for managing hospital real estate

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Based on the meta-model it is possible to organise the CREM models parallel to the EFQM-INK model. The CREM stakeholder perspectives can be positioned parallel to the result criteria that are described in the EFQM-INK model. In this way stakeholder management is part of the organisational management and is translated into real estate perspectives on CREM (strategic, financial, functional and physical).

In order to align the perspectives on real estate with the stakeholders' objectives, the items from the CREM perspectives of Den Heijer's (2012) original model have been rotated. The rotation results in two vertical columns of related items. In the first column, the functional and physical perspective on real estate is paralleled with the impact on society, customer satisfaction and employee satisfaction. In the second column, strategic and financial perspectives on real estate are paralleled with the organisation's key performance results. The perspectives on real estate are translated into added values of real estate as the common language that in all phases of the real estate lifecycle can be understood and assessed. This concept of adding value by real estate is connected to the key issues for success that result from the demands and wishes that society, employees, customers and the organisation's management have at an organisational level. Both the key issues for success and the added values of real estate provide input into the change management process of the organisation and its real estate. The organisation's change management is directed by leadership and is about policy & management of the resources, including human resources and

real estate. In this part of the model, different resources for production have to be balanced against each other. This results in a process that has to be implemented in a physical environment. In this model, the DAS Frame is the basis for real estate change management. In an iterative process a match is made between demand and supply, now and in the future, which results in a building which can support organisational primary processes. In order to align the DAS-frame to the other items in the integrating framework, the original DAS-frame is slightly reshaped whilst keeping the relations of the original model between current and future / demand and supply. Reshaping the DAS-frame within the integrating framework results in a direct relation between the added value of real estate and the organisation's leadership on the current and future demand for real estate. On the other hand, current and future supply is connected to the organisation's resources. Paralleling the management of accommodation with organisational change therefore leads logically to a step-by-step plan for the transformation of the accommodation. Both the processes and the building are compared with the stakeholder demands and connected perspectives on real estate. The attainment of stakeholder demands are on an organisational level, the stakeholders are interested in the overall performance of the organisation and not in the performance of real estate as a separate resource for production. The integrating framework for managing hospital real estate is represented in Figure 42.

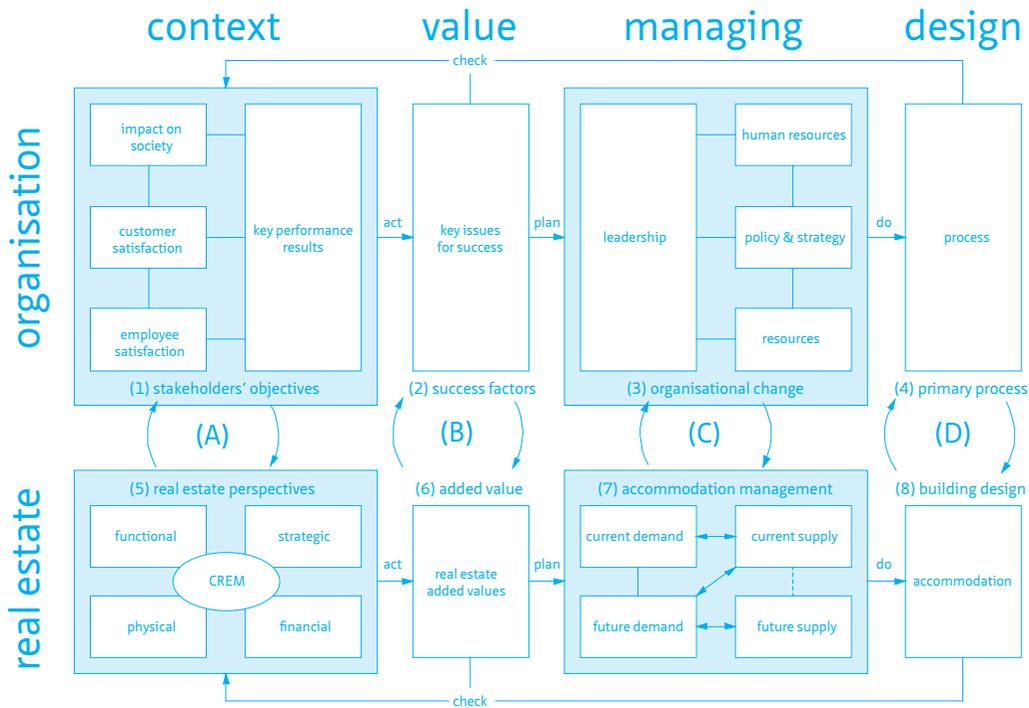


Figure 42 An integrating framework for managing hospital real estate.



5 Case study managing hospital real estate

How is organisational management and CREM applied in the initial phase of a new hospital?

Abstract

Purpose: This chapter presents a case study to test the integrating framework for managing hospital real estate presented in the previous chapter on its applicability in the initial phase of a new hospital building. The integrating framework is used to reconstruct organisational objectives and real estate decision-making regarding the Orbis Medical Centre in Sittard, Netherlands, on four aspects: context, values, managing and design.

Literature study: A review of publically available documents, books and publications about this particular hospital.

Empirical research: Based on document analysis, a site visit and an interview with a former Board member, an ex-post analysis was conducted of the initial phase of Orbis Medical Centre. This hospital was initiated, designed and built during the transition towards new legislation and regulations on hospital real estate in the Netherlands. This descriptive case study analyses both organisational objectives and accommodation choices during the initial phase.

Findings: This case study shows how organisational goals, strategy and decisions are converted into perspectives on real estate, added values of real estate and a building concept. The assessment of the initiation phase through a triple assessment of the organisational structure, primary process and accommodation provides insight into the level of ambition. This case confirmed the two crucial steps in the meta-model of matching the accommodation strategy to the organisational strategy. The first step is the ex-ante definition of added values in connection to both the success factors of the organisation and to different stakeholders' perspectives on real estate. In this step, accommodation goals are defined. The second step is to assess whether these objectives have been achieved by an assessment of the design. This requires tools that can make pre-set goals visible in design drawings.

Introduction

The review of CREM models and healthcare management in the previous chapter resulted in the meta-model and integrating framework for matching accommodation management to organisational management. Figure 43 represents the eight main steps of the meta-model and how these steps are connected to each other: (1) organisational context; (2) key issues for success; (3) organisational design and (4) primary processes on organisational level and: (5) real estate perspectives; (6) real estate added values; (7) accommodation design and; (8) building design on the level of real estate decision making. In this chapter, the integrating framework is tested for its practical applicability. For this purpose, an existing and well-documented case is described in retrospect using the integrating framework.

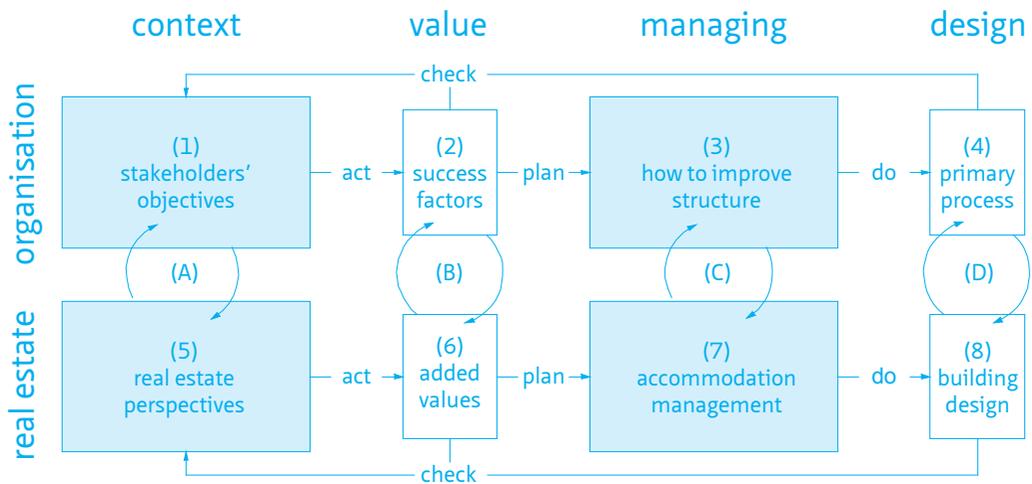


Figure 43 Eight main steps of the meta-model for managing hospital real estate.

In the literature study similarities were found between the 5-points-scales of the EFQM model, the organisational structures (Mintzberg, 1993) and the evolutionary stages of real estate (Joroff et al., 1993). These scales are similar in terms of their structure and seem to correspond with each other. Therefore, the case study presented in this chapter is also used to test whether these scales can be used in practice as an additional assessment tool. Each item of the integrating framework is examined in terms of how it relates to the five-point scales. The criteria for assessing the EFQM-INK model are taken from an assessment tool developed by the Dutch INK-Institute. Van Hasselt (2005) report on CREM of hospitals was used as input to the real estate assessment criteria and missing items were elaborated and completed.

The applicability of the integrating framework is tested by a retrospective description and analysis of the initial phase of the Orbis Medical Centre in Sittard. This hospital was chosen as a case study for several reasons. The main reason is that the Orbis Medical centre was developed and presented as the Hospital of the 21st century. In the initial phase of developing this hospital of the 21st century, all organisational processes were discussed and reinvented in order to improve healthcare delivery and infrastructure. Because of this pioneer status, the initial phase of the development of this hospital is well documented in books and other publications. In these publications arguments for the decisions made are described and reflected on. There is consequently much data available which makes it an accessible case and appropriate for desk research. The literature used were the extensive historical description of the Maasland Hospital by Veldman (2008), three publications about the initiative phase by Veldhoen + Company (2001, 2003, 2008), a case description by the facility manager of the Orbis Medical Centre in a series of case studies on European Hospitals (Van Laarhoven & Eskrine, 2009) and other publicly available reports and documents. The case study is divided in three parts. The first part is a short description of the case history and the changing context of new legislation and regulation of real estate investments. The second part is an assessment of the initial phase from an organisational perspective and the third part focusses on the real estate decision making in the initial phase.

The initial phase of the development of the Orbis Medical Centre will be described according to the integrating framework for managing hospital real estate. On an organisational level, the criteria of the EFQM-INK model are used to elaborate on these aspects. Regarding real estate decision making, different stakeholders' perspectives on real estate, adding value by real estate and the Designing an Accommodation Strategy (DAS) framework are used. Each item in this case study starts with a short summary of that item from the literature, followed by the description of how this item is visible in the initiation phase of Orbis. An assessment is made of all the items at the end of each step of the integrating framework on managing hospital real estate (Figure 42) by using the triple assessment (see table 15, chapter 4). In this way a matrix could be developed for each step, describing the criteria per phase for each item (see for an example Table 16). In the discussion part, the applicability of the conceptual model on managing hospital real estate will be discussed by reflecting on the alignment of real estate decision making to organisational management in terms of four aspects: context, values, managing and design.

§ 5.1 Maasland hospital Sittard



Figure 44 Maasland hospital (source: Bonnema Architecten / Orbis Medical Centre, Netherlands).

§ 5.1.1 History

The hospital in Sittard was established in 1905 by the French convent 'the daughters of the Divine Providence' (De dochters van de goddelijke voorzienigheid). After merging in 1986 with the Barbara Hospital (St. Barbara ziekenhuis) in Geleen (founded in 1963), the Maasland hospital in Sittard-Geleen came into being. The foundation with overall responsibility also included some nursing facilities and therefore the name was changed into the Orbis Medical Centre (Orbis Medisch en Zorgconcern: OMC) in 2000. In the middle of the nineties of the last century, the Maasland Hospital developed into a regional general hospital with all the basic specialisms and the ability to refer patients to top clinical and academic hospitals.

Initiation

The Maasland Hospital was spread over two locations which was perceived as beneficial until 1995 and was promoted by the bi-location model. In a period that many merging hospitals were concentrated in one newly built hospital, the Maasland hospital maintained its bi-location model with one location just beyond the city centre of Sittard and a comparable location in Geleen. However, in 1995 the board of the Maasland hospital decided to concentrate on one location.

First Concept

In 1996 the first request for approval to build was submitted to the minister of healthcare. As the minister had supported the bi-location model of the Maasland Hospital partly in reaction to other newly built merge hospitals, the Maasland Hospital built an argument for concentrating on one location by introducing a new vision of the position of the hospital in the region.

This so-called Barbapapa model (Figure 45) is a 'circuit in which the patient stands central, surrounded by the General Practitioner (GP), nursing care and the hospital as intervention centre. The diagnostic centre overlaps several circles and other overlaps are also possible.' Due to this model, the Maasland Hospital was presented as 'a front runner in supplying and stimulating the healthcare continuum in the region.' The proposal was to merge all forms of healthcare services into one organisation.

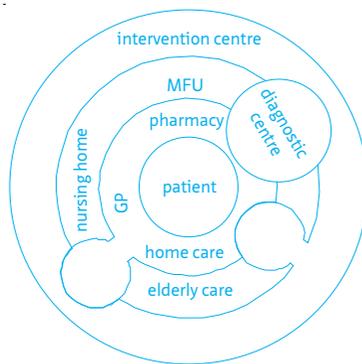


Figure 45 Barbapapa model (source: Orbis Medical Centre).

This model was very innovative for its time, although the plan for the new hospital building that was submitted at the same time was traditional and did not reflect the new vision of the position of a hospital in the region. The proposed plan for a new hospital building was therefore not approved by the Minister. The Minister argued that this plan for a new hospital building was 'in fact a continuation of existing traditional hospitals. [...] There were no, or very few, structural innovations towards a new hospital concept, a hospital of the 21st century.' The minister was looking for innovation in the organisation and architecture of hospitals with increasing outpatient treatment, fewer beds per capita, and 'high-tech-cure', resulting in a flexible and integrated medically specialised business and decentralised and patient-centred healthcare in new satellites. This concept of a 'hospital of the 21st century' was predominantly a political concept, without the support of existing or new policy on this matter. Even civil servants at the ministry did not know at that time what a 'hospital of the 21st century' implied. There were only two main directions: (1) regional cooperation in healthcare pathways and; (2) medical and information technology.

The Minister challenged the Maasland Hospital to come up with a concept of the hospital of the 21st Century in which innovation of healthcare processes and healthcare infrastructure is central. In a letter dated 28 October 1997, the minister invited the Maasland Hospital and two other hospitals in Apeldoorn and Amersfoort to rethink the whole concept of a hospital and to develop principles for a new hospital concept. Once approved by the Minister, a new hospital building representing these principles would be approved. The Maasland Hospital was granted financial and organisational freedom by the Minister, not only for a new building, but also for reinventing the hospital as a phenomenon. In 1998 a new proposal was submitted that was approved in 1999 by the Minister. From this moment on, Orbis Medical Centre started to work on the hospital of the 21st Century. In this process, the whole concept of what a hospital is was rethought and developed, including the processes that take place in a hospital. In addition, new ways of working were studied. The consequence was that not only the hospital building concept, but also the hospital as an organisation, was reinvented.

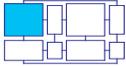
The Netherlands' Board for Healthcare Institutions ('College Bouw Zorgvoorzieningen': CBZ) was an important governmental stakeholder at that time. This board had the legal task of approving requests for new healthcare infrastructure on behalf of the Minister. At first, this institution was not keen to participate in a focus group with the three hospitals. The initiative for a hospital of the 21st century was perceived as nothing more than a 'fin de siècle' feeling and an 'exaggerated and not scientifically based desire for renewal by the Ministry'. According to the CBZ, the healthcare sector had already been pre-occupied with this drive for renewal for years. The CBZ's position was also a reaction to the minister's policy to overrule the existing bureaucracy and to address the healthcare organisations directly as players in the field, as such by-passing the CBZ.

The CBZ chose a very formal position, supported by current legislation, in which they had to approve any request for new hospital buildings according to norms and standards. As a result, the CBZ could not recommend that the minister approved the Maasland hospital because the request did not fit to the norms and standards.

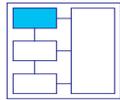
The cost estimated for the final design of the Maasland hospital (formally submitted to the CBZ in 2003) were regarded as too high, not fitting the norms and standards and missing some functions (e.g. a physical archive for patient records). Other added functions were perceived as unnecessary luxury, such as the four knowledge centres and the nursing facilities with 100% single patient bedrooms. An agreement was reached in March 2004, resulting in the final approval. In this agreement, the CBZ approved € 136.9 million of the requested € 159 million. The difference of € 20 million were not regarded as real estate costs for a hospital and were therefore not considered part of the budget for the hospital and had to be paid from other sources or reimbursed by increased efficiency. The final design was approved in 2004, construction started in 2006 and the newly built hospital building opened its doors for patients in 2009.

§ 5.2 Organisation

§ 5.2.1 Stakeholders' objectives



Assessing the stakeholders' objectives includes the objectives of three important stakeholders of the organisation: society, customers and employees. This assessment positions the organisation in its context and describes the objectives used by stakeholders to evaluate the organisation. In the EFQM-INK model, these objectives are translated into overall business results.

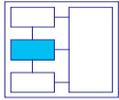


Impact on society

Impact on society assesses what the organisation is achieving in terms of satisfying the needs and expectations of the community at large, including society's perception of the organisation and the organisation's impact on society (Shergold & Reed, 1996).

According to the mission statement, Orbis Medical Centre is a regional general hospital with all the basic medical specialists and patient referral to top clinical and academic hospitals. It is an institution with a strong image, outstanding hospitality and healthcare logistics, reliable partnerships in regional healthcare pathways, good healthcare delivery, entrepreneurship and a good employer. On the labour market Orbis aims to be a state of the art employer with employees who are result, service and patient focused, change minded, entrepreneurial and flexible.

Faced with the newly competitive environment in the Dutch hospital sector and with the particular needs of the surrounding population, Orbis extended the healthcare services it offers to the Sittard/Geleen region. At the heart of this development is the new Maasland Hospital. The central hospital is not only an embodiment of the anticipated changes in capital planning, service design, managerial techniques, and clinical outcomes, but also part of a developing context in which healthcare services are feasible and affordable. Social interaction and active living are crucial elements in this concept, in which healthcare consumption is also reduced.



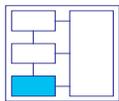
Customer satisfaction

The two main areas within this criterion relate to the customers' perception of the organisation's products, services and customer relationships and additional measures relating to the satisfaction of the organisation's customers (Shergold & Reed, 1996).

Orbis' philosophy is that, just as successful businesses focus on the needs of customers and clients, healthcare organisations should concentrate on meeting the individual needs of patients. Therefore, the centrality of the patient is the leading motto behind Orbis' healthcare concept. The patient comes to hospital to get better and everything in the hospital should be organised from that perspective. In the case of Orbis, this means that the patient is a customer in a demand-driven process. The needs of the patient are input for the processes and not the other way around. In the hospital of the future, the engagement takes place between people and resources that contribute to improved health. Besides primary patient needs the Maasland hospital also focuses on secondary patient needs. Patients have been encouraged to be part of the changes taking place with patient representatives participating in the design phase of the new hospital buildings and the Medical Park as a whole.

At the macro level, patient-centred care also involves careful analysis of current and future patient profiles. To this end, Orbis engages in demographic and epidemiological studies and translates these data into both capacity and production models.

Although patients are central in the healthcare models of Orbis Medical and Healthcare group, they do not play a visible role in the initiation phase and design phase of the Maasland hospital. Patients and patient groups are more or less in the background of all the decisions and processes, without really being part of the stakeholder debate.



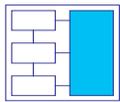
Employee satisfaction

The perception of the people in relation to the organisation is important and any additional measures relating to employee satisfaction need to be considered (Shergold & Reed, 1996).

Specialists and the medical staff played a remarkably small role in the initial phase of the new Maasland hospital. Although the medical staff participated in many organisational transformation projects (see also policy and strategy further on in this analysis), they had little interest in the new hospital building. A plenary staff meeting

in which the new plans were presented had a low response and was attended by only a few specialists: only 50 questions were posed regarding the functional plan. Loss of their own workspaces in the new office concept with flexible workplaces provoked the most commotion. Resistance to this new office concept was widespread throughout the organisation. Despite these concerns, little use was made by the medical staff of the possibilities for participation in the design decision process. Besides the formal position of the medical staff in the organisation, there was a group of specialists that organised themselves outside of the formal structure. This group originated from several healthcare renewal projects from previous years. The specialists belonging to this group had different positions within the organisation and were represented in most project groups for healthcare renewal. It was this group's quest for renewal that played an important role in the design decision process for the new hospital and made the realisation of a new hospital concept possible.

Orbis reported that the large-scale changes in both the physical environment and working practices adversely affected staff morale from time to time. It is not uncommon for staff to express doubts and to be fearful of losing professional autonomy. Orbis did not carry out a "before-and-after" culture change survey, but the managerial experience suggests that persuading staff to accept a radically different way of working cannot be achieved without the support of senior clinicians and the recognition that changes are driven primarily by a desire to improve patient outcomes and population health.



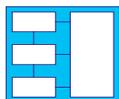
Key performance business results

Key performance results reviews what the organisation is achieving in relation to its planned business and/or service objectives and in satisfying the needs and expectations of everyone with an interest in the organisation (Shergold & Reed, 1996).

According to the mission statement, Orbis is an institution with a strong image, outshining in hospitality and healthcare logistics, reliable partnerships in regional healthcare paths, good healthcare delivery, entrepreneurship and being a good employer. Core competences are reducing costs and increasing the quality of healthcare. Therefore, Orbis has made the Systematisation of work processes the core principle of its model. This applies equally to clinical care, ICT, logistics, financial systems, human resources, architecture and strategic asset planning. As a rule of thumb, Orbis considers that 80% of any process can be made routine. This is believed to reduce the overall administrative burden and to give professionals more freedom to apply their knowledge and skills to addressing the challenges of the remaining 20%. Systematisation is not an end in itself, but a means of achieving a number of organisational objectives:

- running health care services as a dynamic business by managing the risks inherent in an increasingly competitive market and by embracing sustainable change;
- a patient-centred approach;
- creating a total chain of care that not only encompasses diagnosis, treatment and rehabilitation, but also links to the primary sector and to other third party providers of care and services;
- Developing an integrated philosophy that influences the physical infrastructure, the processes and methods of clinical and administrative work, the ICT, and the logistics of the operation.

Systematised care processes contribute to each of the above objectives by ensuring transparency in clinical decision-making (transparent to clinicians, managers and patients), by allowing hospital management to gain a clear view of the degree of financial and clinical variance (and hence risk) associated with medical procedures, and by embedding the intelligent use of medical data in the services that support treatment programs. An innovative hospital building with a new way of working enables this concept. This requires a high investment in real estate and Information and Communication Technology (ICT), accompanied by the aim to reimburse the extra investments by a more profitable exploitation of the hospital. Therefore the healthcare professionals should receive a workplace that connects them to modern ways of working. Besides ICT, separating logistic flows from patient flows and employees is one of the means that make this new way of working possible.



Assessment stakeholders' objectives

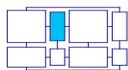
An assessment of the stakeholder objectives as perceived by Orbis shows that Orbis has formulated an ambitious mission and vision for healthcare delivery. The needs and expectations of the community at large are part of the decision making process. The organisation is perceived by the Minister as a frontrunner in its field. This is also visible in the status of state-of-the-art employer. In contrast to these strategic and society oriented stakeholder objectives, the expectations of external financiers is very ambivalent during the process. The budgeting system for real estate investments is mainly focused on managing results within budgets.

Table 16 summarises the assessment of the stakeholders' objectives. The five phases of organisational development (rows) and the five dimensions of stakeholders' objectives (columns) according to the EFQM-INK model are clearly visible. This table can therefore be used to assess the organisation on these aspects. Based on the description of these dimensions, this assessment has been completed for the Orbis case. This assessment shows that the organisational context of Orbis as state of the art organisation is mostly society-oriented, although the financial performance results are system-oriented.

	impact on society	customer satisfaction	employee satisfaction	key performance results management	key performance results financiers
	satisfying the needs and expectations of the community at large.	customer relationships and customers' perception of products and services	expectations and needs of employees	attainment of planned business and/or service objectives and the needs and expectations of all stakeholders	expectations of external financiers
product oriented	* constrained by rules and legislation, average score on customer benchmark	* product central, supply according to agreements	* reliable employer with respect for craftsmanship	* reliable supplier of products and services	* directing on business result within budgets
process oriented	* good price/quality rate that is visible in above average score in customer benchmark	* process central, prize/quality rate	* own responsibilities within process	* good product for lowest price	* directing on direct and indirect costs
system oriented	* good services, anticipating customer needs, high score on customer benchmarks	* customer central, high customer satisfaction	* possibility of optimising own sub process	* customer is central and all processes are focused on that	* budgets for sub processes and internal costing
chain oriented	* reliable (regional) chain partner, frontrunner in chain	* good customer flows, customers stay in chain	* communication with chain partners on operational level	* regional chain organisation	* directing based on benchmark in own sector
society oriented	* organisation is seen in media as national frontrunner in its field	* compared to excellent organisations	* state-of-the-art employer	* innovative frontrunner in sector	* compared to excellent organisations

Table 16 Assessment of stakeholders' objectives. The cells contain the assessment criteria based on the assessment of healthcare organisations according to the INK-Institute, the blue marked cells are the stage which best fits the Orbis-case.

§ 5.2.2 Key issues for success



Key issues for success are the factors and policies that determine the continuity of the organisation (Ahaus et al., 2001). Key issues for success can be divided into hygienic and motivational factors. Hygienic factors are the minimum criteria that an organisation has to meet; an organisation that disobeys these criteria is in crisis, but a good score on these criteria does not imply that the vision is realised.

The term hygienic originates from Herzberg's (1966) satisfaction theory, where he states that good results on hygienic factors (so-called 'dis-satisfiers') do not motivate employees, but disregarding these factors results in demotivation. Visionary factors (also called 'satisfiers') are factors that motivate employees in their work (Ahaus et al., 2001). Therefore the key issues for success are the driving force behind an organisation achieving its objectives.

Innovation of the healthcare processes by Orbis resulted in the development of 10 rules for New Ways of Working (NWW). These ten rules for a New Way of Working integrate three aspects of the organisation of healthcare: the impact on the appreciation by patients and employees (people), the healthcare process (process) and the hospital as place of healthcare delivery (place). Below, rules that have an impact on the appreciation of patients and employees are written in normal black, impacts on the healthcare process are written in bold and place/related rules are written in italic.

- 1 The patient is customer **in a demand driven process**
- 2 **efficient deployment of people and means** *in a comfortable and inspiring environment*
- 3 **separation of different activities**
- 4 **information** *available independent of time and place*
- 5 guaranteed quality
- 6 **supply chain organisation with focus on process**
- 7 **transparent flow of information to patient**
- 8 **care process is client to facility management**
- 9 *environment adapted to situation of patient*
- 10 frontrunner in healthcare

People

The impact on the appreciation by patients and employees is determined by the focus on the patient as customer (1), guaranteed quality (5) and being a frontrunner in healthcare (10). These rules define the chosen position of the Maasland hospital in its context.

Process

The healthcare process is described in five rules: (1) a demand driven process (in which the patient is a customer); (3) separation of different activities; (6) supply chain organisation with a focus on process; (7) transparent information flow to patient; (8) care process is client to facility management. These rules describe the principles behind the healthcare process in the new Maasland hospital.

Place

In addition to the impact on appreciation and the healthcare process, place-related objectives are also described in these ten rules: (2) a comfortable and inspiring environment; (4) information available independent of time and place; (9) an environment adapted to the situation of patient. Remarkably, each rule focuses on another part of the organisation of healthcare. The first rule (2) connects the employees with their working environment; the second rule (4) determines the flexible use of space in the healthcare process and; the third rule (9) connects patient and place.

Assessment of key issues for success

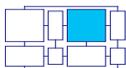
The ten rules for New Ways of Working show Orbis' ambition to be the frontrunner in its field. The attainment of shared values with society are visible in Orbis' drive for innovation and being a frontrunner in healthcare is described in the last rule. Both mission and core competence are society-oriented.

Table 17 summarises the key issues for success related to the five phases of organisational development. The cells contain the assessment criteria based on the assessment of healthcare organisations according to the INK-Institute, the cells marked blue are the stage which best fits the Orbis-case. Completed for the Orbis case, this table shows that the mission and core competences of the Orbis Medical Centre are society-oriented. In the integrating framework for managing hospital real estate, this table can be used to assess the organisational key issues for success.

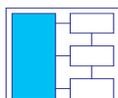
	mission	core competence
	primary function of the organisation that is perceived as a task	main focus of organisation
product oriented	* focus on delivery of products and services	* supply and demand for products and services
process oriented	* focus on optimising process	* operational excellence
system oriented	* focus on optimising services	* customer intimacy
chain oriented	* chain partners are part off mission	* focus on core competence in chain
society oriented	* attainment of shared values with society	* frontrunner in own sector and comparable with international best practices

Table 17 Assessment of the key issues for success. The cells in the matrix include the criteria for each phase of organisational development related to the organisation's mission and core competence.

§ 5.2.3 Organisational design



Assessment of organisational design describes the organisational fields that are used to manage and improve the primary processes. According to the EFQM-INK model, leadership, policy & strategy, human resources and other resources are the organisation's main steering possibilities on the primary process. Therefore these criteria are assessed in this step of the integrating framework on managing hospital real estate.



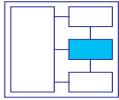
Leadership

Leadership relates to the behaviour of all managers and how the executive team and all other managers inspire, drive and reflect total quality as the organisation's fundamental process for continuous improvement. Within this category, leaders need to visibly demonstrate their commitment to excellence and continuous improvement and their support with regard to improvement and involvement by providing appropriate resources and assistance. How leaders recognise and appreciate the efforts and achievements of their employees is also an important part of this criterion (Shergold & Reed, 1996).

During the initial phase of the new hospital, Orbis chose several times for a style of leadership that was unfamiliar to the hospital sector. In 1995 the supervisory board agreed to merge the two locations in Sittard and Geleen. It then turned out that the CEO was unable to lead this process due to operational problems and conflicts with the medical staff. The supervisory board decided to appoint a strong manager from outside the organisation to lead the process. A former CEO of Rotterdam Harbour's employer organisation, with no experience in the healthcare sector, was appointed and in December 1997 started as CEO of The Maasland hospital. His Board of directors included at that time a director of a nursing home, an economic specialist with good connections with the medical staff, and a medical director. A few years later the development process for the new hospital overloaded the board of directors, the supervisory board again decided to appoint someone from outside the organisation, a former director of the Dutch Small and Medium-sized Enterprises (SME: MKB Nederland). Choosing external managers with no experience in the healthcare sector contributed to creating an organisational culture that enabled the development of a new hospital organisation.

The new CEO was committed to the assignment of developing a 'hospital of the 21st Century'. This was in the first instance not a building but healthcare renewal and innovation of healthcare concepts, in other words: new ways of working. Therefore,

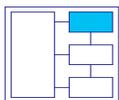
Veldhoen + Company and Bonnema Architects were asked for advice on the change process and architecture of the hospital. Both advisors had no previous experience in the healthcare sector but brought in experiences from other sectors such as offices and industry.



Policy and strategy

Policy and strategy reviews the organisation's mission, values, vision and strategic direction. How the organisation's policy and strategy reflect the concept of total quality and the principles of total quality are used in the formulation, deployment, review and improvement of policy and strategy. The different parts of this criterion relate to how policy and strategy are based on information which is relevant and comprehensive, how policy and strategy are developed, how policy and strategy are communicated and implemented and how policy and strategy are regularly updated and improved (Shergold & Reed, 1996).

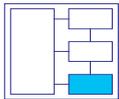
The development of new concepts for the hospital of the 21st Century consisted of a change process in which 100 people participated in more than 60 focus groups. Besides participation in the change process regarding the new hospital concept, the medical staff was also encouraged to participate in several medical renewal projects. In retrospect, these projects became the basis for the new ways of working. In the end almost all specialists were involved in one or another project to realise this new way of working. These projects were the first significant steps in improving the healthcare process for patients. Important policies and strategies of the Maasland hospital were: patient-centred service organisation; logistic systems; quality and safety and; collaboration and new markets.



Human resources

Human resources examines the management of the organisation's employees and how the organisation releases their full potential to improve its business and/or service continuously. Several areas are important within this category: how human resources are planned and improved; how people capabilities are sustained and developed; how people agree targets and continuously review performance; how people are involved, empowered, recognised and cared for and; how people and the organisation have an effective dialogue (Shergold & Reed, 1996).

Employees work to make patients better and doing this, make themselves feel better. This is first of all achieved by doing the right activity at the right time in the right place. For employees improving professionalism involves sharing knowledge as well as delivering the guaranteed quality care. One of the risks described by Orbis, is that failure to change the work culture in the various healthcare facilities could emerge, with the risk that staff do not accept new ways of working or do not change their attitude towards patients. Doctors, nurses, medical managers and administrators are highly trained people who have often acquired their skills over many years. This professionalism is not always easy to change. Therefore Orbis advocated a stepwise, incremental method of introducing change and keeping staff fully informed and involving healthcare professionals in management decisions. The management team set up a number of working groups, each involved in designing a particular aspect of the new hospital, including the physical layout, future working processes and application of ICT. Employees participated in the design of the working environment. The working groups comprised representatives of hospital management, the consultancy company and the hospital "domains" (roughly equivalent to medical departments). In turn, the domains were run by a manager and staff representing physicians, nurses, planners and specialists in logistics and ICT. They were commissioned to analyse the performance of the domain, reviewing patient outcomes and satisfaction, and ensuring that professional standards were maintained.



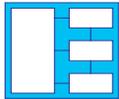
Resources

Resources refer to the management, utilization and preservation of resources and how the organisation's resources are effectively deployed in support of policy and strategy. This criterion includes several different areas, the first being how financial resources are managed, defined as the funds required for the day-to-day operation of the business and the capital funding from various sources. The management of information resources also needs to be considered together with how supplier relationships and materials are managed. The other areas within this criterion include how buildings, equipment and other assets are managed and how technology is managed (Shergold & Reed, 1996).

Information and Communication Technology (ICT) is described by Orbis as the motor behind many innovations. The real innovation is the ability to make information available independent of time and place. The Digital Patient File (DPF) is an important part of this new technology, making information accessible for healthcare professionals anywhere in the hospital. One of the new possibilities is that specialists visit patients

in their own bedroom or consultation room to discuss the medical diagnosis and treatment. This requires flexible use of space and led to the design of a new hospital information system.

Logistics is the flow of materials and equipment that support the contact between patient and healthcare professional. Just like information, equipment and materials need to be available independent of place and time. A just-in-time concept makes sure that equipment and materials are in the right place at the right time, without being in the way. This innovation in logistics is based on the standardisation of materials, outsourcing where possible and a logistic infrastructure that is separated from the flow of patients and healthcare professionals.



Assessment of organisational design

Table 18 shows the assessment criteria of the integrating framework for the organisational design.

Reviewing the design of the organisation shows Orbis' ambitions in terms of human resources, ICT and logistics. The introduction of a new way of working using just-in-time logistics illustrates Orbis' aim to be the front runner in its field. This ambition is supported by the chosen leadership style, in which people outside the organisation and sector were invited to rethink the organisation of healthcare processes. Compared with this ambition two important steering possibilities lag behind: policy & strategy and financial resources. Policy & strategy is related to the hospital organisation as a professional bureaucracy asking for involvement of the professionals in the organisational design. Financial resources are restricted to legislation and healthcare budgets.

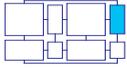
	leadership	policy & strategy	human resources
	behavior of all managers and executive team in inspiring and demonstrating the corporate culture and appreciating the efforts and achievements of the people.	development, communication and implementation of organisation's mission, values, vision and strategic direction.	management of organisation's people and how the organisation utilizes the full potential of its people. This includes core competences of employees and recruitment criteria.
product oriented	<ul style="list-style-type: none"> * objectives of main tasks are determined * craftsmanship is appreciated and relied upon * management knows what has to be improved 	<ul style="list-style-type: none"> * principals' demands on products and services are known * management is responsible for strategy * policy by working plans and capacity planning 	<ul style="list-style-type: none"> * human resources are recruited after identified need * knowledge and skills based on craftsmanship * top-down decision-making on change and innovation
process oriented	<ul style="list-style-type: none"> * vision is made explicit in policy document * primary process and its management is central to the design of the organisation * management participates in improvement teams 	<ul style="list-style-type: none"> * insight in primary processes makes it possible to determine policy * improving primary process is part of policy * results, resources and responsibilities determined for every implementation plan 	<ul style="list-style-type: none"> * cooperation skills are important recruitment criteria * learning is focused on cooperation and managing processes * participation in focus groups is stimulated
system oriented	<ul style="list-style-type: none"> * vision and mission are translated to measurable objectives and familiar for employees * customer groups are central to the design of the organisation * management delegates responsibilities 	<ul style="list-style-type: none"> * there is information on attainment of organisational goals, trends and developments in context * strategy and policy are derived from the vision and translated into measurable objectives * goals are translated into key performance indicators for all sub processes 	<ul style="list-style-type: none"> * communication skills are important recruitment criteria * development and career policy is focused on team work and flexibility * employees participate in design of working environment
chain oriented	<ul style="list-style-type: none"> * vision is made in cooperation with chain partners and this vision describes responsibilities and tasks of different partners in chain organisation 	<ul style="list-style-type: none"> * the organisation makes benchmarks of own sector * policy is focused on exploiting and developing core competence * implementation plans of chain partners are matched 	<ul style="list-style-type: none"> * there is a sector wide strategy as attractive employer * stimulating and continuous learning is part of human resources policy * employees participate in determining vision and mission of organisation
society oriented	<ul style="list-style-type: none"> * belonging to the top three is an objective on all levels of the organisation * the organisation is flexible and can react to new trends * management plays an important role in public debate in society 	<ul style="list-style-type: none"> * there is an international benchmark with other sectors * strategy is focused on added values of all stakeholders * international best practices are used and translated to own organisational context 	<ul style="list-style-type: none"> * there is constant renewal by recruiting non-confirmatives from other sectors * development programs support the transforming capacity of the organisation and individual employees * everyone participates in a constant process of innovation

	financial resources	information and communication	technology	materials and facilities
	effective deployment of financial resources defined as short term funds and capital funding	communication and information management used for corporate policy, key performance indicators that are leading for the organisation	the role of technology in (primary) processes, including Information and Communication Technology (ICT)	FM management of logistic processes that support primary processes and responsibilities (central or decentral) for maintenance of supplies
product oriented	* management determines budgets	* financial accountability	* investing in traditional and proven technology	* problem solving service to primary processes
process oriented	* input and output are registered and analysed per process	* management information gives insight into productivity of primary process	* implementing new technologies in primary process	* controlling processes, problem prevention by analysis of internal needs of clients
system oriented	* investments in core competences	* results of new technologies are analysed	* existing and new technologies are evaluated in whole process	* optimising cooperation, supporting core competences by innovative solutions
chain oriented	* financial analyses and benchmarks initiate new policy	* knowledge management and risk analyses on the whole chain organisation	* technology is developed in cooperation with chain partners	* added value by cooperation, outsourcing, alliances and shared service centers
society oriented	* investment in promising cooperation	* knowledge management is focused on anticipating changing circumstances	* innovation, knowledge and technology are key issues for success	* development and implementation of innovative solutions

Table 18 Assessment of organisational design.

Applied to the Orbis case, the light-blue cells show that the change in Orbis' organisational processes connects mostly to the society-oriented phase. Two important items, policy and strategy and financial resources, are in the system oriented phase

§ 5.2.4 Primary process design



Primary processes analyse the management of all the value adding activities within the organisation, and address how processes are identified, reviewed and revised to ensure continuous improvement of the organisation's business and/or service. How processes key to the success of the business are identified and how processes are systematically managed needs to be highlighted. Review of the processes and the setting of targets for improvement also needs to be addressed as well as improving processes using innovation and creativity, changing processes and an evaluation of the benefits (Shergold & Reed, 1996).

The development process of the hospital of the 21st century started with an analysis of working processes. Veldhoen + Company moderated discussions with more than 60 focus groups of healthcare professionals and employees. Central to these discussions were the working processes, not the space, but which activities were conducted in the available spaces: what is the logic behind processes and how could healing processes be improved? Three perspectives were important: patients, employees and logistics. This analysis of working processes was the basis of the New Way of Working.

Based on these discussions, processes are divided into six different activities: (1) diagnosis; (2) consultation; (3) treatment; (4) nursing; (5) knowledge and; (6) support. This business approach in which working processes are separated into a sequence of activities is the key to the new hospital concept. These activities are translated into six centres: (1) the diagnostic centre; (2) consultation centre; (3) treatment centre; (4) nursing centre; (5) expertise and knowledge centre and; (6) logistic centre.

Figure 46 shows the process model that was developed by Veldhoen for the Maasland Hospital. In this model the three perspectives of employees, patient and logistics are positioned on the left side. The healthcare process is translated into a chain of diagnosis, consultation, treatment and nursing, supported by expertise and knowledge and logistics. The General Practitioner (GP) is integrated in the chain as a partner on both sides, but not as part of the hospital itself. Other partners at the end of the chain are elderly homes, home care and nursing homes. Compared to the Barbapapa model (Figure 45), this new model focused on the processes in a hospital and reintroduced processes as sequential activities. In the new chain organisation, patients are referred to the diagnostic centre by the GP, after the first tests and photos in this centre the diagnosis is discussed with a specialist in the consultation centre. From here patients go to the treatment centre and if necessary to the nursing centre.

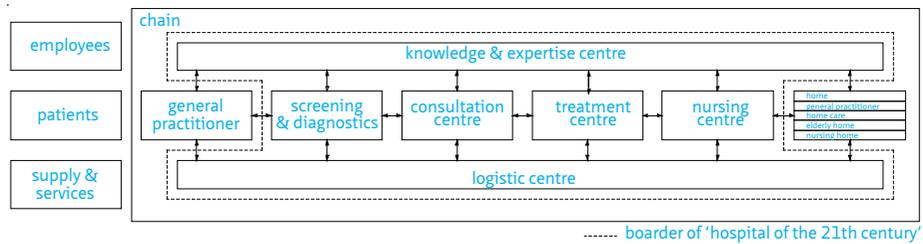


Figure 46 Primary process model Maasland Hospital (source: Veldhoen+Company / Orbis Medical Centre).

Assessment of the primary process design

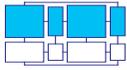
	primary process
	identifying and describing (primary) processes in the organisation and how activities are organised in processes. This includes managing processes, key performance indicators, business targets, analysing processes and benchmarks.
product oriented	<ul style="list-style-type: none"> * there is a scheme of the organisation and work plans are used * management determines the way tasks are executed * process improvements are small and work related
process oriented	<ul style="list-style-type: none"> * primary process is described in steps * there is a quality system and patients' appreciation is measured * initiatives are implemented in projects and established in the process
system oriented	<ul style="list-style-type: none"> * primary and secondary processes are described * performance measurement in all processes * continuous improvement is part of management process
chain oriented	<ul style="list-style-type: none"> * execution of tasks are matched to needs of clients and chain partners * process management is compared with other organisations * constant innovation on products and services in cooperation with chain partners
society oriented	<ul style="list-style-type: none"> * innovation leads to redesign of organisation and processes * efficient use of public resources is core competence * inefficient products and services are timely abolished based on strategic decisions

Table 19 Assessment of the primary processes.

The cells contain the assessment criteria based on the assessment of healthcare organisations according to the INK-Institute, the cells marked blue are the stage which best fits the Orbis-case.

Innovations in ICT, the new way of working and the logistics concept resulted in a redesign of the organisation and the primary process. The purpose of this redesign was the efficient use of public resources and a focussing on the organisation's core competences. This innovative process model is the basis for the hospital's building design and separates patient and employee flows from the logistics of goods. The healthcare chain is centrally positioned and supported by the knowledge & expertise centre and the logistics centre. The chosen position in the context shows that Orbis is oriented in society as a whole.

§ 5.2.5 Conclusion regarding organisation



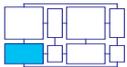
Assessment of the organisational context of the Orbis Medical Centre shows that on different levels, Orbis has formulated a high-end ambition. The mission and vision of the organisation is focused on society and the organisation presents itself as the front runner in its field. This is visible in the constant renewal and development programs to transform both the capacity of the organisation and the individual employees. Knowledge management is focussed on anticipating changing circumstances and innovation and technology are connected to the key issues for success. This resulted in the development and implementation of innovative solutions.

Following the four steps of organisational context, key issues for success, organisational design and process give insight into the different steps Orbis took to innovate and improve their primary process and the development of the healthcare process model.

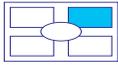
The ten rules for a new way of working as key issues for success result from the organisational context and provide input for the organisational design and the management of healthcare processes. The assessment in phases of organisational orientation shows the high-end ambition of Orbis, whereas some criteria like policy & strategy and financial criteria merely represent a system oriented phase.

§ 5.3 Real Estate

§ 5.3.1 Real estate perspectives



Stakeholders are interested in the overall performance of the organisation and not specifically in the organisation's real estate, even though the buildings in which healthcare is delivered to patients influence their appreciation of healthcare quality. Four perspectives on real estate (strategic, functional, financial and physical) can contribute to the translation of organisational objectives into real estate goals by discerning separate aspects of real estate from stakeholders' interests in the overall performance of the organisation.

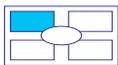


Strategic perspective on real estate

This perspective entails real estate as a fifth resource for production. The main variables are the institutional goals: how and to what extent are institutional goals supported and achieved or obstructed by the current real estate. The strategic perspective focusses on decisions that improve the quality and effectiveness of the primary process by i.e. improving quality of space, supporting culture or supporting the image of the organisation (Den Heijer, 2011; Den Heijer & De Jonge, 2012; Hoendervanger et al., 2012).

In 1995 the hospital board decided to abolish the bi-location model and to concentrate the two hospitals on one location utilising the Barbapapa model (see Figure 45 on page 84) as the leading principle. In this model the patient is central, surrounded by the GP, nursery homes, and the hospital as intervention centre. The diagnostic centre overlaps the rings surrounding the patient. This concept demands changes in the organisation of the hospital, healthcare processes and infrastructure of the hospital. Challenged by the Minister, Orbis Medical Centre made the development of the hospital of the 21st Century its main strategic aim regarding real estate.

‘A hospital is only on the third turn a building. First of all, a hospital organises the encounter of patients, medical staff and equipment. Secondly, necessary information being time and place independently available, finally supported by the building in an environment that suits the activity between healthcare professional and patient at that moment’. From this point of view, the new building accompanies a New Way of Working. This requires a transformation of the organisation, in which the building could have a directing role.



Functional perspective on real estate

This perspective focusses on real estate as a facilitator for users and primary processes and is primarily important for users as it focusses on decisions that (optimally) support the user’s activities by changing the quantity and quality of space. Decisions include the amount of users and variety of types of users that have to be accommodated, satisfaction about the current real estate and occupancy rates (Den Heijer, 2011; Den Heijer & De Jonge, 2012; Hoendervanger et al., 2012).

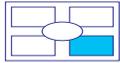
The functional perspective on real estate for the Maasland hospital was developed by Veldhoen + Company. Veldhoen is an unconventional workplace designer who was known for redesigning work processes, efficient use of space and the application

of information technology. His approach to the new hospital included three phases: (1) orientation; (2) definition and; (3) concepts. In the first phase stakeholders were interviewed and best practices were visited. In the definition phase, the New way of Working was introduced and described in ten rules. In the third phase analysis of information technology, medical technology and urban structure leads to concepts for the new hospital: healthcare processes in a built structure. The starting point for this development was the Barbapapa model, but in the course of the process the focus shifted to the hospital itself. The cycle that is the basis of the Barbapapa model was transformed into a healthcare chain organisation, with the General Practitioner (GP) at both ends of the line. This chain organisation had the practical advantage that the process could be split into sequential steps that could be arranged in a built structure.

The working environment stimulates employees to work together, each from their own independent professionalism, on creative and innovative answers to the demands of patients. In more than 60 focus groups the logic behind the processes was studied. Improvement of working processes was a central point of discussion in these groups. It is of essential importance for patients and employees that the healthcare professional can provide the necessary activities in the right way at the right time, in a space that is optimal for the patient. For this reason, availability of information and equipment independent of time and place is crucial. This new way of working separates three different flows in the hospital: patients, employees and equipment, with the objective of diminishing the largest flow of patients within the hospital. To this end, offices for specialists were replaced by patient consulting rooms.

Patient-centred care extends to the design of the inpatient environment. Orbis considers a therapeutic environment to be one where the patient feels valued and is treated with respect. Orbis recognises that systematisation helps to orient patients and visitors, and to make their experience more pleasant. Orbis has requested a standardised “front office” environment, so that the physical design of reception and waiting areas is similar throughout the hospital and other care centres; signage conforms to a common standard. The front office is everything that patients encounter in the healthcare circuit. The back office is all the support necessary in providing efficient and effective healthcare services. The patient is central in these consulting rooms. Specialists come to the patients from the knowledge centres near the consulting rooms. In these knowledge centres, the specialists have their flexible workplaces to do their administrative work, research and meet with colleagues. Separating staff and patient logistics makes the hospital more efficient and for the patient conveniently arranged. Orbis is convinced that the available evidence shows that single rooms provide greater privacy for patients, more clinical flexibility in managing patient throughput, and shorter lengths of stay.

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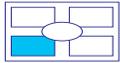
Financial perspective on real estate

Real estate from the perspective of the financial controller, responsible for financing, cost and reimbursement includes the costs of real estate investments, the resources that are spent on real estate and the values that real estate represents (Den Heijer, 2011; Den Heijer & De Jonge, 2012; Hoendervanger et al., 2012).

Patient centrality, professionalism and efficiency are the main characteristics of the new hospital. This was expected to lead to a 20% improvement in efficiency (OMC year report 2001). Consequently, the choice was made for high investment in the hospital infrastructure that would be offset by lower exploitation costs. Orbis expects to run the new hospital with 175 fewer staff (including nurses, managers and administrative staff) than the former hospital.

At the time of approval for a new hospital building by the Minister in 1999, government guaranteed the costs related to real estate. Within this system the financial perspective on real estate was restricted to the rules of square meters and costs per square meter, set by the government. This system changed during the construction of the hospital and by delivery of the hospital buildings hospitals had themselves become responsible for earning back capital investment, even if their problems resulted from decisions made in the past approved by the government of the time.

As with most major health asset projects in the Netherlands, the Maasland Hospital and Medical Park was financed by loans from a bank, and not (as would be the case in some other countries) through central treasury funds. It is possible that the innovative elements in the Orbis business plan made it a more risky investment than a business plan with a more "traditional" scope and initially Orbis had difficulty finding a financial institution willing to provide capital for investment. However, Orbis argued that other health care organisations were running a greater risk by failing to anticipate the coming changes in the Dutch healthcare landscape. The total capital investment in the new Orbis Medical Park was envisaged to be €360 million. This is approximately 15% more than would be normal for a project of this size, largely due to the extra costs in designing and building an adaptable patient environment and in developing fully integrated information and communication technology (ICT) systems. Orbis, however, expected the greater efficiencies provided by Systematised work processes to make it possible to meet the commitments in the business plan regarding the returns on investment.



Physical perspective on real estate

This perspective incorporates the physical aspects of real estate that determine usability and the maintenance of the quantity and quality of both current and future real estate, includes location characteristics, types of spaces, condition and age of buildings. (Den Heijer, 2011; Den Heijer & De Jonge, 2012; Hoendervanger et al., 2012).

Developing a new hospital building takes on average 10 years, implying that hospitals are already outdated at the moment of delivery and that updating and changes start immediately after opening. Healthcare concepts change faster than buildings. It is therefore necessary to think not one but several steps ahead (OMC year report 2001). The physical perspective on real estate can be described in four steps. First the Maasland hospital adopted a patient-centred approach, reflected in its design in terms of work processes. Patient-centred care therefore extends as far as the design of the patient's environment. This results in public spaces which are intended to humanize the interaction between patients and front office hospital staff and, as far as possible, provide a nonclinical environment. Second, physical facilities are standardised wherever possible with standardised design in outpatient consultation rooms and inpatient bedrooms. Consulting rooms are meant for use by different specialties and no domain "owns" any particular space. In general, each consulting room is identical in terms of equipment and ICT facilities. Third, the hospital is planned with clear "front" and "back" offices, linked by a knowledge and expertise centre where professionals can hold meetings, carry out research, and catch up on administrative work. Finally, the new hospital building is also designed to separate the various logistic flows, so that medical personnel and patients enter from different areas, and the movement of goods is kept apart from both. The building is an embodiment of this innovative healthcare concept. This makes the introduction of another healthcare concept complicated. Structural vacancy is resolved in the new hospital by a maximum flexibility of the working environment with facilities that individually-occupied specialist's rooms could not achieve.



Assessment perspectives on real estate

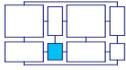
An assessment of the real estate perspectives of the Maasland hospital show that the focus of the organisation, visible in the strategic and functional perspectives on real estate, connects to the high ambition of the stakeholders' objectives (Table 16).

	strategic	functional	financial	physical
	aligning real estate with institutional goals	aligning real estate with (primary) processes	aligning real estate financial value, risks and costs with production of products and services	quantity and quality of current and future real estate
task manager	* supply in demand for real estate	* products and services can be suitably produced	* realization of real estate within budgets * historical costs * replacement costs	* technical focus * supply needs for real estate * engineering buildings
controller	* reducing real estate costs by optimising primary process	* physical environment optimal for primary process, analyses of primary processes are part of solution	* reducing real estate costs by optimising primary process * real estate costs / production rate	* cost reduction * analytical approach * information on RE objects * benchmark
dealmaker	* balancing real estate costs with optimising and increasing productivity of processes	* physical environment optimal for customer, analyses of customer satisfaction are part of solution	* balancing real estate costs against increasing productivity of processes * internal costing of real estate costs to sub processes	* create financial value * problem solving * standardisation real estate * flexible internal RE market
intrapreneur	* conscious insourcing and outsourcing	* optimising chain processes leads to real estate alterations	* balancing real estate costs against optimising and increasing production with chain partners * real estate market value	* internal RE company * proposing solutions * external market options
business strategist	* real estate adds value to organisational objectives	* international benchmark leads to changes in real estate with a state of the art working environment that adds to organisational objectives as goal.	* measuring and monitoring added value of real estate to organisational objectives	* anticipates on trends in society * measuring and monitoring results * contribute value to organisational objectives

Table 20 Assessment of real estate perspectives.
The cells contain the assessment criteria based on the literature, the blue marked cells are the stage which best fits the Orbis-case.

Table 20 shows a potential mismatch between the focus of the organisation on functional and strategic perspectives on real estate and the focus on financial and physical perspectives. This mismatch seems to indicate that the ambition of the organisation is society-oriented, but that the real estate decisions connected to this ambition are more process related. This could result from the focus on organisational flexibility and a building that supports this flexibility by efficiently organising processes.

§ 5.3.2 Real estate added values



In order to add value to the organisation and to contribute to organisational objectives, real estate goals should be aligned with both the organisational key issues for success and the strategic, financial, functional and physical perspectives on real estate. The way real estate can contribute to these key issues for success also depends on how value is added by real estate. Nine different added values that are commonly mentioned in CREM literature are: (1) increase innovation; (2) increase user satisfaction; (3) improve culture; (4) reduce costs; (5) increase productivity; (6) improve flexibility; (7) supporting image; (8) control risks and; (9) improve financial position. These added values of real estate are further discussed in PART 3 of this thesis.

Increase innovation

To stimulate renewal and an improvement in the primary processes, products and services by real estate.

Efficient application of human resources in an inspiring environment is the main objective behind innovation; the knowledge centre facilitates the patient's encounter with medical staff and other healthcare professionals. In the back office, the focus is on sharing knowledge efficiently. As a consequence, a specialist's individual room was replaced with flexible workplaces in central knowledge centres. This knowledge centre includes different working environments to cater to different needs: concentrating, meetings, social contact or privacy.

Increase user satisfaction

To create functional, pleasant and comfortable places for visitors, consumers and employees.

Healthcare professionals find their satisfaction in healing patients and this is achieved by providing the right activity at the right time and place. Therefore an efficient application of human resources requires a pleasant and inspiring working environment with innovative information and communication facilities. An important question is how do people work together to attain organisational objectives, not only how medical staff interact with patients, but also vice versa. In other words: what is the best interaction between healthcare professional and patient for the benefit of both? An

inspiring environment contributes to the atmosphere of an encounter between the healthcare professional and the patient. In the hospital building important aspects of the atmosphere are defined by Orbis as functionality, size, climate and sterility.

Improve culture

To improve interpersonal relations and communication through the real estate.

The physical environment of the outpatient clinic supports an organisational culture in which the patient is the client in a demand-driven process. The specialist visits his patient in a specially equipped consulting room. On the patient side, a front office and comfortable waiting facilities support patient flows. The consulting rooms are adjusted to the needs of the patients at that moment: privacy, comfort and well-being are central.

Reduce costs

Reduce investment costs, capital costs, operational costs and other real estate related costs.

Real estate investment in the Maasland hospital is perceived as a long-term investment where the returns are a result of higher efficiency and a more profitable exploitation of the hospital. Logistics are therefore crucial in providing the right goods at the right time and in the right place to enable the healthcare professional to provide the right activity for the patient at that specific moment. Logistics are organised utilising the just-in-time concept with standardisation of supplies, outsourcing, external storage and a logistic network within the hospital building. A robotized logistic network separated from patient flows and employee areas delivers the goods in the hospital.

Increase productivity

To increase production by using the same amount of resources for production through a more effective use of real estate.

The concept of the hospital of the 21st century started with an analysis of the working processes, resulting in six activities being distinguished: diagnosis, consultation, treatment, nursing, knowledge and facilities. The healthcare process is perceived as a combination of these activities. Efficient application of resources, including human resources, is realized by separating these activities and providing demand-driven facility services. A just-in-time concept for patients results in efficient working processes.

Improve flexibility

To structure a real estate portfolio in a way that enables future spatial, technical, organisational and judicial adjustments.

The Maasland hospital focuses on organisational flexibility. Information and goods are available throughout the hospital regardless of time and place. The standardised consulting rooms and nursing centre with one-person bedrooms make efficient use of available space possible.

Support image

To express corporate objectives by using real estate as an icon for the organisational culture.

The image of the hospital organisation is determined by the focus on the patient as customer (1), guaranteed quality (5) and being a frontrunner in healthcare (10). These rules define the chosen position of the Maasland hospital in its context. Therefore, Orbis is a frontrunner in the regional healthcare continuum; this implies a guaranteed quality in an environment that is adjusted to the needs of the patient.

Controlling risks

To anticipate the future real estate-related technical and financial opportunities and risks.

In the concept of the hospital of the 21st Century, controlling real estate-related risks focuses on ensuring that the hospital building can contribute to providing state-of-the-art healthcare for the 40 years of the building's lifespan. Important risks are the continuously changing legislation and regulations for hospitals. Orbis recognised the necessity for an increased business focus in an incremental process towards a liberal healthcare market. The concept of the Maasland hospital and the healthcare pathways in Orbis Medical Park is regarded by Orbis as the best possible solution for managing the risks arising from the new healthcare market.

Improve financial position

To attract external financing for investment in the primary process or to improve the overall financial position of the organisation by regarding real estate as an asset.

The hospital is a resource for production and the real estate investment has to be earned back by a higher efficiency. Because of the long-term horizon related to real estate investments and the specific use of a hospital, the hospital itself is not used for improving the financial position. The chosen location in a green area between Sittard and Geleen makes future urban development of the area possible.

Assessment of real estate added values

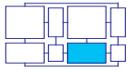
Reviewing the real estate added values shows that most values are connected to the third stage of Joroff's five stages of real estate strategy – that of the dealmaker. Standardisation of real estate and the flexible use of space are the main focus. The impact of the building on the organisation's image and culture can be analysed and together with user (dis)satisfaction this can result in changes in the real estate supply in order to add value to customer satisfaction. Compared to the high-end ambition formulated in the organisational key issues for success, the added values of real estate are oriented more towards the system level than society. This resamples the theory that within a professional bureaucracy the level of dealmaker seems to be the best way to manage real estate within the organisation.

	increase innovation	increase user satisfaction	improve culture	reduce costs
	To stimulate renewal and improvement of primary processes, products and services by real estate.	To create functional, pleasant and comfortable places for visitors, consumers and employees.	To improve interpersonal relations and communication by real estate.	To reduce investment costs, capital costs, operational costs and other real estate related costs.
task manager	* small alterations in primary process within existing real estate	* user satisfaction is measured	* supplying square metres of real estate, in this phase little is done to improve culture through real estate	* technical maintenance of real estate based on long term accommodation plans
controller	* innovation is focused on improving primary process, real estate is adapted to this process	* results of user satisfaction measurements are connected to the objective of reducing costs	* in this phase little is done to improve culture through real estate	* reducing real estate costs by minimising investment and maintenance costs
dealmaker	innovation is focused on all processes and real estate is used as resource that can add value to innovation by supporting interpersonal communication	* results of user satisfaction measurements result in changes in real estate in order to add value to customer satisfaction	* analysis of impact of real estate alterations on corporate culture	* benchmarks result in reducing exploitation costs
intrapreneur	innovation is focused on chain partners and real estate is used to improve collaboration between partners	* results of user satisfaction measurements are used to compare organisation to other organisations in sector and this leads to real estate alterations	* benchmark within sector leads to real estate alterations	* use benchmarks for maintenance costs * outsourcing * big influence of real estate department, external market options are considered
business strategist	innovation is integral part of the organisation and the real estate portfolio is flexible in order to react to trends in society	* results of user satisfaction measurements are compared with international best practices and this leads to optimising real estate	* international best practices lead to alterations in real estate	* reducing investment costs and exploitation costs by using benchmarks and life cycle costing * real estate department aligns real estate to corporate strategy

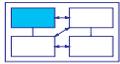
	improve productivity	improve flexibility	support image	controlling risks	improve financial position
	To increase production with the same amount of resources for production through a more effective use of real estate.	To structure a real estate portfolio in a way that future spatial, technical, organisational and juridical adjustments are possible.	To expose corporate objectives by using real estate as an icon for the organisational culture.	To anticipate on future real estate related technical and financial opportunities and risks.	To attract external financing to reinvest in the primary process or to improve the overall financial position of the organisation by regarding real estate as an asset.
task manager	* analysis of working environment and possibilities to improve productivity in existing real estate * good maintenance in order that primary processes are not disturbed by real estate	* technical flexibility, inventory of square metres, ownership and lease	* supplying square metres real estate, in this phase little is done to support image by real estate	* inventory of technical state of real estate and related risks	* inventory of real estate square metres
controller	* insight in working environment and analysis of possibilities to improve primary process by real estate alterations	* insight in juridical flexibility * inventory of possibilities of technical flexibility in combination with organisational flexibility	* efficient building with no extra investments to support image	* inventory of exploitation costs and risks for primary process	* inventory of absolute square metres and functionality of square metres * reinvestment of real estate value in primary process
dealmaker	* working environment and real estate support all processes within the organisation	* insight into possibilities of different forms of flexibility and divided into sub processes	* analysis of real estate aspects that influence customer and employee choices.	* internally flexible real estate market divided in specific and generic parts	* inventory of absolute square metres and functionality of square metres, analysis of reuse possibilities
intrapreneur	* benchmark on productivity leads to real estate alterations	* organisational, technical and juridical flexibility are implemented when possible * layer approach is used for marketability of real estate * lease options are considered	* future marketability of buildings is taken into account when extra investments in real estate are made	* monitoring external real estate market	* inventory of functionality and possibilities of square metres * investing in surplus square metres to match real estate market options
business strategist	* measuring and monitoring of results leads to real estate alterations with the objective of improving productivity by doing the same with less resources	* technical, juridical and organisational flexibility of the real estate portfolio makes it possible to react to trends in society	* impact of real estate on society is considered in decisions * international best practices out of other sectors are used as example	* reacting to changing rules and legislation and employee market	* investing in surplus square metres and alterations in current real estate in order to reinvest financial value in primary process

Table 21 Assessment of the value added by real estate. The cells contain the assessment criteria based on the literature, the blue marked cells are the stage which best fit the Orbis-case.

§ 5.3.3 Managing real estate



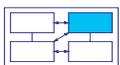
In this part of the integrating framework for managing hospital real estate, the DAS (Designing an Accommodation Strategy) Framework is used to analyse the current and future demand and supply of real estate.



Current Demand

Current demand describes the demand for real estate as formulated in the brief.

In 1996 the first request for building approval was submitted to the minister of healthcare. In the meantime, the minister had adopted the bi-location model of the Maasland Hospital, a reaction to all the newly built merged hospitals. In order to be able to abolish its own bi-location model and concentrate on one location, the Maasland Hospital responded by introducing a new vision of its position in the region. This model was very innovative at the time, but the request for a new hospital building that was submitted at the same time, was traditional and did not reflect the new vision regarding the hospital's position in the region. The request for a new hospital building was therefore not approved by the Minister, who argued that the plan was 'in fact a continuation of existing traditional hospitals. [...] There were no, or very few, structural innovations reflecting a new hospital concept, a hospital of the 21st century.' The minister was looking for innovation in the organisation and architecture of hospitals with more outpatient treatment, fewer hospital beds per citizen, and 'high-tech-cure'. The expected result was a flexible and integrated medically specialised business and decentralised, patient-centred healthcare in new satellites. This concept of a 'hospital of the 21st century' was mostly a political choice, without the support of either existing or new policy on this matter. Even civil servants at the ministry did not know at that time what a 'hospital of the 21st century' implied. There were only two main directions: (1) regional cooperation in healthcare pathways and; (2) medical and information technology.

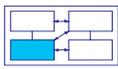


Current Supply

Current supply is an assessment of the available real estate portfolio in quantity and quality.

The oldest part of the original building of the Maasland hospital was over 100 years old, a building where nuns started treating patients at the beginning of the 20th century. Over the decades, this location expanded in different directions and grew into the Maasland hospital in Sittard. Veldhoen described it as follows: 'In a lecture on historical hospital architecture, a bird's eye view of the six hectare Maasland hospital near the centre of Sittard could be very illustrative. It would show almost every style of hospital architecture of the past century: pavilion architecture before World War II, corridor architecture of the sixties, the urban approach of the seventies, blocks and the so called breitfuss model.'

At the end of the 20th century, it was almost impossible to deliver the quality of healthcare that matched modern demands. The building was obsolete and renovation was too expensive. Besides, the Maasland Hospital was historically spread over two locations; one location just outside the city centre of Sittard and a comparable location in Geleen. For a long time these two locations were perceived as beneficial, resulting in the bi-location model. In the same period, a lot of hospitals merged, building on a new location, but the Maasland hospital maintained its bi-location model. However, in 1995 the hospital board decided to concentrate on one location. 'A renewal scenario would be preferable on the location in Geleen, if only financial arguments were opportune. [...] If also other relevant factors are taken into consideration, like medical profile location and building characteristics, consequences for exploitation, investment costs and political and managerial feasibility, then a green field location is a better choice.'



Future demand

Future demand explores possible scenarios for real estate, based on the concept of adding value by real estate and organisational processes.

Based on the analysis of the working processes distinguishing six activities, the hospital is divided into six centres: (1) centre for screening and diagnostics; (2) consultation centre; (3) treatment centre; (4) nursing centre; (5) centre of knowledge and expertise and (6) logistics centre. The future demand can be described by following this division in centres.

(1) Centre for screening and diagnostics

The centre for screening and diagnostics is central in the chain organisation of the hospital and its external partners. In addition to being a gateway to healthcare

programs, it is an extension of the General Practitioner's practice. Each medical device needs to be plug-and-play everywhere to anticipate the unknown future. This utopia is translated into reality by making groups of interrelated functionalities and typologies of medical devices, as far as possible unattached to a particular space, in order to be able to plug-and-play medical devices for the next forty years.

(2) Consultation centre

Instead of visiting the specialist, the patient is visited by the specialist in a specially designed consulting room that is dedicated to the needs of the patient. Privacy, security and comfort are the main objectives. On the patients' side, the consultation centre consists of a front office with comfortable waiting facilities. For the healthcare professionals, the back-office is designed with a focus on the efficient exchange of information and knowledge. The first analysis of the number of in- and outpatients, how many of these visits are a consultation in which the support of a laptop is sufficient, the grouping of patients in healthcare pathways and the average duration of a meeting between a specialist and a patient showed that 132 consulting rooms should be sufficient for 249,650 consultations a year. The ensuing discussion between Veldhoen, who said that even 126 rooms would be enough, and the medical staff, who wanted 256 rooms, was mainly about increasing working hours: flexible use of space includes flexible working hours.

(3) Treatment centre

All activities concerned with the treatment of patients are positioned in the treatment centre. This means that besides the operating theatres, a lot of activities usually located in the outpatient clinic, obstetrics, emergency medicine and the out-of-hours doctor become part of the treatment centre. The operating theatres are equipped with vertical just-in-time logistics enabling equipment to be delivered by elevators and waste transported by vertical shafts. This makes it possible for the operating theatre to become a place where the meeting between patient and healthcare professional occurs. All necessary preparations are done outside the operating theatres.

(4) Nursing centre

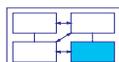
The choice for activity-related centres and a patient-centred orientation in a demand-driven process results in an environment that facilitates in-bed-patients and out-bed-patients. Activities located near or in bed in the past are now located elsewhere, stimulating patients to become as active as possible. Fifteen single bed patient rooms are grouped around a living room. One step further than the living room are the central facilities for patients for recovery. Patients have space at every step of their recovery, first in their own bedroom, after that when they feel better in the living room and later on in the central facilities.

(5) Knowledge and expertise centre

As a result of giving up their own individual consulting rooms the healthcare professional are provided with several different working environments in the knowledge and expertise centre. These environments are adapted for different activities that support the exchange of knowledge and expertise like meetings, lectures and concentrated individual work.

(6) logistics centre

The focus of logistics is the meeting between patient, healthcare professional and equipment. Equipment supports these meetings and this means that it should not stand in the way, in other words there should be no unnecessary storage but a just-in-time delivery. The logistic centre is an underground storage that delivers the goods and equipment horizontally by Automatic Guided Vehicles (AGVs) and vertically by elevators throughout the hospital.



Future supply

Future supply generates models for future real estate that match the future demand.

Orbis described the future supply in its 2003 annual report as follows: *'A hospital building that at the moment of delivery is state-of-the-art, short waiting lists, short lead time, increase of productivity with lower costs and patient centred. Visible for patients is a care environment on the human scale, invisible for patients are the world of healthcare pathways, a flexible hospital that can adapt to future changes in healthcare without large costs; a reduction of clinical patients and an increase of outpatients, a hospital that functions within an overall concept of cooperation with partners in the healthcare chain; a hospital that uses the possibilities of Information and Communication Technology to improve the quality of healthcare and where working processes are organised efficiently.'*

The hospital size was calculated in the initial phase on 50,500 m² gross, whereas a traditional hospital of that size would usually utilise 64,000 m² gross. In the final design, the hospital measured 57,000 m² gross, which was more in line with the norms of the Netherlands Board for Healthcare Institutions.

(1) Centre for screening and diagnostics	12%
(2) Consultation centre	9%
(3) Treatment centre	18%
(4) Nursing centre	34%
(5) Knowledge and expertise centre	12%
(6) Logistics centre.	15%

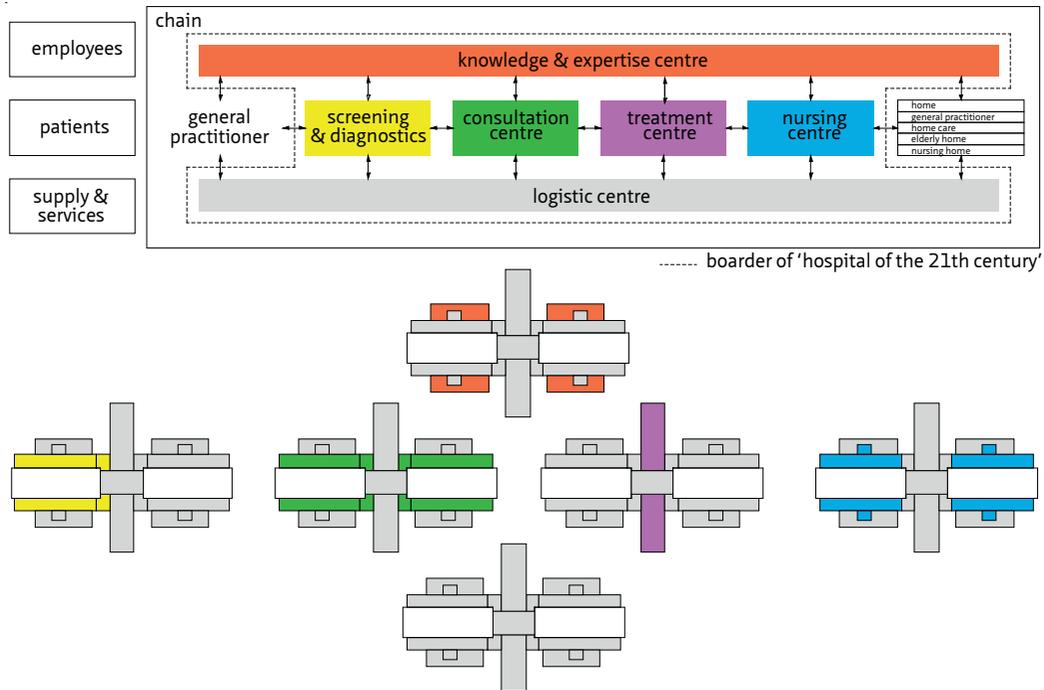


Figure 47 Process model for the Orbis Medical Centre (above) translated into a structural plan for the hospital lay-out (below) (source: Veldhoen+Company / Orbis Medical Centre).



Assessment managing real estate

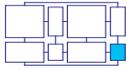
The new organisational process model for healthcare delivery was the basis for the accommodation design. The model is almost literally translated into a structural design for the new hospital building. For all the organisational processes, the demand for real estate was determined during the initial phase and translated into a demand for real estate. Standardisation of real estate supply was the main focus, resulting in standardised consult rooms, single patient bedrooms and flexible work places for specialists in the knowledge and expertise centres.

Table 22 shows that there is a focus on the third stage of Joroff's five stages of real estate strategy. This relates to the hospital as a professional bureaucracy in which the professionals are the main part of the organisation and have to be kept satisfied and feel supported in their processes. This seems also to support the conclusion that there is a mismatch between the high ambitions of Orbis at an organisational level and the practical design of a hospital that has to facilitate primary processes, which asks for a more system-oriented approach at a building level.

	current demand	future demand	current supply	future supply
	assessing current demand for real estate, including translation to brief with amount, quality and functionality of space.	exploring changing demand for real estate based on stakeholders' objectives, real estate perspectives and added values of real estate	analysing quantity, quality, capacity, functionality, location, age and condition of current real estate	generating models for future real estate that match future demand for real estate
task manager	* demand for real estate at the moment that current processes do not fit in existing real estate	* ad hoc demand	* inventory of gross floor area, capacity and maintenance	* incremental
controller	* demand for real estate based on analysis of primary process	* future demand for real estate based on scenario planning in primary process	* cost per square meter and functionality for primary process are analysed and compared to benchmark.	* incremental / standardisation
deal maker	* demand for real estate based on business processes: for each sub process quality, functionality, costs and capacity are determined.	* scenario planning in all processes are used for future demand	* real estate information is collected per sub process and used to solve demand for real estate.	* standardisation
intrapreneur	* demand for real estate is divided by using layer approach and possibilities for outsourcing * possibilities in external real estate market	* chain partners participate in determining real estate demand	* real estate information is used for alternative use in external real estate market. * real estate outsourcing strategy	* standardisation of marketability real estate, external market options
business strategist	* measuring and monitoring real estate performance in relation to organisational objectives * demand for flexible real estate in order to anticipate trends in society	* flexibility and possibilities to anticipate trends in society	* added value of real estate is measured and monitored and related to organisational objectives	* value based

Table 22 Assessment of the Designing an Accommodation Strategy. The cells contain the assessment criteria based on the literature, the cells marked blue are the stages which best fit the Orbis-case.

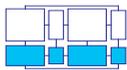
§ 5.3.4 Building design



How are the organisational key issues for success and added values of real estate translated into a building design? In this part of the conceptual model, alignment of the real estate design decisions to the organisational processes is central. Therefore the structural plan of the building is described as it is presented in the final design or realised in the actual building.

The hospital building consists of three domains: a public domain, an employee domain and a logistics domain. The building is linearly structured around an atrium. This atrium literally represents the central position of the patient. From this atrium, the 128 standardised consulting rooms on the ground and first floors are accessible to patients. Patients do not go to the specialist's room, but to a consulting room specially equipped to the patient's needs. The employee domains are located on the other side of the consulting rooms in the knowledge & expertise centres. The specialist therefore enters from the other side and meets the patients in the consulting room. The nursing wards are situated above the consulting rooms and only consist of en suite single patient bedrooms with their own shower and toilet. The logistics domain is situated in the basement where all the goods and materials are horizontally distributed throughout the building and from where elevators deliver to all departments.

§ 5.3.5 Conclusion real estate



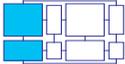
This ex-post analysis of the initial phase of Orbis Medical Centre shows a discrepancy between the high-end organisational ambition that is society-oriented and the more system-oriented approach of real estate decisions. This discrepancy can be explained by the fact that the organisation was challenged by the Minister to develop and innovate the healthcare process and the related infrastructure on the one hand and the hospital as a professional bureaucracy on the other hand. As a professional bureaucracy, the hospital building should first of all support the professionals in doing their work efficiently. The organisation of the healthcare processes is therefore the main focus in the building design.

The assessment in four steps (real estate perspectives, real estate added values, accommodation strategy design and building design) follows the different steps that are made in the initial phase. It makes clear that organisational objectives are translated into real estate on the different levels of context values and design. The assessment of Joroff's stages of real estate strategy demonstrated the discrepancy between the organisational ambition (oriented on societal goals) and the accommodation and building design that is oriented more towards its own organisation at a system level.

§ 5.4 Applicability of the meta-model and integrating framework

The meta-model and integrating framework for managing hospital real estate was tested utilising an extensive analysis of the initial phase on different levels. Separating the organisational level and the real estate level demonstrates how organisational objectives, strategy and decisions are translated into real estate perspectives, values and design. Following the four main steps (context, value, managing and design) of the conceptual model for managing hospital real estate, the Orbis case is discussed in this last part of the case study. The alignment between the levels of organisation and real estate is summarised below regarding context, value, managing and design.

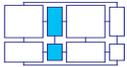
§ 5.4.1 Context



Separating ex-post organisational stakeholders' objectives and the perspectives on real estate show that the perspectives on real estate are not directly connected to the stakeholders' objectives for the whole organisation. As the organisational context describes the organisational objectives in relation to the main stakeholders, the perspectives on real estate focus on the translation of the healthcare process model in real estate objectives. Using this integrating framework can therefore reveal how real estate objectives are aligned to pre-set organisational objectives. These real estate perspectives in turn provide input in the real estate added values.

Challenged by the Minister to develop a hospital of the 21st century, Orbis presented itself as a frontrunner in the field. The redevelopment of the hospital focussed on the organisation of healthcare and the way societal needs are met. The Barbapapa model was leading and positions the organisation in its context as an intervention centre with the patient as the central point. In the real estate decision process, this Barbapapa model was transformed into a healthcare process model. This process model organised the different steps in the healthcare chain in such way that sequential steps could be arranged within a built structure

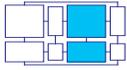
§ 5.4.2 Value



This step in the integrating framework shows the importance of clearly defined organisational key issues for success performance indicators for both the design of organisational processes and the design of the accommodation strategy. These key issues for success can be described in several ways. Orbis used a set of their own rules, but it is also possible to use more generally formulated issues for success, such as described by Porter (1985) or Treacy and Wiersema (1995). These authors state that leading companies choose one of three particular organisational strategies: product leadership, customer intimacy or process leadership i.e. operational excellence. Depending on the chosen organisational strategy, it is in this step that the alignment between organisational strategy and real estate strategy takes place.

Orbis' main organisational values are described in the ten rules for a new way of work. These rules provide input for the redesign of the organisational processes, but also give direction to the design of the hospital building. Translating the ten rules into real estate added values show the implications of these rules for the design of hospital real estate. As the organisational values are oriented on society as a whole (resembling the fifth phase of organisational orientation according to the EFQM-INK model), the real estate added values are related to the third stage, which is more system oriented.

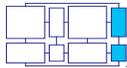
§ 5.4.3 Manage



The integrating framework clearly separates the organisational transformation process from the real estate transformation process and shows the implications of the new way of work and hospital process redesign for the hospital building design.

The organisational management describes the necessary changes in the organisation in order to transform the healthcare process according to the ten rules for a new way of work. This step shows the organisational transformation. Part of this transformation is the design of new hospital accommodation as one of the five resources for production. The DAS framework showed that the current supply did not match the future demand within which the new way of work has to be established. Therefore, the organisational process model is translated into a structural plan for a new hospital building. Alignment of the organisational healthcare model to the building design shows that the building is almost a literal translation of this model into a building structure.

§ 5.4.4 Design



The integrating framework shows how the design of the building is aligned to the design of the primary processes. In this way, the framework contributes to understanding the hospital building in terms of its main objectives.

This step in the analysis of the initial phase of Orbis shows how the new design of the primary process fits into the new hospital building. In this case, the design of the building is aligned to the design of the primary process. The process model is almost literally translated in the new building. Standardisation of space was the main objective in this design and is best visible in the standardised patient rooms, single person bedrooms and the knowledge centres.

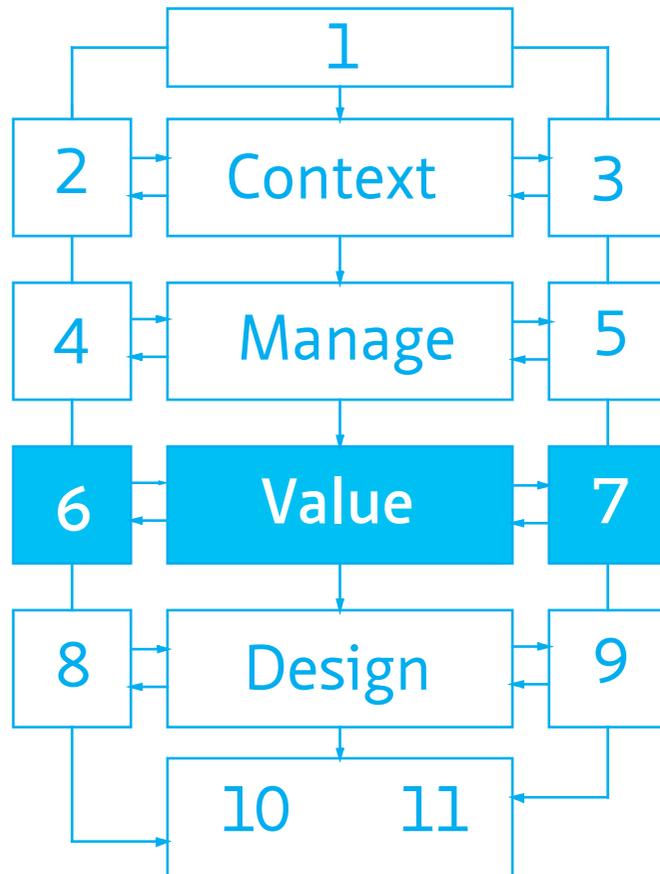
§ 5.4.5 Consequences for the meta-model and integrating framework

Real estate decision-making can be seen as being positioned in a layered context of general context, sector specific context and organisational context. The integrating framework can be used as a tool to describe real estate decision making processes in retrospect. Besides an ex-post analysis of the initial phase, the integrating framework can also be used as a tool for ex-ante management of real estate aligned to the organisational strategy. The triple assessment makes it possible to assess organisational and real estate decisions in order to set goals for further development of the ambition of the organisation in terms of process innovation and connected real estate investments. The case description in this chapter can be used as an instruction for both the assessment and the use of the meta-model as a management-tool, as it shows how different items can be translated into an organisation and how the criteria from the literature can be applied.

This case study also showed that during the initial phase of a new hospital building, the steps of the integrating framework are not followed in a parallel sequence. In the first part of the initial phase, there was a focus on the organisational process design. From the moment the processes were clearly described, the alignment of real estate to the healthcare process model started. Application of the integrating framework made it possible to compare the perspectives on real estate that resulted from the healthcare process model with the original stakeholders' objectives related to the overall performance of the organisation. In this way, the alignment of the organisational context to the perspectives on real estate is the first check of whether the stakeholders' overall objectives have been met. The ex-post analysis of the initial phase of the Orbis Medical Centre using the meta-model and integrating framework clearly shows that the separation of organisational level and real estate level gives new insights into the design decision process and also makes clear that there are two crucial steps in the meta-model.

The first crucial step is the alignment of real estate added values with the organisational key issues for success. This alignment has to take into account the perspectives on real estate that result from the stakeholders' objectives and relate this to the overall performance of the organisation. This alignment is important because it forms the input in the design of both the accommodation strategy and the organisational design, which then steers the primary process. PART 3 of this dissertation therefore looks further at the added values of hospital real estate and how these values can be connected to different stakeholders' perspectives on real estate. The second crucial step is the alignment of the building design to the design of the organisational processes. This makes the assessment of these added values of real estate within the design of the building important. This assessment makes it possible to test the formulated added values in the proposed design for a new hospital. Assessment of these added values in a final design is further studied in PART 4.

PART 3 Value



perspective on real estate

strategic	financial	functional	physical
adding value to organisational goals: how do the objectives achieved or obstructed by real estate?	value, resources and costs: what are financial consequences of the accommodation on resources, real estate value, and life cycle costs?	fitness for use: how and to what extend is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
organisational culture & innovation: meeting and exchange of knowledge, space, and innovation	Improving interpersonal communication between staff and professionals with focus on fewer medical mistakes	Creating an environment for interaction such as workplaces, consultation rooms, restaurant, staff skills labs and knowledge centres.	Creating an environment for interaction such as workplaces, consultation rooms, restaurant, staff skills labs and knowledge centres.
Encouraging innovative interpersonal relationships within the building: the interaction between people contributes to improving communication between staff and healthcare professionals with focus on fewer medical mistakes	patient satisfaction: patient satisfaction is related to the welfare of patients and the environment to the healing process. Aspects of patient satisfaction include: materials, noise, orientation & routing, privacy in doctor's office	Sharing or private rooms influences interaction such as workplaces, consultation rooms, restaurant, staff skills labs and knowledge centres.	Sharing or private rooms influences interaction such as workplaces, consultation rooms, restaurant, staff skills labs and knowledge centres.
Positively healing patient accommodation facilities for patient healing: building contributes to healing of patients as such as shorter hospital stay and higher occupancy due to higher satisfaction.	Building contributes to healing of patients as such as shorter hospital stay and higher occupancy due to higher satisfaction.	The built environment influences patient satisfaction.	The built environment influences patient satisfaction.
employee satisfaction: satisfaction of employees is an important accommodation must. This implies functional of healthcare to patients.	employee satisfaction: satisfaction of employees is an important accommodation must. This implies functional of healthcare to patients.	employee satisfaction: satisfaction of employees is an important accommodation must. This implies functional of healthcare to patients.	employee satisfaction: satisfaction of employees is an important accommodation must. This implies functional of healthcare to patients.
Functional, comfortable employees.	Functional, comfortable employees.	Functional, comfortable employees.	Functional, comfortable employees.

perspective on real estate

strategic	financial	functional	physical
adding value to organisational goals: how do the objectives achieved or obstructed by real estate?	value, resources and costs: what are financial consequences of the accommodation on resources, real estate value, and life cycle costs?	fitness for use: how and to what extend is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
reducing costs: Reducing accommodation costs as investment in operational costs.	reducing costs: Reducing accommodation costs as investment in operational costs.	reducing costs: Reducing accommodation costs as investment in operational costs.	reducing costs: Reducing accommodation costs as investment in operational costs.
Increasing productivity through more effective and efficient use of accommodation: Ensure that professional staff can be delivered in a timely manner.	Increasing productivity through more effective and efficient use of accommodation: Ensure that professional staff can be delivered in a timely manner.	Increasing productivity through more effective and efficient use of accommodation: Ensure that professional staff can be delivered in a timely manner.	Increasing productivity through more effective and efficient use of accommodation: Ensure that professional staff can be delivered in a timely manner.
use flexibility: Flexibility in use will be the innovative capacity of the building can adapt to changes in requirements to the building. This type of flexibility makes processes and this is a robust healthcare processes.	use flexibility: Flexibility in use will be the innovative capacity of the building can adapt to changes in requirements to the building. This type of flexibility makes processes and this is a robust healthcare processes.	use flexibility: Flexibility in use will be the innovative capacity of the building can adapt to changes in requirements to the building. This type of flexibility makes processes and this is a robust healthcare processes.	use flexibility: Flexibility in use will be the innovative capacity of the building can adapt to changes in requirements to the building. This type of flexibility makes processes and this is a robust healthcare processes.
Spatial and technical flexibility to adapt the accommodation to in healthcare processes: Robust building that allows different layouts by separating technical and configuration.	Spatial and technical flexibility to adapt the accommodation to in healthcare processes: Robust building that allows different layouts by separating technical and configuration.	Spatial and technical flexibility to adapt the accommodation to in healthcare processes: Robust building that allows different layouts by separating technical and configuration.	Spatial and technical flexibility to adapt the accommodation to in healthcare processes: Robust building that allows different layouts by separating technical and configuration.



6 Adding value by real estate

What is the state of the art of literature on adding value by real estate?

Abstract

Purpose: Adding value by real estate is a component of the meta-model and integrating framework as presented in PART 2. This chapter presents how real estate objectives can be successfully aligned with organisational key issues to provide input into the value-based management of real estate and accommodation strategies. It compares research perspectives and theoretical reflections on the concept of adding value by real estate.

Literature study: In the field of corporate real estate management, the concept of adding value is usually linked to various lists of possible real estate strategies that could contribute to the organisation's objectives and organisational performance. The chapter starts with a review of 'value' and 'adding value' in the literature, not particularly related to real estate, and continues by looking at the concept of adding value by real estate in influential journals within the academic field of Corporate Real Estate Management before comparing different dimensions of added values of real estate.

Empirical research: Nine added values are discussed that have been empirically explored by interviews with CEO's and/or real estate project managers of 15 hospitals in the Netherlands. The empirical part is presented in Chapter 7.

Findings: The literature shows that value is a multidimensional concept that can be defined as the (subjective) appreciation in achieving stakeholders' overall goals and purposes. Value is defined in this study as the performance of a product or service that contributes to the achievement of the goals set by the stakeholders. 'Adding value by real estate' includes stakeholders' valuation and therefore stakeholders' perspectives on real estate should be the starting point for the design and management of the accommodation. Added values of real estate have to be defined in advance (ex-ante) to enable the goals of the stakeholders to be established and also to enable testing afterwards (ex-post) of the design or the building-in-use.

Introduction

CREM is the range of activities undertaken to optimally attune the institution's real estate to organisational performance (De Jonge et al., 2008). The basis of real estate management is the presumed impact of real estate on organisational performance. If real estate had no effect on performance, no society, organisation or individual would spend

resources on it (Den Heijer & De Jonge, 2012). The literature on corporate real estate management describes several models and concepts to understand and explain the position of real estate in the organisation and the match between the demand and supply.

In the field of corporate real estate management, the concept of adding value is usually linked to various lists of possible real estate strategies that could contribute to the organisation's performance goals (Nourse & Roulac, 1993; De Jonge, 1996; Lindholm et al., 2006; De Vries, 2007; Lindholm, 2008; De Vries et al., 2008; Den Heijer, 2011; Den Heijer & De Jonge, 2012; Jensen, Van der Voordt, & Coenen, 2012). Many authors have contributed to the literature and practice of adding value by real estate by defining, comparing and categorising. Building on this literature, this chapter explores the concept of adding value by real estate and its contribution to organisational goals and objectives, and how this concept can be applied in real estate decision making processes. The concept of adding value is firstly defined based on the general literature before focusing on defining the added values of real estate using CREM literature. As the main goal is comparability and categorising of the different added values of hospital real estate, the definitions in this chapter are based on those publications that describe and compare at least three values. A limitation of this literature review is that added values of real estate is used as a key search and not particular values such as economic value or use value or further elaborations e.g. flexibility or productivity.

§ 6.1 Value

Value has many different meanings and applications. There is a basic difference between value singular, expressing the worth of something, and values, which relates to personal beliefs and social behaviour. In addition, 'added value', 'adding value' or 'value-added', is a multidimensional construct, playing diverse roles, and interpreted in different ways by different people (De Chernatony & Harris, 2000; Jensen, Van der Voordt, & Coenen, 2012). Different authors have tried to operationalize the concept of adding value, starting with a definition of the term 'value'. In pricing literature the term 'value' is usually defined as the trade-off between the customers' perceptions of benefits received and the sacrifices incurred (Lezinski & Marn, 1997),

Value = benefits – sacrifices as perceived by customers

Sacrifices can be interpreted as only financial costs, but other authors also include non-monetary factors such as time and effort (De Chernatony & Harris, 2000). In consumer behaviour 'value' is defined in terms of customer needs and what is desirable; or in terms of the mental image or cognitive representations of underlying customers' needs and goals (Peter & Olsen, 1987), ultimately affecting customers' responses and actions.

'Values' can consist of shared beliefs or group norms in terms of what is desirable, influencing individual attitudes and subsequent behaviour (Durgee, O'Conner, & Veryzer, 1996). In this broader definition of the concept, value could be described following Woodruff's definition of customer value (Woodruff, 1997) as the stakeholders' perceived preference for a product or service in achieving stakeholders' goals and purposes.

This definition of value by Woodruff (1997) also aligns with a description of real estate value, as described in the Real Estate Lexicon: real estate value is not unambiguous, rather it is subordinated to subjective appreciation (Keeris, 1997). Therefore, in relation to real estate, 'value' refers to the stakeholders' (subjective) appreciation in achieving the stakeholders' goals and purposes.

In CREM literature, different values of real estate are mentioned, e.g. shareholder value, balance sheet value, investment value, commercial value, economic value, functional value, historical investment value, market value and reconstruction value. Jensen, Van der Voordt, and Coenen (2012) traced six different types of added value: use value (quality in relation to the needs and preferences of the users), customer/consumer/user value (the trade-off between benefits and costs for these stakeholders), economic/financial/exchange value (the economic trade-off between costs and benefits), social value (e.g. supporting positive social interaction or reinforcing social identity), environmental value (Green Facility Management, environmental impact of FM), and relationship value (e.g. getting high-quality services or experiencing a special treatment). This clearly shows the multi-dimensionality of the added value concept.

	financial	non-financial
tangible	A tangible financial value	C tangible non-financial value
intangible	B intangible financial value	D intangible non-financial value

Figure 48 Value-matrix.

De Vries, Van der Voordt, and Arkesteijn (2004) divide these different values into a matrix of tangible versus intangible values and financial versus non-financial values (Figure 48). Tangible values refer to physical objects, intangible values refer to what real estate represents, e.g. by the appearance of a building. The intangible values are difficult to measure in output, either now or in the future. The distinction between financial and non-financial values implies that a value can either be translated into financial monetary value (money) or not. Financial value is largely dominated by real estate characteristics and external factors, e.g. market conditions. Non-financial values on the other hand are determined by the users and other stakeholders (De Vries et al., 2004).

Tangible financial value (A) represents the value of real estate that can be found in the financial administration of a corporation, e.g. the balance sheet value. Values of this quadrant can be calculated based on the volume and quality level of the buildings. Intangible financial values (B) are non-physical values that can be calculated, e.g. the market value of real estate, which can be higher or lower than the balance sheet value. The tangible non-financial value (C) of real estate represents the ability to achieve the stakeholders' goals and purposes. User value and functional value are examples of values in this quadrant of the matrix. This value is strongly related to the stakeholders' preferences and evaluation. An example of intangible non-financial values (D) is the symbolic value of real estate. This symbolic value is based on how a certain stakeholder appreciates real estate e.g. the appearance of a building and to what extent this appearance represents the values of the organisation (De Vries et al., 2004).

§ 6.2 Adding value

With reference to the well-known VAT-rate – focusing on the economic value added (EVA) – Van Wagenberg (2009) defined value added as: ‘the difference between the value of the product/services delivered to a client during a period (value of output(s) in period $\Delta t1 - t2$) and the value of the input(s) in the production function - or functions in the case of a supply chain - in the same period $\Delta t1 - t2'$ ’ (Van Wagenberg, 2009):

Value added = value of output ($\Delta t1 - t2$) product & services – value of input in production ($\Delta t1 - t2$)

In the field of relationship marketing, Sarshar and Pitt (2009) present a definition for customer value or customer value ratio:

Customer value ratio =
$$\frac{\text{Results produced for the customer + service process quality}}{\text{Price to the customer + cost and effort in acquiring the service}}$$

Following this idea of value ratio, Per Anker Jensen defined added value as the ratio between added use value and costs (Jensen, Nielsen, & Nielsen, 2008). In a follow-up paper (Jensen, 2010) this formula was extended to:

Added value = Quality & Process / Price & Difficulties.

Macmillan (2006) refers in his article *added values of good design* to Rouse (2004) and states that organisations recognise the corporate benefits of architectural investments. These added values represent both tangible benefits that can be evaluated using a traditional cost-benefit analysis and intangible benefits that are more difficult to

measure (Rouse, 2004). In Rouse's research employee satisfaction was the most highly rated motivation, but corporate policy and procuring a building as part of a much wider corporate development process were also mentioned. Besides financial value, Macmillan (2006) describes three other types of value: use value, social value and environmental value. Use value is described as the subjective quality of a product or service customers experience in relation to their needs (Bowman & Ambrosini, 2000). According to Macmillan (2006) social value is *"created by making connections between people, creating or enhancing opportunities for positive interaction, reinforcing social identity and civic pride, encouraging social inclusion and contributing towards improved social health, prosperity, morale, goodwill, neighbourly behaviour, safety and security, while reducing vandalism and crime."* Environmental value arises from a concern for intergenerational equality, the protection of biodiversity and a precautionary principle in relation to the consumption of finite resources (Macmillan, 2006). Design principles include adaptability, flexibility, robustness, low maintenance and the application of the whole-life cost approach.

Based on 20 in-depth interviews with leading-edge brand experts, De Chernatony and Harris (2000) came to the conclusion that *"Added value is a multidimensional construct which includes functional and emotional benefits, as perceived by consumers, relative to the competition; these often also result in benefits for the firm."*

Recent research into the concepts, findings and perspectives of the added values of Facilities Management (FM) (Jensen, Van der Voordt, & Coenen, 2012) also contributes to the unfolding of the concept of adding value. Comparison of the added values parameters shows that the basic structure of the CREM and FM models differ. This may be related to CREM being oriented towards the development and management of existing and new buildings, whilst FM is more service and process-oriented (Jensen, Van der Voordt, & Coenen, 2012). Despite the differences, similarities were also found in the generic added values used in both disciplines. These values are: increasing user satisfaction; cost reduction; supporting culture; supporting image and corporate identity; supporting flexibility and adaptability; stimulation of collaboration and innovation; risk control; and supporting environmental sustainability. The FM value map presented by Jensen, Van der Voordt, and Coenen (2012) shows the interrelationships between stakeholders, added values of FM, processes and resources. The authors remark that this value map is fairly static as it is not oriented towards action, but is rather focussed on creating an overview and basic understanding, for analysing and illustrating specific cases and for being applied as a framework for developing strategies for adding value-management in FM. They conclude that it would be interesting to develop a conceptual model that connects the different perspectives on added values to decision-making processes on a strategic, tactical and operational level and by whom: top management; middle management, FM and CREM staff.

A scan of the titles of 234 papers published in the *Journal of Corporate Real Estate* between 1998 - 2009 traced 80 papers with a possible link to the concept of Added Value of Facility Management or Real Estate (Jensen, Van der Voordt, Coenen, et al., 2012). After a second scan based on the abstracts, 47 articles were found that more or less explicitly discussed how to providing added value to core business by aligning real estate strategy to business strategy. The papers differ with regard to the attention paid to theoretical reflections and empirical research and a focus on the input (HR, information, capital, technology, real estate and other facilities), processes or output indicators. Improving productivity and decreasing costs turned out to be the areas most discussed for adding value by corporate real estate management. Improving productivity includes providing a more efficient working environment (input), e.g. less m² and lower costs), and providing accommodation and other facilities that effectively support new ways of working and a high quality and quantity of production (output).

Regarding the *Journal of Real Estate Research*, 8 papers were found in this period. In most of these papers, the added value of Real Estate is described as the ability of real estate decisions, processes and inputs to create wealth for shareholders. All the studies described added values in economic terms: cost cutting or profitability growth (Jensen, Van der Voordt, Coenen, et al., 2012). Stakeholder value is only mentioned in one of the papers, which stated that real estate decisions have an impact on the quality of our environment and/or shareholders' wealth (Manning, Roddriguez, & Ghosh, 1999). On the basis of this literature review, it is apparent that the concept of adding value is multidimensional and extends beyond financial value. In addition to the strategic aspects and multidimensional character of value, both its subjectivity related to customers' perception is important as well as the concept of "value for whom": who benefits from the added value. It is therefore important to take the views and interests of different stakeholders into account (Jensen, Van der Voordt, Coenen, et al., 2012).

The definitions and descriptions of 'value' and 'added value' so far all include customers' valuation of a product and/or services and show that adding value is a construct that relates the output or outcome to the input as perceived by the customers. For real estate decision-making processes this implies that stakeholders' perspectives (as a translation of the customer in a decision-making process) should be the starting point for the valuation of output. Based on stakeholders' goals and purposes the valuation thereby relates shared beliefs or group norms either to stakeholders' needs or to what is desirable. The attainment of values therefore depends on what is perceived as desirable by stakeholders in relation to their overall objectives and goals.

Being able to apply the concept of 'adding value' in practice requires the defining of 'added values' in such a way that stakeholders can ex-ante define the objectives related to their overall goals and purposes and ex-post assess the outcome (a design or constructed building) on attainment of the objectives and goals.

Figure 49 shows the position of the concept of adding value by real estate in the conceptual model for managing hospital real estate as presented in the previous chapter.

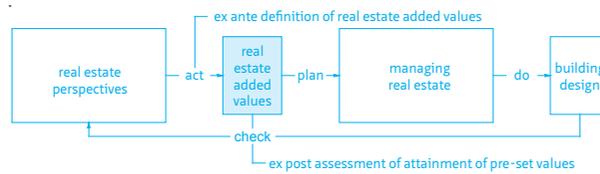


Figure 49 Concept of adding value in the model of managing hospital real estate.

§ 6.3 Literature on the added value of real estate

In practice CREM is a continuous process of matching demand and supply, derived from organisational goals and primary processes. As CREM aims to achieve a positive impact on performance, real estate management processes could also be defined as the process of adding value, as stated: *'adding value is perceived as an activity or sum of activities that (attempt to) influence the effect of real estate on performance: to prevent a negative effect or to realise a positive effect'* (Den Heijer & De Jonge, 2012). Nourse & Roulac (1993), pioneers in this field, compiled a list of real estate strategies as possible interventions and how real estate could be linked to corporate business processes. Since then, De Jonge (1996), Lindholm et al. (2006), Scheffer et al. (2006), De Vries (2007), De Vries et al. (2008), Den Heijer (2011) and Jensen, Van der Voordt, and Coenen (2012) have all contributed to the research on this topic in which the term 'added value of real estate' is predominately used.

Insight into the added value of real estate can be gained by comparing these different lists, definitions, strategies and objectives. Although different authors use different words, such as real estate strategies, added values or real estate added values, the objectives mentioned are in line with each other. The resulting lists of the added values of real estate from these studies partly overlap. Nourse and Roulac (1993) and De Jonge (1996) provide definitions of the added values of real estate, whereas Lindholm et al. (2006) and Den Heijer (2011) also use descriptions to clarify the added values. All these authors give examples of possible real estate strategies connected to the added values. In addition, Lindholm et al. (2006), Scheffer et al. (2006), Den Heijer (2011) and Riratanaphong, Van der Voordt, and Sarasoja (2012) also give key performance indicators (kpi) as measurable objectives. In the review of added values in this section, the added values are related to organisational objectives and real estate operating decisions by positioning the added values central in a table with the organisational objectives on the left side and the operating decisions on the right side (see Table 23 as example).

§ 6.3.1 Real estate strategies (Nourse and Roulac, 1993)

One of the earliest articles which aligned real estate decisions with corporate strategy was published by Nourse and Roulac (1993). They stated that an organisation's real estate decisions will only be effective when they support the overall business objectives and that effective real estate decisions are integral to the realisation of those objectives. This can be achieved by explicit consideration of how real estate strategies support corporate strategy and how specific real estate operating decisions support real estate strategy (Nourse & Roulac, 1993).

Corporate strategy and corporate real estate strategy are specified in another article by Roulac (2001): a corporate business strategy addresses such critical elements as customers, employees and processes; the environments in which the enterprise interacts with customers, houses its people and support its processes are elements of corporate property/real estate strategy. A corporate property strategy aims to impact and produce positive outcomes in employee satisfaction, production factor economics, business opportunities, risk management considerations and other impacts on enterprise value (Roulac, 2001).

These two articles demonstrate that real estate strategy should be linked to corporate strategy and that real estate operating decisions should be consistent and support both real estate and corporate strategy. Links between real estate strategy and overall business strategy and between real estate strategies and real estate implementation decisions are therefore necessary. Nourse and Roulac (1993) made these linkages clear in different cross tables in which the real estate strategies were positioned against corporate strategy decisions and real estate operating decisions. However, the direct link between corporate strategy and real estate operating decisions is less clearly visible.

Although added values are not mentioned as such in these articles, the real estate strategies that are described could be interpreted as the added values of real estate. These real estate strategies are: minimizing occupancy costs; facilitating and controlling production, operations and services; promoting human resource objectives; capturing real estate value creation; flexibility; promoting the marketing message; facilitating managerial processes and knowledge work and; promoting sales and selling processes.

According to Nourse and Roulac (1993) these real estate strategies are key drivers in the real estate operating decisions on: location; quality; tenancy duration; identity / signage; building size character; building amenities; exterior quality, company space; mechanical systems; information / communication systems; ownership rights; financing; control and risk management.

corporate strategy	real estate strategy	real estate operating decisions
creating and retaining customers	occupancy cost minimalization	- location
attracting and retaining outstanding people	flexibility	- quantity
contributing to effective business processes to optimize productivity	promote human resource objectives	- tenancy duration
promoting enterprise values and culture	promote marketing message	- identity / signage
stimulating innovation and learning	promote sales and selling process	- building size character
enabling core competency	facilitate and control production	- building amenities
increasing shareholders wealth	facilitate managerial process	- exterior quality
	capture real estate value creation	- company space
		- mechanical systems
		- information / communication
		- ownership rights
		- financing
		- control
		- risk management

Table 23 Real estate strategies aligned with corporate strategy and real estate operating decisions Nourse and Roulac (1993).

On the left are the corporate strategies which are related to the 8 real estate strategies (blue cells) and translated into real estate operating decisions on the right side.

§ 6.3.2 Pinpointing the added values of real estate (De Jonge, 1996)

De Jonge (1996) tried to pinpoint the added values of real estate in a list of seven elements of added value that contribute to the transformation of real estate from “cost of doing business” to a true corporate asset (Krumm, 1999). The seven added values described by De Jonge (1996) are: reduce costs; improve flexibility; improve the availability of finance; increase flexibility; marketing; improve culture and risk management. These added values are described by examples of real estate strategies that are supportive to the added values.

The elements of the added values of real estate by De Jonge (1996) redefine some of the alternative real estate strategies of Nourse and Roulac (1993). Based on the given definitions of both authors, the conclusion can be drawn that ‘promoting human resource objectives’ and ‘facilitating managerial processes and knowledge work’ are combined in ‘improving culture’; that ‘promoting the marketing message’ and ‘promoting sales and selling process’ are combined in marketing and; that risk management is added as a possible element of the added value of real estate.

Scheffer et al. (2006) build on De Jonge (1996) and connect 25 measurable items to the seven added values in order to assess whether the appropriate added values are promoted by the organisation and whether the full potential of the added values are utilized. These items are based on literature research and have been underpinned by the participating corporate real estate executives. (Scheffer et al., 2006).

added values of real estate	measurable items
increasing productivity	- selection of location - innovative workplaces - retaining human capital
cost reduction	- workplace costs - accommodation costs - facility costs - benchmarking - corporate finance
risk control	- inflexibility of real estate portfolio - selection of location - value risk - working environment - environmental aspects - development process
increase of value	- acquisition / disposal - redevelopment - market analysis
increase of flexibility	- organisational flexibility - financial flexibility - technical flexibility
changing the culture	- workplace innovation - communication
PR and marketing	- image - points of sale - sales strategy

Table 24 Added values De Jonge (1996) and Scheffer et al. (2006).
The added values (blue cells) are connected to 25 measurable items of real estate.

Table 24 shows the seven added values of real estate by De Jonge (1996) connected to 25 measurable items by Scheffer et al. (2006). The items were measured by the researchers in an ordinal scale from (1) no use; (2) moderate use; (3) fairly good use and; (4) extensive use. The goal of this study was to assess the use of measurable items to the connected added values of real estate.

§ 6.3.3 Added value of corporate real estate (Lindholm, 2008)

Lindholm (Lindholm, 2008; 2006) conducted empirical research in which real estate strategies by Nourse and Roulac and the elements of added value by De Jonge were used as the starting point for interviewing CRE managers and directors of commercial business organisations on the use of the added values of real estate in practice.

Based on these interviews, Lindholm made a list of seven added values of real estate: (1) reducing costs; (2) increasing productivity; (3) increasing employee satisfaction; (4) increasing value of assets; (5) increasing flexibility; (6) promoting marketing and

sale and; (7) increasing innovation. Table 25 shows the seven added values from the conceptual framework by Lindholm, connected on the one side to the core business performance level and on the other side to real estate decision making on the operational level.

core business performance level	real estate strategy level	real estate decision making on operational level
revenue growth	increase value of assets	<ul style="list-style-type: none"> - obtain current valuations of facilities - select suitable locations - manage risk associated with properties - make lease/purchase decisions on facility by facility basis - redevelop obsolete properties - create and maintain IT system for property management
	promote marketing and sale	<ul style="list-style-type: none"> - select locations that attract customers - provide space that attracts customers - make symbolic statements through design and location - create workplace that supports brand - provide environment that supports sale
	increase innovation	<ul style="list-style-type: none"> - develop usability of the workplace - design facilities that allow innovative processes - emphasize knowledge work settings - allow users to participate in design phase
profitability growth	increase employee satisfaction	<ul style="list-style-type: none"> - seek locations convenient to employees - provide pleasant working environment - provide functional workplaces - provide desired amenities - respond quickly to real estate requests
	increase productivity	<ul style="list-style-type: none"> - maintain facilities to accommodate optimal operations - provide environment that enhances productivity - choose convenient layout and locations for providers - design facilities that improve the creation and delivery of products - choose convenient locations for employees in separate buildings
	increase flexibility	<ul style="list-style-type: none"> - choose leasing instead of owning - negotiate short-term leases - create flexible workplace solutions - favour multiple use facilities - select services offices
	reduce costs	<ul style="list-style-type: none"> - minimize acquisition and financing costs - minimize operating expenses - create economies of scale in acquisitions - use workplaces more efficiently - conduct routine maintenance - balance between outsourced and in-house services

Table 25 Real estate strategies, Lindholm (2006).
Seven real estate strategies (blue cells) are related to two core business performance levels and various real estate decisions on operational level.

In addition to addressing different possible real estate strategies, Lindholm also gives possible measurements that could be described as key performance indicators for the different added values, dividing the added values into two groups, one increasing profitability growth and the other increasing revenue growth. These two groups are connected to the perspective of maximizing the wealth of shareholders.

Compared to the previous lists by Nourse and Roulac (1993) and De Jonge (1996), Lindholm re-establishes 'promoting human resource objectives' from Nourse and Roulac by introducing 'increasing employee satisfaction' as an added value. Lindholm also added 'increasing innovation' to the list of added values, which can be seen as a redefinition of 'facilitating knowledge work' (Nourse & Roulac, 1993) and 'improving culture' (De Jonge, 1996).

§ 6.3.4 Performance through real estate (De Vries, 2007; De Vries et al., 2008)

De Vries (2007) conducted a study into corporate real estate strategy and organisational performance from the perspective of both the management and real estate literature. De Vries states that in management literature, an organisation is perceived to be a unit with a certain input producing a desired output. In addition to real estate, organisations deploy four other assets to achieve their objectives; human resources, technology, information, and capital (adapted from Joroff et al, 1993). The output is affected by the resources available and organisational characteristics such as the organisation's culture, structure, leadership or objectives. The task of management is to make appropriate choices in making use of scarce assets (De Vries et al., 2008).

performance aspect	added value of real estate
profitability	reducing costs
	controlling risks
	expanding funding possibilities
	enhancing flexibility
productivity	increase productivity
	stimulating innovation
distinctiveness	improving culture
	supporting image
	increasing satisfaction

Table 26 Added values related to organisational performance aspects (De Vries, 2007). Nine added values (blue cells) are related to three organisational performance aspects.

The empirical research on the added value of real estate by De Vries (2007) is based on a conceptual model that takes its starting point from the thinking of Joroff et al. (1993). The resources are inputs into an organisational process leading to the general outputs of products and services. The impacts on performance are related to changes in productivity, profitability and competitive advantages. In the model all elements and relationships refer to the inside of the organisation. Outside the organisation, the external context also exerts its influence, represented by legislation, society, market and demography as well as the perception of the stakeholders divided into owners, suppliers, government, clients, employees and neighbours (Jensen, 2010).

De Vries (2007) defines nine aspects of organisational performance on which real estate strategies could have a direct or indirect impact: (1) reducing costs; (2) increasing productivity; (3) increasing satisfaction; (4) expanding funding possibilities; (5) enhancing flexibility; (6) supporting image; (7) stimulating innovation; (8) improving culture and; (9) controlling risks. While Lindholm (2008) used a shareholder perspective, using their wealth as the main objective for real estate strategy, De Vries et al. (2008) introduced the stakeholder perspective (Freeman, 1983) in the discussion about real estate added values. The nine added values were thus divided into three groups defined by the contribution of the added values to three overall business performance indicators: profitability, productivity or competitive advantage. These three performance indicators are based on the literature review of organisational performance by Tangen (2005) who concluded that performance is a compound variable embodying competitive advantage or excellence, profitability and productivity. The assessment of performance variables depends on the position and interests of the various stakeholders and is therefore affected by context variables such as legislation, market developments, social trends or demographic developments (De Vries et al., 2008). Table 26 lists the nine added values, divided into the three organisational performance aspects, based on the empirical research by De Vries et al. (2008).

§ 6.3.5 Facility performance measurement (Lavy et al., 2010)

Another interesting study is the literature review conducted by Lavy, Garcia, and Dixit (2010). This literature review emphasises that a performance evaluation of real estate is important not only for benchmarking with other facilities, but also for facilitating decision-making. Furthermore, the literature suggests that performance indicators must be categorised in such way that they are useful for holistic performance assessment, as well as for a specific aspect of the building (Lavy et al., 2010).

This research identified indicators for performance measurement and classified them into four major categories: financial, physical, functional and survey based.

category	added value of real estate	performace indicator
financial indicators	this study does not connect the performance indicators to the cooncept of adding value by real estate	<ul style="list-style-type: none"> - operating costs - occupancy costs - utily costs - building maintenance costs - ground-keeping costs - custodial and janitorial costs - current replacement value - deferred maintenance backlog - capital renewal - maintenance of efficiency indicators - facility condition index - churn rate and churn costs
physical indicators		<ul style="list-style-type: none"> - building physical condition quantitatively - building physical condition qualitatively - property and real esate - waste - health and safety - indoor environmental quality - accessibility for disabled - resource consumption energy, water, materials - security - site and location
functional indicators		<ul style="list-style-type: none"> - productivity - parking - space utilisation - employee turnover rate - mission and vision dependency index - adequacy of space
survey-based indicators		<ul style="list-style-type: none"> - customer/building satisfaction - community satisfaction - learning environment - appearance

Table 27 Facility performance measurement (Lavy et al., 2010). Various performance indicators on building level are related to four categories of organisational performance without connecting them to added values of real estate (blue cell).

Financial indicators provide a holistic financial appraisal of a facility's performance and are all cost-related indicators that represent performance in terms of currency per unit, area, person or output/product. Physical indicators represent the physical state of the building in terms of appropriateness, quality of space, accessibility and resource consumption. Functional indicators measure the functioning performance of a building by evaluating aspects related to the organisational or business mission, space, employees and other supportive facilities. Survey-based indicators measure psychological aspects of a building where higher importance is given to respondents' reactions and opinions. This category is best compared with strategic indicators, e.g. community and user satisfaction and learning and growth perspective. Categorized in these four groups, Lavy et al. (2010) identified 35 performance indicators. Although these indicators are not connected to added values of real estate, both the indicators and the categorisation of these indicators is useful related to the concept of adding value by real estate.

§ 6.3.6 Added values of real estate (Den Heijer, 2011)

Over the years, CREM literature has elaborated on different stakeholder perspectives, distinguishing four quadrants: institution versus real estate and strategic versus operational. This CREM model has gradually been changed into a conceptual framework that identifies four types of stakeholders and matching perspectives (Den Heijer, 2011). Den Heijer (2011) conducted a study into 'managing the university campus' with a focus on management information to support real estate decisions. In this study, ways to add value to the core business and how policy makers and real estate managers incorporate the concept of adding value is further explored.

stakeholder	performance (output)	added value of real estate
policy maker	competitive advantage through strategic goals	stimulating innovation
		stimulating collaboration
		supporting culture
		supporting image
		improving quality of space
controller	profitability through financial goals	decreasing costs
		increasing real estate value
		controlling risks
user	productivity through functional goals	supporting user activities
		increasing user satisfaction
		increasing flexibility
technical manager	sustainable development through physical goals	reducing footprint

Table 28 Added values of real estate related to performance output (Den Heijer, 2011). Twelve added values (blue cells) are connected to four stakeholders.

In this research added values are connected to four stakeholder perspectives in order to balance the needs of different stakeholders. Therefore, the hierarchy of adding value is connected to the different stakeholders and linked to four main perspectives: (1) strategic perspective of the policy maker with a focus on competitive advantage; (2) financial perspective of the controller with a focus on profitability; (3) functional perspective of the user with a focus on functionality and; (4) physical perspective of the technical manager with a focus on sustainability. As such, the four CREM stakeholder perspectives are connected to the real estate goals and the performance criteria profitability, productivity, competitive advantage and sustainable development.

Besides the previously defined ones, four more values were added to the list: (1) supporting user activities to replace increasing production (De Vries et al., 2008); (2) stimulating collaboration; (3) improving quality of space and; (4) reducing the ecological footprint. The last one is primarily added because many universities have campus strategies with the explicit goal of reducing the ecological footprint, either interpreted as less floor area or as reducing the carbon footprint in terms of CO2 emissions (Den Heijer, 2011).

§ 6.3.7 Added value of architecture for hospitals (Niemeijer, 2013)

Niemeijer (2013) conducted research into the added value of architecture for hospitals. In her PhD-thesis she connects the design of a hospital to business processes. She developed a value-model in which three core values of architecture are described: (1) cultural-value; (2) user-value and; (3) future-value. Cultural-value positions the building in a context and its connections to society. User-value focusses on functionality, programming and routing. Future-value includes sustainability and the adaptability and the possibilities for re-using the building. In her research, these three core-values are not directly linked to the added values of real estate. As Niemeijer (2013) uses other dimensions for the added value of architecture, comparability with the added value of real estate is difficult. However, it may be possible to link the three core values to the added value of real estate as described in CREM literature.

core values	added value of architecture
cultural-value	accessibility
	individual behaviour
	patient satisfaction
	employee satisfaction
user-value	business processes
	safety
	front-back-office
	healing environment
future-value	sustainability
	flexibility
	life-cycle costs
	re-use possibilities

Table 29 Added value of hospital architecture (Niemeijer, 2013). Added values of architecture (blue cells) are related to three core values of spatial quality.

§ 6.4 Conclusions on the added value of real estate

Table 30 gives an overview of the added values of real estate addressed by these authors. It shows that the original eight alternative real estate strategies by Nourse and Roulac have been redefined over the years into real estate added values.

Nourse & Roulac (1993)	De Jonge (1996)	Lindholm (2006)	Scheffer et al (2006)	De Vries (2008)	Den Heijer (2011)	Niermeijer (2013)
real estate strategies	added values	real estate strategies	added values	real estate added values	added values of real estate	added value of architecture
facilitate and control production, operations and service delivery	improve productivity	increase productivity	increase productivity	increase productivity	supporting user activities	functionality of lay-out
promote human resource objectives		increase employee satisfaction		increasing satisfaction	increasing (user) satisfaction	user satisfaction
	improve culture		changing the culture		improving quality of place	
facilitate managerial process and knowledge work				improving culture	supporting culture	individual behavior of users
		increase innovation		stimulating innovation	stimulating collaboration	
occupancy cost minimalisation	reduce costs	reduce costs	cost reduction	reducing costs	decreasing costs	exploitation of building
promote sales and selling proces	marketing	promote marketing and sales	PR and marketing	supporting image	supporting image	business processes
promote marketing message						
flexibility	increase flexibility	increase flexibility	increase of flexibility	enhancing flexibility	increase flexibility	flexibility
capture real estate value creation	improve availability of finance	increase value of assets	increase of value	expanding funding possibilities	increase real estate value	re-use possibilities
	risk management		risk control	controlling risks	controlling risk	
					reducing ecological footprint	sustainability

Table 30 Lists of added values of real estate.

Added values have been combined or split up and other values added to the list. 'Promoting Human resource objectives' has been divided into 'improving productivity' and 'increasing employee satisfaction'. 'Facilitating managerial process and knowledge work' has been divided into 'increasing innovation' and 'improving culture'. 'Promoting the marketing message' and 'promoting sales and selling processes seems to have been combined into 'promoting marketing and sales' and later into 'supporting image'. Lindholm's model (2006) focusses on the maximization of shareholders' wealth, whereas De Vries et al. (2008) link values to organisational performance as perceived by various stakeholders. Den Heijer (2011) relates the values to four particular stakeholders.

Lindholm et al. (2006), De Vries et al. (2008), Den Heijer (2011) and Niemeijer (2013) also categorised the added values they described. Although these four authors together use almost all nine added values, the classification of these values is not consistent. This inconsistency is made visible in Table 31 which shows the categorisation of the added values. Whereas Lindholm (2008) tried to connect real estate interventions to two organisational performance criteria: profitability growth and revenue growth, De Vries et al. (2008) used Tangen (2005) model to connect real estate added values with profitability, productivity and competitive advantage. Den Heijer's CREM stakeholder model (2011) defines four perspectives on real estate: (1) strategic; (2) financial; (3) functional and; (4) physical. The categorisation of Niemeijer (2013) in cultural-value, user-value and future-value makes it possible to connect these added values of real estate to the added values of architecture. These categories do not match each other and as a consequence different added values can be assigned to different categories. This indicates that a clear categorisation of added values is missing in the literature.

real estate added value	Lindholm (2006)	De Vries (2008)	Den Heijer (2011)	Niemeijer (2013)
	maximize shareholders wealth	performance for stakeholders	CREM stakeholder model	added value of architecture
reduce costs	profitability growth	profitability	controller	user-value
improve productivity	profitability growth	distinctiveness	user	user-value
increase user satisfaction	revenue & profitability	productivity	user	cultural-value
improve culture		distinctiveness	policy maker	cultural-value
increase innovation	revenue growth	productivity	policy maker	cultural-value
support image	revenue growth	distinctiveness	policy maker	cultural-value
improve flexibility	profitability growth	profitability	user	future-value
improve financial position	revenue growth	profitability	controller	future-value
controlling risks		profitability	controller	future-value

Table 31 Added values of real estate as categorised by Lindholm (2006), De Vries (2008), Den Heijer (2011) and Niemeijer (2013).

Although it is not easy to determine the influence of real estate on the organisational performance, all these researches show a growing understanding of the impact of real estate on corporate performance and how to cope with the needs of different stakeholders. From these studies it can be seen that in practice it is very hard to find evidence that real estate decisions actually contribute to the organisational performance criteria. Results show that some relations are likely or plausible, sometimes convincing, but mostly not very strong. (Den Heijer, 2011). The main reason behind this is that the effect of real estate cannot be isolated from other resources for production. De Vries et al. (2008) concluded that the ways of adding value may reinforce each other, but can also neutralise each other's effects or have a combined negative effect.

The multidimensionality of the added values in the literature comes to the fore in the different categories of added values (Table 31). This multidimensionality seems to be a result of trying to put an added value into a certain category or to connect to a specific stakeholder. Another approach could be defining four perspectives of each added value. In this approach each added value incorporates one or more of these perspectives. The balance between these perspectives means that one added value could be logically connected to a certain stakeholder, but not necessarily. If a certain added value gains in importance in time due to changing circumstances, it transfers to the more strategic perspective of the policy maker. Following Den Heijer's CREM stakeholder model (2011) these four perspectives could be: (1) strategic; (2) financial; (3) functional and; (4) physical.

A comparison of the different lists of added values presented in this chapter shows that nine added values are mentioned by most authors: (1) reducing costs; (2) improving productivity; (3) increasing user satisfaction; (4) improving culture; (5) increasing innovation; (6) supporting image; (7) improving flexibility; (8) improving the financial position and; (9) controlling risks. In Table 32, definitions of these added values are made by combining the different descriptions and definitions provided by these authors. In addition to these nine added values that are commonly mentioned, during the literature search as part of this study sustainability was found to be often mentioned as an added value and has therefore been integrated separately as an added value of real estate.

'Adding value by real estate' includes the stakeholders' valuation and therefore the stakeholders' perspectives on real estate should be the starting point for evaluating the accommodation. As a consequence, 'added values' should be defined in a way that stakeholders can ex-ante define the objectives related to their overall goals and purposes and ex-post assess the outcome on attainment of the purposed objectives and goals. As stakeholders' appreciation is part of the concept of 'adding value', 'added values' are per definition sector specific and have to be aligned to the overall organisational key issues for success in that specific sector. As a consequence, generic

added values from literature have to be translated into sector specific definitions. It is therefore necessary to investigate the perception of these added values within a sector. In chapter 7, the list of nine added values that resulted from this literature review will be used as the starting point for a further exploration of the added values of hospital real estate. The applicability of sustainability as a relatively new added value of real estate during the course of this research was investigated in the interviews by asking the respondents separately how sustainability is considered as an added value and how it is related to the other added values.

real estate added value	definition
reduce costs	To reduce investment costs, capital costs, operational costs and other real estate related costs.
improve productivity	To increase production with the same amount of resources for production from more effective use of real estate.
increase user satisfaction	To create functional, pleasant and comfortable places for visitors, consumers and employees.
improve culture	To improve interpersonal relations and communication by real estate.
increase innovation	To stimulate renewal and improvement of primary processes, products and services by real estate.
support image	To expose corporate objectives by using real estate as an icon for the organisational culture.
improve flexibility	To structure a real estate portfolio in a way that future spatial, technical, organisational and juridical adjustments are possible.
improve financial position	To attract external financing to reinvest in the primary process or to improve the overall financial position of the organisation by regarding real estate as an asset.
controlling risks	To anticipate future real estate related technical and financial opportunities and risks.

Table 32 Nine added values of real estate defined from CREM literature.

7 Adding value by hospital real estate

How is the concept of adding value by real estate perceived and used by hospital decision makers?

Abstract

Purpose: Added values have to be aligned to the overall key issues for success in the specific sector at hand. Besides, added values should be defined in a way that stakeholders can ex-ante define the objectives and ex-post assess the outcome on the attainment of the proposed objectives and goals. This chapter presents and reflects on the results of interviews in order to explore the added values of hospital real estate.

Literature study: The review of literature on adding value by real estate (chapter 6) was used as input for interviews with the CEO's and/or real estate project managers of 15 hospitals in the Netherlands all of whom initiated, designed or constructed a new hospital building in the period 2004-2012. In addition, the available initial documents and public documents for these hospitals were analysed to explore if and how the concept of added values was incorporated into the decision-making on hospital real estate.

Empirical research: First an explorative interview with a CEO of the Orbis Medical Centre (see also case study chapter 5) was conducted as the starting point for 10 semi-structured interviews with CEOs and/or real estate project managers of hospitals in the Netherlands. In these interviews the added values of real estate from the literature were discussed. Furthermore respondents were asked to mention how these values were incorporated into the design and management of their hospital building and which values were prioritised and why. The findings from these interviews were discussed in reflective interviews with 4 hospitals that initiated a new hospital building after the introduction of the new legislation.

Findings: The research into the added values of hospital real estate shows that the concept of adding value through real estate fits the practice of hospitals that have recently designed and constructed a new hospital building. Comparing the added values of real estate from CREM literature with the practise of the construction of new hospitals in the Netherlands resulted in a sector-specific definition of the added values of hospital real estate and a categorisation of nine values in three clusters. The first cluster consists of user-values such as the promotion of organisational culture and patient and employee satisfaction. The second cluster includes the more tactically oriented production-values such as improving productivity, reducing accommodation costs and the flexibility to adapt the physical environment to new healthcare processes.

The third cluster consists of future-values, e.g. the image of the building, sustainability, real estate related risks and opportunities to use the financial value of real estate for financing primary processes. These clusters of added values relate to the literature on spatial quality and connect the concept of adding value to the quality of architectural design. The results contribute to a better general understanding of both adding value by real estate and the values mentioned in literature, as well as for the hospital sector in particular.

Introduction

Whereas the previous chapter reviewed the concept of adding value by real estate in the literature on CREM, this chapter explores this concept within the hospital sector. Regarding the multidimensional and multi-faceted character of added value, both similarities and dissimilarities could be seen in chapter 6. Common issues included: (1) reducing costs; (2) improving productivity; (3) increasing user satisfaction; (4) improving culture; (5) increasing innovation; (6) supporting the image; (7) improving flexibility; (8) improving the financial position; (9) controlling risk. These nine added values were discussed in 15 interviews with the CEOs and real estate managers of hospitals (D.J.M. Van der Voordt & Van der Zwart, 2011; Van der Zwart, 2011). Besides these nine commonly described added values, sustainability has in recent years been added to the list. Therefore, interviewees were separately asked if and how sustainability was appreciated and perceived as added value of hospital real estate.

First, an explorative interview was conducted with a CEO of the Orbis Medical Centre. Based on this interview, the case study of chapter 5 and the literature review of the concept of adding value by real estate, 10 semi-structured interviews were conducted with hospitals' CEOs and/or real estate project leaders on how real estate added values were perceived and used in the design and management of the hospital. Furthermore, hospital decision makers were asked to prioritise various added values of real estate and clarify this prioritisation. The results from these interviews were later discussed in 4 reflective interviews with hospitals who initiated a new hospital building after the introduction of the new regulations in 2008.

In order to select appropriate respondents, a list was made of the hospitals involved in building or designing a new hospital in the period 2004 – 2012. This list was presented to experts in the field and was updated when other hospitals were found that were initiating a new building process. This resulted in a list of approximately 30 hospitals. A selection of cases was made based on heterogeneity in terms of three characteristics: 1) general, top clinical and academic hospitals; 2) size in number of beds and turn-over; 3) current position in the building process i.e. initiation, briefing, design, construction, or use (Table 33). This made it possible to explore whether the type of hospital, size and phase in the real estate life cycle affects (priorities in) value added management.

The selected cases represent approximately 15% of all Dutch hospitals and 50% of all Dutch hospitals planning or building a new hospital in 2004-2012. The selection includes 7 general hospitals, 6 top clinical hospitals and 2 academic hospitals. With regard to the number of beds, the case selection includes 4 small size hospitals, 5 medium size hospitals, 4 large hospitals, and 2 extra-large academic hospitals due to the integration of research and education facilities in the real estate portfolio. 5 hospitals were in the initiation phase, 5 hospitals were constructing the building at the moment of the interview and 5 hospitals had new buildings-in-use and were therefore in the exploitation phase. Half of the interviews were conducted with CEOs, and half with the real estate project manager of the hospital. Information and documents available on the internet were studied in advance to gain a first impression of the hospital, its mission and vision, and main real estate objectives.

Hospital	city	code	category	size	beds	phase	respondent
Gelre Hospital	Zutphen	GZ	general	S	217	use	CEO
Gemini Hospital	Den Helder	GD	general	S	244	initiation	project manager
Zaans Medical Centre	Zaanstad	reflection	general	S	299	initiation	CEO
Diaconessenhuis Meppel	Meppel	reflection	general	S	330	initiation	project manager
Admiraal de Ruyter Hospital	Goes / Vlissingen	reflection	general	M	370	initiation	CEO
Deventer Hospital	Deventer	DD	top clinical	M	390	use	CEO
Reinier de Graaf Hospital	Delft	RD	top clinical	M	397	initiation	project manager
Vlietland Hospital	Schiedam	VS	general	M	421	use	CEO
Maasland Hospital	Sittard	exploration	general	M	425	use	CEO
Albert Schweitzer Hospital	Dordrecht	AD	top clinical	L	475	construction	project manager
Meander Medical Centre	Amersfoort	MA	top clinical	L	600	construction	project manager
Maasstad Hospital	Rotterdam	MR	top clinical	L	620	construction	CEO
Medical Spectrum Twente	Enschede	reflection	top clinical	L	650	construction	project manager
UMC Groningen	Groningen	UG	UMC	XL	1097	use	CEO
Erasmus UMC	Rotterdam	ER	UMC	XL	1320	construction	project manager

Table 33 Characteristics of the cases.
S = small; M = medium; L = large; XL = extra-large.

The semi-structured interviews consisted of three parts. First an open question was raised on which values were or are being taken into account in the real estate decision making process. The values spontaneously mentioned in the first part could be indicators of the managers' awareness of possibilities to add value by real estate. The second part of the interview consisted of a structured interview where respondents were asked to prioritise nine added values found in the literature. In this part the nine added values derived from the literature were presented on little cards in a matrix with 3 rows and 3 columns (Figure 50).

The ranking of added values occurred in three steps. First respondents were asked to prioritise the three added values in each row. Secondly, respondents were asked to rank the three added values per column on least importance. In these two steps the respondents were made familiar with the added values used in literature in order to be able to prioritise all of them in the third step. In the last part of the interview, respondents were asked how these added values were visible in the (design of the) hospital building.

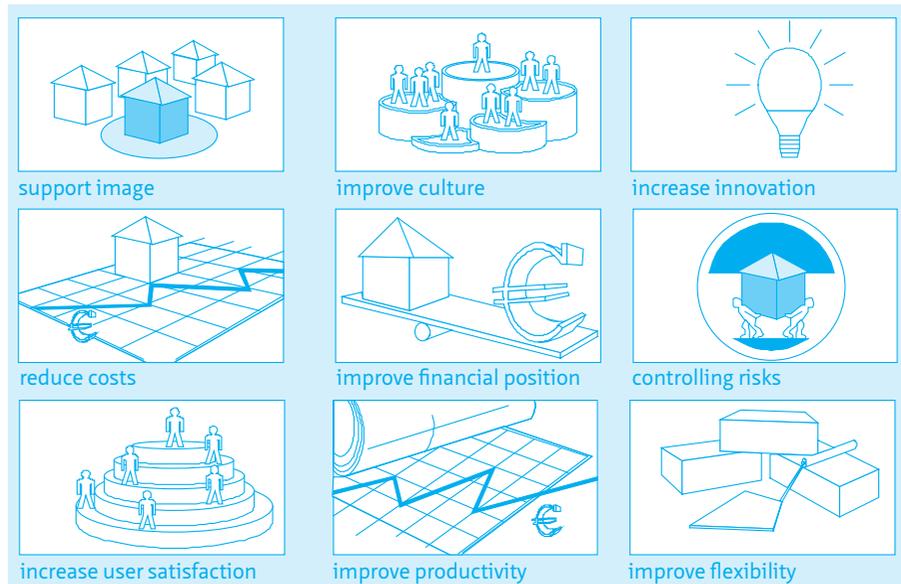


Figure 50 Added values of real estate from CREM literature.

The four reflective interviews followed the same three steps as the semi-structured interviews, with the exception of step 2. In the second part, the ranking results of the previous interviews were presented as the starting point for discussing the priority of added values. After the reflection on the former ranking, respondents were also asked to describe how these added values were visible in the design of the new hospital.

The results of the interviews are discussed according to the three steps in the interviews. Firstly, value-based hospital real estate management as discussed with the interviewees in the open interview on organisational goals for real estate is described (7.1). Secondly, the prioritisation of added values and the reactions on this ranking in the reflection interviews are discussed (7.2). Finally, accommodation choices supporting the added values of hospital real estate are described (7.3).

§ 7.1 Value based hospital real estate management

The first priority of hospitals is to deliver good healthcare in a cost-efficient way. Real estate is secondary but at the same time an important resource in achieving the organisational objectives and optimally facilitating healthcare processes. Being a resource for production, real estate should always be judged upon its contribution to business processes and business economics. Supporting the primary process also means that the building should be comfortable. On the one hand the building should support patient's needs and wellbeing. On the other hand the building should be a pleasant and productive working environment for the healthcare professional. Therefore, the building should support an organisational culture of multidisciplinary and patient-focussed working processes: multidisciplinary cooperation and good communication around the patient is a trend that hospitals have to make their own.

In most cases, supporting efficient healthcare processes was shown to be at the core of real estate design and management at the building level. Much attention is paid to efficient logistics for patients, healthcare processes and the transport of people and goods. In spite of the widely used motto "the patient is central", most hospitals focus on efficient healthcare process, because it also benefits the patients if processes are well connected and as such supports both customer satisfaction, labour productivity and employee satisfaction. This implies efficient working processes with a focus on outpatient healthcare and diagnostics. Efficiency means that different flows of patients, personnel and materials have to be logically organised within the building. From this perspective it is a production factory. On the other hand, patients have to feel at ease and therefore the building must have an ambiance of hospitality. Furthermore, it has to fit with the budgets for exploitation costs and energy expenses.

Deventer Hospital, Deventer

The building should facilitate the healthcare processes in such a way that the building meets the organisation's objectives on the first day it opens its doors. In addition, the building must be flexible in order to support business processes for a period of 40 years and to be able to cope with changing visions on healthcare delivery. The building concept is based on the vision that healthcare processes include four different patient flows: acute, urgent, elective, and chronic. This resulted in a process-based building with a focus on logical connections between medical healthcare processes.

All cases show a connection between the organisational strategy and the real estate strategy. In most cases the possibilities of the current real estate portfolio as well as the desired future supply is taken into account in the real estate strategy. Often organisational objectives such as transparency and appropriate healthcare are translated into the architecture of the building. But a strict translation of the organisational mission, vision and ambitions into the architecture is also mentioned as being difficult because of both the long planning and construction time – often 10 to 15 years - and the expected 40 years of exploitation afterwards. During this period the organisation will change its management structure and style, objectives, vision on optimal organisation of healthcare processes several times. Flexibility is therefore often mentioned as an important criterion of adding value by real estate. Flexibility should enable the hospital building to support the healthcare processes for at least 40 years under changing circumstances.

Meander Medical Centre, Amersfoort

First a Long Period Accommodation Plan was made to formulate a real estate strategy. This strategy consisted of a renovation of the existing hospitals to support their use for another 10 to 12 years and in the meantime designing and constructing a new hospital on a central location. All complicated top clinical care would be centralized in the new hospital building. In addition, a regional hospital was renovated and converted into a day care hospital and four outpatient centres were established in the region. The central building is divided into three parts: 1) a hot floor with all high technical functions; 2) wards with standard one-person bedrooms, and; 3) multifunctional examination rooms, all with different technical installations and constructions and different access to patients. Flexibility is realised by the expandability, adaptability and exchangeability of rooms.

The new financing system has made the payment of investments and running costs dependent on production in terms of diagnosis-treatment combinations, resulting in a very business-like approach: no more square meters than necessary and life-cycle-costs as low as possible. The hospitals that started a new building project after the introduction of the new regulation show a shift from focusing on maximum capacity and quality towards less capital expenses and increasing productivity. Recently built and currently being built hospitals are designed and constructed on the basis of a business case and pay great attention to creating a compact building with a small amount of surplus square meters to enable future production growth, low capital costs and a high level of flexibility. Slim fit buildings are accompanied with extendibility in the future. New business cases would need to be presented to financiers for these extensions. The planning and construction period decreased from the usual 10-15 years to 4-5 years.

Gelre Hospital, Zutphen

From the moment of the first initiative, it was known that the building had to be financed on own risk, reimbursed by healthcare production. Therefore, a business plan was presented to financiers. The starting point of this business plan was to focus on keeping the capital costs as low as possible in order to gain a competitive advantage with regard to the costs of healthcare products and services. This is accomplished with a cheap, functional and lean building with little surplus square meters and a focus on flexibility, anticipating future alterations. Also typical for this project is the short period of 4 years in total from initiation to design and construction.

Since the introduction of the regulated market system, a growing awareness of the market position of the hospitals has become visible. Liberalisation of the regulations on hospital healthcare investments introduced possibilities for hospitals to invest in new infrastructures. For these hospitals, it was clear from the beginning that they had to find their own financing. With the new regulations in 2008, it became clear that hospitals were not only responsible for their own real estate, but that they also had to finance their real estate within existing budgets for healthcare delivery, without extra financial support.

Since the introduction of the new regulation, hospitals have become more aware of their position in the region. Most hospitals are part of a larger network with one central location for all the complicated top clinical healthcare and several day care hospitals and outpatient centres in the region. In this 'horizontal' cooperation, peripheral locations demarcate the service area of the hospital and aim to ensure that patients choose this hospital, only going to the central location if top clinical care is necessary. Other hospitals have chosen for a 'vertical' cooperation in the healthcare chain, anticipate the changing context of healthcare services: building alliances with General Practitioners, home care and elderly housing organisations to deliver healthcare in their region.

Under the new legislation, the position of different stakeholders has changed. The governmental responsibility for the accessibility of healthcare is restricted to acute healthcare. The influence of healthcare insurers has increased: they have to be willing to pay for the exploitation consequences of healthcare real estate investments and integrate these expenses into their tariffs for healthcare services. This implies that healthcare insurers are increasingly looking after patient's interests in terms of quality of healthcare services, including the healthcare infrastructure. Also the position of the banks as financiers of healthcare infrastructure has changed. Since the new regulations, banks require more guarantees and better and more detailed business plans than before.

§ 7.2 Prioritising added values

In the 10 semi-structured interviews respondents were also asked to prioritise the added values that resulted from the literature study. The results of prioritising these nine added values by the CEOs and project managers of ten hospitals are presented in Figure 51.

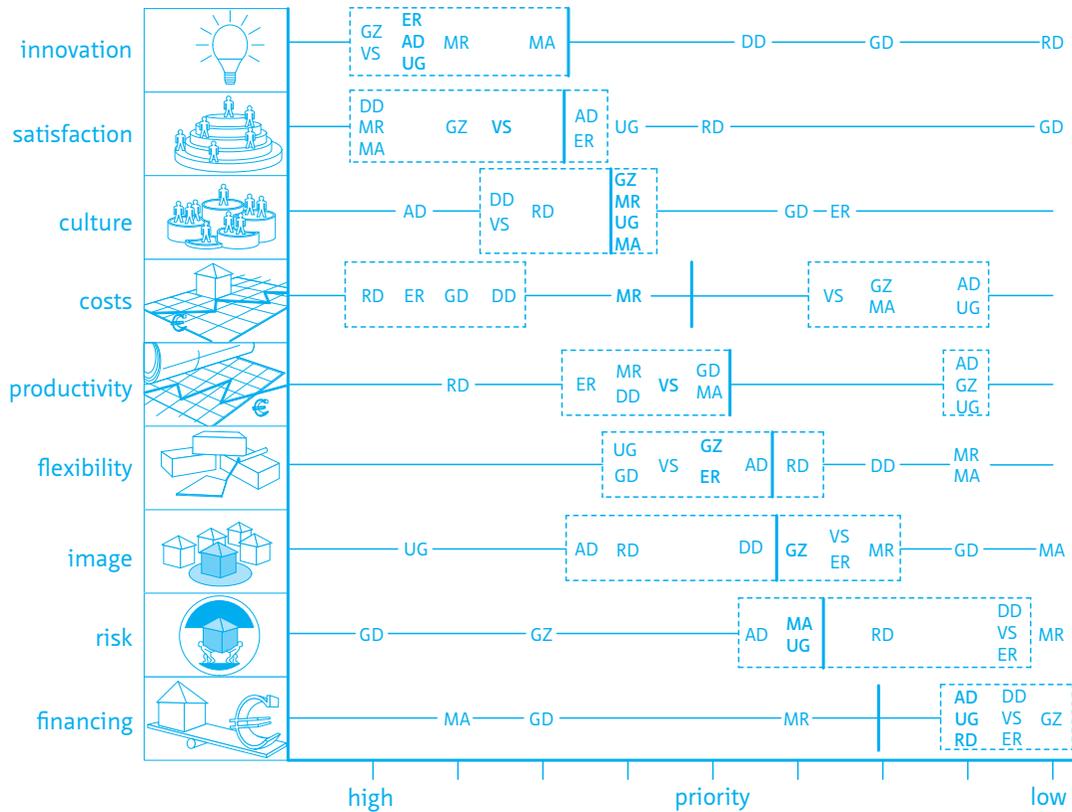


Figure 51 Plot diagram of ranking prioritised real estate added values.

The horizontal axis is scaled from 1 = highest priority to 9 = lowest priority according to the respondents. The nine added values are presented on the vertical axis of the diagram. Horizontally next to these added values the priority ranks are plotted for all the hospitals interviewed with their names abbreviated according to Table 33. When two or more added values were given the same priority, these added values received the same average rank. The dashed-lined boxes cluster the answers most often given, usually showing a maximum of three exceptional ranks per added value. The vertical lines show the average ranking per added value. The bold abbreviations show the

hospitals with a median ranking for that particular added value. The added values on the vertical axis are ordered from the highest median rank (above) till the lowest median rank (below). If two added values share the same median, the average was used to choose the priority rank.

Figure 51 shows that on average supporting innovation, increasing user satisfaction and improving the organisation's culture were given highest priority by the respondents. Cost reduction was highly prioritised by four respondents, but ranked as not that important by five other hospitals. Because of this variety, the average rank is not a representative expression of the different thoughts. Increasing productivity, optimising flexibility and supporting corporate image are prioritised in the middle. Risk control and increasing financing possibilities were usually given low priority by the respondents. One hospital (GD) ranked the priorities of the nine added values almost opposite to most other answers. This hospital was planning a new hospital according to the so-called living building concept (LBC), a new form of Public Private Initiative.

If we look at the answers related to the function of the respondents, there seems to be a fairly even distribution in the prioritisation of the added values of real estate between CEOs and real estate project managers. A difference in prioritisation seems visible between the initiation-phase, the design-phase and the use-phase of the building. During the initiation-phase, values such as risk management and increase financing possibilities are important, while in the use-phase stimulating innovation, user satisfaction and improving organisational culture are the priorities.

This ranking of real estate added values was discussed in reflective interviews with four hospitals in either the initial or construction phase of a new building. Results from these interviews show that the top ranking of increasing innovation is doubted. In these reflective interviews, innovation is interpreted by the interviewees as a means to improve patient satisfaction and is not regarded as a goal in itself: the main objective is accessible, affordable and qualitatively good healthcare.

For all hospitals that initiated a new hospital building after the new regulations in 2008, improving efficiency is an important objective. Efficiency has increased in importance since hospitals have themselves become responsible for the reimbursement of their real estate investments. Remarkably, the inefficiency of these hospitals in their current buildings is largely a result from the past where, under the old regulations, hospitals were not allowed to reinvest in real estate.

In the reflective interviews, flexibility is perceived to be more important than is mentioned in the ranking that resulted from the first ten interviews. Flexibility makes real estate expensive. This implies that future reinvestments have to be integrated into the business case. New processes or a change in the organisational focus point can lead to future disinvestments. Usually, in this situation, a new business case would be made

in which former considerations are often forgotten. This is typically human: innovation and change go on and real estate flexibility has to cope with it.

Controlling the risks and financial possibilities related to real estate has also become more important since the new regulations. *“Without risk control and a good financial business plan, the other added values of real estate will never be attained. Therefore, the most important values are those values that make other values possible. [...] If this ranking [as in Figure 51] is followed, one stays in the old thoughts from before the regulations changes.”* Maybe this explains why the GD hospital contradicts the ranking, as this hospital proactively anticipated the new liberalisation of hospital real estate regulations.

§ 7.3 Accommodation choices supporting adding value

In this section, each particular added value is presented according to the descriptions of that added value from the interviews. Accommodation choices supporting added values are connected to perspectives on real estate. According to Den Heijer and De Jonge (2012) these perspectives on real estate can be classified into four categories (Figure 52). Descriptions of the added values by the interviewees are summarised in a matrix that builds on the stakeholders’ perspectives (see for an example Table 34). In an analysis of the transcripts, the descriptions of added values by the interviewees were related to different perspectives on real estate. The perspectives on real estate that were most dominantly discussed by the interviewees are highlighted in the matrices in light-blue, indicating whether there is a main focus on the institution, a focus on real estate or both. In paragraph 7.4 all these perspectives on added values are summarised in one table (Table 43) in order to compare the contribution of different added values from the different stakeholders’ perspectives.

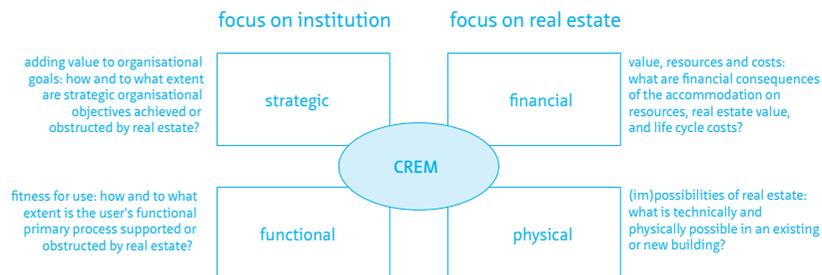


Figure 52 Four perspectives on real estate (adapted from Den Heijer and De Jonge, 2012).

§ 7.3.1 Innovation

To stimulate renewal and improvement of primary processes, products and services by real estate.

Organisations in competitive markets depend on innovations in order to survive and grow. These organisations need to provide workspaces that encourage and support innovative thinking and working. This requires the participation of space users in planning spaces and providing the type, size, and design of workspace that creates an inspiring working atmosphere (Lindholm et al., 2006). Another possible real estate strategy is to emphasize knowledge work settings over a traditional industrial paradigm (Nourse & Roulac, 1993). Also part of this strategy could be adding to 'serendipity': unintentionally making discoveries or finding new solutions by the interference of others resulting from planned and unplanned encounters between users (Den Heijer, 2011).

In the first series of interviews hospital managers recognised stimulating innovation as the most important added value of real estate. "Innovation and organisational changes result in accommodation changes, but also the other way around: building processes lead to innovations and organisational change."

Innovation is not only building innovation, but also and primarily innovation in healthcare processes: a continuous process of optimising healthcare services for the benefit of patients. Hospitals are knowledge-intensive environments where innovation can be stimulated by real estate if places are created where medical staff can meet. Innovation requires both individual creativity and team creativity. Creative thinking is supported by opportunities to relax and concentrate and places that support the exchange of knowledge. Therefore, most hospitals create meeting places such as a knowledge centres, study centres, or skills labs. ICT is also used as a tool to innovate processes, e.g. by the use of digital patient files. The co-location in clinical centres of disciplines that work frequently together around a certain patient category also stimulates innovation. Another real estate intervention to stimulate innovations is the spatial integration of different types of cure and care, but the present financing system with separate money streams is considered an obstacle to this.

In the reflective interviews it was mentioned that the building is not the engine behind the innovation of healthcare processes, rather that the building makes it possible to anticipate new developments and in this way facilitates innovation.

strategic	financial
* Innovation as a continuous process of optimising healthcare services * Co-location of healthcare providers	* Financing system with separated budgets for cure and care are contra-innovative
* ICT patient information * Central waiting system * Use of patient lift systems	* Places for medical staff to meet each other * Facilities like skills labs and knowledge centres * Minimal surgery in single patient bedrooms
functional	physical

Table 34 Real estate perspectives on increasing innovation.
Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.3.2 User satisfaction

To create functional, pleasant and comfortable places for visitors, consumers and employees.

This added value is extra important in a labour market with many competitors (Den Heijer, 2011). User satisfaction is seen as a means to enhancing profitability; any firms in a range of industries have recognised this indirect path to profits (Lindholm et al., 2006). By offering functional, pleasant and comfortable working environments with the desired level of amenities, the architecture of workplaces can lead to a lower staff turnover. From the perspective of real estate management it is important to react adequately to users' requests. Also the choice for a good accessible location in an area with a high standard of living for staff is a possible strategy.

In hospitals, this added value may be split into the satisfaction of potential customers of the hospital, visitors and patients on one side and staff on the other side. Not only patient satisfaction, but people in general are central. Customer value increases in importance as one of the possible added values of hospital real estate. Besides processes in which patients are central, there are also processes in which the healthcare process is central, or as reported by several respondents: it is in the best interest of patients if healthcare processes are well organised.

Patient satisfaction is connected to well-being and concepts like a healing environment and Planetree. Employee satisfaction results from an attractive and inspiring working environment. The places where patients stay deserve extra attention in their design. Important aspects are safety, visibility by personnel, daylight, use of colour, orientation

in the building, privacy and architectural quality of spaces. A central waiting concept can contribute to better waiting facilities. In this concept, patients are notified ten minutes before an appointment to go from the central waiting room to the decentralized small waiting rooms near the consulting rooms. Also single bed rooms contribute to patient satisfaction. Especially privacy and the healing effects that result from single bed rooms are mentioned as beneficial, as well as less bed movements and disturbance by personnel.

Most respondents emphasize that good staff with excellent medical skills and a customer-friendly attitude and behaviour are of the utmost importance. Happy employees make happy patients and therefore good facilities for staff and healthcare professionals are important as well. Staff satisfaction depends on sufficient and nice consulting rooms, treatment rooms and separation of front-office and back-office; short walking distances and daylight.

strategic	financial
<ul style="list-style-type: none"> * Human in general is central * Attracting and retaining good personnel 	<ul style="list-style-type: none"> * Extra investment in real estate for healing environment
<ul style="list-style-type: none"> * Wellbeing of patients * Planetree concept * Central waiting concept * Processes where medical process is central versus processes where patient stands central. 	<ul style="list-style-type: none"> * Architectural quality of patient rooms * Single patient bedrooms
functional	physical

Table 35 Real estate perspectives on increasing user satisfaction. Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.3.3 Culture

To improve interpersonal relations and communication by real estate.

De Jonge (1996) defines improving culture as using real estate as a means to effecting cultural change and improving interpersonal relations. This also relates to matching the use of real estate with the corporate culture (Den Heijer, 2011). This could be done by office concepts like an open floor plan or flexible workplaces that could improve communication within the organisation.

Though culture is merely a matter of shared values and behavioural rules focusing on high quality care, reliability and customer-friendly behaviour, (changing) culture can also be supported by real estate. One interviewee mentioned that real estate is regarded as the outboard engine of the organisation: creating another working environment changes the culture of the organisation. Stimulating encounters between medical staff is seen as an important added value of real estate to the organisation's culture. Therefore, managers promote the creation of more openness and informal meeting facilities, facility sharing and hot-desking, in order to stimulate communication. They pay extra attention to places where medical staff and personnel can meet and change information. Almost all newly built hospitals have introduced a front-back-office concept. Front offices are the examination, treatment and consulting rooms where specialists meet their patients, the back offices are the places where healthcare professionals do their deskwork. These back offices are mostly located next to or above the clinics, with most of the front offices. For the back office different office-concepts are used, like office-boxes where each specialist has their own desk; desk-sharing in an open office landscape or; flex-workplaces, where specialists have no desk of their own.

strategic	financial
<ul style="list-style-type: none"> * Real estate as the outboard engine of the organisation * Improve communication between staff and healthcare professionals 	
<ul style="list-style-type: none"> * Front-back-office concept * Office concept (flex working, desk sharing or boxes) * The building supports interaction between people 	<ul style="list-style-type: none"> * Paying attention to places where people can meet.
functional	physical

Table 36 Real estate perspectives on improving culture. Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

In one interview, culture was not only regarded as organisational culture, but also in the way that a hospital is a mirror on society, a melting-pot of different cultures including ethnic differences and highly and less educated people. Bringing together these different cultures could also be an added value of hospital real estate.

In the reflective interviews the importance of implementing in the old building as many of the organisational changes as possible necessary for working in the new building was mentioned. *“Improving organisational culture is not set in stone but in the behaviour of people within the organisation. [...] Everything that you design in the new building,*

but do not implement in the organisation beforehand, means that you are already too late when you start in the new building. [...] Therefore, everything that you can improve in the old building will be a success factor in the new building. [...] If you do not do this, people will take their old behaviour to the new building."

§ 7.3.4 Costs

To reduce investment costs, capital costs, operational costs and other real estate related costs.

Nourse and Roulac (1993) describe 'occupancy cost minimization' as choosing the lowest cost decision, being cost effective for the quality space sought. Den Heijer (2011) refers to cost reduction not only in terms of real estate costs, but also overall costs or personnel costs, when a concept adds to higher production or a lower percentage of absence. Reducing costs in any area has a direct and immediate impact on the financial position of the organisation (Lindholm et al., 2006). Creating insight into cost structure (De Jonge, 1996) and minimizing life cycle costs, acquisition costs, operational costs, financing costs and other real estate related costs (Lindholm et al., 2006) are useable strategies for reducing costs through the added value of real estate. Other possible strategies are outsourcing of real estate services; using corporate real estate expertise in the real estate transactions for business units; centralization of activities; architecture of facilities with low exploitation and maintenance costs; efficient use of the available space and periodical maintenance of the buildings in order to avoid unexpected high renovation costs. Also investment in sustainability leading to lower energy use for heating and cooling the buildings can be part of reducing costs as an added value.

Since the introduction of the regulated market system, reducing life cycle costs and the total costs of ownership has become more and more important. Reducing costs of hospital real estate focuses on controlling investment costs and real estate related costs. Therefore, hospitals produce business plans to make costs and benefits in the short and long term visible. Real estate measures to stimulate cost reduction include co-operation in the building, design and management of hospital real estate with other care organisations and commercial parties, new ways of contracting such as Design and Build, or DBFMO (Design-Build-Finance-Maintain-Operate), strict space budgeting and space reduction by shared workplaces. This includes choosing an investment level that fits the scale of the building. This is done by making life-cycle-costs, including long term real estate costs for maintenance, energy and facility, visible in business plans; slim-fit buildings with no more square meters than necessary and the strict

budgeting of square meters per department. Quite often extra investments are needed to reduce the life-cycle-costs of the building, e.g. sustainable measures in order to reduce energy consumption. Energy-saving methods often applied are underground cold-warm storage, using industrial warmth waste for heating and activating a concrete construction for cooling and heating the hospital building. The cost aspects of these decisions are not always leading as the reimbursement calculations of these measurements are not always predictable. More important is that the building is future-proof, and with the expected increase in energy costs, being dependent on traditional energy will not be sufficient.

Decreasing investment costs is also realised by making sober plans, instead of building more square meters for future flexibility, future developments and possible expansion possibilities are incorporated into the building plans. These expansions can be later presented as separate business plans.

strategic	financial
* No more square metres than necessary	<ul style="list-style-type: none"> * Future expansions based on new business plans. * Investment level that fits the scale of the building * Controlling investment costs and real estate related costs
<ul style="list-style-type: none"> * Space reduction by shared workspaces * Strict budgeting of space per department 	<ul style="list-style-type: none"> * Life cycle costs including maintenance and energy * Sober plans with slim-fit buildings * Low initial investment costs * Sustainability to make hospital future proof and less reliant on traditional energy resources.
functional	physical

Table 37 Real estate perspectives on reducing costs. Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.3.5 Productivity

To increase production through a more effective use of real estate.

Improving productivity will lead to increased profitability (Lindholm et al., 2006). This added value combines two alternative real estate strategies: 'Facilitate and control production, operations and service delivery' and 'promote human resource objectives' (Nourse & Roulac, 1993). The main objective of improving productivity as added value is to create 'efficient environments to enhance productivity and greater efficiency' and the 'control of operations aligned with the corporate strategy' (Nourse & Roulac, 1993), or in other words: 'use real estate as a means of working more efficiently' (De Jonge, 1996).

This can be done by increasing production for the same available space and/or the same level of production using less space. Possible real estate strategies are offering adequate accommodation by architecture and floor-plans that support primary processes and location choices that support business objectives. The possibilities and consequences of Information and communication Technology (ICT) play an important role in improving productivity by real estate. Real estate management is focused on good maintenance in order to avoid disturbance of the primary processes. Lindholm (2006) states that real estate and the decisions on facilities influence a number of personnel and system factors, which influence the level of productivity of the individual and, subsequently, the level of productivity of teams and the profitability of the organisation (Lindholm et al., 2006). Improving productivity is also connected to user satisfaction as several researches show that the working environment of employees also has an impact on productivity. Regarding this aspect important means are: individual control on indoor climate; quiet workplaces; individual workplaces; visual attractive working environment and last but not least daylight and a window view outside. Therefore Den Heijer (2011) proposed changing this added value into 'supporting user activities', which could refer to increasing production or satisfying employees to make them more loyal to the organisation but also to improving the quality of products and services by optimally supporting the primary process with the real estate.

The main organisational objective behind increasing productivity as a possible added value of hospital real estate as reported in the interviews is ensuring that healthcare professionals can do their work as efficiently as possible. This includes optimally facilitating medical care processes and supporting activities by spatial clustering of departments and centralization of the high technological functions in a hot floor. Another way to increase productivity is found in the use of a front-back-office concept. In this concept consulting and treatment rooms are the front offices in which the doctors and patients meet, separated from the back offices in which the doctors do their desk work. Information and Communication Technology (ICT) supports this by enabling place and time independent access to digital data. Extending opening hours is also reported as a possibility for increasing the productivity of real estate capacity.

Separating patient and personnel streams from logistical streams also contributes to increasing productivity. Separate logistics makes just-in-time delivery possible from decentralized storage facilities. In addition to the logistics of goods, patient streams also have to be considered. Dividing patients into different streams such as acute, urgent, elective and chronic contributes to a clear building layout in which patients can easily find their way. Locations with high flow rates near the entrance avoid unnecessary patient flow within the building. Combined consulting and treatment rooms on the other hand lead to a decrease in productivity because healthcare professionals have to wait while patients (un)dress.

A healing environment and single person bedrooms can also contribute to increased productivity due to shorter stay of patients and more efficient use of capacity. Single person bedrooms leads to fewer infections and accelerates the healing process which might shorten the average stay in hospital. It also avoids problems of empty beds due to the difficulties of mixing people with different cultural backgrounds or of a different gender. One hospital calculated that extra investments in real estate necessary for single person bedrooms would be reimbursed by decreasing the average stay from 5.2 until 4.8 days.

strategic	financial
* Ensuring that healthcare professionals can do their work as efficiently as possible	* Yearly space budgeting per department based on production and turnover * Production rates * Empty beds
* Optimally facilitating the healthcare processes * Front/back-office concepts * Healing environment * Single person bedrooms	* Centralization of high technical functions in hot floor * Spatial clustering * Separating logistics from patient and personnel streams
functional	physical

Table 38 Real estate perspectives on improving productivity. Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.3.6 Flexibility

To structure a real estate portfolio in such a way that future spatial, technical, organisational and juridical adjustments are possible.

A strategy for increasing flexibility may include both physical workspace and in financial terms. Many organisations form and reform work teams within their offices on a regular basis (Lindholm et al., 2006). The organisational, juridical, spatial and technical flexibility of real estate contributes to minimizing occupancy costs in the long term (Nourse & Roulac, 1993). Juridical flexibility is the freedom to choose between ownership, lease or rent of real estate and the subsequent possibilities for the alteration and disposal of surplus square meters. Spatial flexibility is the physical adaptability of the building in terms of external expansions or internal alterations of the floor-plans. Technical flexibility is the possibility to change the building's installations and construction. Organisational flexibility involves alterations in the primary processes in order to make more efficient use of the available real estate. Examples of organisational flexibility are opening hours, flexible use of workspace and

innovative office concepts. Increasing flexibility also includes real estate interventions that implement more standardised space or more flexible multi-functional or multi-user concepts without defining individual spaces or providing certain groups with exclusive use (Den Heijer, 2011). Lindholm (2006) mentioned various operating decisions that would follow from a flexible real estate strategy, including choosing spaces that can be adapted to multiple uses and workers, creating flexible workspaces within the structures, negotiating short-term leases including options for expansion and contraction, and leasing rather than purchasing properties that are not essential to the core business (Lindholm et al., 2006).

Flexibility has to ensure that a hospital building is able to support changing business processes for at least 40 years. This means a robust building with construction measures that make different layouts possible. This has many consequences for the installation technology in the building that should be adaptable to these different layouts by using installation cable free walls whenever possible. Real estate measurements include standardisation, multifunctional use of space, a clear separation between the supporting structure and fill-in because of their different life cycles, extra power of load-bearing walls and floors in order to cope with future functions, easy-to-adapt bedrooms (from a two-bed room to two one-bed rooms and vice versa) and facilities that make extension of the building easily possible. Flexibility can also be attained by the realisation of oversize in those parts of the building that are not easily interchangeable, like the operating theatres and intensive care units.

The organisation of people is the most flexible factor in a hospital building. Sharing consulting rooms, treatment rooms and wards between departments are examples of organisational flexibility. Space and desk sharing in a non-territorial environment and organisational measures such as flexible working also benefit flexibility. Multi-functional and generic consulting rooms and a standardised back-office make this exchangeability between departments possible. Also the applicability of single-person bedrooms contributes to flexibility. If all standardised single-person bedrooms are located on the same floor and are not dedicated to the different disciplines or clinical centres, departments can increase or decrease in capacity as necessary. Dividing the wards into different compartments also makes it possible to close different parts during weekends if there are less patients.

Another concept is the layer approach that divides the hospital into four functional zones. Spatial separation of the hot floor with highly technical facilities, factory with labs, hotel functions with the wards and office activities such as the back-office and consulting rooms make the different building parts more standardised and as such more easily marketable if the hospital activities decrease (De Hoogh, 2007).

Although flexibility is a very important issue in the initiative and design phase, after realisation of the building it is seen as a given fact that supports other organisational objectives like increasing productivity or user satisfaction.

strategic	financial
<ul style="list-style-type: none"> * Supporting changing business processes during the lifespan of the building * In initial phase important, during occupational phase a given fact. 	<ul style="list-style-type: none"> * Extra investments in future flexibility * Pre investments in expandability * Possibilities to rent space
<ul style="list-style-type: none"> * Adaptability * Multi functional use of space * Sharing consultant and treatment rooms, wards and other facilities * Standardising spaces * Flexible office concept 	<ul style="list-style-type: none"> * Robust building that makes different layouts possible * Separate technical installations * Standardisation * Supporting structure and fill-in * Expanding possibilities
functional	physical

Table 39 Real estate perspectives on improving flexibility. Summary of perceptions resulting from the interviews.

§ 7.3.7 Image

To express corporate objectives by using real estate as an icon for the organisational culture.

This added value combines two alternative real estate strategies from Nourse and Roulac (1993): ‘promoting the marketing message’ and ‘promoting sales and selling processes’. It is seen as physical institutional advertising (Nourse & Roulac, 1993) by exploiting the positive impact of real estate as a symbol of the organisation (De Jonge, 1996) to express the organisational objectives and culture. In terms of “practice what you preach”, supporting image is usually closely linked to the organisation’s primary goals, for instance by emphasizing the innovative, creative, sustainable or exclusive character of an organisation (Den Heijer, 2011). Lindholm (2006) states that accessibility and visibility are key issues for attracting customers and increasing revenues. Physical design can be used to create an image for the company among its suppliers, employees, customers, and investors, and is as such an indirect way of adding value to the organisation (Lindholm et al., 2006). Possible real estate strategies include standardising the corporate identity and location choice and architecture that supports the corporate identity.

Although a hospital as an institute has a strong image of its own and the image of a hospital is more connected to the organisation of healthcare processes, it is recognised by the interviewees that good architecture can contribute to the image of a hospital. Marketing by real estate is merely managed by focusing on a nice and easy to access location in a lively and safe environment, a nice overall appearance, an attractive “healing” environment with a high percentage of single rooms, nice colours and materials, light and transparent, and nice facilities, in order to improve patient satisfaction and as a consequence to improve competitive advantage. This image is not only important for patients and consumers, but also for the medical staff and employees. Some hospitals use pictures from their building as a marketing tool in personnel advertisements. Attractive and professional staff facilities may contribute to attracting and retaining staff. Most interviewees report that patients should feel quickly at ease and reported two different ways to achieve this. On the one hand, a hospital should not look like a hospital, but more like a comfortable environment such as a house or a shopping mall. This is related to the Planetree concept in which a hospital tries to create a recognisable feeling of home for patients. Other interviewees emphasise that hospitals should focus on their patients by creating an environment “where patients are allowed to be patients” and do not feel awkward walking about in pyjamas with a drip in their hand.

The location is an important aspect of the image of a hospital. The first impression of a hospital is often its position in the urban context. Hospital architecture should fit the regional culture and should be where it can serve people. In addition, hospitals are often an icon in their environment, a point around which the neighbourhood develops by attracting urban activities. The external outpatient centres play a role in this, being seen as decentralised advertisements for the centralised main hospital location.

strategic	financial
* Improve competitive advantage by using the building as a marketing tool, both for (potential) patients and employees	* Extra investment in architectural quality
* Healing environment * Percentage single bedrooms * Hospital recognisable as hospital	* Nice and easily accessible location * Nice overall architectural appearance
functional	physical

Table 40 Real estate perspectives on supporting image.
Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.3.8 Risk

To anticipate on future real estate related technical and financial opportunities and risks.

Real estate comes together with financial risks due to its relative long-term horizon and large investment. These risks can be controlled by opting for different forms of tenure with a mix of ownership, rent and lease; monitoring the local real estate market, human resource market and other contextual factors like legislation and regulation. Other possible strategies include making space available for third parties and selecting suitable locations. Besides financial risks that can be controlled by being able to easily adjust the size and character of the real estate portfolio, Den Heijer (2011) also refers to controlling technical and functional risks by carefully monitoring the technical condition to make sure that primary processes are not hindered.

Real estate related risks are controlled by hospitals in different ways. It is the least discussed of the added values and is mainly managed by real estate choices which improve flexibility and marketability, a detailed business plan and outsourcing maintenance for a long period. The most commonly mentioned ways of controlling risks are slim-fit buildings with no more square meters than necessary and expansion possibilities based on new business plans in the future as well as the creation of generic square meters that can be used by different departments or let to third parties if internal demand decreases. Some hospitals have created a separate Private Limited company for their real estate to limit the risks associated with real estate. External outpatient clinics are mostly rented, to be flexible in the future. Longer opening hours in order to optimise the available capacity and avoid expanding the building was also mentioned.

In the additional reflective interviews with four hospitals that are currently in the initiation or construction phase for a new building, controlling real estate related risks was mostly connected to the construction phase. Alliances are initiated and market parties, technology suppliers, medical equipment companies like Phillips and Siemens and construction companies are invited to participate during the design process. As part of these alliances, maintenance during the occupancy phase is often outsourced to the construction company.

Besides real estate risks, also risk reduction in the healthcare process is mentioned as an added value of real estate. Timely renovation or rebuilding of the hot floors, good maintenance of the technical installations and air control are necessary to avoid cross infections between patients and other medical risks in the future.

strategic	financial
* Risk reduction in healthcare processes	* Business case * Marketability of real estate * Real estate in Private Limited Company * External clinics rented
* Longer opening hours to optimize available capacity	* Slim fit building with no more square metres than necessary * Outsourcing maintenance for a longer period * Contractor and technology partner in initial phase and design process
functional	physical

Table 41 Real estate perspectives on controlling risks.
Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.3.9 Finance position

To attract external financing to reinvest in the primary process or to improve the overall financial position of the organisation by regarding real estate as an asset.

Improving the financial position as an added value regards real estate as a capital asset that can contribute to optimising the organisation's overall financial position. The objectives may be to maximize the value of the property portfolio or to ensure that the lowest cost alternative is chosen considering all the short- and long-term costs of owning versus renting (Lindholm et al., 2006). This also includes all real estate interventions that aim to result in a higher potential (market) value of land and buildings (Den Heijer, 2011). Profitability can increase by reinvesting the surplus value of the real estate in the primary process of the organisation. Possible real estate strategies are: way of financing real estate; location value with an acceptable current location and real estate value with current architecture; sale-and-lease-back; timely purchase and sale of real estate and redevelopment of obsolete locations (De Jonge, 1996). In addition, other possible strategies are: making buildings rentable and marketable to third parties, suitable for external (paying) users or by acquiring land on valuable locations in the real estate market (Den Heijer, 2011). However, proper management of the company's portfolio must start with an inventory and valuation of the current facilities by using a property information system (Lindholm et al., 2006).

This added value is stimulated by the involvement of external parties that rent space in the building or on so-called healthcare boulevards or health parks. Other options are Public Private Partnerships in owning the building, and focusing on the future value of the building in terms of adaptability, marketability and maintenance management.

On the other hand, hospitals are regarded as being built for delivering healthcare and not for increasing the financial possibilities by real estate. A choice has to be made between optimising the healthcare process during the functional lifespan or marketability in the future. This means that a hospital building is not regarded as an asset by most interviewees, but mainly as a resource for production.

The layer approach (De Hoogh, 2007) that divides the function package of a (general) hospital into four layers - hot floor, hotel, office and factory – with a focus on marketability of the different layers is only partly used in newly built hospitals. Small hospitals seems to be more focused on marketability of the real estate than larger hospitals and the profitability of the layer approach is lower for small hospitals. Larger hospitals have a more functional and architectural perspective on the layer approach, dividing a hospital into different parts in connection to different technical services and construction. Although there is a lot of scepticism about the end value of hospital real estate after 40 or 50 years, location value may provide a possibility to increase the financial possibilities of the organisation. To be able to capture the location value in the future, a hospital needs to be willing to relocate somewhere else, as only then the financial value of the location becomes accessible. Location value can also be created by developing the urban area around a hospital with other parties in e.g. a healthcare boulevard.

In the additional reflective interviews, real estate was not regarded as an essential asset that had to be owned by the hospital. All three hospitals that had initiated a new building tried to find investors to participate in the real estate investment. At that time, the real estate investment market was not willing to invest in hospital real estate due to the complicated healthcare market, uncertainty regarding healthcare regulations and the consequent high risk of investments.

strategic	financial
* Real estate is more a resource for production than an asset	<ul style="list-style-type: none"> * Banks as stakeholder * Private investment in hospital real estate * Marketability of real estate * Real estate as an asset * (Potential) location value * Urban Area Development
* Choice between optimizing healthcare processes during lifespan of building or marketability afterwards.	<ul style="list-style-type: none"> * Layer approach (hot floor, hotel, office and industry) * Location potential
functional	physical

Table 42 *Real estate perspectives on improving the financial position.*
 Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

§ 7.4 Reflections on the added values of hospital real estate

This chapter explores the concept of adding value by real estate in the field of healthcare. The qualitative approach of this research – using semi-structured interviews with open questions – provides much information on how real estate added values are perceived by hospital managers and how they are prioritised in hospital real estate decision making. The results contribute to a better understanding of adding value by real estate and the values mentioned in the literature, in general and specifically for the healthcare sector. Although quantitative concepts have been used to summarise and interpret the research findings - modus, mean, average, a plot-box - these results should also be regarded as qualitative data. The priority diagram (Figure 51) is a representation of only ten rankings on priority and as such is only a first exploration of (clusters of) priorities. The validity of the results can be improved by conducting more interviews and organising expert meetings to discuss and compare individual rankings. The same methods could be applied in other sectors such as office organisations or higher education in order to explore similarities and dissimilarities in different fields.

One of the limitations of this research is that mainly literature is used that defined and compared different added values of real estate in order to explore added values of hospital real estate and discover how these values are prioritised and clustered by decision makers who are initiating a new hospital building. The literature review included researches on the broad perspective of adding value by real estate, and not on specific added values that are mentioned in these researches. Further literature research could help to elaborate all the specific added values, e.g. flexibility or productivity.

Though hospital real estate is being regarded now more and more as a resource for production, there was a remarkable difference between the answers to the open question and the assignment prioritising the added values in the more structured part of the interview. In response to the open question of what are the values used in the design and management of hospital real estate, most respondents mentioned facilitating the primary processes and supporting productivity as the main objectives. Confronted with added values of real estate mentioned in the literature, the main real estate objective seems to shift from process-oriented priorities towards the contribution of real estate to organisational strategic objectives such as stimulating innovation, improving culture and increasing user satisfaction. Whereas in the open interview flexibility is often mentioned as an important added value, in the ranking assignment this issue is never given a high priority, probably because it has been a common issue in real estate management for decades. Cost reduction splits the interviewees into two groups. Some of the respondents ranked cost reduction at the top of the highly prioritised values, whereas others give this issue low priority. This split does not follow the distinction of respondents in CEOs and project managers.

Although in the open interview most hospital managers call cost reduction a basic issue in most real estate decisions, in particular since the new healthcare real estate regulations, cost reduction gets median priority, like productivity and flexibility.

The configuration of cards ranked by the CEO of hospital VS (Figure 53) represents more or less the average ranking of all the respondents. This hospital was built under the former hospital real estate regulation and is now in the exploitation phase of the building process. This ranking shows stimulating innovation to be the top priority for adding value. Two other values - improving user satisfaction and improving organisational culture - are ranked as second highest priority. Two columns are then recognisable (and also described as such by the CEO while sorting the cards). The three added values at the left were connected to the process: increasing productivity; decreasing real estate costs as a means to decrease the price of healthcare products and services, and controlling real estate risks related to the production process. The three added values on the right side are more building related values: optimising flexibility; supporting corporate image, and increasing finance possibilities. According to this CEO these values were captured in the building design, and as a consequence adding value management with regard to these issues is less possible in the exploitation phase.

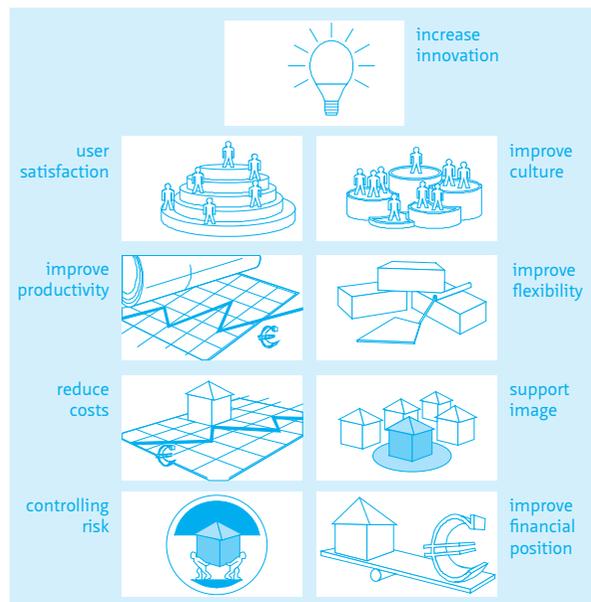


Figure 53 The most 'representative' result of the ranking assignment.

Despite the limited number of interviews conducted, there are some striking trends visible in the prioritisation of real estate added values as these results are related to different insights from literature.

At a high level of abstraction, the Pyramid of Maslow is recognisable. This theory is based on the individual needs of people on four levels: (1) biological need e.g. existence, environmental health and safety, (2) social needs in which activities and functionality is central; (3) psychological level of experience in experiencing beauty, recognition and sense of value and self-worth and; (4) metaphysical level of meaning and symbolism. Jacobs (2002) noted that the needs at a lower level are less difficult to determine than at higher levels. As a result of increased prosperity, more and more basic needs are fulfilled which results in growing attention and interest for higher levels. This provides an explanation for the growing attention to a culture of experience (Hooimeijer, Kroon, & Luttk, 2001).

Also recognisable are the evolutionary stages of real estate according to Joroff, Louargand, Lambert, and Becker (1993). Like Maslow's pyramid, this evolution is hierarchical and cumulative. This means that a higher level includes all lower levels. Values such as risk and financing are the first interest of the task manager. Flexibility, productivity and cost connects to the level of the controller; organisational culture and user satisfaction are consistent with the approach from a real estate dealmaker and stimulating innovation is a strategic approach to real estate.

Both the overall results of the priority ranking assignment (Figure 51) and the "representative" configuration (Figure 53) show some clusters of prioritised added values that seems to be connected to the widely used triplet of people-process-place (Duffy, 1992). The top three prioritised added values by the respondents are stimulating innovation, increased user satisfaction and improving corporate culture. These three added values of real estate contribute to the organisational performance with regard to *'people working together, in a smart way organising things efficiently'* as one CEO mentioned in the interview. The second cluster of added values includes cost reduction, increasing productivity and optimising flexibility. These three added values all contribute to the (production) process of healthcare services and the prizes of these products and services. A flexible hospital building makes it possible to adjust real estate to improve productivity and capital cost reduction reduces the price of health care products and services. As one CEO mentioned: *'Maybe it is not that surprising that improving productivity is in the middle of this configuration, some added values are enablers and contribute to a higher productivity, others are more the result of an increasing productivity.'* The third cluster of added values - contributing to corporate image, controlling real estate related risks and improving finance possibilities - are more directly related to the real estate portfolio, as it appears in the concept of place. As one CEO mentioned in the interview: *'Contributing to the corporate image or financial possibilities are strongly related to the location and appearance of the hospital building. I can imagine that it becomes important if a hospital is located in the city centre, but otherwise it is less important as a real estate objective.'*

The classification of the added values of architecture according to Niemeijer (2013) in cultural-value, user-value and future-value is recognisable as well. This classification

is related to the Nota Architecture Policy 'Space for Architecture' (Architectuur Nota, ruimte voor architectuur WVC and VROM (1991)) and the preliminary Fourth Nota on Spatial Planning (1988). These reports led to a lively discussion about spatial quality. Hooimeijer et al. (2001) conducted a study to conceptualize spatial quality. They came to the conclusion that spatial quality is contextually bound and dependent on location, time, scale, social and cultural influences. Different stakeholders have their own views on quality, depending on the specific interests of these stakeholders. Hooimeijer et al. (2001) use the classic tension in design tasks between form (the what) and function (which) as a starting point for the conceptualisation of spatial quality. Therefore spatial quality is split into three concepts: (1) experience-value, (2) user-value and, (3) future-value. Experience-value focuses on identity, diversity, recognition and meaning. User-value consists of functional suitability and effectiveness in use and exploitation. In future-value, sustainability in terms of efficiency in time is central, including extendibility and adaptability. This conceptual framework is similar to concepts of spatial planning (pattern, structure, process) but more meaningful if they are linked to the action (form, function, time). There is also a similarity with the three terms that Vitruvius used in his first treatise on architecture in 60 BC. According to Vitruvius, architecture must meet three criteria: (1) Venustas, which can be translated as the perception of beauty, (2) Utilitas, which focuses on usability and, (3) Firmitas, in which sustainable use is central (Hooimeijer et al., 2001).

Based on the prioritisation of the added values of real estate in the interviews it can be concluded that experience-values such as stimulating innovation, user satisfaction and improving organisational culture are highly valued. These are followed by more tactically oriented user-values such as improving productivity, reducing building costs and the flexibility of the building in order to adapt to changing care processes. Future-value such as image, controlling risk, and future financing possibilities are mentioned later as possible added values of hospital real estate.

Table 43 summarises all the accommodation choices supporting adding value by real estate as described by the interviewees. The accommodation choices are related to the four perspectives on real estate mentioned by Den Heijer (2011). The light-blue marked cells show the added values that were most frequently mentioned and most extensively elaborated by the interviewees.

Table 43 shows clearly that flexibility is an important added value from all perspectives. Increasing innovation, improving culture and supporting the image are strategic added values and reducing costs, controlling risks and improving the financial position are more financially-oriented added values. Financial perspectives on real estate have direct physical implications, each financial accommodation choice is translated into a physical building design decision. As financial perspectives seem to be connected to physical implications, strategic perspectives on real estate are more related to the usability of real estate.

added value of real estate	perspectives on real estate			
	strategic	financial	functional	physical
increase innovation	<ul style="list-style-type: none"> * Continuous process of optimising healthcare services * Co-location of healthcare providers 	<ul style="list-style-type: none"> * Financing system with separated budgets for cure and care are contra-innovative 	<ul style="list-style-type: none"> * ICT patient information * Central waiting system * Use of patient lift systems 	<ul style="list-style-type: none"> * Places for medical staff to meet each other * Facilities like skills labs and knowledge centres * Minimal surgery in single patient bedrooms
increase user satisfaction	<ul style="list-style-type: none"> * Human in general is central * Attracting and retaining good personnel 	<ul style="list-style-type: none"> * Extra investment in real estate for healing environment 	<ul style="list-style-type: none"> * Wellbeing of patients * Planetree concept * Central waiting concept * Processes where medical process is central versus processes where patient stands central. 	<ul style="list-style-type: none"> * Architectural quality of patient rooms * Single patient bedrooms
improve culture	<ul style="list-style-type: none"> * Real estate as the outboard engine of the organisation * Improve communication between staff and health-care professionals 		<ul style="list-style-type: none"> * Front-back-office concept * Office concept * The building supports interaction between people 	<ul style="list-style-type: none"> * Paying attention to places where people can meet.
reduce costs	<ul style="list-style-type: none"> * No more square metres than necessary 	<ul style="list-style-type: none"> * Future expansions based on new business plans. * Investment level that fits the scale of the building * Controlling investment costs and real estate related costs 	<ul style="list-style-type: none"> * Space reduction by shared workspaces * Strict budgeting of space per department 	<ul style="list-style-type: none"> * Life cycle costs including maintenance and energy * Sober plans with slim-fit buildings * Low initial investment costs * Sustainability to make hospital less reliant on energy resources.
improve productivity	<ul style="list-style-type: none"> * Ensuring that healthcare professionals can do their work as efficiently as possible 	<ul style="list-style-type: none"> * Yearly space budgeting per department based on production and turnover * Production rates * Empty beds 	<ul style="list-style-type: none"> * Optimally facilitating the healthcare processes * Front/back-office concepts * Healing environment * Single person bedrooms 	<ul style="list-style-type: none"> * Centralization of high technical functions in hot floor * Spatial clustering * Separating logistics from patient and personnel.
improve flexibility	<ul style="list-style-type: none"> * Supporting changing business processes during the lifespan of the building * In initial phase important, during occupational phase a given fact. 	<ul style="list-style-type: none"> * Extra investments in future flexibility * Pre investments in expandability * Possibilities to rent space 	<ul style="list-style-type: none"> * Adaptability * Multi functional use of space * Sharing consultant and treatment rooms, wards and other facilities * Standardizing spaces * Flexible office concept 	<ul style="list-style-type: none"> * Robust building that makes different layouts possible * Separate technical installations * Standardization * Supporting structure and fill-in * Expanding possibilities
support image	<ul style="list-style-type: none"> * Improve competitive advantage by using the building as a marketing tool, both for (potential) patients and employees 	<ul style="list-style-type: none"> * Extra investment in architectural quality 	<ul style="list-style-type: none"> * Healing environment * Percentage single bedrooms * Hospital recognisable as hospital 	<ul style="list-style-type: none"> * Nice and easily accessible location * Nice overall architectural appearance

Table 43 Real estate perspectives on hospital real estate added values. Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

added value of real estate	perspectives on real estate			
	strategic	financial	functional	physical
controlling risks	* Risk reduction in healthcare processes	* Business case * Marketability of real estate * Real estate in Private Limited Company * External clinics rented	* Longer opening hours to optimize available capacity	* Slim fit building with no more square metres than necessary * Outsourcing maintenance * Contractor and technology partner in initial and design phase
improve finance position	* Real estate is more a resource for production than an asset	* Banks as stakeholder * Private investment in hospital real estate * Marketability of real estate * Real estate as an asset * (Potential) location value * Urban Area Development	* Choice between optimizing healthcare processes during lifespan of building or marketability afterwards.	* Layer approach (hot floor, hotel, office and industry) * Location potential

Table 43 Real estate perspectives on hospital real estate added values. Summary of perceptions resulting from the interviews, the main focus is highlighted in light-blue.

The accommodation choices related to added values and real estate perspectives can be used as a tool to describe goals to achieve ex-ante or evaluate projects afterwards (ex-post). Table 43 can be used to translate the added values of real estate from organisational objectives into real estate design decisions. This table makes it possible to define ex-ante real estate objectives as pre-set goals that should be attained in the designed or constructed building which can be used as a starting point for further research on added values in hospitals. In addition, it is also possible to use the table as an instrument for ex-ante discussions on added values with different stakeholders in other sectors, in order to clarify the set goals to assess in the architectural design. This makes this table a starting point for performance indicators, which can be assessed ex-post by POEs in the actual building, or by design assessment in the design phase.

Research findings show that it is of the utmost importance that added values are clearly defined in the literature and made applicable to a certain sector. In the case of hospital real estate, *user satisfaction* should be split up into *patient satisfaction* and *employee satisfaction*. Although *stimulating innovation* is highly valued as an added value of real estate, it seems to be largely overtaken in the descriptions given by *improving culture* as an added value: stimulating a culture that supports and facilitates innovative processes. The question arises as to whether *stimulating innovation* is a separate added value or not. Based on these interviews, an added value that could be added to the list is *improving safety* i.e. risk reduction in the primary process.

In the interviews some other added values of real estate were mentioned, in particular its contribution to a sustainable and healing environment. Sustainability is not usually perceived as a main objective of health care organisations, but as a necessity to cope

with societal needs, now and in the future, and as a means of showing corporate social responsibility. Most respondents admit that sustainability measures are applied only when the extra costs have a reimbursement period of less than 5-10 years. Focusing on a healing environment is of the utmost importance in health care and cure. Though not explicitly presented as one of the nine added values, it is implicitly included in improving satisfaction and supporting productivity. It seems to be more appropriate to add this value to the list as a healthcare-specific real estate added value. By adding sustainability as a particular value, as Den Heijer (2011) did in her dissertation on “Managing the University campus”, rankings in the health care sector may be better comparable with rankings in other fields.

In this PART 3, the concept of adding value by real estate has been studied in the literature and elaborated upon and made applicable to the hospital sector by the interviews. The interview method showed which accommodation strategies first comes to the minds of directors. The second more structured part of the interview in which the values from the literature were presented and prioritised, provides insight into the conscious and intuitive control on real estate added value. In response to the open question, many common values in healthcare such as productivity, user satisfaction and flexibility were mentioned by the respondents. The structured part of the interview showed that human-related values such as improving the organisational culture and stimulating innovation were also considered important. The findings can serve as a reference for deciding on accommodation at both strategic and tactical levels and thus provide important input for the development and implementation of a professional accommodation strategy. The five key findings from the interviews are summarised below.

People are key

Supporting innovation, patient and employee satisfaction and culture were highly prioritized by CEOs and real estate project managers. These values are related to the experience of the building by its users. Measures to stimulate innovation and improve organisational culture were linked to social interaction and communication by creating meeting places where healthcare professionals can exchange information and ideas. References were made to the use of innovative office concepts and creating a back-office for medical specialists. Patient satisfaction was often linked to hospitality, a healing environment and the Planetree concept with the ultimate aim of contributing to the health and well-being of the patient.

Alignment of the accommodation to primary processes

A general value is to provide optimal healthcare at a reasonable price. Related real estate values are increasing productivity and reducing costs. Reducing the capital charges of real estate lowers the price of healthcare products and services. Optimising the flexibility and adaptability of the building are often applied in order to be able to continuously align the building with changing healthcare processes and to increase productivity in a changing context.

Priorities depend on building phase

A number of added values of real estate such as the image of the building are difficult to customise after completion of the building and for this reason are highly prioritized in the initial phase and during the design of the building. Due to the static character of real estate, importance decreases once the building is realised. Controlling risk and using real estate as an asset are closely related to the physical appearance of the building and the location. These real estate characteristics largely determine the future-value of real estate and opportunities to facilitate changing user requirements and adaptive re-use.

Sector dependent definitions

The respondents interpreted user satisfaction as patient and employee satisfaction. Apparently, patient satisfaction and employee satisfaction are perceived as two distinct added values of real estate. The use of real estate to get a high return on investment – now and even more so in the future – was not recognised as an important issue in the context of hospitals. Real estate choices as a means of increasing financial possibilities appeared to be comparable with measures to control risks. Application of functional ‘layers’ by dividing the building into a hot floor (operating theatres), office, hotel (bedrooms) and factory (laboratories) was often mentioned as a means to improving the marketability and future disposal of hospital real estate at the end of its functional life cycle.

Value for different stakeholders

The respondents were asked about how the added values of real estate were visible in the design of the hospital building. The responses varied from associations with regard to the concept of value adding, abstract visions on accommodation to concrete design interventions. All these different responses are linked by the author to four perspectives on real estate (Den Heijer & De Jonge, 2012): strategic, financial, functional and physical.

§ 7.5 Definitions of hospital real estate added values

Based on the prioritisation of added value in the interviews, the added values can be categorised into (1) user-value, (2) production-value and (3) future-value. This categorisation follows the perception of spatial quality and connects the added values of real estate to the added value of architecture. This classification also makes it possible to integrate other values. This enables sustainability as an added value of real estate to be directly linked to the future-value. Healing environment as a specific added value in hospitals is an experience-value. This makes the conceptual framework on added values robust. Below the added values of hospital real estate are described and classified in these three categories, based on the underlying research.

User-value

The way the physical environment is experienced by people and evaluated in daily use. This connects directly to the organisation as a form of cooperation between different people who want to achieve their goals.

Improving organisational culture of information exchange & stimulating innovation

Improving interpersonal relationships and communication within the organisation by creating meeting places for the medical staff and healthcare professionals. This contributes to an organisational culture of information exchange between professionals in order to improve and innovate healthcare processes and services. These meeting places include staff centres with space for specialists for their back-office operations, consulting rooms and classrooms for exchanging knowledge.

Patient & healing environment

Patient satisfaction is related to the welfare of patients and the contribution of the physical environment to the healing process. Important aspects of patient satisfaction are: view of nature, light, materials, noise, orientation & routing, privacy in doctor's offices and nursing rooms.

Employee satisfaction

The satisfaction of employees is an important added value in any professional bureaucracy and the accommodation must support this. Healthcare professionals are the key staff in a hospital. This implies functional and comfortable workplaces for effective and efficient delivery of healthcare to patients.

Production-value

Functional suitability and effectiveness in use means that a building is effective in a functional sense and meets the desired usage. Appropriate dimensions, positioning of the program and routing within the complex are important aspects.

Reduce accommodation costs

Reducing accommodation costs has a direct impact on the prices charged for healthcare products and services. Examples include low investment costs in new buildings or renovation, a fixed space budget for departments and the life-cycle-costs of accommodation including maintenance and energy costs.

Increase productivity

More efficient use of the available space is possible by separating the front-office and back-office, using generic consulting rooms that can be used by several medical specialists at different times during the week. Increasing productivity should also ensure that healthcare professionals can do their work properly and efficiently. Separating patient flows (acute, urgent, elective and chronic) from employees and goods flows is widely used.

Use flexibility

Flexibility in use focuses on the extent to which the building can adapt to changes in healthcare processes without major modifications to the building. This type of flexibility makes it possible to organise the workplace according to the primary processes and this is a prerequisite for the innovative capacity of the organisation to improve healthcare processes.

Future-value

Efficiency in time, which implies sustainability of the design and suitability for re-use so that the building can maintain quality and value.

Support image

The building as an icon adds to the sustainable position of the hospital organisation in society. Real estate can contribute to the positioning in society by means of the architecture of the hospital building.

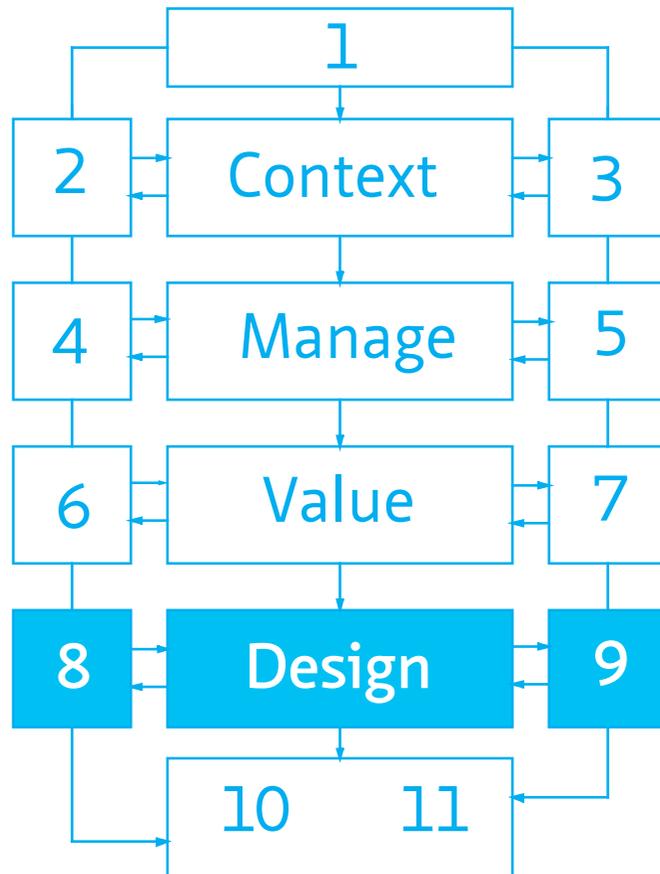
Reduce risk and increase financial possibilities

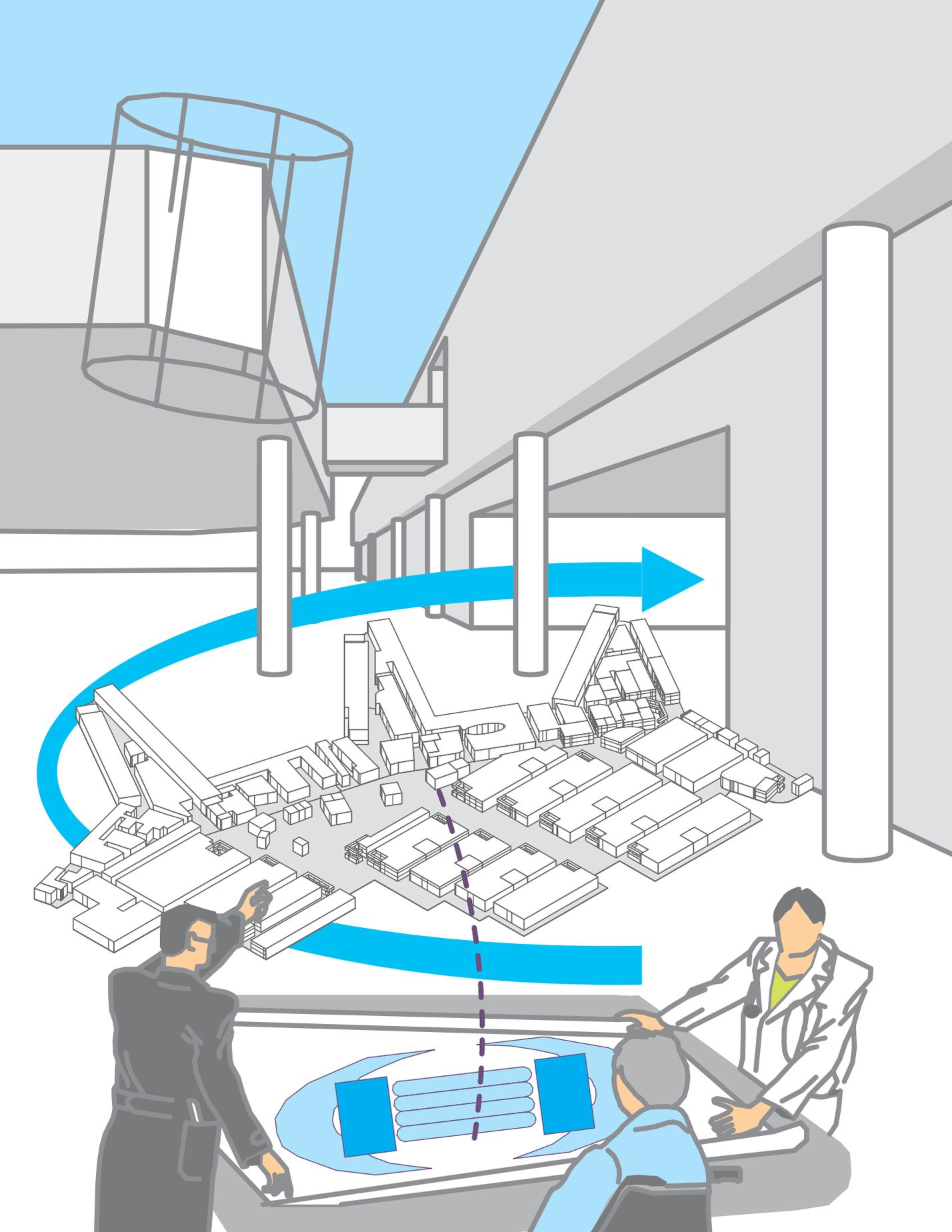
Risk and financing of real estate focuses on the future potential of the physical environment in which adaptability and reuse opportunities are important aspects of future flexibility. In hospitals this is mainly associated with the layer approach, in which the hospital is divided into four types of real estate: hot-floor, hotel, office and factory. It is also possible to create land value for future use by developing a purposeful location.

Sustainability

Within hospitals, sustainability focuses mainly on reducing energy costs so that healthcare can continue to be delivered in the future despite increasing energy prices. This means that investments are made in re-use of waste-energy from industry, heat and cold storage in the soil and other architectural energy concepts.

PART 4 Design





8 Design assessment of hospital real estate

What methods and tools are available to assess patient satisfaction in architectural drawings?

Abstract

Purpose: User-value is highly prioritised in the occupancy phase but difficult to assess during the design phase as these values are normally only experienced by users after the building has been constructed. In addition to ex post evaluations, attainment of these values during the design phase should also be assessed. This chapter explores the tools for assessing architectural hospital design in terms of patient satisfaction in order to make this value visible and measurable in architectural design drawings and debatable in the design decision process.

Literature study: Review of architectural and urban design analysis methods and drawing techniques and in particular those that are applicable to the assessment of patient satisfaction in architectural design drawings of hospitals. Analytical drawing techniques are illustrated by a simple architectural composition of a waiting area, reception desk, office area and two (patient) rooms connected by a corridor.

Empirical research: Aspects of patient satisfaction associated with architectural design are made visible in different design drawings of a nursing department of the Deventer hospital in which research by (re)drawing is used to assess patient satisfaction. The case study in chapter 9 visualises pre-set values in the initial documents and findings of Post Occupancy Evaluations in the architectural design of the Deventer Hospital.

Findings: By using different analytical drawing techniques, this chapter shows how different aspects of patient satisfaction can be visualised and how the level of achieving these values in the architectural design can be tested. Pre-set values can be visualised and different design solutions can be compared. In particular techniques that come from space syntax provide opportunities to study aspects of user-value in the architectural design drawing. Although this part of the study is a first exploration of the possibilities of design-assessment, the results are promising. The graphs that can be produced seem to give good insight into the consequences of spatial design, although the analyses are still indicative and as yet unvalidated. More research is needed to validate the analysis and to examine the extent to which the results of the analyses are representative of the physical built environment of hospitals. This is possible by comparing the results of design assessment with actual user experiences in the buildings.

Introduction

Only those decisions in a design process that are incorporated into the final architectural design contribute to the attainment of added value to organisational objectives. The translation of real estate added values into the architectural design is therefore crucial to the concept of adding value by real estate. It is the architectural design that translates organisational objectives and accommodation goals into the language of three-dimensional design solutions. The architectural design is visible in actual buildings and in design-drawings and plans. The drawing is an instrument to understand architectural form. Understanding the meaning and concepts behind architectural form requires specific analytical instruments. Using the architectural drawing as an instrument to analyse the architectonic form connects to a research method that is described in the literature as research by drawing. *'The drawing and the map are critical research instruments because they are – unlike the words and concepts that are derived from other disciplines – completely native to architecture and three-dimensional design. If something cannot be drawn, in the deepest sense it cannot be considered to be architectonic design. To draw something again, critically, is therefore the only way to analyse an existing design as a composition and make it accessible for design criticism'* (Steenbergen & Reh, 2012).

De Jong (2005) showed how drawings can be used as a means of evaluating design ex post and ex ante. He emphasised the importance of a clear legend and a transformation of different drawings in order to be able to compare designs in different contexts. *'Effect analysis enables evaluation of the design based on values. In the apology of the design, attention is given to the effect of each design intervention on the design itself, and on the context within a particular perspective'* (De Jong, 2005). For the sake of comparing drawings, it is necessary to redraw the original architectural design in order to investigate the attainment of added values before the hospital is actually built. As such, research by drawing is a method for conducting design research on the added value of hospital real estate during the design phase.

During the design process, social cultural objectives are translated into spatial form, represented in floor plans, sections, facades and other architectural drawings. Every architectural drawing can be regarded as a reflection of the goals and activities of the users as interpreted by the architect. Michelson (1970) speaks of congruency between the spatial and social system when the design conforms to the users' preferences and the building supports the desired activities in an appropriate way (D.J.M. Van der Voordt, Vrieling, & Van Wegen, 1997; Van Hoogdalem, Van der Voordt, & Van Wegen, 1985). To achieve an optimum congruency between spatial and social systems, a preliminary assessment of the objectives, values, standards, activities and preferences of future users is indispensable. Pre- and Post-design research can lead to a sound theoretical framework for drawing up performance requirements, designing with 'people in mind', checking preliminary designs on behavioural consequences and developing standards and design guidelines (D.J.M. Van der Voordt et al., 1997).

This kind of research is also related to Building Performance Evaluation (BPE) as described by Preiser and Schramm (2012) and shown in Figure 54. This process model includes a cycle of six phases, each with internal reviews and feedback loops. The six phases are strategic planning, programming, design, construction, occupancy and adaptive reuse / recycling. In this framework each phase ends with an internal feedback loop that consists of a review or evaluation of the previous phase. The design phase ends with a design review. This design review involves the architect, the programmer, client and/or user representatives. The development of knowledge-based and computer-aided design (CAD) techniques makes it possible to evaluate solutions during the earliest phases of the design when modifications to the design are still possible (Preiser & Schramm, 2012).

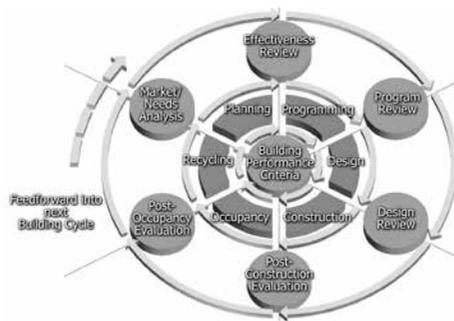


Figure 54 Building Performance Evaluation (BPE) process model, Preiser and Schramm (2012).

Design review enables designers to receive user feedback on the design at a stage where correcting mistakes and making improvements is simple and cost-effective. It is the architect's task to provide the drawings which clients and users can use to assess whether the design fulfils their objectives. Drawings, 3D computer models, virtual walk-throughs and full-scale mock-ups can be used to support ex ante discussions of the spatial form with users as part of the design review.

The design review is also described as 'An ex ante assessment of the effects of design decisions from various perspectives' (D.J.M. Van Der Voordt & Van Wegen, 2005) and adds scientific knowledge to the design decision process by using the best possible analytical research methods and techniques to assess a design in terms of pre-set organisational and real estate objectives. Design assessment could make it possible to single out and measure real estate added values in the design phase in order to make them the subject of discussion in the design decision process.

The interviews with hospital CEOs in chapter 7 showed that user-value in the occupancy phase, for example patient satisfaction, is perceived to be an important added value of hospital real estate. Patient satisfaction is related to patients' experiences of the

hospital and the demands of patients regarding the physical hospital environment. These values are only experienced by users after realisation of the building and are therefore difficult to assess in the design phase. Research in Urbanism and Landscape architecture provides several analytical instruments to analyse design and numerous drawing techniques, computer modelling and analytical computer applications to illustrate and explain concepts by drawing and redrawing designs. These analytical tools and drawing techniques are tested in this chapter on their applicability to assess patient satisfaction as an added value of real estate in the architectural design drawings of hospitals.

§ 8.1 Design assessment

According to Knight and Ruddock (2008), contemporary architectural research can be divided into research that deals primarily with the process of design and construction and research that focusses on architectural design as product. The second way divides research between explicit scientific knowledge and tacit knowledge. *'The multiple socio-economic, cultural and aesthetic 'intangible' aspects of building performance combine the tangible product with the tacit knowledge of user experience. In these aspects of architecture, progress is subject to innovation through practice'* (Knight & Ruddock, 2008). Post Occupancy Evaluations make it possible to learn from previous projects, but also a lot can be learned from design research. It is here that drawn, even un-built projects can be as influential as buildings themselves. *'In the area of architectural innovation through practice the non-discursive nature of the building exerts a considerable effect. It is this effect that gives the architectural critic a key role in architectural culture: the role of translating buildings and projects from the non-discursive world of experience into the world of language, and so bring them into the discursive culture'* (Knight & Ruddock, 2008). As such, an architectural critic has the opposite role to the designer who translates verbal concepts into architectural form.

A way of translating building projects for the discursive world is found in research by drawing that reveals the architectonic form in a systematic set of drawings. *'The architectonic form of the design is inherent in the design sketches and images and concepts they call up. Drawings are therefore used to analyse and interpret interesting designs. This analysis is done by repeatedly preparing new drawings in order to single out important aspects of the architectural composition.'* (Steenbergen & Reh, 2012).

Steenbergen and Reh (2003) also describe how an architectonic composition can be understood by addressing the most general concepts that set out the relation between various aspects of the architectonic form and its perception in a systematic way. Frankl (1968), Steenbergen and Reh (2003) and Nijhuis (2011) define four important architectonic-layers for analysing (landscape) architectural design. These architectonic-

layers are represented in Figure 55 and follow the design process from the first sketches in the preliminary design that set out the basic form. Later on in the design process more detailed information is available in drawings of floor plans, sections and facades. This makes it possible to draw up the spatial form in three-dimensional drawings and models including the tectonic of these spaces in colours and materials. The relation between the architectonic form and users is best analysed in the occupancy phase.

Assessment of the added values of real estate in architectural compositions asks for a design analysis on all four architectonic-layers. Following this basic structure for architectural analysis ensures that the architectonic composition is explained based on its general concepts that set out the relation between the architectonic composition and its real estate added value. So far, this thesis has mainly focussed on the fourth layer of purposive intention. In the following chapter is studied how patient satisfaction is incorporated into the architectural design.

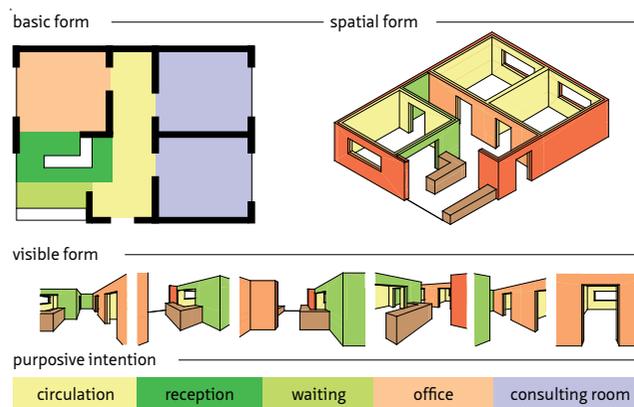


Figure 55 Four architectonic-layers for analysing architectural design. Basic form, spatial form, visible form and purposive intention.

Four architectonic-layers for analysing architectural design

Basic form: the way in which the design is reduced, rationalised and activated in the floor plan of the design.

Spatial form: three-dimensional forms made by spatial patterns composed of open spaces, surfaces, screens and volumes.

Visible form: appearance of the perceived space connected to the movement through the composition.

Purposive intention: relationship between the architectonic object and the social institutions for which they are conceived: the functional zoning and the organisation of the programme.

§ 8.2 Research methods for design assessment

This section describes different methodological aspects related to the design assessment of architectural floor plans before explaining and illustrating several techniques and instruments for architectural analysis in section 8.3. Floor plans are abstractions of real buildings and are the starting point for many architectural analyses. Architectural analysis of floor plans is not about faithfully reproducing the object, but rather examining the architectural drawings on components crucial to the analysis, e.g. its composition, relationship between design and context, or between design, construction and usefulness (Leupen, 1997). According to Leupen (1997) there are three basic methods available for this purpose: (1) Reduction; (2) Démontage and; (3) Addition. Reduction is the omission of all information that has no relation to the main composition of space and material in order to disclose the structure of the design. Démontage involves drawing the object as if it was separated into the different parts to reveal the relationships between the elements. Addition is introducing new layers of information into the drawings that are either non-visual or non-architectural like function or use. One method for floor-plan analysis often described and used in this context is space syntax (see text box below).

Space Syntax (Hillier & Hanson, 1984)

Space syntax was developed at University College London by Bill Hillier and his colleagues and proposes that people's patterns of movement and interactions are directly affected by the geometry and network typology of spatial patterns formed by the built environment. As people move within a building whilst performing their role-defined tasks, the configuration of the circulation network coupled to the location of specific functional spaces within that network (the origins and destinations) generates a pattern of movement (Hillier & Hanson, 1984). As such, space syntax is a method and application that calculates the spatial configuration of built environments, especially public spaces. The spatial configuration is the pattern of spaces and relations between spaces which makes up buildings and cities (Hillier & Hanson, 1984). Space syntax therefore measures the connectivity and spatial integration of spaces rather than measuring space in terms of physical distance and area.

Space syntax developed methods for representing and quantifying the geometric and topological properties of space patterns in order to allow differently planned buildings and urban areas to be compared on a quantitative basis. The floor plan is simplified to a network of nodes and links that represent the basic patterns of accessibility and circulation. Different spaces in a single building are differently embedded in these networks of nodes and links.

Space syntax measures primary all-to-all relations between different segments of this network of spaces and connections as well as the to-movement, or accessibility potential and the through-movement potential of each segment in the network. Each of these two types of relational patterns can be weighed by three different definitions of distance. The metric distance measures the network as a system of shorter paths, while the topological distance calculates the network as a system of fewest turn paths. The geometrical distance gives a picture of a system with the fewest angle paths (Hillier & Iida, 2005; Van Nes, 2011). For more than 20 years ago, most calculations of spatial relationships in a network were conducted manually. Today, software programs have improved the possibility of analysing the complex spatial relationships of public spaces and describing and visualising spatial inequalities, make point depth analyses, isovist analyses, all-lines analyses, and agent based modelling in which the movement of computer-generated virtual agents is based on research in a present urban context (Turner, 2007).

Design research using space syntax is relatively new in studying healthcare environments. Khan (2012) conducted a literature review to understand the contribution of space syntax in improving operational efficiency in healthcare design. Khan (2012) came up with several space syntax studies in hospital design. Studies by Lu, Peponis, and Zimring (2009), Heo, Choudhary, Bafna, Hendrich, and Kaiser (2009), Haq (1999) and Setola (2009) show that visual and physical accessibility have significant effects on movement pattern, frequency of trip and way-finding. In the past the design of hospitals was more focused on the requirements of functional and organisational structure. This focus shifted over the years to the needs and experiences of patients. Hospitals are attempting to develop organisational cultures more sensitive to patients (Peponis & Zimring, 1996). Studies show that walking distances and common routes taken by staff members are largely affected by the design and layout of the hospital. Studies also show that hospital design affects access to each and every department, with a direct impact on the movement of patients, staff and supplies.

According to Becker and Douglass (2008), a physical design that increases the visibility and accessibility of the receptionist is likely to facilitate more opportunities for positive interaction. Surveillance of waiting areas is necessary for a number of aspects of care delivery. Becker et al. (2008) mention that the design can play an important role in facilitating surveillance of the area by ensuring visibility of the waiting areas from the reception desks.

Various studies demonstrate that space syntax has the ability to predict deliberate use of space in way-finding situations. Peponis, Zimring, and Choi (1990) suggest that spatial exploration could be predicted by the space syntax measure of integration. People use predictable paths when they explore and find their way in a hospital. Based on observations of participants' search patterns and Space syntax analysis, researchers

found that participants tended to move along more “integrated” routes and not the most direct paths (Peponis et al., 1990). Weisman (1981) showed in his study that when the average number of connections per choice in a layout increased, it decreased cognitive mapping ability and way-finding performance. Heo et al. (2009) show that connectivity is a significant factor in determining the frequency of trip and movement patterns in a hospital building. In the public areas of hospital buildings, the visibility of reception and information areas, the density of movement and placement of lively and private spaces all have impact on patient satisfaction (Peponis & Zimring, 1996).

§ 8.3 Analytical drawing techniques for design assessment

The development of space syntax as a research method for analysing spatial form also resulted in different drawing techniques and instruments for analysing architectural design. These techniques focus on the connections between spaces, routing, sight-lines and visibility. Below, the basic principles of a number of analytical drawing techniques applicable for assessing added values in hospital real estate are explained and illustrated using an example of a composition including a waiting area, reception desk, staff area and two rooms connected by a corridor.

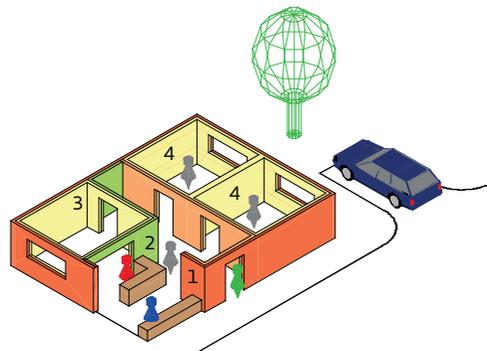


Figure 56 Waiting area (1), reception desk (2), staff area (3) and two patient rooms (4).

§ 8.3.1 Functional floor plan analysis

In functional floor plan analysis the floor plans are analysed in terms of the functional purposive intention. Usually the functions are made visible in the floor plans by using a code of colours. In floor plan analysis important aspects such as the fabric the building

is made of, its structural system, its colours and finishes, the types of installations and its costs are usually omitted. On the other hand floor plans provide essential information on the most permanent parts of the building: the shell and structural grid. Furthermore, the floor plan embodies the social nature of the building, through which it localizes people and modulates their interaction (D.J.M. Van der Voordt et al., 1997; Van Hoogdalem et al., 1985).

On the left-hand side of Figure 57 a functional floor plan analysis shows that the public area connects the staff zone with the consulting rooms. Also visible are the connections between the spaces divided into staff routes, public routes and patient routes.

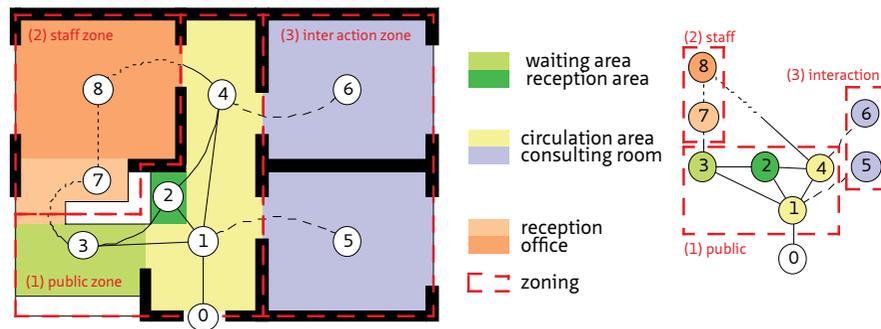


Figure 57 Functional floor plan analysis (left) and spatial configuration (right). The functional floor plan analysis gives an indication of the use of the spaces with different colours. In the spatial configuration all spaces are represented as circles connected by lines. The zoning in terms of public (1) staff (2) and interaction (3) areas is also made visible.

§ 8.3.2 Spatial configuration analysis

Another way of representing the relationship between different spaces in a layout was developed by Hillier and Hanson (1984). All interior spaces and their adjacent relationships to other spaces, as well as to the outside, are reduced to justified maps of dots and connecting lines. These maps are generated by designating each room as a circle with the lines radiating from it signifying the access points to and from the room. The circles and lines are then rearranged to reveal how many rooms any particular room is removed from a starting point, usually the entrance. These maps enable the analysis and comparison of the social interactions between spaces (Hillier & Hanson, 1984). The spatial configuration in Figure 57 shows the central position of the circulation area (1 and 4 in yellow) in the functional layout of the floor plan.

An important principle in healthcare buildings involves the division of space into three zones: (1) public zone; (2) staff zone and; (3) interaction zone between patients and staff (Cammock, 1981). According to Cammock, assuring privacy involves striving to achieve a clear distinction between public, staff and interaction zones; separate entrances to the public zone and staff zone; separate routes from public and staff zones to the interaction zones and no direct connections between public and staff zone (Van Hoogdalem et al., 1985). The zoning in the spatial configuration (Figure 57 right-hand side) shows that there is no direct connection between the staff area and the interaction-area. Staff can only access the consulting rooms by passing the corridor (4) or even the waiting area (3) and hall (1).

§ 8.3.3 Spatial form analysis

Spatial form can be analysed by using three-dimensional composition elements. Separating the different spatial elements from each other enables the different elements to become visible and the connections between them. An example is shown in Figure 58 in which the waiting area, back-office, corridor and consult rooms are drawn as separate composition elements. This analysis shows the central position of the reception desk in the spatial composition between back-office, hall and waiting area.

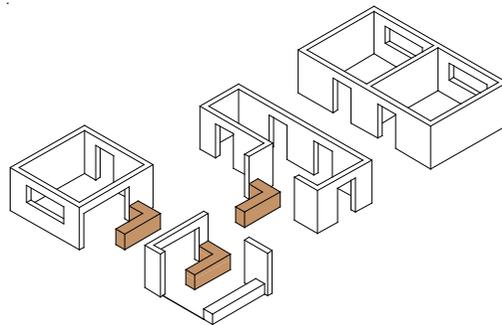


Figure 58 Analysing spatial form by using composition of 3D elements.

§ 8.3.4 Convex space analysis

A convex space is defined as a space where “all points within that space can be joined to all other points without passing outside the boundary of the space.” (Hillier & Hanson, 1984). In urban analysis, other methods such as point depth and all-lines analysis have replaced the convex space analysis because of the time-consuming work required to make a convex map and the lack of software improvements since the 1990s (Van Nes, 2011).

Figure 59 analyses the convex space by using all points visibility. In the drawing on the left, the centrality of the main spaces is visible as well as how this composition can be divided into five convex spaces. The combination of these three drawing techniques shows where the most interaction will be within the spatial configuration, as this is a combination of visibility, movement and boundary of space. The drawing on the right shows that the reception desk is situated on the most visible spot of the composition and that the consulting rooms have relatively more visual privacy, although in this composition the longest sight lines do partly enter the consulting rooms.

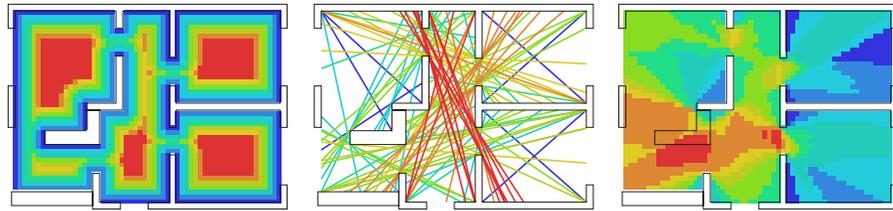


Figure 59 Centrality of space (left), all lines analysis (middle) and all point visibility analysis (right). All three analyses show in a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue other aspects of convex space. In the left drawing centrality of space (red-orange-yellow) indicates the spaces for interaction. The drawing in the middle shows the longest sight lines (red and orange) as a representation of the visibility of space and the figure on the right shows the central point of visibility (red) in the whole composition.

§ 8.3.5 Axial map analysis

An axial line represents the longest sight-line in space and represents the way people move through the network. An axial map is a representation of the built environment with the longest and fewest sight lines. This map is the basis for several spatial analyses. Four syntactic measures can be calculated that can be used in quantitative representations of a building or urban plans: (1) spatial connectivity; (2) integration; (3) control value and; (4) global choice. Connectivity measures the number of directly connected axes to an axis. Integration calculations are divided into global and local. Global integration calculates the number of direction changes needed to move from one axis in the network to all other segments. Fewer direction changes to move to all other axes implies a higher spatial integration. Local integration analysis calculates how integrated an axis is when changing direction three times from it. Today software programs are able to calculate this integration for every axis in the whole built environment (all-lines analysis). Control value measures the degree to which an axis controls access to other directly connected axes, taking into account the number of alternatives the other axis has. A space has a strong choice value when many of the shortest paths, connecting all spaces to all the other spaces of a system, passes through.

Figure 60 shows that the axial line in the corridor (1) has the highest connectivity and is also the most integrated line in this composition. This indicates that this line is the most used route in this composition.

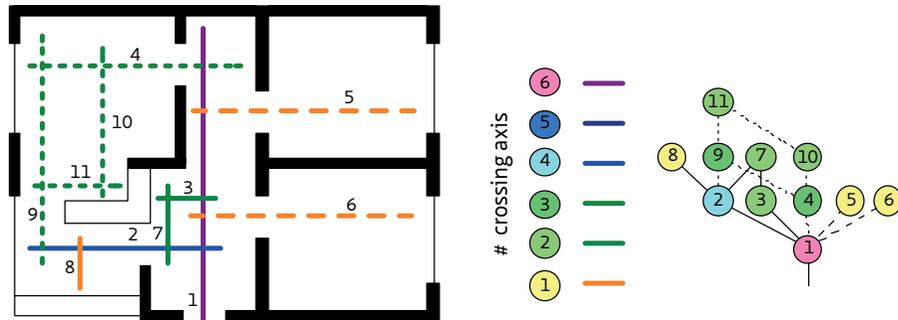


Figure 60 Axial map (left) and connectivity (right).
 The axial map represents in a colour-spectrum from yellow-light green-green-light blue-blue-purple the number of crossing axes which is an indication of the connectivity of that particular axis. The numbers in the connectivity diagram refer to the axes in the axial map.

§ 8.3.6 Isovist analysis

An isovist field represents the view of one person from a given point in space and is used for orientation and way-finding analysis. Whereas in the early days an isovist analysis had to be conducted manually, today software can produce one-point as well as all-points isovist analysis. The basis for isovist analysis is a representation of the built environment that divides open space and the objects defining that space. An isovist represents ‘the set of all points visible from a given point in space’ (Benedikt, 1979). An isovist visualises the view from a particular standing point in the built environment that is defined by objects such as walls and columns. When moving through space, the shape and size of an isovist changes and in this way it is possible to visualise the sequence of scenes or sightlines from particular points along the movement routes.

Figure 61 shows on the left side the area of visibility from the reception desk and on the right side from the waiting area. These isovists are manually made in the upper drawing and underneath are the isovists generated by computer software. What is clear is that a part of the small corridor is not visible from the reception desk and that both entrances to the consulting rooms are visible from the waiting area.

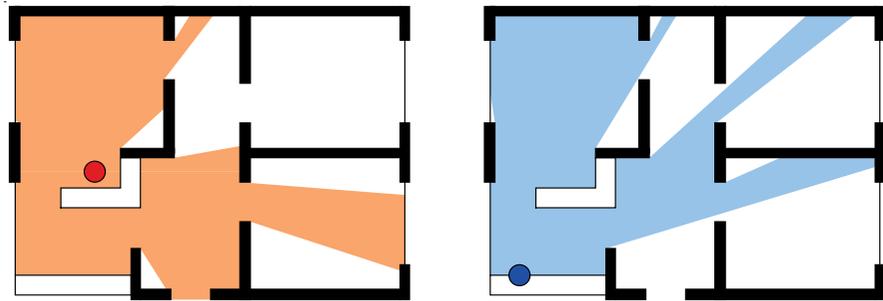


Figure 61 Isovist analysis from reception desk (left) and waiting area (right). The orange area is visible from the red spot behind the reception desk. The blue area is visible from the blue spot in the waiting area.

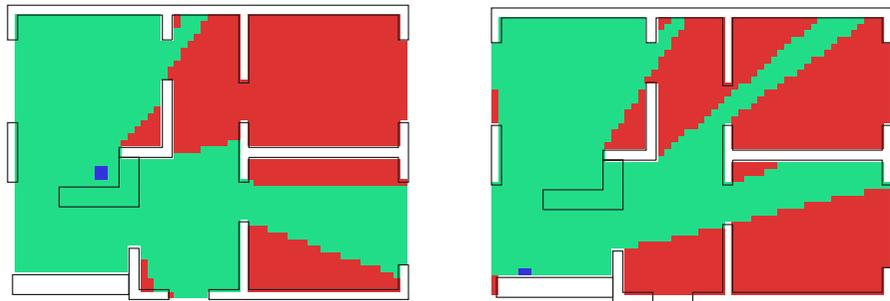


Figure 62 Visibility from reception desk (left) and waiting area (right) by using a visibility graph. The green area is visible from the blue spot, the red area is not visible from that particular spot.

By using a visibility graph it is also possible to calculate the degree of visibility from every point of the public space to all other points. This method is useful to explore where the most visible and less visible areas are in the floor plan (see also Figure 59 on the right side). In addition, it is also possible to show the visibility of certain objects and areas from every point in the room.

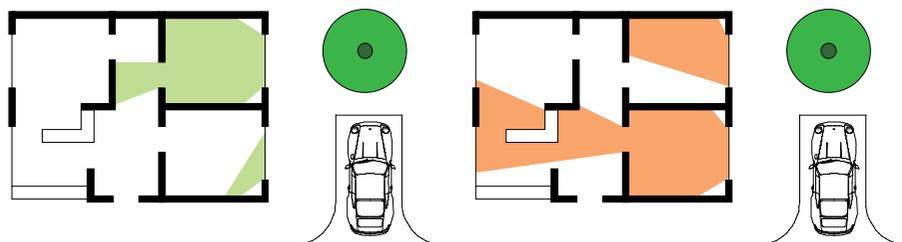


Figure 63 Do you see a tree (left), or a car (right)? In the left drawing, light green represents the area in which the tree is visible. In the right drawing, orange represents the area in which the car is visible.

In this way it is possible to determine 'how much tree you can see' in the view outside or how much 'view of a wall or a parked car' there is from a certain spot in space. Figure 63 shows in a hand-made drawing the areas in which the tree (left side) or car (right side) is visible within the composition. In Figure 64 the same analysis is made by using a visibility graph.

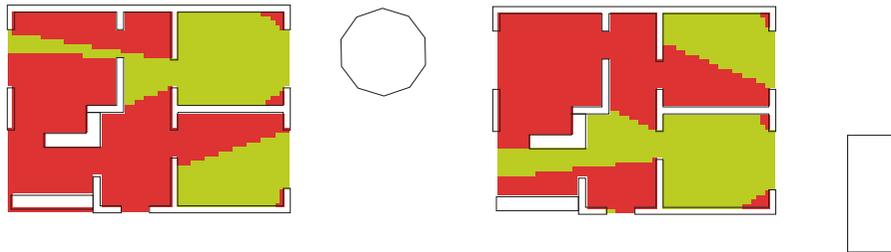


Figure 64 Visibility tree (left) and car (right) using visibility graph. The object (tree in the left drawing and car in the right drawing) is visible in the green area and not visible in the red area.

§ 8.3.7 Agent based modelling

Another analytical technique that is applicable to assess floor plans is agent based modelling (ABM). This technique is a simulation of movement within a floor plan by using agents as self-deciding entities within a computer model. The directions these agents choose can be assigned randomly, or by following given rules such as the direction of longest sight line or most integrated route. Agent based modelling can show what are likely to be the most used areas in the layout. Figure 65 is an example of an agent based modelling in which the internal circulation is made visible. This drawing shows that the corridor and entrances off the consulting rooms are the most used areas in the composition. Also visible is that the back-office is accessed from two sides.

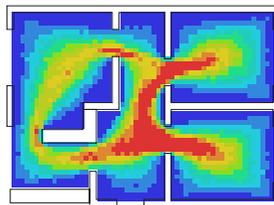


Figure 65 Agent based modelling. In a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue the number of passing agents is represented as an indication of the circulation of people in the composition.

§ 8.4 Evidence based design

Design assessment as a perspective on design research is also related to Evidence Based Design in hospital architecture as described by Hamilton (2009): *'All architects, engineers, designers and planners use evidence to inform their design decisions. [...] Evidence Based Design (EBD) is a process for the conscientious explicit and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project. [...] Because the context and goals for each project are unique, EBD will provide unique responses to each individual situation. EBD is in fact simply a design process that includes a higher level of attention to research in order to inform a few key decisions.'* (Hamilton, 2009, p. 10). EBD implies that design decisions are based on the best available research on that topic. One of the principles of EBD is that the scientific evidence resulting from the POE research on existing buildings is used in the design decision process for new buildings. Evaluation of the building itself can make it clear how the building is actually used and appreciated and this knowledge can be used as input into new design projects. One of the most famous EBD researches in hospital architecture is the study of Ulrich (1984). This research, published in *Science*, proved that a view from a hospital bed of nature outside compared with a view of a wall resulted in patients requiring less medication and recovering faster. *'Patients with the nature view suffered substantially less pain, as indicated by their need for far fewer doses of strong pain medication than their counterparts with the wall view. In addition, the patients exposed to nature had shorter post-surgery stays, better emotional well-being, and fewer minor complications such as persistent nausea or headache'* (Ulrich, 1984).

A Literature review on EBD conducted by the Center for Health Systems and Design at Texas A&M University and the college of Architecture at Georgia Tech (Ulrich et al., 2008) came up with 600 studies on how hospital design can impact clinical outcomes. The review covers design issues such as single-room versus multi-bed rooms, way-finding, noise effects, sunlight, exterior views, mechanical installations and ergonomics. In their conclusion, the authors argue for the use of EBD as a means for creating healthcare buildings informed by the best available evidence regarding how the physical environment can interfere with or support the activities of patients, families, and staff (Ulrich et al., 2008).

In the literature review on Evidence Based Design (see text below) and the interviews with the CEOs of Dutch hospitals in chapter 7, some common themes came up. Regarding patient outcomes, important aspects of an architectural design that were mentioned are: (1) view of nature; (2) daylight; (3) use of materials; (4) reducing noise levels; (5) way-finding; (6) visibility of patient areas from reception desks; (7) single patient bedrooms and; (8) ensuring privacy and good communication between medical staff and patients.

Evidence Based Design regarding patient outcomes (Ulrich et al., 2008).

Ulrich, Zimring, Quan, Joseph, and Choudhary (2004) conducted a literature review of Evidence Based Design in Hospitals. An updated and extended version of this research is published in the journal Health Environment Research and Design (HERD) in 2008 (Ulrich et al., 2008). The search included any study that alluded or referred to the physical environment of healthcare in the title or abstract and resulted in more than 600 papers. These studies were sorted into three categories: patient safety; other patient outcomes and staff outcomes. The papers were screened on both the empirically based approach and examined in terms of the influence of physical characteristics on patient, family or staff outcomes.

One of the results of this literature review is the acknowledgement that there is a growing number of rigorous studies that support the establishment of the relation between the physical design of hospitals and the outcome on patient and staff objectives. Most studies focussed on reducing the frequency of infections acquired in hospital, medical errors and patient injuries. The authors state that *'it is now widely recognised that well designed physical settings play an important role in making hospitals less risky and stressful, promoting more healing for patients and providing better places for staff to work'* (Ulrich et al., 2008).

In the category 'other patient outcomes', the literature review summarises different studies on reducing patient stress and increasing patient satisfaction. Empirical evidence was found that the physical environment has influence on patient outcomes in different ways, e.g. a view of nature results in less medication, faster recovery and a shorter stay of patients; the positive effects of daylight on patients; the negative effects of too much noise; art can be a means of distraction in a healthcare environment; reducing spatial disorientation and; patient privacy in combination with improved communication between medical staff and patients. Disorientation and way-finding problems in hospitals were identified as having a particular impact on those who are less familiar with the hospital, for example outpatients and visitors.

A study by Harris, McBride, Ross, and Curtis (2002) suggests that environmental satisfaction is a significant predictor of overall satisfaction in healthcare settings. Telephone interviews with 380 discharged inpatients helped to determine that environmental satisfaction was a significant predictor of overall satisfaction with their healthcare, ranking only below the perceived quality of nursing and clinical care (Harris et al., 2002). There is therefore strong evidence that a satisfying environment should be designed with patients' and families' needs in mind. The healthcare environment should provide an aesthetically pleasing environment, a nice view outside, adequate lighting and sunlight and a helpful information guide. Single patient bedrooms can provide favourable environmental features, such as quietness, privacy and a sense of control, thereby improving patients' satisfaction with the healthcare experience (Ulrich et al., 2008).

§ 8.5 Design assessment of patient satisfaction

As can be concluded from the literature review of Evidence Based Design, important aspects of patient satisfaction are: (1) view on nature; (2) daylight; (3) use of materials; (4) reducing noise levels; (5) way-finding; (6) visibility of patient areas from reception desks; (7) single patient bedrooms and; (8) ensuring privacy and good communication between medical staff and patients. Although these aspects are mainly related to the user-experience after the building is constructed, they ought to be part of the discussion in the design phase, as they are perceived as the most important added values of real estate. This section elaborates on the possibilities to use the described analytical drawing techniques to assess these aspects in an architectural design of a hospital. An assessment is made of an existing nursing department of the Deventer Hospital. In the next chapter, these instruments are also applied in a case study to assess user-value on different scale levels in the architectural design of the whole hospital.

Apart from the mother-child department and the intensive care on the first floor, all nursing departments are situated on the second floor. The clinical beds on the second floor are divided into three wards of 84 beds. The wards are organised around the three elevators in the clinic. Each ward of 84 beds has 22 3-person bedrooms and 18 1-person bedrooms and is divided into two sub-wards of approximately 40 beds that share some facilities. Figure 66 shows one sub-ward of the Deventer Hospital with eleven 3-person beds and ten single-person bedrooms.

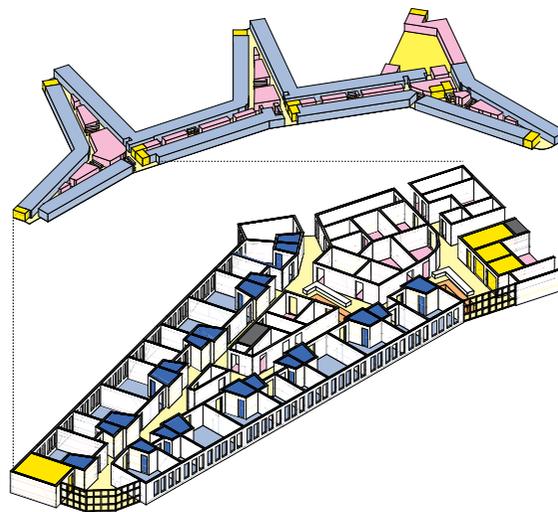


Figure 66 3D model of nursing departments on second floor with one sub-ward.

§ 8.5.1 Single patient bedrooms

A functional floor plan analysis makes it possible to assess the number and position of (single) patient bedrooms in the hospital. An abstraction of a floor plan in combination with a justified map of nursing wards including the use of space (single bed, multi bed, communal or staff rooms) makes comparison of wards possible on a functional level. Besides this, a functional floor plan analysis enables a comparison of the size and space use of different alternatives. In combination with an axial analysis, the walking distances for employees can also be taken into account.

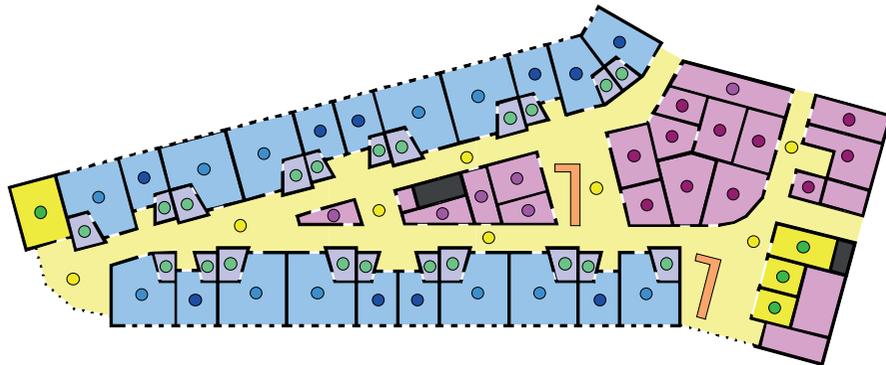


Figure 67 Functional floor plan analysis.

§ 8.5.2 Daylight

Based on the floor plan and the positioning and size of the windows, it is possible to make two different sunlight analyses. One is a traditional sunlight study in which the direct sunlight is illustrated in three-dimensional (computer) models. This is a time-consuming exercise because several timeframes in different seasons have to be utilised and even then each model only illustrates the direct sunlight visible at that specific time and on that particular day. These studies make it possible to determine the best orientation of the building regarding patient needs, e.g. avoiding direct sunlight on patient areas. It is also possible to make an assessment of indirect sunlight in a plan. This is possible by regarding indirect sunlight as the visibility of the sky dome from each and every point in the building. If there is a larger part of the sky dome visible from one point in a room, the amount of indirect daylight is larger. If this is combined with an all points visibility analysis, it is possible to determine from each and every point in the hospital the amount of visible indirect daylight. Based on such an assessment, the amount of indirect daylight can be manipulated in the design process by the position and size of the windows.

Figure 68 shows the visibility of daylight in the nursing department and makes clear that all nursing rooms and almost all corridors have daylight. An exception is the area around the central reception desk where, if the doors to the nursing rooms are closed, there is no direct view of a window.

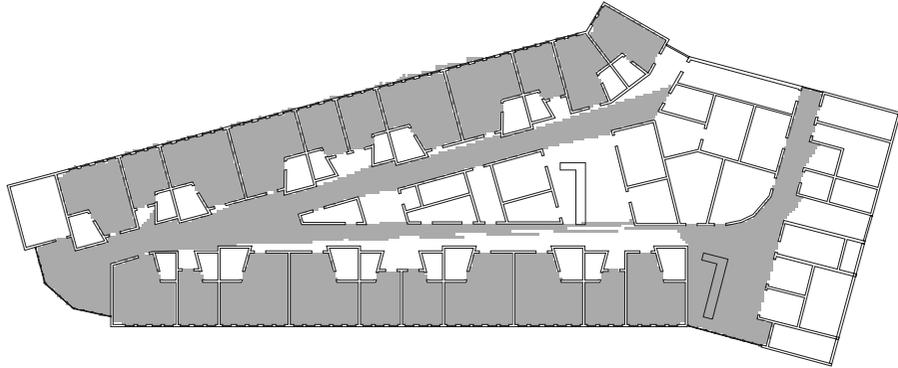


Figure 68 *Visibility daylight.*
This graph shows the visibility of daylight (grey area) but not the amount of daylight.

§ 8.5.3 Use of materials

An analysis of the materials used can be made in a three-dimensional model. Architects commonly use representations of interior space to assess colour and use of materials in perspective or virtual reality.

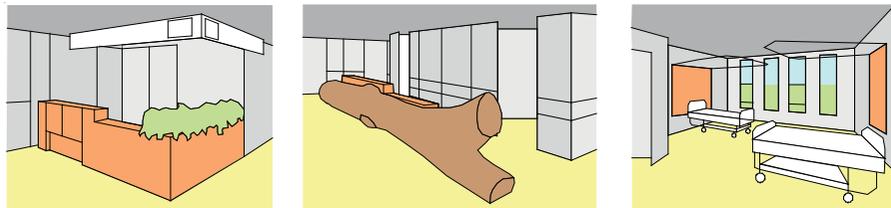


Figure 69 *Ex post photo analysis of a nursing department.*
This analysis shows the visible form of the nursing department in a classification of materials such as ceiling, walls, floor, reception desks, information shields, plants and windows with a view outside.

Figure 69 shows the interior space of the nursing department of the Deventer Hospital in which colour, material and space is analysed on the basis of interior photos. For the purpose of analysing colour and material also three dimensional representations can be used in the design phase.

§ 8.5.4 View on nature

The view on nature can be measured by an isovist analysis of each room. In this isovist analysis, the visibility of natural objects outside can be assessed for each viewpoint in a room. With this technique it is possible to determine 'how much tree you can see' or show how much 'view of a wall or parked car' there is from a certain spot in space. Combining and comparing this information makes it possible to determine the best view outside from each room. In this way it is possible in a design decision process to assess the consequences for the quality of a view through a window for every spot in each room.

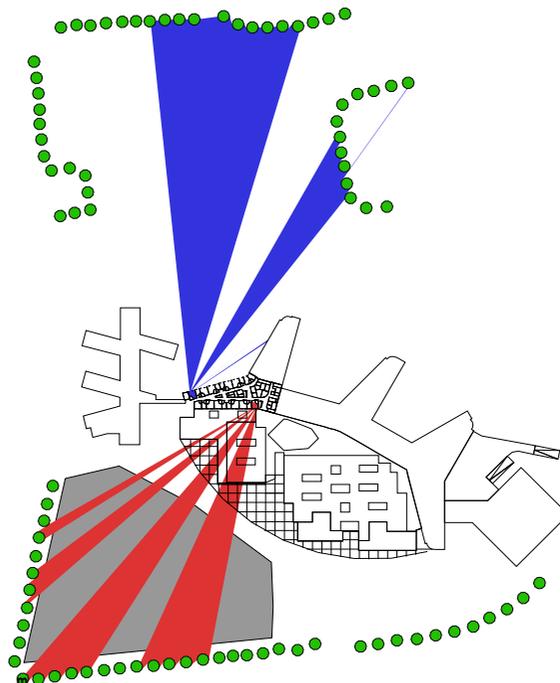


Figure 70 View outside from two patient rooms to north-side (above) and south-side (below). The blue area is visible from that particular spot in one patient room on the north-side, the red area is visible from another patient room on the south-side.

During the design phase, the view outside can be manipulated by using different window sizes and re-positioning the patient viewpoint in the room; considering the orientation of the windows and rooms in relation to the surroundings or the positioning of trees in the direct surroundings of the hospital that are well visible from different viewpoints in the hospital.

Figure 70 shows two isovist views from the nursing department. On the north side there is a view on an open landscape with trees. Also a small part of the opposite nursing department is visible. On the south side, the view extends to the trees on the other side of the parking area. The visible area contains the roof of the lower parts of the hospital and the parking places.

Figure 71 shows the visibility of the opposite wall on the right side in the bedrooms of the nursing department. Besides the view of a wall, also the visibility of trees can be analysed. Figure 72 shows the visibility of a tree from inside the bedrooms. By using this analysis, the best positions of trees can be chosen in the design of exterior space related to interior space.

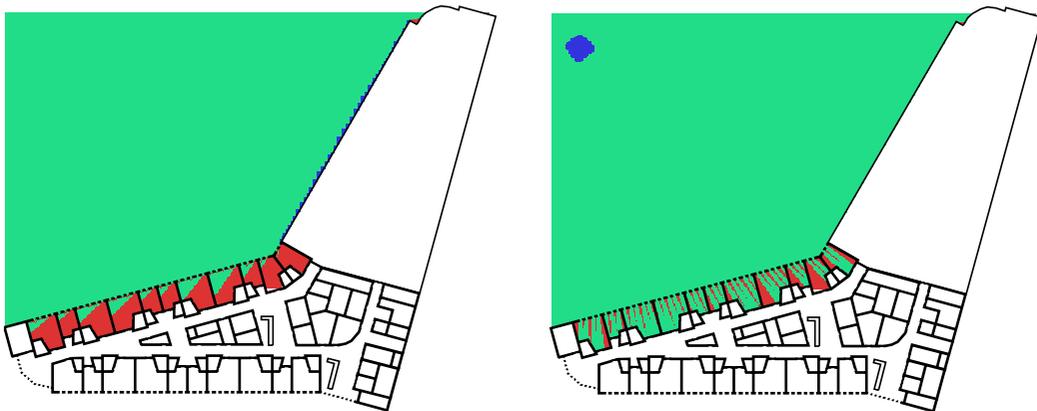


Figure 71 Visibility of outside wall from nursing department (left).
The wall (dark blue) is visible in the green area, the red area has no direct view of the wall.
Figure 72 Visibility of a tree from patient rooms (right).
The position of the tree (dark blue) is visible in the green area but not in the red area.

§ 8.5.5 Visibility of patient areas from reception desks

Another possibility that arises from the combination of routing analysis and visibility studies in hospitals is an assessment of the visibility of the patient areas from the reception desks. In this way the visibility of the main routes that are likely to be taken by patients in their way-finding can be combined with an isovist analysis of the reception and information desks. Software can be used to determine how visible each spot in these patient areas are from the reception and information desks. In this way the position and number of necessary viewpoints can be assessed in the design decision process in order to attain an optimum visibility of the waiting areas and the main patient routes through the building.

Figure 73 shows the area in which reception desks are visible. Figure 74 shows the visible area for two people, one behind each reception desk. This area is much smaller, but still covers the whole entrance area of the nursing department.

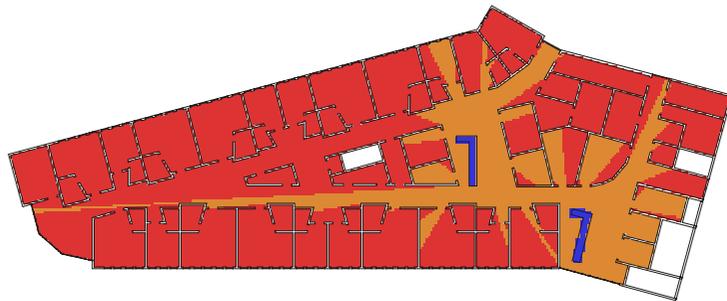


Figure 73 Visibility of reception desks.
The reception desks (dark blue) are visible in the orange area but not visible in the red area.

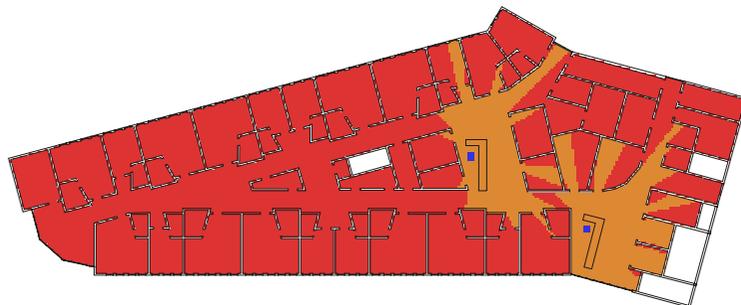


Figure 74 Visibility from reception desks.
The orange area is visible from the two positions behind the reception desks (dark blue).

§ 8.5.6 Way-finding

People tend to orientate themselves by following the most integrated paths. An axial map analysis of a hospital floor plan makes it possible to determine what the most integrated routes are. Also agent based modelling can give an indication of the most locally integrated spots in a hospital. If the most integrated routes are determined, a point depth visibility study using these routes shows which areas are best visible for patients. In a design decision process, one can try to manipulate these routes by changing the architectural design of the layout or the position of information and the reception desk in such a way that they are best visible in relation to the main routes taken by patients.



Figure 75 Axial map local integration.
In a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue the local integration of all axes is made visible. The most locally integrated lines are the two red lines in the corridors.

§ 8.5.7 Reducing noise levels

Although the amount of noise is not predictable in a floor plan, it is possible to make an assessment that could indicate the quieter and livelier spots. An axial map analysis can show the most locally integrated routes, which gives an indication of the probability that people will use those routes. After that, a point depth analysis can be made which shows how visible the main routes are from each and every point in the hospital plan. If one spot has strong visual contact with a high locally integrated route, this spot is likely to be a more lively than a spot that has less (or no) visual contact with a lower locally integrated route. The amount of local integration can also be made visible by agent based modelling. Then a visibility assessment can be conducted to define the extent to which agents are visible from each and every spot as an indicator of higher or lower noise level. This instrument is also applicable in staff areas for reducing noise levels in work stations in an open office concept.

Figure 76 and Figure 77 are both agent based models from the nursing department. Figure 76 shows the internal circulation that is to be expected for the configuration of the nursing department. Figure 77 shows how these agents spread from the elevator as the point of entrance. The combination of these two figures shows that the lower corridor is used much more often than the upper corridor and that the area between the reception desks is also used by many agents. This leads to the assumption that some bedrooms are much less quiet than other bedrooms in the department, based on the view of the movement of people through the hospital.

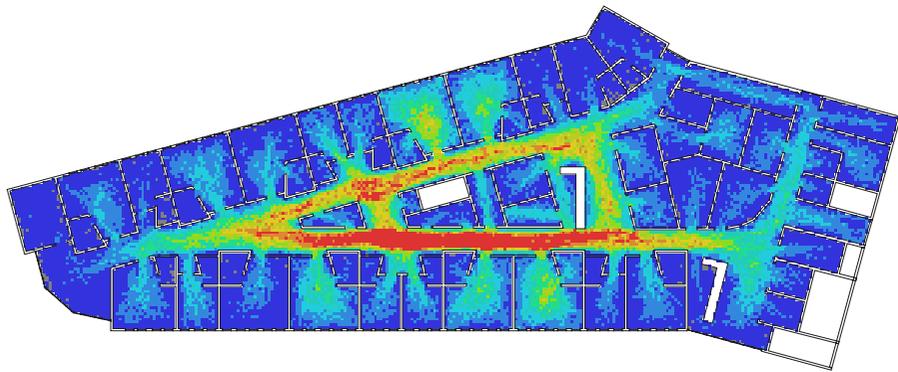


Figure 76 Agent based modelling of internal circulation.
In a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue-grey the number of passing agents is represented as an indication of the noise that is related to the circulation of people in the composition.

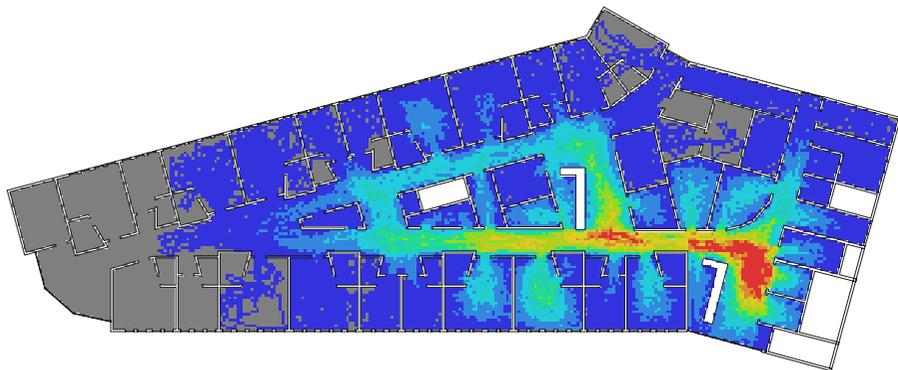


Figure 77 Agent based modelling of circulation from entrance.
In a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue-grey the number of passing agents is represented as an indication of the noise that is related to the circulation of people in the composition.

§ 8.5.8 Ensuring privacy and good communication

Ensuring privacy and good communication between medical staff and patients is best attained by private consulting rooms and single bedrooms. For multi-person bedrooms, the availability of enough consulting rooms nearby to speak with patients or family can best be assessed in a functional floor plan analysis. In addition to privacy through single patient bedrooms and consulting rooms, privacy in the waiting areas is also an important architectural aspect of patient satisfaction. This aspect conflicts partially with the issue of the visibility of patient areas from the reception desks. Waiting patients want to be seen from the desk by employees, but not necessarily by visitors or other patients. The privacy of waiting areas can be assessed using a visibility study that combines the most locally integrated routes with visibility of space from these routes and waiting areas. If this assessment is also combined with the position of the reception desks, the visibility from these desks of the main routes used by patients can also be taken into account.

Figure 78, Figure 79 and Figure 80 contribute to the analysis of privacy in the nursing department. Figure 78 shows the centrality of space and the different enclosed spaces in which a conversation can take place. This figure shows that the areas around the reception desk are relatively large spaces. Figure 79 shows all axial lines within the spatial configuration of the nursing department. This analysis shows that the two corridors have the longest sight lines, but that there are also long sight lines in the patient rooms at those points where the two corridors are connected. These sight lines are an indication of intrusion of privacy in that a view on a conversation is possible.

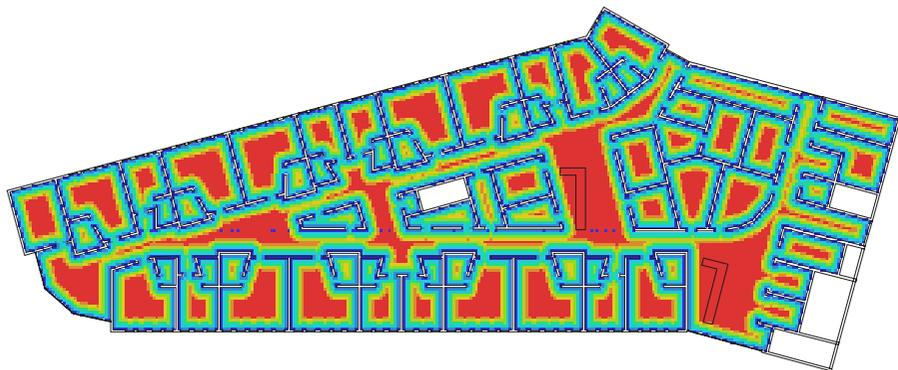


Figure 78 Centrality of space.
In a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue centrality of space (red-orange-yellow) indicates the spaces for interaction.

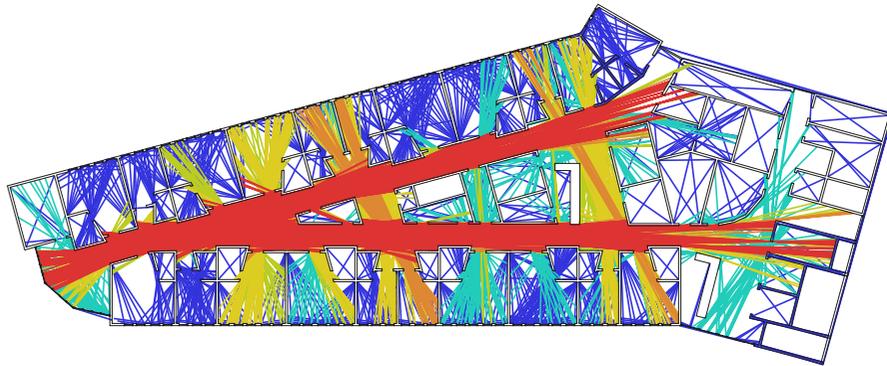


Figure 79 All lines axial map.
 In a colour spectrum from red-orange-yellow-green-light blue-blue-dark blue the longest sight lines (red and orange) as a representation of visibility of space is made visible.

Figure 80 shows an all-point visibility study of the nursing department. This figure shows that the point where the two corridors come together is the most visually integrated area in the department. What is remarkable is that the areas around the reception desk are not the most visibly integrated spots in the spatial configuration. This indicates that the visibility of the reception desks is relatively low. One positive aspect of this is that the patient may feel less observed by others around the reception desk, possibly improving communication.

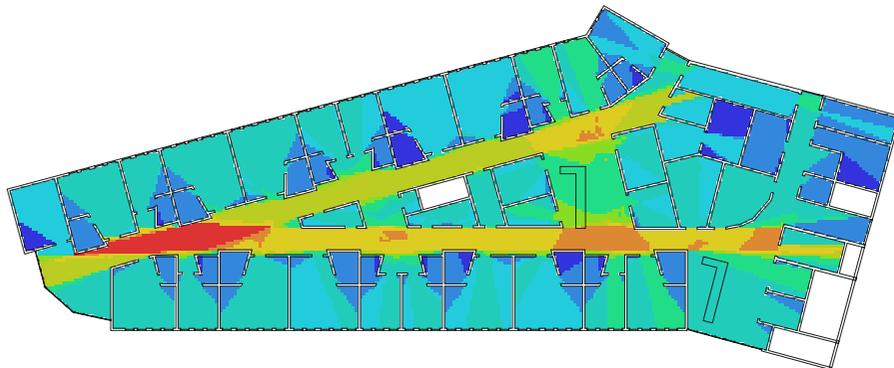


Figure 80 Visual integration.
 In a colour spectrum from red-orange-yellow-green-light blue-blue-dark the most visible area (red) and less visible area (dark blue) is shown.

§ 8.6 Applicability of design assessment on patient satisfaction

This chapter has explored how different aspects of patient satisfaction can be visualised by analysing floor plans. Based on the literature review of Evidence Based Design, different aspects were revealed. By using different analytical drawing techniques, this chapter has shown how these aspects can be made part of the discussion in the design decision process. An assessment of the real estate added values during the design phase makes it possible to test the design on the attainment of these values. Pre-set values can be visualised and different design solutions can be compared on these values by using these drawing techniques.

Conducting the case study by applying computer software to analyse spatial form also showed that the available software of space syntax has developed to a point where it can be applied by architects in the design process. The software is, in appearance and usability, comparable to common drawing programs like Autocad and Vectorworks and the basic steps are easy to explain to someone who is used to working with Computer Aided Design (CAD). Although the analyses are still indicative and not yet validated, the graphs that can be produced can support decisions in the design phase.

The availability of software and the applicability of these programs by architects makes it also possible to use these techniques in combination with Building Information Management (BIM) in the design and construction phase (Andrews, Senick, & Wener, 2012). BIM aspires to digitally represent the physical and functional features needed to develop and document building designs. Today, BIM applications support walk-through visualisations, heating-ventilating-air-conditioning system design, energy performance estimation, lighting design and the assessment of safety and security issues such as evacuation. However, the user as active participant in the composition is not yet integrated into the building information system, although these elements belong in the simulation because they affect the performance of alternative design solutions.

Although the analytical drawing techniques are further tested in chapter 9 using a case study in which the results of the design assessment are ex post compared to Post Occupancy Evaluations (POEs), one of the limitations of this research is that there are no studies available in which patient satisfaction for several hospital are systematically compared in relation to the architectural design of floor plans. Therefore further research is recommended in which the drawing techniques are validated by design assessments of different hospital floor plans. This can be done by comparing the outcomes of different hospital floor plan assessments with the results from measurements of visibility, light, noise and movement within the actual building. In addition to comparing the design plans, these hospitals have to be compared on user satisfaction in order to compare post evaluation results with ex ante design research.

Another limitation of this chapter is that only patient satisfaction as an example of an added value of real estate is studied. Although this added value is perceived as one of the most important in the interviews with hospital CEOs and real estate project managers, assessing other added values is also important in the design phase. The analytical drawing techniques used can also be translated to include employee satisfaction and aspects of improving organisational culture. Further research is also necessary to test and explore how these drawing techniques can be applied to assess e.g. flexibility or to improve productivity. As the choice and balance between different added values is the crux of the concept of adding value by real estate, all the different added values should be assessed in the design phase.

9 Case study design assessment

How are aspects of patient satisfaction defined in the different phases of initiation, design and use and how can these aspects of patient satisfaction be assessed in architectural drawings ?

Abstract

Purpose: This case study is an exploration of the applicability of the analytical instruments on design assessment as presented in the previous chapter. It aims to show how different analytical drawing techniques can be used in the design phase to assess the attainment of pre-set goals and objectives.

Literature study: The analytical instruments for design assessment as developed and described in chapter 8 of this dissertation are the starting point for design research of an architectural design of the Deventer hospital, Netherlands.

Empirical research: The empirical research consists of an ex post design assessment of the architectural design of a hospital designed and built just before the introduction of new regulations in the Netherlands. The design assessment is connected to findings from a descriptive case study research based on initial documents and Post Occupancy Evaluations.

Findings: This case study aimed to be a first validation of the drawing techniques by linking them to available Post Occupancy Evaluations and other documents from the occupancy, initiative and design phase. During the course of the case study it became clear that this validation is not yet realistic. Validation of the drawing techniques requires a specific study in which research findings from the design assessment are tested in practice by measuring the same aspects in the building. The analytical instruments are mainly instruments for architects to show clients how a design contributes to the achievement of pre-formulated added values of real estate. As such, this type of research and analysis can contribute to the practice of design by looking at the architectural design from the perspective of the added value of real estate.

Introduction

In this chapter, the design of the Deventer Hospital is assessed on different added values of real estate. The original aim of this part of the study was to test the applicability of the assessment tools in the design of a hospital and relate the results of that design assessment to results of existing Post Occupancy Evaluations in order to

validate the design assessment. With this goal in mind, documents of the initial, design and use phase were studied in terms of the added values of real estate in general and the different aspects of patient satisfaction in particular. During the design assessment of the hospital floor plans, it became obvious that the validation on the basis of existing POEs was not possible. Without actual measurements within the actual building, the results of the design assessment could not be verified. This part of the study is therefore a further exploration of the possibilities that design assessment has to offer and further research for validating the results is recommended.

The Deventer Hospital was selected as a case study on several grounds. The new hospital in Deventer opened her doors in 2008 and in 2010, as the only hospital, received a nomination for the Hedy d'Ancona Award for excellence in Dutch Healthcare Architecture. This is an indication that this hospital is recognised as a best practice for hospital architecture in the Netherlands. Another reason is the available information on the initial phase and design process of the Deventer Hospital. In addition also several Post Occupancy Evaluations (POE) are available for the Deventer Hospital, including patient- and staff satisfaction reports and an 18-hour observation of the main hall. The availability of these reports makes it possible to compare the results of the design assessment with the actual use of the hospital measured in the Post Occupancy Evaluations.

phase	document	author, year	content
initiation	The new Deventer hospital, demand driven in healthcare, construction and organisation.	Deventer Hospital, 1999	Vision of organisation of healthcare.
	brief document	Deventer hospital, 2000	
design	design concept	Gortemaker de Jong, 2001	healthcare concept translated into functional concept and building concept.
	office concept	Deventer Hospital, 2003	presentation of new office concept based on front- and back-office
construction	New Deventer Hospital	Deventer Hospital, 2008	presentation of the new Deventer hospital
occupancy	Interview CEO Deventer Hospital	Van der Zwart, 2010	Deventer hospital related to added values of real estate
	Post Occupancy Evaluation	Niemeijer, 2010	evaluation of outpatient clinic (front-office) and staff accommodation (back-office)
	18-hours observation	Hameling, Herkmans and Van der Laan, 2011	user observation research main hall
	patient hospitality	Van der Voordt & Prevosth, 2011	assessment of nursing departments on hospitality

Table 44 Documents related to different phases of building cycle.

In the available documents from the initiation, design, construction and occupancy phases of the new Deventer hospital several added values of real estate can be recognised in the different phases of the building's life cycle. These documents were analysed, examining how the added values of real estate are defined and used in the different phases of the building cycle.

An unexpected result of the document analysis was a confirmation that different values were the main focus in different phases of the building cycle. The analysis of these documents shows that during the initiation, design, construction and occupancy phases of the Deventer Hospital, different values are more or less important. Patient satisfaction, however, was perceived as an important value in all phases. As patient satisfaction is mainly connected to the users' experiences, the focus of the analysis was on patient- and staff areas. Patients' areas can be divided into patient facilities, waiting areas, clinical nursing wards and outpatient consulting rooms. Staff areas include the connection between front- and back-office, the used office concept and available staff facilities. In these areas the added values employee satisfaction and improving the organisational culture are the most obvious. Parallel to the case description, a design assessment was conducted by using the analytical drawing techniques as described in chapter 8. This design assessment is used to illustrate how the aspects of patient satisfaction as mentioned in the initial documents can be made visible on the basis of floor plan analysis.

§ 9.1 Deventer hospital

History

In 1985 the St. Jozef Hospital and the St. Geertruiden Hospital merged to form the Deventer Hospital. This merger aimed to improve organisational efficiency. Several options for renovation and designing of a new hospital building were explored in order to further optimise the primary processes of health delivery. A new hospital on a green location seemed to be the best solution. In 1998 the Dutch Ministry of Healthcare approved the initiative for a new hospital in Deventer.

The Deventer hospital developed a new vision of healthcare based on patient flows in the hospital (Maljers, 1999). Four patient flows were distinguished: acute, urgent, elective and chronic patients. Based on this vision a brief was completed in 2000. Part of the brief was the Deventer Hospital's ambition of a sustainable design and saving energy. A first preliminary design by Gortemaker de Jong Architects was presented in 2001 (Algra et al., 2001) and completed in 2002. The Netherlands' Board for Healthcare Institutions approved the plans in 2003. Construction started in 2004 and on 1st of September 2008 the Deventer Hospital was operational in its newly built hospital.

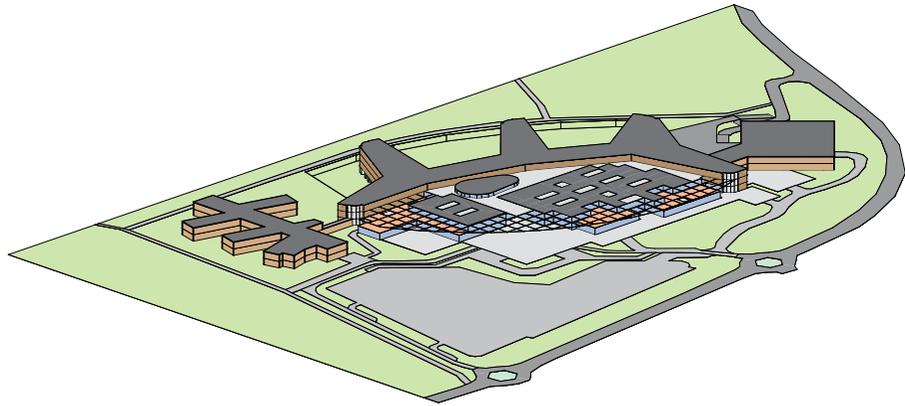


Figure 81 *New Deventer Hospital on a green location.*

Initial phase 1999 - 2000

The traditional hospital used to be described as a 'one-size-fits-all organisation' and is - due to its orientation around disciplines, outpatient departments, clinics and functional departments - barely capable of anticipating the expectations of patients coming to the hospital with different demands, depending on their illness. In the initial document 'The new Deventer Hospital, demand driven in healthcare, building and organisation' (Maljers, 1999), the Deventer Hospital positions itself as an institution capable of answering different patients' demands for healthcare in a flexible way without an oversized healthcare infrastructure. A new hospital building is seen as an important step towards embodying these principles. The building is not perceived as the organisation of the hospital, but rather that the organisation is made up of people and shared values, mentality, beliefs, information structure and cooperation that is reflected in the organisational culture. 'A well-designed building can support the organisational culture, but is not a guarantee that the culture is also healthy.'

For the new hospital, a new vision of healthcare was developed by the medical staff, hospital board and management team. In this vision for healthcare a separation was made between patient flows through the hospital, patients being divided into acute, urgent, elective and chronic healthcare (Figure 82).

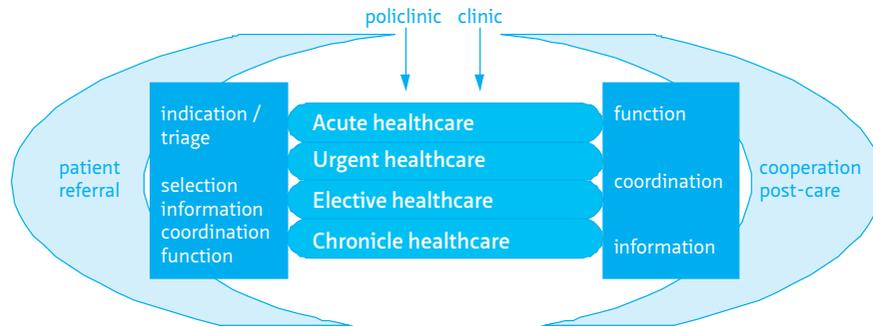


Figure 82 Concept of patient flows.

Each flow essentially differs from the others in terms of ambiance, organisation, predictability, position of healthcare professionals and demand on real estate. Acute healthcare is for patients who are in life-threatening situations, normally only 10% of patients. In the acute healthcare department, patients are stabilised 7 days a week 24 hours a day. For patients in the urgent department, some hours between intake and treatment are not life threatening. There is time to collect the necessary data on the patient and to prepare the treatment by planning the necessary capacity of the function departments. Whereas urgent patients need treatment within hours, elective patients have days or even weeks between diagnosis and treatment. Elective healthcare is predictable and the most important aspect of this healthcare process is efficiency. Chronic healthcare needs a long term relationship with the patients. These patients come several times for treatment, sometimes for weeks or months. Most chronic patients follow a standardised and predictable procedure.

This concept of four patients' flows has far-reaching organisational consequences for healthcare delivery. Although most changes resulting from the patient flows concept are organisational, there are also consequences for the physical environment. *'A well-designed building can support these organisational changes by providing the space that fits the function.'* One of the goals for the design of the new hospital building is to translate these four patient flows into a built environment in which each flow has its own ambiance and image.

Acute healthcare has its own entrance and is located near the urgent healthcare. Both clusters share certain functions, infrastructure and personnel when the urgent healthcare department is open. The entrance is easily accessible, but not a walk-in. Due to its 24-hour accessibility this part of the hospital is separated from the rest of the hospital building.

Urgent healthcare has a quiet and calm ambiance with a focus on privacy. Patients spend a few hours here before they are treated and there is enough room for private conversations. Elective healthcare is best compared with the traditional clinics and

outpatient departments, the consulting rooms of the outpatient department and the clinical beds are not specifically dedicated to different disciplines. Chronic healthcare is mostly integrated with the elective healthcare.

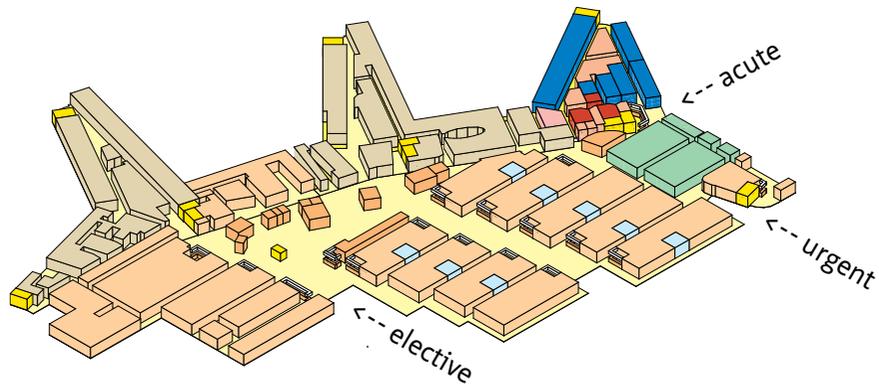


Figure 83 Ground floor with position of entrances to acute, urgent and elective care.

Besides giving architectural form to the four patient flows, flexibility is seen as one of the main objectives of the new hospital building. In a co-operation between users (specialists, nurses and patients) and the architect, different standardised spatial clusters were determined for the outpatient department. Each cluster consisted of different rooms logically organised in a way that they are applicable to different patient groups. For each cluster, the physical relations (distance, scheduling, employee shifts) to the function departments are determined. This flexible use of space in time, asks for a routing system that is variable in time to escort the patients to the right place at the right time.

Design phase 2001 - 2003

In the design phase, the healthcare concept of four patient flows is translated into a functional concept, spatial concept and architectural concept for the building. The healthcare concept of the four patient flows resulted in a design in which acute and urgent healthcare were located near each other with their own entrance in a separate part of the building near the OR. Chronic healthcare is integrated with elective healthcare in the outpatient department. The separation of patients both into acute, urgent, elective and chronic healthcare and from the employees and logistic flows of supplies starts outside the building.

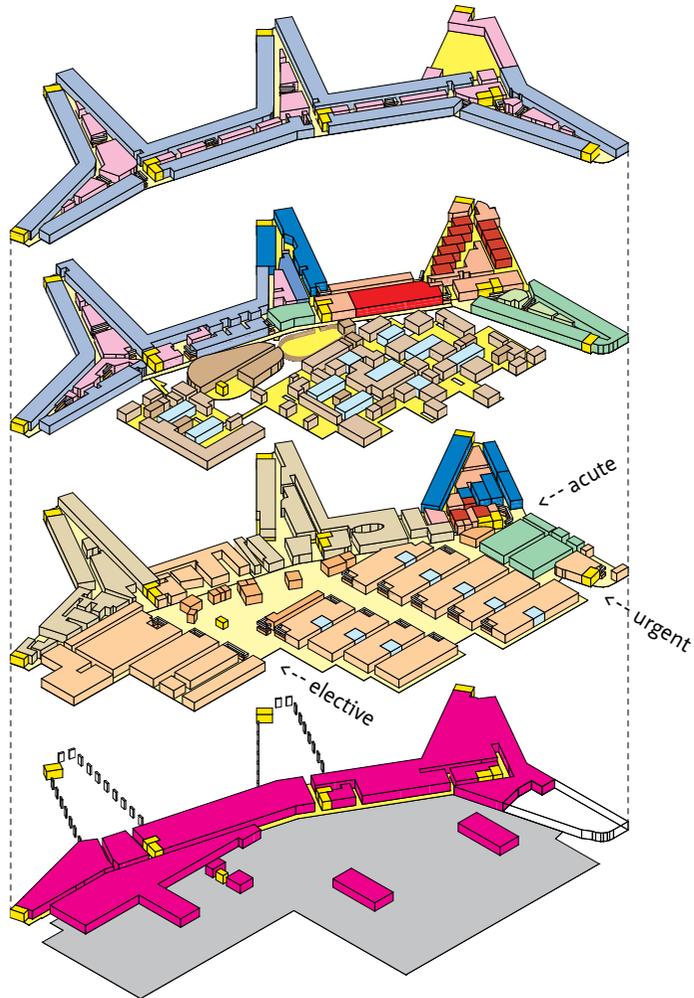


Figure 84 Three dimensional representation of the functional program.

The supply logistics have a separate entrance in the basement at the back of the building. From this logistics service point, the goods are transported horizontally in the building through a logistical corridor in the basement to the different elevators, from which the goods are delivered to the different departments. Ambulances have a separate entrance connected directly with the Emergency Rooms at the back for acute patients. Urgent patients enter the building at the General Practitioner's Post, where a quick diagnosis can be made in order to separate acute patients from urgent patients or to send patients home again with an appointment for elective healthcare. Patients with an appointment for elective healthcare enter the building through the main entrance and go through the main hall to their consulting or treatment room.

A clear distinction between elective and chronic healthcare is not made within the building. In the interior design, the four patient flows have influenced the use of colours and materials. Chronic healthcare such as the dialysis department uses warm and homely colours. The artwork in these areas also supports the home-like ambience. In the acute and urgent healthcare more cool colours such as green and blue are used to express the functionality of these areas. The use of colour and materials is more expressive in the outpatient department. The interior design and the colours here are used to facilitate patients in their orientation and way finding. Chronic healthcare is in general organisationally distinguished from elective healthcare and where possible this is translated into the space and ambience of waiting facilities and consult rooms.

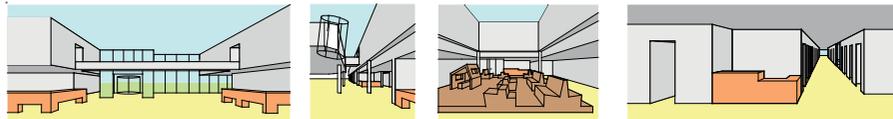


Figure 85 Interior space outpatient department.

The spatial concept of the Deventer hospital combines a backbone building and a terminal at the front side. The terminal at the front side consists of the main hall and outpatient department. The high main hall – two storeys – connects outpatient with clinical functions. In the main hall facilities such as patient information, shops, and public restaurant are available. The terminal with the main hall and outpatient department is typologically related to airport terminals: different flexible small buildings arranged in a grid under one big roof. The terminal is constructed from steel with columns every 7.6 meter, a construction which is easily expandable. A distinction is made between the construction as structure, the façade as skin and the inner walls as scenery (Leupen, 2006), generating a generic space that is easily expanded and adaptable.

In the backbone building specific clinical functions are situated, such as the OR, nursing departments and X-ray department. Although the backbone building is constructed from steel the architectural form of this part of the building – the columns are not positioned in a grid – means that the structure to a large extent determines the spatial possibilities. In addition, the large amount of technical installations makes this part of the building less adaptable and more inflexible.

Apart from the mother-child department and the intensive care on the first floor, all nursing departments are situated on the second floor of the clinic. The clinical beds on the second floor are divided into three wards of 84 beds. The wards are organised around the three elevators in the clinic. Each ward of 84 beds has 22 3-person bedrooms and 18 1-person bedrooms and is divided into two sub-departments of approximately 40 beds that share some facilities. Traditional wards in a clinic have between 28 to 32 beds.

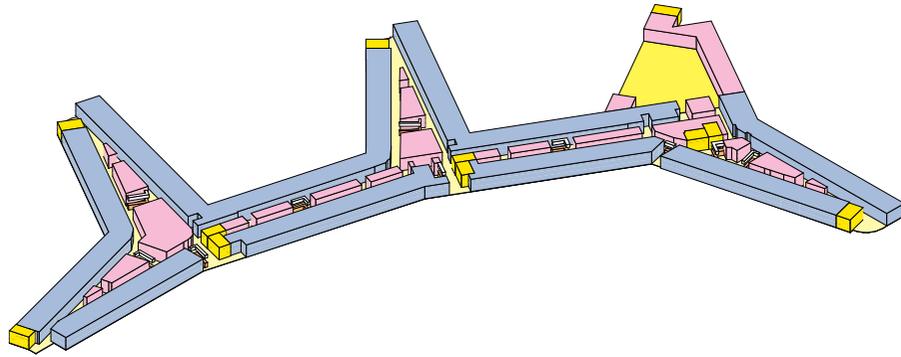


Figure 86 Second floor with three nursing wards.

Traditionally, each ward reserved beds for the unexpected intake of patients, resulting in structural vacancy of beds and overcapacity. Combining the nursing departments and organising them horizontally on the same floor in the Deventer Hospital makes this overcapacity unnecessary, making a higher occupation of clinical beds possible. The Deventer Hospital uses a zoning system for the clinical beds. This implies that zones with clinical beds are ascribed to certain disciplines, but the actual beds in these zones are not dedicated to the specialist or disciplines, ensuring the most flexible use of capacity. Clinical beds between the zones ensure that disciplines can increase or decrease capacity if necessary.

The functional concept consists of a new office concept with a separate patient area (front-office) and staff area (back-office). The Deventer hospital was the first hospital in the Netherlands that used non-dedicated consulting rooms and a separate staff area for employees. The patient area consists of consulting rooms, treatment rooms, function rooms and consulting assistance. The outpatient consulting rooms are located on the ground floor near the main entrance and are designed as rooms for the patients (Projectbureau Nieuwbouw, 2003).

The patients' areas are as generic as possible and consist of standardised, uniform and modular units, making them flexible in use. The basic module of the outpatient department is a consulting/treatment room of 18 square meters, equal for every discipline. If necessary, a distinction is made between specific, devices-related consulting rooms and standardised non-dedicated consult rooms. Most disciplines are not devices-related and can therefore use the basic consulting/treatment rooms, making it possible to react to changes in capacity. Each discipline has its own service desk in the outpatient department. The more reflective disciplines e.g. internal diseases are situated near the entrance and the surgical disciplines closer to the acute and urgent healthcare at the back.

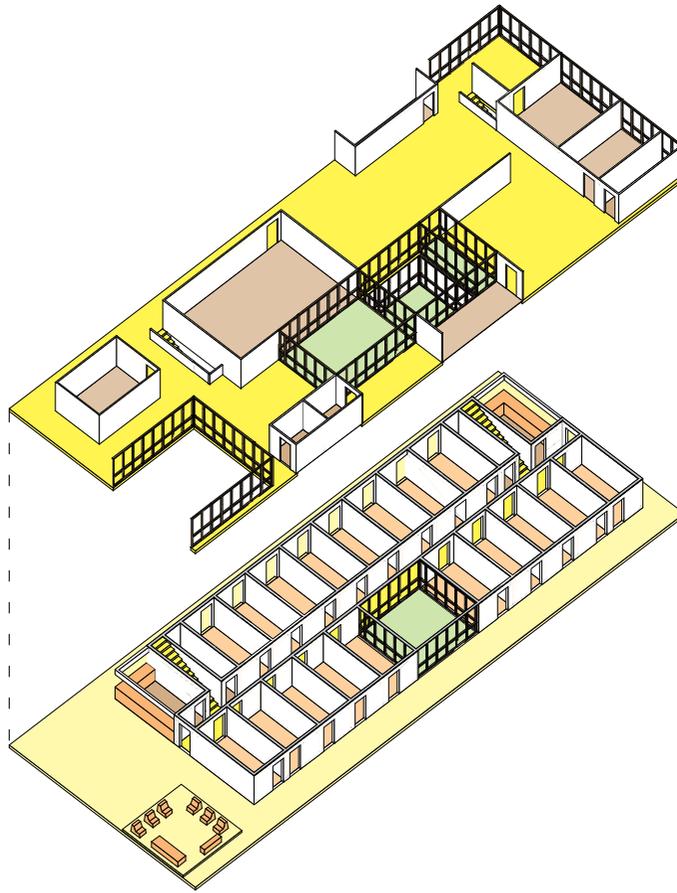


Figure 87 Standardised cluster in the outpatient department with front-office below and back-office above.

The back-office for specialists, management and other healthcare professionals is located on the first floor above the outpatient department in direct relation with meeting rooms, auditorium, library and other employee-related facilities. This staff area is the area in which specialists and healthcare professional conduct their not-patient-related activities and provides a mix of places for administrative work, inter-disciplinary consultations, meetings, learning and relaxing. In this area, not everyone needs their own workplace, flexible workplaces are usable by every employee. The concept of the back office is translated to the level of working environment that results in the interaction between people, working processes, and working place. Each discipline has its own room for handover meetings, a room for specialists and an office for employees. Meeting rooms and concentration work places are organised in clusters. The library, auditorium and larger meeting rooms are centrally organised.

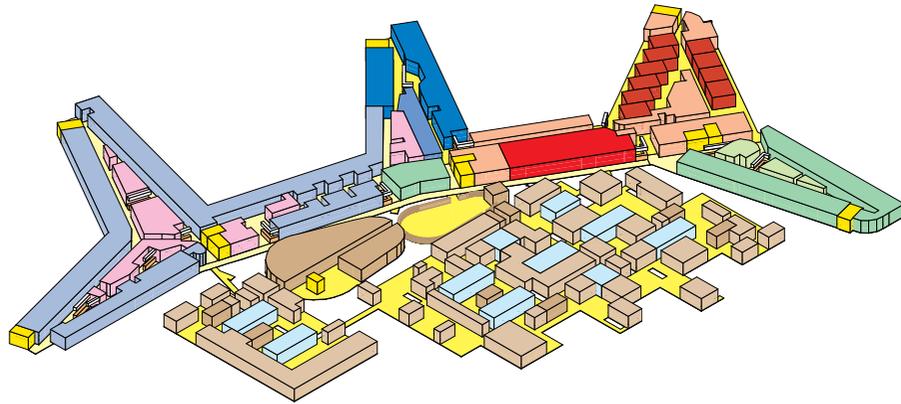


Figure 88 First floor with the central position of the back-office.

In the architectural concept, the architect states that 'the building expresses flexibility and transformation of healthcare. It presents itself more as a collection of small buildings with their own functions than as an enormous building'. This flexibility is visible in the non-dedicated consulting rooms, the non-dedicated clinical beds and the flexible spatial concept of the terminal. Under the on-going roof of the terminal, maximum flexibility is possible: adding space or altering functions is possible without losing spatial clarity. The staff accommodation above the outpatient department can expand or change function together with the consulting rooms underneath. The backbone building with its specific functions and nursing departments is the most inflexible part of the hospital, both in its use and physical changeability. It is possible to expand the clinical building both at the end of each wing on the backside and under two of the five wings. Due to its construction, changeability of the floor plan in this part of the hospital is limited.

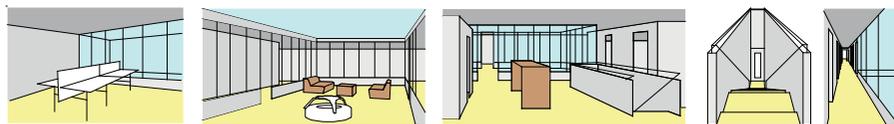


Figure 89 Interior space back-office.

Construction phase 2004 - 2008

In retrospect, the focus of the design decisions shifted during the construction phase to creating a healing environment. The use of materials and colours, the position of daylight and nature in the building and the use of art as an integral part of the interior design are design-related aspects that created a healing environment in the Deventer

Hospital avant la lettre. In the publication in which the Deventer hospital presents her new building to the public (Deventer Ziekenhuis, 2008), it is mentioned that even before healing environment was a topic in the Netherlands, different aspects of it were already part of the new design. 'Architecture has an impact on people. Design solutions in a hospital can help patients to feel better and thus stimulate their healing process'. The healing environment of the Deventer Hospital starts outside in the park landscape in which it is embedded, surrounded by a natural area and farmland that is visually and physical accessible for patients. The building aims to contribute to the healing environment by its interior design, materials and colours used and the use of nature in the building. The materials and colours used are related to the four patient flows in the hospital. Art is used as a distraction for patients in waiting areas where people like to feel at home. The combination of art and wooden furniture also aim to support this house-like ambiance. Besides one-person bedrooms, there are also 2- and 3-persons bedrooms. Low vertical windows ensure that patients have a view outside from their beds. Hospitality contributes to the well-being of patients in the nursing departments and is therefore also part of a healing environment. To improve hospitality, the Deventer Hospital introduced room service for in-patients. These employees take over some of the nurses' duties like serving meals and cleaning the rooms.

Occupancy phase since 2008

Safety, accessibility and personal attention are the focus points of the organisation. The building contributes to patient safety by the visibility of patients in waiting areas and the way the building makes safe working processes possible. Accessibility in physical form relates to the parking facilities directly under the main hall, wheelchair possibilities and the positioning of all outpatient departments at ground level. Personal attention is visible in the design of the mainly 1-person bedrooms and the attention given to the interior design of the waiting facilities.

'From an organisational point of view, the main objective for the new hospital building was that the building should support the activities related to the healthcare processes. During the lifespan of the building, the concept of healthcare changes several times, so the main objective is that on the first day the hospital opens its doors it supports the healthcare processes. Besides this, the hospital building must be flexible enough to be able to support the healthcare processes after 20 years of changing visions of healthcare.'

The concept of the four patient flows of acute, urgent, elective and chronic healthcare was one of the starting points for the new hospital building. Evaluating these flows in the new building leads to the conclusion that acute and urgent healthcare have their own logistics and that elective and chronic healthcare have their own logistic.



Figure 90 Visibility (yellow) central hall from reception desks (blue), the red areas are not visible.

Both clusters (acute/urgent and elective/chronicle) have their own entrance. The acute and urgent cluster have a separate entrance at the back with an integrated general practitioner's post. This part of the building is sober and efficient. The ambiance of the building supports the attitude of people who are focused on providing fast, efficient and life-saving healthcare. Here a triage of patients is conducted to determine which patients are acute, urgent or can be sent home with an appointment for elective healthcare. A healing environment for patients who come to the acute/urgent healthcare is different than those who come for elective and chronic healthcare. Aspects of the healing environment such as a view outside and the use of nature and art in the building are less important in the acute/urgent cluster than in the outpatient department and clinics/wards of the hospital. The main entrance is used by elective and chronicle patients and leads directly to the outpatient department. Chronic healthcare is mostly integrated with elective healthcare and positioned near the main entrance. From chronic healthcare, only the dialysis department has its own setting separate to the standardised consulting rooms of the outpatient department.

The spatial concept based on airport terminals in the main hall and outpatient department means that the logistics of patients is organised in such way that disciplines with a high turn-over and a lot of patients are positioned near the entrance.

A consequence is that most people stay near the main entrance and further away is quieter. An exception is made for rheumatology, this relatively small discipline is still positioned near the entrance to make sure that those patients who are less mobile do not have to walk further than necessary.



Figure 91 Agent modelling of circulation from entrance.

One of the objectives in the brief was sustainability. This is realised in a building that is capable of supporting healthcare processes for the whole of its lifespan: sustainable as flexibility and adaptability. This goal is best attained in the outpatient department of the hospital, with its flexible grid, non-dedicated standardised consulting rooms and flexible work places in the staff accommodation. Flexibility in the clinic of the hospital turned out to be less successful. This part of the building can be expanded at certain points, but reducing is more difficult. The structure enabled the addition of up to two more ORs, one of which has already been realised, but flexibility in this part of the building is also limited. Another aspect of sustainability in the Deventer Hospital is cost reduction. For example, the hospital uses an underground cold-warm well to reduce heating costs in the winter and cooling in the summer. The consideration was that a hospital should only invest in sustainability if the investment would be reimbursed

within the lifespan of the building. The societal impact of a green sustainable hospital on the image of the organisation is a nice side-effect.

In an interview with one of the CEOs of the Deventer Hospital, improving user satisfaction was mentioned to be the most important added value of real estate. In a sorting assignment of added values, improving organisational culture and reducing costs were second and third, followed by increasing productivity. Stimulating innovation and supporting image were positioned in the middle in a cluster with flexibility. The aspects considered the least important were controlling risks and using real estate for attracting external financing.

In this interview improving user satisfaction is related to short walking distances, daylight, views outside, warm colours and materials and visibility of patients by staff. Improving the organisational culture is visible in the staff accommodation where staff and employees meet each other. *'This building supports employees in their belief that they are working together to cure patients. You cannot leave the building without seeing patients or other staff members. There is more informal contact between employees and less scheduled official meetings. This is what the building supports very well.'*

Reducing costs means that investment costs are relatively low. A comparison of the business economic value and the value of real estate on the balance sheet after one year's use proved that the economic value is higher than the on-paper value (Hirschler-Schulte & Kleinjan, 2010). As for improving productivity it is important that building this new hospital was accompanied by a digitalisation of the information used in the healthcare processes with computers on wheels and the infrastructure for wireless internet. The new building also supports the image of the organisation as it attracts new patients who come to see the new hospital. Although a building is not necessary for innovating processes, the staff accommodation's meeting facilities, skills labs and knowledge centre supports interaction between the medical staff of different disciplines, creating an innovative capacity within the organisation. Flexibility proved to be less important than values like organisational culture and patient satisfaction during the occupancy phase of the building cycle.

The Deventer hospital plans its future capacity in the outpatient department by annually re-allocating the space available for each discipline. Disciplines can also make their own agreements with each other regarding under- or overcapacity during the year. In autumn 2008 a comparison was made of the planned allocation of space to the different disciplines and the actual use of space (Niemeijer, 2013) This comparison proved that the actual use of space was lower than the planned capacity. The planned capacity was 89%, as in the months October – November – December 2008, the actual used capacity in the outpatient department was respectively 77%, 80% and 57%. Regarding the different disciplines, the difference between planned and used capacity was even larger (Niemeijer, 2013).

In 2009 a patient satisfaction survey was conducted (Niemeijer, 2013) in the outpatient department of the Deventer Hospital. This survey measured the satisfaction of outpatients regarding the department. According to the respondents (n-286), the new hospital building had improved healthcare processes. These improvements were mostly recognised in the image and ambiance of the outpatient department. The patients were most satisfied with the accessibility, the image of the waiting areas and the appearance of the service desks. Patients were less satisfied about the privacy near the service desks, information about waiting times and privacy in the consulting rooms. For those patients who also had experience of the old hospital buildings the new department was an improvement on all points. Suggested points for improvements involved larger consulting/treatment rooms with daylight and more privacy near the service desks and in the waiting areas.

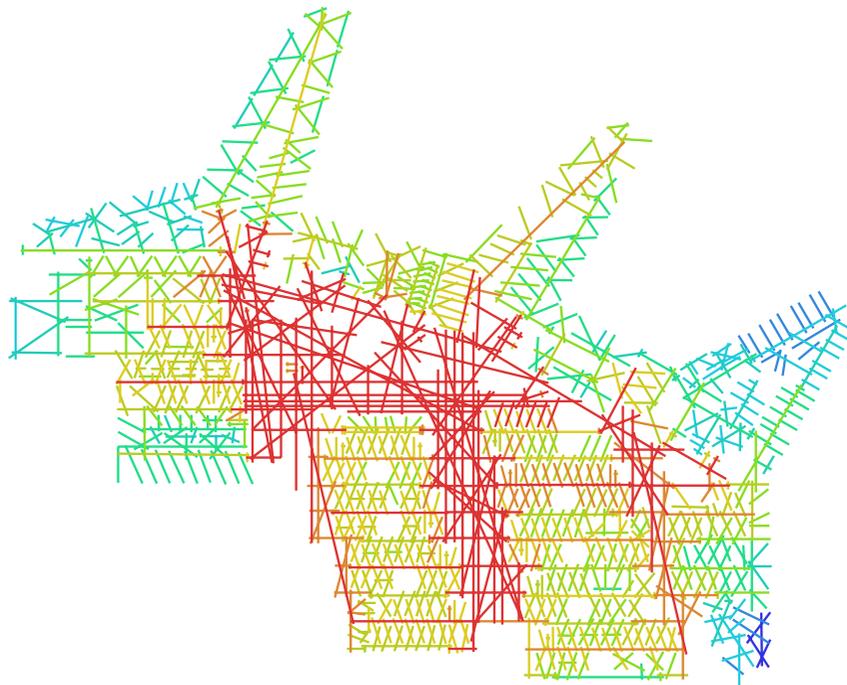


Figure 92 *Local integration of ground floor.*

One of the aspects related to patient well-being is the routing and orientation within the hospital. On the 18th of February 2011 students of the Art Academy Utrecht conducted an 18-hour observation of the main hall of the Deventer Hospital (Harmeling, Hurkmans, & van der Laan, 2011). Different research methods like a Nolli map, snapshot envelope, path shadowing, gate counts, place observation and interviews with visitors and patients were used to observe how the main hall of the hospital is used by visitors, patients and

staff. Harmeling et al studied the movement of people and the more physical aspects of the main hall, how this public space is used by patients and visitors, how the built environment supports the orientation of people in finding their routes. The healthcare environment is visualized in maps over a time period of 18 hours. The findings show places of stress in the design of the main hall and thus where the design of a healing environment could be improved by reducing these stress moments.



Figure 93 *Visual integration of the main hall.*

The snapshot envelope shows that experience of space in the main hall changes continually due to the sequence of different spaces. The space meanders and is never of the same width. This fragments the main routes into many small parts. After the natural flow towards the silence centre the clarity of space is lost, it is not clear if the area behind the silence centre is also accessible for visitors and patients.

The path shadowing shows the main routes through the main hall and the points of orientation of people on their route. The main routes seem to be guided by daylight that comes from the two storey-high glass roof. The main orientation points are in the area near the main entrance and the entrance from the parking garage. At this point, the information desk of urology seems to be more visible than the main information desk on the other side. This leads to confusion for patients and irritation for employees.

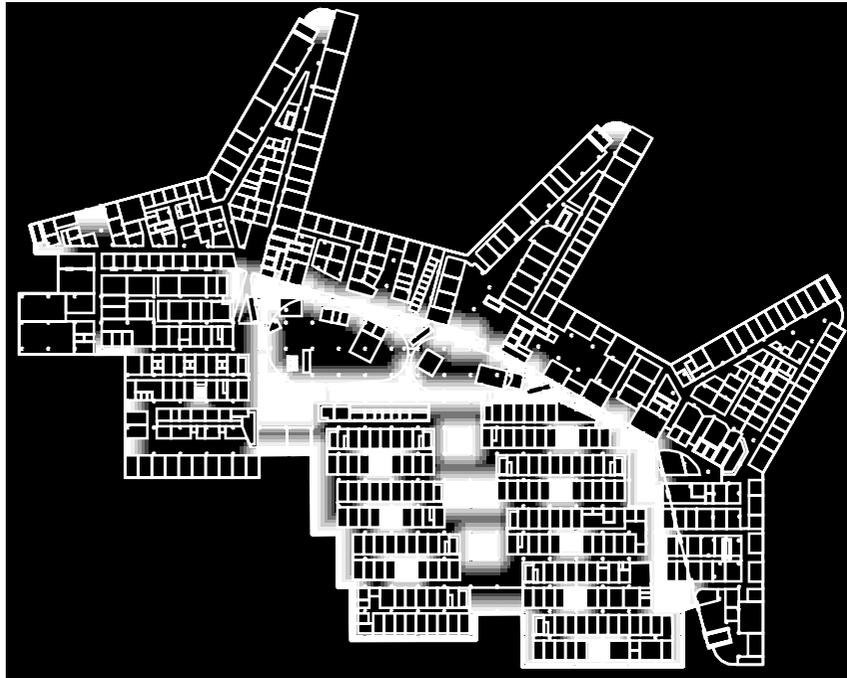


Figure 94 *Visibility of daylight on ground floor.*

Another orientation point is the area between the hairdresser and the pharmacy, which is also the entrance to the central waiting area for the outpatient department. Also the end parts of the main hall in the direction of the dialysis department and behind the silence centre are orientation points for patients.

Niemeijer (2013) conducted interviews in the summer of 2009 with the operational and medical managers for the internists, cardiologists, surgeons and orthopaedics in order to explore the advantages and disadvantages of the outpatient department. As the medical patient healthcare in the old building was already of a high level, the interviewees experienced no improvement of the medical care for patients in the new hospital.

In 2009 the flexible planning of consulting rooms did not work optimally due to an overcapacity of space (Niemeijer, 2013). Besides this, disciplines standardly scheduled consultation rooms without actual appointments with patients, to make sure that they were available for appointments if necessary. The surgeons had two consulting rooms dedicated to back-office activities. One room was in use as reading room for the surgeons and another room was used for surgery preparation activities. The rest of the consulting rooms in the front-office were used on a flexible basis by the surgeons. The orthopaedic department stated that the lack of capacity of rooms would influence future growth, as they were already using rooms from neighbouring disciplines.



Figure 95 Visible area from main entrance.

In 2009 the internists did not use the concept of front-office and back-office (Niemeijer, 2013). The back-office was not used by the internists due to resistance. This resistance resulted from the perception that they were not correctly heard in the initial and design phase. The internists mentioned that multifunctional consulting rooms are not appropriate for their working procedures. The internists therefore moved some back-office activities into the front office and personalized the consulting rooms using paper name tags on the doors. Due to the movement of back-office activities to the consulting rooms, the internists experience was that there was not enough daylight in their working area.

As for the front-office, the medical and operational managers reported that there was a lot of noise disturbance and smells from the employee restaurant in the main hall (Niemeijer, 2013). The smell in the waiting area was perceived as irritating and unprofessional. The wooden furniture was not used by patients and consequently there was not enough normal waiting seats near the service desks. There was also not enough daylight in the consulting rooms, particularly for those disciplines that spend most of their time in these rooms. All managers reported that the service desk employees felt isolated from the specialists and have less contact with colleagues. Also the opening hours of the service desks (8 am to 5 pm) lead to exploitation losses.

The interviewees reported that the introduction of the back office resulted in more informal contacts between specialists of different disciplines, but those occasional meetings did not result in less or shorter formal (interdisciplinary) meetings (Niemeijer, 2012). In the back-office, the concept of only non-personalized flex workplaces proved to be unrealistic. Overcapacity of workplaces meant that employees claimed and personalized their own place. This was mostly done by the employees who worked 4 or 5 days a week. Management did not consider this development to be undesirable. There were complaints of disturbance by noise in the back-office. The telephone service in the open back-office proved to be impractical. The noise level was disturbing, both for the person on the phone and for the employees working nearby. The coffee corners and people passing by also disturbed quiet work. A lot of workplaces for concentrated work were therefore claimed for long periods of time, resulting in not enough of these quiet workplaces.

§ 9.2 Different priorities of added values in different phases

Documents, research reports, interviews and publications on the Deventer Hospital so far show that in the several phases of the building cycle, different added values were more important than others.

Initiation phase

In the initial documents, the focus was mainly on improving productivity by efficient planning of healthcare processes in combination with patient satisfaction and flexibility of the hospital building. A building that fits the needs of patients seems to be the main goal behind these decisions. Therefore patient satisfaction seems to be the most important added value in this phase, although employee satisfaction and the organisational culture are also mentioned as important values, although both as enablers for improving patient satisfaction and productivity. Flexibility is described as one of the main objectives for the new building: standardisation of space should make flexible use possible. The scheme of the healthcare concept is the most important drawing in the initial phase of the Deventer Hospital. This scheme that positions the Deventer Hospital as a healthcare organisation in its context, expresses the four patient flows, embedded between patients and general practitioners on one side and home care outside the hospital on the other side of the healthcare chain.

Design phase

During the design phase organisational culture became more important, which is visible in the focus on the functional concept with a front- and back-office. The main question in the design phase seems to be how the healthcare professionals are

supported in their activities, the impact on the organisational culture and how this is reflected in the design. Standardisation of the consulting rooms in the outpatient department and separating the places for not-patient-related administrative work in the staff accommodation is a clear attempt to influence the organisational culture by real estate. This functional concept resulted in a flexible outpatient department for elective and chronic healthcare, as the most future changes in the delivery of healthcare are expected in out-patient elective and chronic healthcare. Besides the functional concept that separates front- and back-office, the spatial concept seems to be the main design decision in this phase. This spatial concept divides the building into a back side (backbone) with the clinical functions and wards towards the surrounding landscape and a front side (terminal) that includes the main hall and outpatient department. Changeability of these two parts of the building is related to the construction method and the installation techniques used. The chosen construction makes the outpatient department and staff accommodation flexible in use, expandability and changeability of space, but the clinic and more specific functions of the hospital in the backbone are less flexible.

Construction phase

During the construction phase of the Deventer Hospital, the hospital as healing environment came into focus. Choosing natural materials and colours, the use of daylight, art and natural elements in the interior design and the human scale of the building, makes this design a healing environment *avant la lettre*. The concept of four patient flows influenced the chosen materials, colours, art and use of nature in the acute/urgent and elective/chronicle clusters.

Occupancy phase

Since 2008 several evaluations have been carried out. Evaluation of the added values of real estate in the Deventer Hospital show that improving user satisfaction and organisational culture are perceived as important values in the occupancy phase of the hospital building. As for patient satisfaction, this is related to the visibility of patients in the public areas of the building including the waiting facilities, orientation, routing and daylight.

A post-occupancy evaluation among medical staff and employees showed that daylight in the outpatient department, connectivity in the back-office and routing between back-office and nursing wards are points for improvement.

§ 9.3 Reflection on the design assessment as research method

This case study intended to be a first validation of the drawing techniques by linking them to the available Post Occupancy Evaluations and other documents from the occupancy, initiative and design phase. During the case study it became clear that this validation is not yet realistic, despite the available documents which include an 18-hour observation of the central hall. An assessment of the built physical environment and the influence of the environment on patient well-being in the Deventer Hospital has not been found. Validation of the drawing techniques requires a specific study in which research findings from the design assessment are tested in practice by measuring the same aspects in the built environment in order to improve the design assessment tools instead of validating the results of POEs by illustrating them with floor plan analyses.

This case study demonstrates that the end stage of the final design is the best phase for spatial analyses because at that time the floor plans are sufficiently accurate. The analytical instruments seem to be first of all assessment tools to test the design in the final part of the design phase instead of design tools that can be applied during the design phase itself. However, the instruments can be used for spatial analyses during the design phase in order to make the effects of the design solutions visible for users. This makes testing user-value possible in the design phase, in which usually mainly production-value and future-value are key. The analytical instruments are mainly for the architects to use to show the client how the design contributes to the achievement of pre-formulated added values of real estate. As such, this type of research and analysis contributes to the practice of design by looking at the architectural design from the perspective of the added value of real estate.

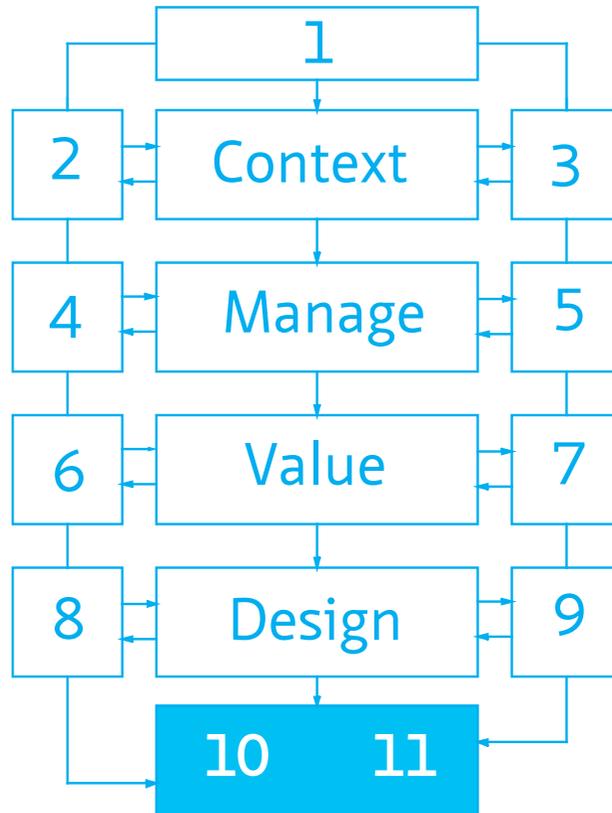
Table 45 presents the different phases of the building cycle of the Deventer Hospital in relation to the added values perceived as most important during that particular phase. This table shows the shift of focus between the different phases and the design-related aspects connected to these added values.

phase	value	design	assessment
initiation	improving productivity by efficient organisation of healthcare	consequences of patient flow for the construction of a new hospital.	image of the building patient flows position acute/urgent/elective/chronic clusters flexibility of clusters standardising consult rooms
design	patient satisfaction and flexibility in the building concept	backbone - main hall - terminal	position of departments in building clinic, outpatient clinic and staff accommodations
	improving organisational culture by introducing front- and back-office	back- and front office concept and office concept for staff accommodation	working process working environment working place
construction	improving image and patient satisfaction	healing environment	used materials art as part of healing environment interior design role of nature in design
occupancy	user satisfaction and improving culture cost reduction and productivity innovation and image flexibility risk and financing real estate	translation of added values to the design of the hospital	user satisfaction and organisational culture as main added values
	patient satisfaction related to orientation, routing.	sequence routing connectivity	movement through space routing of patients and staff in main hall places of stress in orientation
	patient satisfaction	privacy & autonomy windows & view outside comfort & control facilities routing & orientation interior design nature employee facilities	

Table 45 Main added values related to four phases of the building cycle.



PART 5 **Toolbox & final conclusions**



10 A toolbox for value-adding management & design

Which conceptual frameworks can be applied and which tools can be used to support hospital real estate design and management?

This thesis began with the question of how accommodation can contribute to the achievement of a hospital's organisational goals and how the concept of the added value of real estate can be used in the management and design of hospital buildings. Existing conceptual models were examined and compared and made applicable to the hospital sector, resulting in the design of a toolbox of instruments that can contribute to the decision-making process regarding hospital accommodation. This toolbox enables the context, value, design and management of accommodation to be brought into focus and is intended to provide a reference for the alignment between real estate and an organisation.

Table 46 lists the instruments for accommodation management with a brief description of what the instrument is doing, when it can be best used (occupancy, initiation or design phase) and who is involved in the application of the instrument (hospital board, real estate manager, healthcare manager or architect). For further explanation about how the instrument should be used, the table refers to the relevant paragraphs in this chapter.

tool	purpose	phase	applied by	
10.1	context-mapping	positioning organisation in context	occupancy / initiation	CEO
10.2	meta-model	coordination in outline for positioning accommodation relative to organisation	initiation / design	CEO
10.3	integrating framework	operationalization meta-model with existing organisational and CREM models.	initiation / design	real estate manager and healthcare manager
10.4	triple assessment	comprehensive assessment in five stages of organisational and accommodation management	occupancy / initiation	real estate manager and healthcare manager
10.5	added value of hospital real estate	broadly define how accommodation contributes to organisational performance	occupancy / initiation	CEO and real estate manager
10.6	value-impact-matrix	operationalization of accommodation by linking added value of real estate to real estate perspectives	initiation / design	real estate manager, architect and end users
10.7	design assessment	assessment of added values of real estate in the architectural design	design	architect

Table 46 A toolbox to support hospital accommodation management.

The different instruments can be used independently of each other, but can also be combined with each other. The model for context-mapping (10.1) gives an overview of contextual factors. The results from this context analysis can be used as input for the meta-model (10.2) and the integrating framework (10.3) for accommodation management. The meta-model outlines the steps to be completed in the decision-making process. The integrating framework can then be seen as the operationalization of the meta-model with the existing models from organisational management and real estate management (CREM). In this further development of the meta-model the various decision-making steps are further explored and developed by the real estate manager in conjunction with healthcare managers. The hospital board oversees this process at a higher level of abstraction. The triple assessment (10.4) can be used to test the coherence and consistency of all the components of the integrating framework. In addition, this assessment provides a perspective on alternative ways to manage both organisation as real estate. The alignment between these added values and the organisation's key issues for success shows clearly the ways in which accommodation contributes to the overall goals of the organisation. The value-impact-matrix (10.6) is then the further operationalization of these added values by linking them to different perspectives on real estate (strategic, financial, functional and physical). Using this value-impact-matrix, accommodation decisions can be formulated that form the basis for the assessment of architectural design (10.7) on added values of real estate.

The toolbox provides guidelines for the distribution of responsibilities and tasks between the hospital board, real estate manager, healthcare managers and architects in various phases of occupancy, initiative and design. The hospital board determines the outline of alignment between the organisation and real estate with the meta-model, context mapping and added values of real estate. In conjunction with the healthcare managers, the real estate manager is responsible for the operationalization of both the various components of the meta-model in the integrating framework of accommodation management and the added values in the value-impact-matrix. The architect is the one who can contribute to the attainment of added values by making these values measurable in the design phase.

§ 10.1 Context-mapping

Context-mapping positions the organisation in its context by making a map of contextual factors, sector-specific trends, future scenarios and stakeholders' objectives. This context analysis makes visible which circumstances the Board must consider when deciding on long-term investments.

Who	hospital board	how	analysis of the context factors and interests of stakeholders by describing and interrelating these factors. Contextual factors are translated into sector-specific trends and future scenarios. The result of context-mapping is formulations of stakeholders' objectives that can be used as input into the meta-model (10.2) and integral model (10.3) for the management of hospital real estate.
when	occupancy / initiation phase		
example	chapter 3, analysis sector and case study Gelre Hospital		

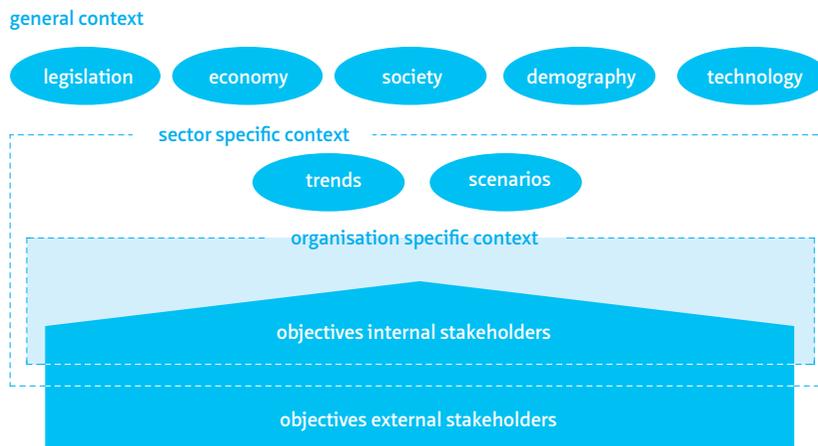


Figure 96 Context-mapping.

Long-term accommodation decisions start with a clear analysis of the context in which the organisation has to operate. Comparable to existing methods such as the DESTEP and PESTEL, context-mapping describes the general context of political, economic, social, demographic and technological developments. In addition, a sector-specific context is analysed with trends and scenarios for the future. Contextual changes take place at different levels, from national to international, regional and local. This requires an understanding of the sector as a whole, the organisation-specific context, and the organisation's internal and external stakeholders. All this is brought together in the model for context-mapping (Figure 96).

Context-mapping elaborates on an adaptation of De Vries (2007) model of real estate added values for colleges. The adaptation is based on document research and a questionnaire distributed to CEOs and real estate project managers recently responsible for the construction of a new hospital facility in the Netherlands. Additions to the existing model include the item 'technology' in the general context and sector-specific context as a link between the general context and the organisation. The sector-specific context includes descriptions of the trends and scenarios for the future and how the hospital sector can contribute to a solution to changes in the context. The last alteration is the division into external and internal stakeholders. External stakeholders are not directly involved in the delivery of healthcare and include the government, which provides the legal framework within which healthcare must be delivered, the healthcare insurers, who are responsible for the funding of healthcare, and financial institutions which provide loans for investment in healthcare real estate. Internal stakeholders actively participate in the delivery of healthcare and include patients, visitors, healthcare professionals and the hospital board who is ultimately responsible for the real estate investment in relation to the quality of healthcare.

Because the instrument for context-mapping positions the organisation as a link between the external environment and the stakeholders' objectives, this model provides an overview of the contextual dynamics. This is not only important for decisions regarding real estate, but also for the entire healthcare organisation. Changes in one of the contextual factors can form the starting point for a review of the organisation's strategy and matching accommodation strategy. This model describes the external context and all external and internal stakeholders but not the organisation itself. By combining context-mapping with models that describe the organisational context, a clear distinction is created between the contextual factors which the organisation needs to respond to and the internal organisation with its own organisational context, policy and strategy. The organisation-specific context is further elaborated in the meta-model (10.2) and the integrating framework for the management of hospital real estate (10.3).

§ 10.2 Meta-model for managing real estate

The meta-model positions real estate in relation to the organisation and parallels accommodation decisions and organisational processes. The meta-model supports the decision-making process by providing a roadmap for the alignment of real estate, the organisation of the primary process and guides the decisions to be made.

who	hospital board	how	In consultation between real estate manager, healthcare managers and stakeholders, the decision-making steps are determined. These steps consist of matching: (A) perspectives on real estate (5) <-> stakeholders' objectives (1). (B) added values of real estate (6) <-> organisation's key issues for success (2). (C) managing the accommodation (7) <-> changes in the organisation (3) (D) (re) design of the accommodation (8) <-> (re) design of the primary processes (4).
when	initiation / design phase		
example	chapter 5, case study Maasland Hospital Sittard		

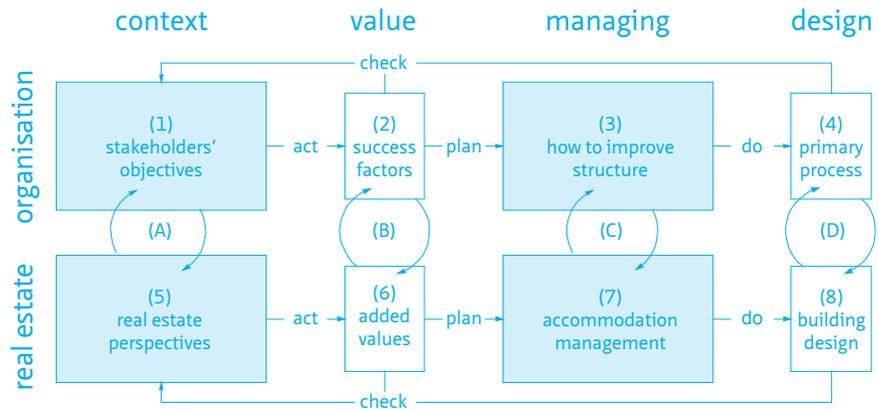


Figure 97 Meta-model for aligning real estate management to the organisation.

Positioning real estate with respect to the organisation is part of CREM. There are therefore various models linking real estate goals to organisational goals described in the literature. However, many of these real estate models describe the organisational aspects without clarifying their interdependence within the organisation. To fill this gap, the way in which conceptual models in the literature of real estate management can be linked to business models was examined. To this end, quality models were used as abstract representations of the organisation and/or its processes. Quality management can be seen as a cyclical process of defining and steering towards attaining performance goals, assessing whether the pre-set goals have been achieved and, when necessary, taking action to improve the outcomes. An important principle is

the plan-do-check-act cycle as described by Deming (1950). In addition, quality can be described in terms of structural, process and outcome criteria (Donabedian, 1988).

The meta-model (Figure 97) supports the decision-making process in which organisational and real estate management are aligned. Paralleling a conceptual description of the organisation based on quality management and real estate makes it possible to align accommodation decisions in relation to (changes in) the organisation. The meta-model shows how in three steps (context, values and management) the management of the organisation and real estate can (re-)design the primary process (4) and accommodation (8).

The model can be used in different ways. For example, to first analyse the organisation and its processes, and when necessary redesign the primary process, followed by analysis and tuning of the accommodation to the (new) organisation. Another possibility is to use the meta-model results in a more interactive approach of alignment between the organisation and accommodation, phased in four steps:

(A) Immediately after the determination of the stakeholders' objectives based on context-mapping (1) looking at the matching perspectives on real estate (5).

(B) Formulating the organisation's success factors (2) accompanied by a translation into added values of real estate (6).

(C) Parallel to changes within the organisation (3) looking at the implications for the accommodation's management (7).

(D) This results in a (re-)design of the primary processes (4) parallel to the (re-)design of the accommodation (8).

The meta-model for the management of organisational and real estate management is innovative because this model is able to connect existing conceptual frameworks. The meta-model can be operationalised with different models of both organisational management and real estate management (see for example 10.3). The logical connection between existing conceptual frameworks creates clarity and a framework that makes accommodation part of the planning process and the organisation's strategy in various phases of decision-making. The meta-model describes a clear and simple roadmap for linking accommodation decisions to changes within the organisation. In this way, the quality of the accommodation is considered parallel to the organisation of healthcare, whereby the conceptual models of real estate management are used as instruments with the plan-do-check-act cycle (Deming, 1950) as a guide.

§ 10.3 An integrating framework for managing hospital real estate

The integrating framework is a specification of the meta-model that supports decision-making. At the organisational level, the elaboration consists of the EFQM model. Regarding real estate the specification consists of the perspectives on real estate, real estate added values and Designing an Accommodation Strategy (DAS) frame. The link between models on quality of healthcare and CREM models supports decision-making at different levels in the organisation.

who	real estate managers in cooperation with healthcare managers	how	<p>In consultation with stakeholders, all the steps in the meta-model are completed and matched. These steps consist of:</p> <ol style="list-style-type: none"> (1) Determination of appreciation of the organisation's end results by society, patients and employees. (2) Translating stakeholders' objectives into organisational key issues for success. (3) Designing a plan for the organisational change of the healthcare process by focusing on leadership, employees, strategy, policy, and management of production resources. (4) The (re-)design of primary healthcare processes. (5) Describing strategic, financial, physical and functional perspectives on real estate (6) Determination of the added values of real estate which meet the key issues for success. (7) Managing the accommodation as one of the production resources by matching the current supply to the current and future demand for real estate. (8) (Phased) implementation of the (re-)design of the accommodation parallel to the changes in the organisation
when	initiation / design phase		
example	chapter 5, case study Maasland Hospital in Sittard		

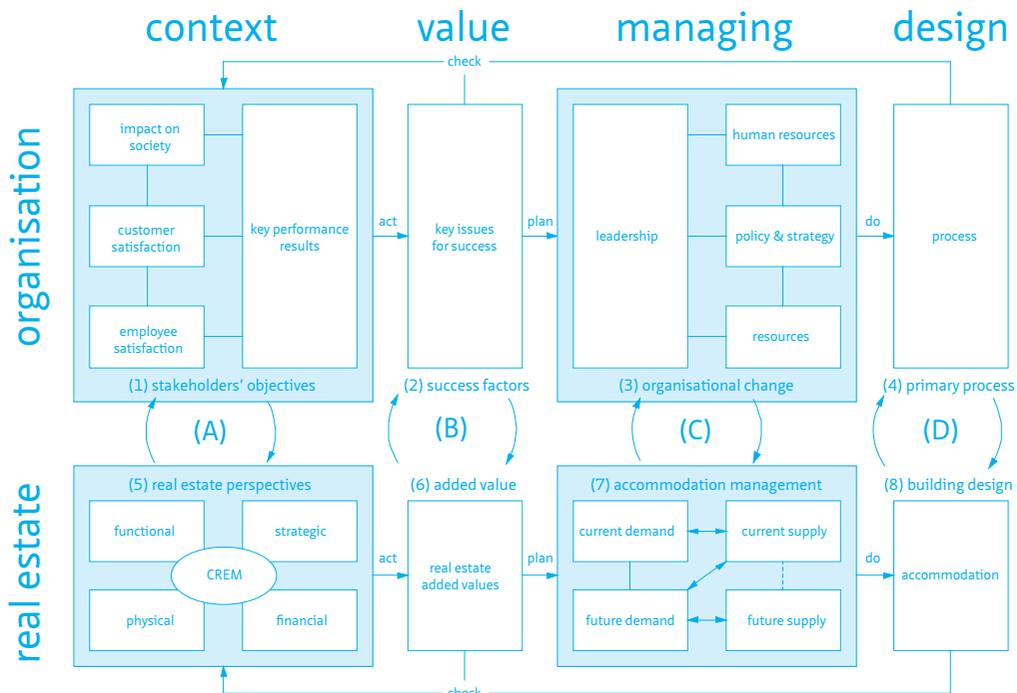


Figure 98 An integrating framework for managing hospital real estate.

Literature on quality management in healthcare shows that the EFQM model is commonly used by hospitals, both within and outside the Netherlands. In the integrating framework, the steps at the level of the organisation are therefore completed by the steps of the EFQM model. The steps at the level of real estate are completed by: (5) strategic, financial, functional and physical perspectives on real estate; (6) the added values of real estate; (7) the DAS-frame for matching supply and demand of the accommodation and; (8) the architectural design of the accommodation. In addition to context-mapping (10.1), the value-impact-matrix (10.6) is a useful instrument to link both perspectives on real estate and the added values of real estate in order to determine ex ante the accommodation goals. Then a plan can be made wherein the accommodation strategy is developed (7). In this step, it is important that the current and future demand for real estate are compared with both the current supply and thereby the appropriate future supply. The architectural design transforms the current supply into a future supply in order to match the future demand for accommodation (8). As a final step before construction, a design assessment (10.7) can be performed to check whether pre-set accommodation targets are attained in the design.

The integrating framework for the management of hospital real estate was tested by means of an ex-post case study of the Maasland Hospital in Sittard. The construction of this hospital was initiated as a hospital of the 21st century, which resulted in redesigning both the healthcare processes and the necessary infrastructure. The case study showed how organisational goals, strategy and decisions were converted into perspectives on real estate, added values of real estate and a building concept. The link between the organisational level and the real estate level constituted a clear distinction between the organisation's transformation process and that of the real estate.

§ 10.4 Triple assessment of organisation and real estate

Triple assessment makes it possible to examine the organisational structure, control of primary process and real estate in a similar way. Assessment of organisation and real estate shows where the organisation stands, how real estate is controlled and what level of ambition is pursued. This instrument can therefore be used as a tool for attaining organisational and accommodation goals and ambitions.

who	healthcare managers in cooperation with real estate managers	how	In consultation with the board an inventory is made of the applicable organisational structure, how the primary process is controlled and improved and how real estate management is positioned in the organisation. Subsequently, the Board determines the appropriate level of ambition to react as an organisation to external contextual factors. Based on the level of ambition, the improvement of both the organisation and real estate management can be initiated. As a first step, the items should be specified in which each component (organisational structure, managing primary process and real estate management) has to be assessed. The items of the integrating framework can be used (10.3) for this. The assessment involves determining the level of each item. Five levels of organisational orientation are described in the tables in Chapter 5 (product, process, system, chain and society). Any additional item can be completed based on Table 47. After the inventory a check is done of whether all the items match regarding the desired target level and which items have to be enforced to reach that desired level of ambition.
when	occupancy / initiation phase		
example	chapter 5, casestudy Maasland Hospital Sittard		

EFQM-INK		five organisational configurations		evolutionary stages of real estate	
product oriented	<ul style="list-style-type: none"> * hierarchical organisation * craftsmanship * top down communication * task culture 	simple structure	<ul style="list-style-type: none"> * strategic top * direct supervision * vertical and horizontal centralisation 	task manager	<ul style="list-style-type: none"> * technical focus * supply needs for real estate * engineering buildings
process oriented	<ul style="list-style-type: none"> * primary process identified * leadership focus on process * horizontal communication * process improvement 	machine bureaucracy	<ul style="list-style-type: none"> * technostructure * standardisation of processes * horizontal decentralisation 	controller	<ul style="list-style-type: none"> * cost reduction * analytical approach * information on RE objects * benchmark
system oriented	<ul style="list-style-type: none"> * secondary processes described * targets and goals * indicators in process * optimising services 	professional bureaucracy	<ul style="list-style-type: none"> * operational core * standardisation of skills * vertical and horizontal decentralisation 	deal maker	<ul style="list-style-type: none"> * create financial value * problem solving * standardisation of real estate * flexible internal RE market
chain oriented	<ul style="list-style-type: none"> * chain of subcontractors and customers is analysed * insourcing / outsourcing 	divisionalised form	<ul style="list-style-type: none"> * middle line * standardisation of output * vertical decentralisation 	intrapreneur	<ul style="list-style-type: none"> * internal RE company * proposing solutions * external market options
society oriented	<ul style="list-style-type: none"> * open dialogue with society * front runner in development * shared values with society 	adhocracy	<ul style="list-style-type: none"> * support staff * informal communication * selective decentralisation 	business strategist	<ul style="list-style-type: none"> * anticipate on trends in society * measuring and monitoring results * contribute value to organisational objectives

Table 47 Triple assessment of organisation and real estate.

In the literature similarities were found between three different assessment tools in the field of organisational structure, organisational development and management of real estate:

- the classification of organisational structures (Mintzberg, 1993),
- the evolutionary steps in CREM (Joroff et al., 1993),
- The stages of organisational development (EFQM, 1997).

Each of these assessment tools makes use of a 5-point scale which describes the different stages of development distinctly oriented towards product, process, system, chain and social context. This makes it possible to parallel these three scales for the assessment of real estate in the organisation with respect to the primary process. Table 47 gives an overview of the five stages of organisational development, structure and real estate.

Triple assessment makes it possible to position the organisation and its real estate management in relation to other companies and institutions by using the meta-model (10.2) and integrating framework for the management of hospital real estate (10.3). This also creates the opportunity to learn from other sectors. Paralleling the assessment scales to the EFQM model ensures a high face-value for organisations used to working with this model. Triple assessment of the organisation and the real estate offers new insights into the decision-making on accommodation and contributes to raising awareness of the management of real estate on an operational, tactical or strategic manner. However, further validating scientific research is needed on the parallels between the scales. An assessment of various organisations would make this possible.

A first step in the validation of triple assessment is the case study of the Maasland Hospital in Sittard, in which the practical applicability of the meta-model as a structuring tool is studied (Chapter 5). In this case study all the items of the integrating framework are described in five phases of development based on an assessment for healthcare organisations issued by the Dutch Quality Institute (Instituut Nederlandse Kwaliteit: INK) and the real estate thermometer (Van Hasselt, 2005). Missing items are completed based on the literature. The case study demonstrates that an assessment using the five stages provides insight into the current and/or desired strategy on the level of organisation and real estate. Triple assessment shows where the organisation stands, how real estate is controlled and what level of ambition is pursued. In addition to an initial validation of the triple assessment, the case study in Chapter 5 can also be used as a manual for the use of triple assessment and the application of the integrating framework for the management of hospital real estate.

§ 10.5 Framework for added values of hospital real estate

Definitions and categorisation of the added value of real estate contributes to the communication between organisational managers, real estate managers and architects by providing a common language in which accommodation goals are determined in order to be measured and discussed in the design and occupancy phase.

who	real estate manager	how	Based on literature and in consultation with stakeholders the added values of real estate are defined that are decisive for the organisation. In each organisation and sector other accents can be made. The categorisation of user-value, production-value and future-value serve as a reference. It is up to the real estate manager to translate organisational objectives into the added values of real estate. The architect can then take these values into account in the design process and make them measurable in the architectural design.
when	initiation phase		
example	chapter 7, added value of hospital real estate		

cluster	definition hospital real estate added value		
user-value	The way the physical environment is experienced by people and evaluated in daily use. This connects directly to the organisation as a form of cooperation between different people who want to achieve their goals.	organisational culture & innovation	Encouraging communication and innovation by improving interpersonal relationships within the organisation.
		patient satisfaction & healing environment	Positively influencing the healing process by pleasant accommodation facilities for patients.
		employee satisfaction	Functional, enjoyable and comfortable workspace for employees.
production-value	Functional suitability and effectiveness in use means that a building is effective in a functional sense and meets the desired usage. Appropriate dimensions, positioning of the program and routing within the complex are important aspects.	reduce accommodation costs	Reduction of accommodation costs such as investment, capital, operating and maintenance costs.
		increase productivity	Increasing productivity through more effective and efficient use of the accommodation.
		use flexibility	Spatial and technical flexibility to adapt the accommodation to changes in healthcare processes.
future-value	Efficiency in time, which implies sustainability of the design and suitability for re-use so that the building can maintain quality and value.	support image	Propagating organisational values by using the building as an icon of the organisational culture.
		reduce risk and increase financial possibilities	Anticipating future technical and financial risks by considering real estate as an asset.
		sustainability	Reducing energy, water and materials usage to maintain affordable healthcare with increasing commodity prices.

Table 48 Added value of hospital real estate.

Value is defined in this study as the valued performance of a product or service that contributes to the achievement of the goals set by the stakeholders. As a consequence, value depends on the (subjective) assessment of stakeholders. Added values of real estate therefore have to be defined in advance (ex-ante) to enable the stakeholders' goals to be pre-set. In this way the goals can then be tested ex-post in the design.

The concept of adding value by real estate is in line with the practice of the hospitals recently involved in constructing new facilities. Prioritizing the added values of real estate emerged in a clustering of values into three categories: (1) user-value, (2) production-value and, (3) future-value. This classification establishes a link between the added values of real estate and the spatial quality of the architecture. User-value includes stimulating innovation, user satisfaction and improving the organisational culture and focuses on the spatial experience of the accommodation by users. Production-value focuses on the cost of accommodation as part of the price of production, productivity and flexibility to change the spatial environment to the production process. Future-value refers to the contribution of accommodation to the image of the organisation in society, risk and using the financial value of real estate for financing primary processes and flexibility in terms of conversion opportunities for re-use and future expandability.

By linking added values to the success factors of the organisation and looking at how these values are translated into the architectural design of hospitals, the definition of the added values of hospital real estate contributes to the use of these values as a common language between the different disciplines. As such, the added value of real estate forms the bridge between the different mind-sets of organisational management, real estate management and architecture. The research into the added values of real estate for hospitals also made clear that a sector-specific definition of the added values of real estate can contribute to their applicability in the hospital sector. In particular, the splitting of user satisfaction into patient and employee satisfaction is important. The definitions can be used to define and assess accommodation targets in the initiation, design and use phase of the building. Categorising and labelling the nine added values of real estate into three types of values makes it also possible to add other values based on additional literature or expert interviews. As such, sustainability as an added value of real estate is included in the category of future-value and healing environment in the user-value cluster.

§ 10.6 Value-impact matrix

The value-impact matrix provides insight into how accommodation design solutions can contribute to real estate added values and on the other hand contribute to the strategic, financial, functional and physical goals arising from the different stakeholders' objectives. The value-impact matrix is a tool to perform discussions with end-users on the added values of real estate during the initiation, design and occupancy phase of the building.

who	real estate managers	how	During the initiation phase an inventory is made of possible accommodation design solutions by means of focus group discussions with stakeholders. These solutions can be positioned in the accommodation-matrix relative to the added values of real estate and the strategic, financial, functional and physical perspectives on real estate in order to examine how the different values can be attained and all stakeholder interests simultaneously met. Conflicting interests can be discussed and balanced.
when	occupancy / initiation / design phase		The first step is to determine the added values (see 10.5) and the interpretation of the perspectives on real estate based on the desired outcomes for the stakeholders (see 10.1 and 10.3). Accommodation solutions can then be presented to the stakeholders with the question of how this solution is measured and what added value and stakeholders' objectives are met by this solution. In the design and occupancy phase these solutions can be assessed in order to measure the attainment of the pre-set values.
example	chapter 7		

Translating stakeholders' objectives into perspectives on real estate and the added values of real estate is a crucial step in aligning the accommodation strategy with the organisation's overall strategy. To support this step the value-impact-matrix was developed, in which accommodation decisions are related to both the added values of real estate and real estate perspectives from different stakeholders' objectives. The matrix is a tool which enables discussions on accommodation design solutions with various stakeholders during the initiation, design and occupancy phase. In the initial phase the accommodation goals are defined to enable an assessment of the spatial environment on the attainment of added values during the design and occupancy phase. Using the nine added values of hospital real estate (10.5) in addition to the categorisation of user-value, production-value and future-value can serve as a starting point in defining accommodation goals. In focus groups with users and stakeholders an inventory of adequate accommodation solutions can be conducted by positioning this solution in the value-impact-matrix. Whether all values and perspectives have been adequately addressed and are in equilibrium with each other can be checked after the inventory. Consistently approaching values from different perspectives enables the versatility of the values to become clear.

		perspective on real estate			
		strategic	financial	functional	physical
		adding value to organisational goals: how and to what extent are strategic organisational objectives achieved or obstructed by real estate?	value, resources and costs: what are the financial consequences of the accommodation on resources, real estate value, and life cycle costs?	fitness for use: how and to what extent is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
user-value	organisational culture & innovation	Improving interpersonal relationships and communication within the organisation by creating meeting places for the medical staff and healthcare professionals. This contributes to an organisational culture of information exchange between professionals in order to improve and innovate healthcare processes and services. These meeting places include staff centres with space for specialists for their back-office operations, consulting rooms and classrooms for exchanging knowledge.			
	Encouraging communication and innovation by improving interpersonal relationships within the organisation.	The building supports the interaction between people and contributes to improving communication between staff and healthcare professionals with a focus on fewer medical mistakes.	Higher accommodation costs are recouped through efficient care.	Choice for front-office and back-office concept and design of workplaces (flex workstations, desk sharing or private rooms) influences human interaction.	Attention to the architectural quality of places for interaction such as workplaces, consultation rooms, restaurant, staff skills labs and knowledge centres.
	patient satisfaction & healing environment	Patient satisfaction is related to the welfare of patients and the contribution of the physical environment to the healing process. Aspects of patient satisfaction are: view of nature, light, materials, noise, orientation & routing, privacy in doctor's offices and nursing rooms.			
	Positively influencing the healing process by pleasant accommodation facilities for patients.	The building contributes to the healing of patients and as such contributes to a better positioning of the hospital in the healthcare market.	Higher accommodation costs are recovered through a shorter hospital stay and higher occupancy due to higher patient satisfaction.	The built environment contributes to a smoother healing process by reducing stress for patients.	Architectural quality of patient areas such as surgery and (individual) nursing room with extra attention for a view on nature, natural light, materials, noise reduction, privacy and orientation and routing through the building.
	employee satisfaction	The satisfaction of employees is an important added value in any professional bureaucracy and the accommodation must support this. Healthcare professionals are the key staff in a hospital. This implies functional and comfortable workplaces for effective and efficient delivery of healthcare to patients.			
	Functional, enjoyable and comfortable workspace for employees.	Attracting and retaining well-qualified staff in an increasingly tight labour market.	Weighing possible reduction of staff turnover relative to higher investment in accommodation.	Processes where the medical healthcare process is central relative to processes where the patient is central.	Attention to architectural quality and functionality of workplaces.

Table 49 Value-impact-matrix.

		perspective on real estate			
		strategic	financial	functional	physical
		adding value to organisational goals: how and to what extent are strategic organisational objectives achieved or obstructed by real estate?	value, resources and costs: what are the financial consequences of the accommodation on resources, real estate value, and life cycle costs?	fitness for use: how and to what extent is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
production-value	reduce accommodation costs	Reducing accommodation costs has a direct impact on the prices charged for healthcare products and services. Examples include low investment costs in new buildings or renovation, a fixed space budget for departments and the life-cycle costs of accommodation including maintenance and energy costs.			
	Reduction of accommodation costs such as investment, capital, operating and maintenance costs.	Aiming for lower life cycle costs for the accommodation and to reduce the required number of square meters. This calls for investments that are appropriate to the scale of the building.	Reduce accommodation costs by minimizing initial investment, operating and maintenance costs.	Reduce demand for space by flexible joint use of consultation rooms, workstations, and offices.	Sober plans with slim-fit buildings that are appropriate to the demand for space and reduce energy costs by sustainability in order to make the hospital less dependent on traditional energy.
	increase productivity	More efficient use of the available space is possible by separating the front-office and back-office, using generic consulting rooms that can be used by several medical specialists at different times during the week. Increasing productivity should also ensure that healthcare professionals can do their work properly and efficiently. Separating patient flows (acute, urgent, elective and chronic) from employees and goods flows.			
	Increasing productivity through more effective and efficient use of the accommodation.	Ensure that professionals can perform properly and efficiently so that more healthcare can be delivered by the same resources or the same healthcare with fewer resources.	Determining (annual) budget of space for each department based on actual sales, production and the percentage of empty beds.	Optimal support by the accommodation for healthcare processes.	Logistics flows (goods, staff and patients), separated spatial clustering, and centralization of highly technical facilities (hot floor).
	use flexibility	Flexibility in use focuses on the extent to which the building can adapt to changes in healthcare processes without major modifications to the building. This type of flexibility makes it possible to organise the workplace according to the primary processes and this is a prerequisite for the innovative capacity of the organisation to improve healthcare processes.			
	Spatial and technical flexibility to adapt the accommodation to changes in healthcare processes.	Supporting changing care processes throughout the economic lifespan of the building.	Investments in future flexibility and expandability, adjustments based on new business plans including initial investment and depreciation of unused space.	Standardising offices, consultation rooms and nursing rooms.	Robust building that allows different layouts by separating structure, technical equipment and spatial configuration.

Table 49 Value-impact-matrix.

		perspective on real estate			
		strategic	financial	functional	physical
		adding value to organisational goals: how and to what extent are strategic organisational objectives achieved or obstructed by real estate?	value, resources and costs: what are the financial consequences of the accommodation on resources, real estate value, and life cycle costs?	fitness for use: how and to what extent is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
future-value	support image	The building as an icon adds to the sustainable position of the hospital organisation in society. Real estate can contribute to the positioning in society by means of the architecture of the hospital building.			
	Propagating organisational values by using the building as an icon of the organisational culture.	Improve the competitive position of the hospital in attracting both patients and staff.	Additional investment in the architectural quality of the building compared to gaining extra revenue by competitive advantage.	A building in which patients feel at ease and welcome contributes to stress reduction and is part of a healing environment which will increase patient satisfaction.	Good location and accessibility, high architectural quality of the building where the human dimension is central.
	reduce risk and increase financial possibilities	Risk and financing of real estate focuses on the future potential of the physical environment in which adaptability and reuse opportunities are important aspects of future flexibility. In hospitals this is mainly associated with the layer approach, in which the hospital is divided into four types of real estate: hot-floor, hotel, office and factory. It is also possible to create land value for future use by developing a purposeful location.			
	Anticipating future technical and financial risks by considering real estate as an asset.	Balancing between real estate as an asset that must yield revenue as a financial investment, or as a production factor that can make money by producing healthcare services during the lifespan of the building.	Marketability and re-use possibilities contribute to real estate as an asset and location-value can be promoted through area development around the hospital.	Balancing between optimising the healthcare process during the lifespan of the building relative to marketability for re-use of the building after the economic lifespan.	Dividing the building into different layers (hot-floor, hotel, office, and factory) so that building components can be used independent of each other.
	sustainability	Within hospitals, sustainability focuses mainly on reducing energy costs so that healthcare can continue to be delivered in the future despite increasing energy prices. This means that investments are made in the re-use of waste-energy from industry, heat and cold storage in the soil and other architectural energy concepts.			
	Reducing energy, water and materials usage to maintain affordable healthcare with increasing commodity prices.	Sustainability is seen as part of social responsibility, but does not contain any investment that cannot be recouped within a specified period.	Additional initial investments are recouped by reducing energy costs in order to deliver durable and affordable healthcare with rising energy prices.	Increasing focus on sustainability in healthcare process: water management, waste management and recycling of materials.	Use of waste heat from industry, underground heat and cold storage, concrete core activation and other architectural energy concepts.

Table 49 Value-impact-matrix.

§ 10.7 Assessment of patient satisfaction in the design phase

Design assessment includes several tools for testing the added value of real estate in the design process. So far, the focus is on user-value by analysing spatial coherence, visibility, views and routes through the building based on architectural plans. This part of the toolkit is to be further developed with analysis instruments for testing, for example, building flexibility, construction costs, energy costs and life-cycle costs.

who	architect	how	The architect performs a design assessment based on the architectural plans and other design drawings in which various added values of real estate are analysed to examine the attainment of predetermined goals. Regarding user-value, several analysis tools are available to visualize spatial coherence, visibility, views and route (see Chapter 8 and 9).
when	design phase		Energy costs, construction costs, building flexibility and life-cycle costs are other values that can be modelled during the design phase. The assessment of the different values during the design also makes it possible to balance design variants relative to each other.
example	chapter 8 & 9		This tool box calls for an elaboration of multiple instruments to test different values. In particular, an integrated design approach between various disciplines has the potential to do so. Also the use of Building Information Management (BIM) can contribute to the assessment of the added value of real estate during the design process.

In addition to defining values in advance, applying added value as a framework also requires an assessment which measures these values in the design and occupancy phase. This assessment can be conducted before (ex-ante) the construction phase by assessing the architectural design or after completion of the building (ex-post) with Post Occupancy Evaluations (POE). Analysis of plans using drawing techniques and computer modelling from architecture and urban design make it possible to make various aspects of user-value visible. This enables the added values of real estate to become part of the design decision-making process.

User-values such as patient and employee satisfaction are a high priority for hospitals. Design assessment ensures that user-values become part of the discussion between architects and users and contributes to a scientific approach to the design process. In particular, techniques that come from space syntax provide opportunities to study aspects of user-value in the architectural design drawing. An architectural composition of a waiting room, reception area, office and two consulting rooms connected by a corridor demonstrates how these techniques can be used. In this way it is possible to qualify and quantify a view based on the architectural plans; to predict noise levels in patient rooms; to predict patient movements in the building and to show the visibility of reception and waiting areas.

The analysis tools used to assess aspects of patient satisfaction based on the design drawings was tested by means of an ex-post examination of the Deventer Hospital. The research by drawing demonstrated that various aspects of patient satisfaction can be displayed in architectural plans. Further validating research is needed to examine the extent to which the results of the analyses are representative of the physical built environment of hospitals. This is possible by comparing the results of design assessment with measurements of user experiences in actual buildings.

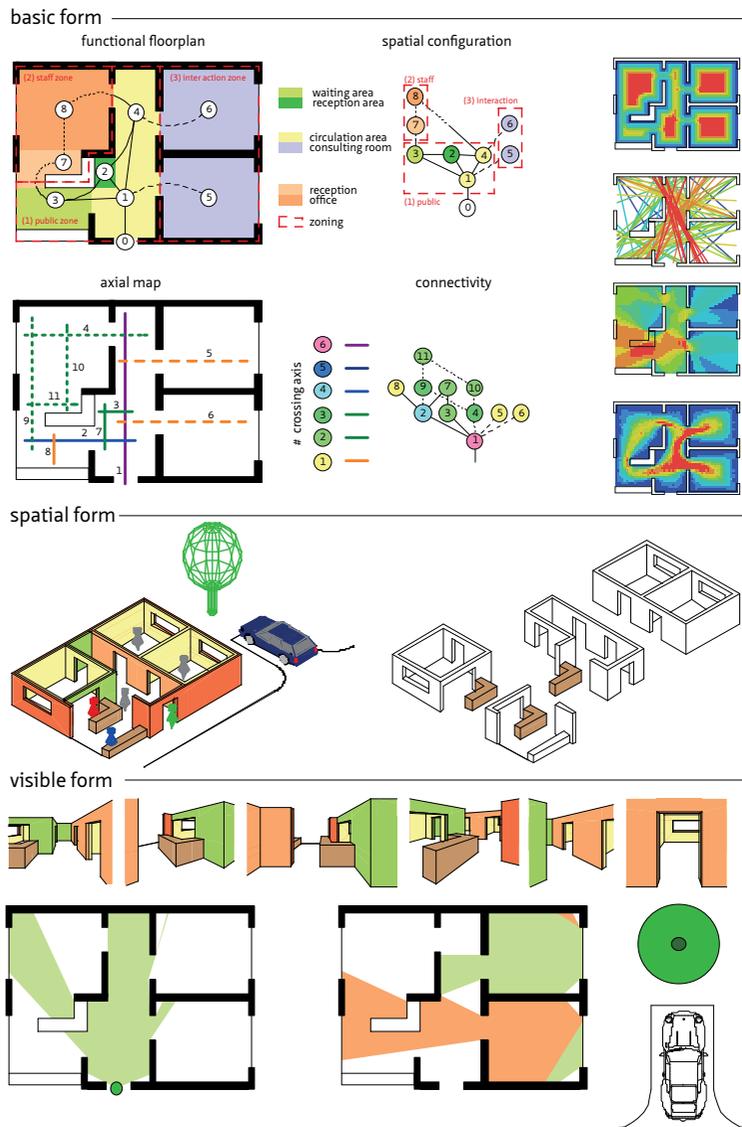


Figure 99 design assessment

11 Conclusions and recommendations

What are the main lessons learned and which recommendations can be given in response to the research questions?

Healthcare is both precious and at the same time expensive and will become even more expensive in the future due to the increasing and changing demand for care by an aging society, the increasing demand for quality of life and new medical technological innovations. Recent deregulation of the laws in the Netherlands regarding hospital real estate has resulted in healthcare institutions having more opportunities to make independent accommodation choices, whilst at the same time having to take responsibility themselves for the risks associated with the investment. Due to this deregulation, institutions are individually responsible for determining and achieving accommodation goals. In addition, accommodation costs have become an integral part of the costs of healthcare. This sheds new light on the alignment between the organisation of healthcare and accommodation: care institutions themselves bear the risk of recouping their investment in real estate and high accommodation costs lead to higher rates for healthcare compared to competing institutions.

This new context, in which hospitals have to make long-term investment decisions themselves, requires: (1) an analysis that positions the organisation within its context; (2) management in which accommodation is aligned with the organisation of healthcare, (3) knowledge of how accommodation can add value to the goals set by the organisation and, (4) opportunities to assess the design of the hospital building in achieving these pre-set goals.

The four partial studies combine to answer the main research question on how real estate can contribute to the attainment of the organisational objectives of hospitals. The second part of the main research question, concerning the implementation of the concept of adding value by real estate in the management and design of hospital buildings, is answered by the case studies and the integration of all the findings and insights into a toolbox that supports the design and management of hospitals in a changing context. In order to answer the main research question in section 11.6, the next sections elaborate on all the answers to the partial research questions: the context in which hospitals operate (11.1); the management of (hospital) real estate (11.2); adding value by (hospital) real estate (11.3); design assessments of recently built hospitals (11.4) and; the design of the toolbox for adding value management & design of hospital real estate (11.5).

§ 11.1 Context

The context in which hospitals make decisions about their real estate was studied using two methods. Firstly, a retrospective analysis was conducted for the period in which the responsibility for real estate investments and related risks was transferred from public to private parties. Secondly, a model for context analysis was developed and tested for applicability to the healthcare sector and subsequently made available for hospital organisations.

What is the impact of the changing legislation and regulations on the accommodation choices of hospitals in the Netherlands?

The deregulation of investment decisions in healthcare real estate marked the end of four major control mechanisms by the government related to the construction of healthcare facilities: (1) the criteria for construction and renovation of hospitals (building standards); (2) the cost of construction (standard costs); (3) capacity planning (planning standards) and; (4) the monitoring of compliance to these standards by the government, carried out by The Dutch Board for Healthcare Institutions (College Bouw Zorginstellingen: CBZ). The abolition of the Building Standards resulted in hospitals independently setting the organisational goals of their accommodation. Removal of the review of construction plans by the CBZ means that hospitals have also become responsible for assessing whether these values are attained in the architectural design.

The retrospective of the period 2004 to 2012 provides insight into a period of great change for the Dutch hospitals. The analysis revealed the issues that played a major role in the transfer from public to private parties of real estate responsibilities and the associated risks: law & regulations; on-paper value & compensation; autonomy & ownership, financing & risk, funding & entrepreneurship.

One of the most important lessons from this retrospective is that a clear policy is needed from the government during the period in which the responsibility for real estate is transferred to private parties. Clarifying as much as possible the financial implications for organisations is also important. In addition to the on-paper value based on the economic market value of real estate, it is also important to assess the technical condition and the state of maintenance. The transfer of responsibilities implies that the real estate-related risks are also transferred, which has direct implications for the financial position of the organisation and the access to loans and venture capital. Organisations must have reasonable access to the financial markets at all times in order to be able to invest when necessary.

In addition to background information about the dynamic period in which hospitals had to make long term accommodation choices, the retrospective is also relevant to other sectors and countries where a similar transfer of responsibilities regarding real estate takes place. In a comparison of different sectors, including the retrospective analysis of the hospital sector, it became clear that similar mechanisms are recognisable in other sectors such as colleges and universities. The development of control and management tools is important to enable these transitions to proceed in an orderly, efficient and effective manner, but above all clarity is required about the rules and risks of real estate and how they relate to the organisation's funding possibilities for real estate investments.

What contextual information on trends in the hospital sector is relevant for managing and designing hospital real estate?

The context in which hospitals have to make long-term decisions on their investment in accommodation are determined by political, economic, social, demographic and technological factors. Hospitals should determine their position regarding these environmental factors on the one hand and the interests of their internal and external stakeholders on the other. Context-mapping is an instrument to analyse these stakeholder interests, the external environmental factors and sector-specific trends and scenarios.

Analysis of the **general context** shows that the political, economic, social, demographic and technological developments all lead to an increasing and changing demand for healthcare. The demand for care increases due to an aging society, medical technological innovations enabling more treatments and a socio-cultural trend in which health is considered as one of the most important aspects of well-being. Changes in the demand for healthcare are due to an older patient population with a higher prevalence of co-morbidity and chronic diseases. In addition, the number of healthcare professionals is decreasing. All these developments call for accommodation decisions that contribute to labour-saving innovations in healthcare.

The **sector-specific context** outlines scenarios on the basis of two trends within the hospital sector: the concentration of highly specialised healthcare in large hospital facilities and deconcentration of low-complex medical healthcare in local healthcare centres. A survey among CEOs and real estate project managers in the Netherlands endorses these two trends of concentration and deconcentration in the accommodation decisions that hospitals make. The description of the scenarios in the healthcare landscape up to 2025 shows possible directions and the subsequent effect on hospitals' real estate portfolios and the associated choices for locations. The concentration of highly specialised complex medical healthcare seems to have already started with the realisation, since 2004, of a number of new hospital facilities across the Netherlands. This implies that the future potential for development may be in

the realisation of local healthcare centres in accessible locations within residential areas. The location and generic structure accommodates various low-complex medical specialities and allied healthcare professionals. The development of these local healthcare centres could be a suitable niche for real estate investors. It appears, from the reports, that the initiative for these local healthcare centres has been mainly placed by general practitioners, whose organisation is usually too small to carry out these projects. This calls for the inclusion of facilitating organisations that have experience in accommodating and facilitating healthcare professionals.



Figure 100 Context-mapping.

Stakeholders' objectives are determined by the hospitals' external and internal stakeholders. Real estate is the responsibility of the hospital board, seen from the perspective of external stakeholders such as the government, healthcare insurance companies and banks. This implies that the hospital board is the key stakeholder, balancing the interests of the different stakeholders involved in an organisation including internal stakeholders such as medical specialists and healthcare professionals who have a major impact on the quality of care. In addition to the quality of care, the physical environment influences a patient's choice of hospital.

The analysis of the hospital sector using the instrument for context-mapping shows that recent changes in the political context have resulted in hospitals having to determine their own strengths and opportunities and taking responsibility for the risks and threats in recouping their investment in accommodation. The deregulation of investment decisions and the implementation of integrated rates in healthcare has meant that hospitals have become more aware of their competitive position in the healthcare market and their position in the region. In addition, the influence of various external stakeholders has changed. The decrease in the government's direct

influence on investment decisions and the related capacity of healthcare institutions has led to an increase in the influence of the health insurance companies in purchasing healthcare (capacity) and the banks in the financing of accommodation investment. The consequences of the changing context of hospital accommodation decisions are: a new positioning of the hospital in the community with associated location choices; the need for accommodation choices that contribute to labour-saving innovations; the need to add value by real estate to the overall performance of the organisation and; possibilities for anticipating changes in the organisation of healthcare within the accommodation.

Summary of the conclusions on context

- As a consequence of deregulation of healthcare real estate, the hospital board - being the central stakeholder - is responsible for: balancing the interests of all stakeholders; the establishment of accommodation goals and; assessing whether these goals are achieved.
 - Transfer of the responsibility for real estate from public to private parties requires: a transparent policy set by the government during the transition phase; understanding of the financial implications for individual private organisations; an analysis of the on-paper value in relation to the economic value of real estate and; an assessment of the accommodation's technical condition.
 - Increasing and changing demand for healthcare calls for labour-saving innovation in healthcare real estate.
 - Future developments within hospital real estate need to focus on the development and realisation of decentralised local healthcare centres through collaboration between General Practitioners (GPs) and medical specialists.
 - The decrease of direct governmental influence on investment decisions in hospital real estate has led to an increase in the influence of health insurers in purchasing healthcare (capacity) and banks in the financing of hospital real estate investments.
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§ 11.2 Managing hospital real estate

How can Corporate Real Estate Management be aligned to organisational management in order to contribute to optimal organisational performance?

In this thesis Real Estate Management is aligned with the organisation of healthcare by paralleling the existing conceptual models of CREM and models that control the quality

of organisational processes. The basic conceptual model for managing the organisation is an abstraction of the European Foundation for Quality Management (EFQM) model in four steps: (1) stakeholders' objectives, (2) the organisation's key issues for success, (3) managing the organisation's structure and resources; (4) improvement of the primary process. The plan-do-check-act cycle as common ground in quality management is also included in this basic conceptual model.

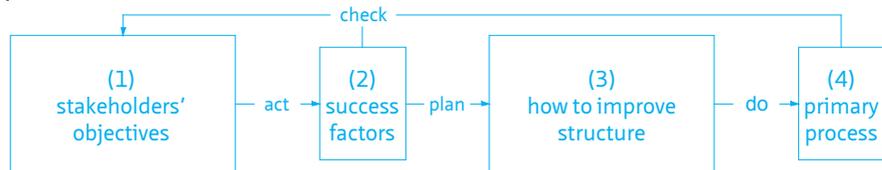


Figure 101 Basic conceptual model of organisational management.

The meta-model was created by placing existing CREM models parallel to this basic conceptual model and is an instrument which provides structure to a real estate decision-making process aligned with the organisation of healthcare. This meta-model shows how the parallel management of organisation and accommodation in three sequential steps (context, value management) results in the design of a process (4) and a building (8).

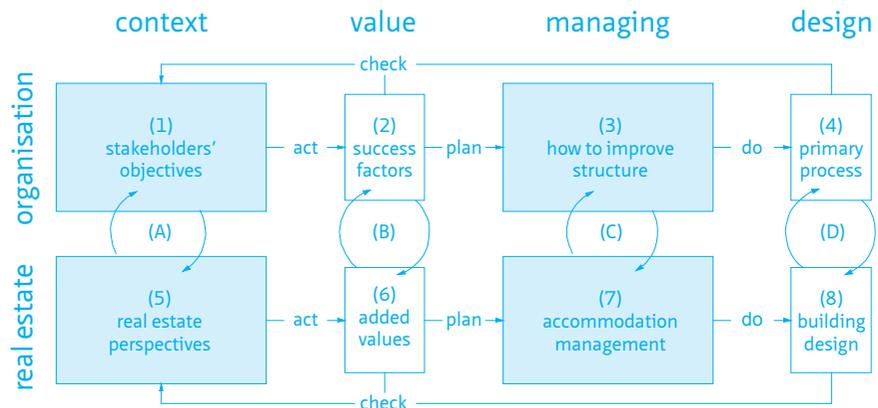


Figure 102 Meta-model real estate management.

The connection between the existing management models leads to an integrated approach for organisational and real estate management in four steps of alignment between:

- (A) the outcomes for stakeholders (1) and perspectives on real estate (5);
- (B) the organisation's key issues for success, (2) and the added value of real estate (6);
- (C) managing structure and resources (3) and managing real estate (7);
- (D) the primary process (4), and the design of the building (8).

The integrating framework for managing hospital real estate presented in section 10.3 is a further elaboration of the meta-model. In the integrating framework, the steps at the organisation level are met by the EFQM model. The steps at the level of real estate are met by: (5) four perspectives on real estate (strategic, financial, functional and physical); (6) the added values of real estate; (7) the Designing an Accommodation Strategy (DAS)-frame for matching supply and demand of the accommodation and; (8) the architectural design of the accommodation.

In addition, a five-point scale for all items in the integrating framework was developed for assessment of the stage of development of the organisation and its accommodation decisions. Triple assessment of the organisation and accommodation shows where the organisation stands, how real estate is controlled and the desired level of ambition with a corresponding focus on product, process, system, chain or society.

The three stages of development of the healthcare system (Cutler, 2002) seem to correlate to the first three steps of this triple assessment. The first 'wave' is a product-oriented approach in which the accessibility of healthcare is central. The second 'wave' consists of controlling the costs of healthcare by a process-oriented approach. In the third 'wave' market incentives are used to optimise the whole system of healthcare delivery. From this perspective, the three waves of healthcare reform can be completed by a 'fourth wave', visible in a government which as far as possible outsourced responsibility for the delivery of and funding for healthcare to private organisations. The 'fifth wave' is the more society-oriented approach to healthcare with a shifting focus from 'illness and healthcare' to 'health and behaviour' (RVZ, 2010, 2011). Here the government focuses more on the prevention of illness and promotion of healthy behaviours rather than curing disease afterwards, so also reducing costs.

How can the literature on organisational management and CREM be used to support the initial phase of a new hospital?

The integrating framework for managing hospital real estate was tested with an ex-post case study of the Orbis Medical Centre in Sittard. The construction of this hospital was initiated as a hospital of the 21st century in which both the healthcare process and the necessary infrastructure is redesigned. The initial phase of this redesign was reconstructed by analysing all the steps and components of the integrating framework based on various publications and reports. In addition, the five-point scale was used as an assessment scale for all the items listed within the integrating framework. Applying the integrating framework to this ex-post analysis of the initiation phase demonstrated

that the clear separation between the organisation and real estate levels provides insight into the contribution the accommodation makes to the achievement of the objectives set by the organisation. The integration of context, value, management and design of both the organisation and the real estate provides an integral approach in which the added values of real estate play a central role in the coordination between the organisation's key issues for success and the perspectives on real estate. This step determines the objectives for management of the accommodation. In the initiation and design process of Orbis firstly an outline of the transformation of the organisation was developed and then, as a parallel process, the development of the building's architectural design was begun.

Summary conclusions management

- Integral control on quality of the organisation of healthcare, accommodation and spatial design is possible by paralleling accommodation management and organisational quality management.
 - Added value of real estate plays a central role in the coordination between the organisation's key issues for success and the stakeholders' perspectives on real estate.
 - Alignment of accommodation with the primary process requires a clear interaction between the organisation's transformation process and the transformation of real estate.
-

§ 11.3 Adding value

What is the state of the art in the literature of adding value through real estate?

Value is defined in this study as the valued performance of a product or service that contributes to the achievement of the goals set by the stakeholders. As a consequence, value depends on the (subjective) assessment of stakeholders. The added values of real estate have to be defined in advance (ex-ante) in order to be able to pre-set the goals of the stakeholders and to test them afterwards (ex-post) in the design.

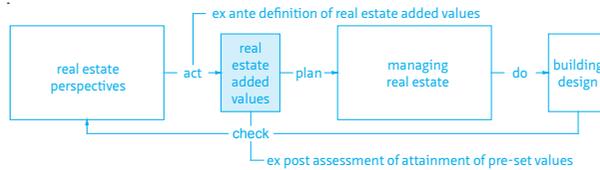


Figure 103 Ex-ante defining and ex-post assessment of real estate added values.

The added values of real estate are associated in CREM literature with real estate strategies that can contribute positively to the achievement of goals set by the organisation. In the course of time, different values are defined, renamed, sorted, merged and sometimes disappeared. The literature review provided a list of nine added values that were examined in interviews with CEOs and real estate project managers of hospitals in the Netherlands. This investigation into the added values of hospital real estate shows that the concept of adding value through real estate fits the practice of hospitals that have recently designed and constructed a new hospital building. Applying the added values of real estate from CREM literature to the construction of new hospitals in the Netherlands has resulted in a sector-specific definition of the added values of hospital real estate and a categorisation into three clusters.

cluster	definition hospital real estate added value		
user-value	The way the physical environment is experienced by people and evaluated in daily use. This connects directly to the organisation as a form of cooperation between different people who want to achieve their goals.	organisational culture & innovation	Encouraging communication and innovation by improving interpersonal relationships within the organisation.
		patient satisfaction & healing environment	Positively influencing the healing process with pleasant accommodation facilities for patients.
		employee satisfaction	Functional, enjoyable and comfortable work space for employees.
production-value	Functional suitability and effectiveness in use means that a building is effective in a functional sense and meets the desired usage. Appropriate dimensions, positioning of the program and routing within the complex are important aspects.	reduce accommodation costs	Reduction of accommodation costs such as investment, capital, operating and maintenance costs.
		increase productivity	Increasing productivity through more effective and efficient use of the accommodation.
		use flexibility	Spatial and technical flexibility to adapt the accommodation to changes in healthcare processes.
future-value	Efficiency in time, which implies sustainability of the design and suitability for re-use so that the building can maintain quality and value.	support image	Propagating organisational values by using the building as an icon of the organisational culture.
		reduce risk and increase financial possibilities	Anticipating future technical and financial risks by considering real estate as an asset.
		sustainability	Reducing energy, water and materials usage to maintain affordable healthcare with increasing commodity prices.

Table 50 Added value of hospital real estate.

The first cluster consists of user-values such as the promotion of organisational culture and patient and employee satisfaction. This cluster is followed by the more tactically oriented production-values such as improving productivity, reducing accommodation costs and the flexibility to adapt the physical environment to new healthcare processes. The third cluster consists of future-values, e.g. the image of the building, sustainability, real estate related risks and opportunities to use the financial value of real estate for financing primary processes.

How is the concept of using real estate for adding value perceived and used by hospital decision-makers?

The applicability of the added values of real estate in the hospital sector were assessed by 15 interviews with CEOs and real estate project managers that were initiating, designing or constructing a new hospital building in the period from 2004 to 2012. After an initial open and exploratory interview ten structured interviews were conducted and the results were discussed in four reflective interviews. Central to the interview was the hospital's accommodation strategy, with a focus on the role of the added value of real estate during the life-cycle of the building, how these values are prioritised in the decision-making process and how these values are visible in the final architectural design of the building. The findings from this study could serve as a reference for real estate decisions at both strategic and tactical levels and therefore provide important input for the development and implementation of a professional accommodation strategy. The five key findings from these interviews are:

People are key

Stimulating innovation, increasing patient and employee satisfaction and supporting the organisational culture are perceived as main objectives for the accommodation. These added values focus on the appreciation of spatial quality as experienced by the users.

Alignment to primary processes

There is an apparent breakdown in strategic user-values related to the perception of space by the users on one side and tactical production-values on the other. This affects the primary process as well as services and products such as cost, productivity and flexibility.

Priorities depend on building phase

A number of added values of real estate are difficult to customise after completion of the building and for this reason are perceived more important in the initial phase and during the design of the building. Although these real estate characteristics largely determine the future-value of real estate, the perceived importance decreases once the building is constructed.

Importance of sector specific definitions

It is important to translate the generic added values in the literature to the specific sector. This implies that some values are less important and will overlap whilst other values increase in importance. For example, in the healthcare sector an obvious choice is dividing user satisfaction into patient satisfaction and employee satisfaction as two different added values.

Value for various stakeholders

The added value of real estate is assessed from the perspective of various stakeholders in terms of achieving their overall objectives. Translating these objectives into strategic, financial, physical and functional perspectives on real estate enables interpretation.

		perspective on real estate			
		strategic	financial	functional	physical
		adding value to organisational goals: how and to what extent are strategic organisational objectives achieved or obstructed by real estate?	value, resources and costs: what are the financial consequences of the accommodation on resources, real estate value, and life cycle costs?	fitness for use: how and to what extent is the user's functional primary process supported or obstructed by real estate?	(im)possibilities of real estate: what is technically and physically possible in an existing or new building?
user-value	patient satisfaction & healing environment	Patient satisfaction is related to the welfare of patients and the contribution of the physical environment to the healing process. Important aspects of patient satisfaction are: view of nature, light, materials, noise, orientation & routing, privacy in doctor's offices and nursing rooms.			
	Positively influencing the healing process by pleasant accommodation facilities for patients.	The building contributes to the healing of patients and as such contributes to a better positioning of the hospital in the healthcare market.	Higher accommodation costs are recovered through a shorter hospital stay and higher occupancy due to higher patient satisfaction.	The built environment contributes to a smoother healing process by reducing stress for patients.	Architectural quality of patient areas such as surgery and (individual) nursing room with extra attention for a view on nature, natural light, materials, noise reduction, privacy and orientation and routing through the building.

Table 51 Value-impact-matrix of patient satisfaction & healing environment.

In addition to defining the added values of hospital real estate, a value-impact-matrix was developed to support the alignment between the organisation's key issues for success, the added values of real estate and the perspectives on real estate from different stakeholders' objectives. This instrument makes it possible to highlight the added values of real estate from different perspectives (strategic, financial, functional and physical).

The matrix can be filled with specific accommodation decisions such as whether or not to use flexible workplaces, the choice of a structure-built-in construction or the inclusion or exclusion of future expansion possibilities in the design. Table 51 shows an example of possible connections between one of the values – patient satisfaction and healing environment – to four different perspectives.

Summary conclusions value

- Adding value through real estate can be regarded as the realisation of the accommodation's quality as perceived by relevant stakeholders.
 - Achieving added value from real estate requires the ex-ante formulation of accommodation targets and ex-post assessment of whether these objectives have been met.
 - Spatial-experience by patients and staff is key in hospital real estate added value.
 - The importance of the future value of real estate has increased due to the deregulation of hospital real estate investment.
 - Stakeholders' interests differ by sector; which calls for a sector-specific definition of real estate added values.
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§ 11.4 Hospital real estate design assessment

What methods and tools are available to assess patient satisfaction in architectural drawings?

Only those design decisions that are incorporated into the final design contribute to achieving the objectives set, so the translation of accommodation targets into the architectural design is a crucial step in achieving added value of real estate. In addition to defining these values in advance, applying added value as a framework also requires assessment to measure these values in the design and use phase. This assessment can be conducted either before (ex-ante) the construction phase by an assessment of the architectural design or after completion of the building (ex-post) by Post Occupancy Evaluations (POE). Analysis of plans by using drawing techniques and computer modelling from architecture and urban design make it possible to make various aspects of user-value visible. This enables added values of real estate to become part of the design decision-making process.

Literature on Evidence-Based Design (EBD) shows a number of aspects which contribute to patient satisfaction: (1) view on nature; (2) natural light; (3) materials used; (4) reduction of noise levels; (5) easy orientation in the building; (6) visibility of the waiting areas from the receptions; (7) single patient rooms; (8) privacy during consultations between patients and medical specialists. How these aspects can be made visible based on architectural design drawings was examined. In particular, techniques that come from space syntax provide opportunities to study aspects of user-value in the architectural design drawing. Utilising these techniques was demonstrated with a simple architectural composition of a waiting room, reception area, office and two consulting rooms connected by a corridor. Based on the architectural plans, these techniques enable a view to be qualified and quantified; the noise levels in patient rooms to be predicted; movement of patients in the building to be predicted and; the visibility of reception and waiting areas can be shown.

Design-assessment also sheds a new light on Evidence Based Design (EBD). Where traditional EBD is focused on the application of the best available scientific evidence in the design, design-assessment focuses on the application of the best available analysis techniques to attain added value in the architectural design plans. This enables aspects of user-perception to become part of the discussion between designer and user during the design process. In this way design-assessment creates new opportunities for involving the user in the design process. In recent literature this is also referred to as “user oriented design”. In addition to the comparison of design alternatives, it is also possible to use these instruments for the optimisation of the architectural design.

How are aspects of patient satisfaction defined in the different phases of initiation, design and use and how can these aspects of patient satisfaction be assessed in architectural drawings ?

The analysis tools to assess aspects of patient satisfaction by an assessment of the design drawings in the final stage of the design were tested using an ex post examination of the Deventer Hospital. This hospital was constructed in the period 2004 to 2008 and therefore several Post Occupancy Evaluations (POE) and other studies on the functioning of the building are available. First a retro perspective case study was made of the initiation, design and occupancy phase. Next, how pre-defined added values can be made visible in available drawings from the stage of the final design was examined. This is then compared with the building assessments based on the available POE.

Despite the fact that this part of the study is a first exploration of the possibilities of design-assessment for testing the attainment of the added value of real estate in the design phase, the results are promising. More validating research is necessary in order to link the results of the analysis of architectural drawings to outcomes from POE.

Summary conclusions design

- Applying added value of real estate as an assessment framework requires, in addition to the formulation of the goals in advance, an assessment of these values in both the design and occupancy phase.
 - Assessment of user-value in design drawings contributes to a “user-oriented design” in which accommodation goals become part of the discussion between architects and end users during the design.
 - Validation of design assessment instruments requires Post Occupancy Evaluations in which results from architectural plan analysis are verified by end-user experiences.
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§ 11.5 Toolbox value-adding management & design

Which conceptual frameworks can be applied and which tools can be used to support hospital real estate design and management?

Each sub-study resulted in the design of one or more instruments that can contribute to the decision-making on hospital accommodation. This toolbox provides grip on the context, value, design and management of accommodation and is intended as a reference tool for the alignment between real estate and organisation. The toolbox presented in chapter 10 includes seven instruments that support decisions about accommodation of hospitals : (1) context-mapping; (2) meta-model for the management of real estate; (3) integrating framework for the management of hospital real estate; (4) triple assessment of organisational structure, process and real estate; (5) definition of hospital real estate added values; (6) value-impact-matrix to relate the added value of real estate to perspectives on real estate; (7) methods for the design assessment of patient satisfaction in the architectural design.

These instruments can be used independently of each other, but can also be combined. As such, the toolbox provides guidelines for the distribution of responsibilities and tasks between the hospital board, real estate manager, healthcare managers and architects in various phases of occupancy, initiation and design.

Summary toolbox

- The toolbox provides grip on the context, value, design and management of accommodation and is intended as a reference tool for the alignment between real estate and organisation.
 - The toolbox enables the context, value, design and management of accommodation to be brought into focus and is intended to provide a reference for the alignment between real estate and an organisation.
 - The toolbox provides guidelines for the distribution of responsibilities and tasks between the hospital board, real estate manager, healthcare managers and architects in various phases of occupancy, initiation and design.
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§ 11.6 Recommendations for real estate management of hospitals

How can real estate contribute to the attainment of the organisational objectives of hospitals and how can the concept of adding value by real estate be implemented in the management and design of hospital buildings?

Existing frameworks as a starting point

The case studies demonstrated the usefulness of the conceptual models of CREM in matching accommodation for hospitals with the organisation of healthcare. Alignment of accommodation to healthcare processes should start with a clear analysis of the context in which the organisation has to operate. The model for context-mapping provides a starting point to get grip on the position of real estate in the dynamic context of hospitals. The arrangement of different conceptual models in the meta-model and the link to the EFQM model as an abstract description of the organisation results in a roadmap in which accommodation and the organisation of healthcare can be iteratively coordinated. While the meta-model at the level of the CEO provides an overview and outline of the considerations to be made, the integrating framework can be used as a comprehensive tool for real estate managers to further elaborate on the various steps. This integrating framework shows various ways to explore and define both how to organise healthcare processes and how to design and manage real estate, separately and in connection with each other. As such, application of the integrating framework can make clear how accommodation can contribute to the achievement of organisational goals. The translation of generic values from the literature into the sector-specific added value of hospital real estate can be applied to a balanced policy that takes into account the different needs and preferences of various stakeholders.

This sector-specific interpretation gives meaning to the concept of real estate value adding management within the hospital sector. In addition to the prior definition of accommodation goals, assessment afterwards of whether the pre-set goals have been achieved is also an important step in achieving added value for the organisation through real estate. Design assessment makes it possible to test various aspects of pre-set values already before the design is actually constructed.

A transdisciplinary approach to accommodation and organisation of healthcare

Establishing the link between existing CREM models and conceptual frameworks of quality management and spatial quality is another important contribution of this research to the scientific debate. The toolbox for accommodation management was developed by testing existing conceptual frameworks and models on suitability, and when necessary supplementing and adapting these models. The toolbox can be used to support the real estate decisions of hospitals in making connections between the existing knowledge from different disciplines. The addition to existing frameworks is therefore the creation of a new basis through connecting the various disciplines, enabling professionals such as real estate managers, healthcare managers, medical specialists and the hospital board to contribute to a better balance between accommodation and healthcare. On a conceptual level, common principles of real estate management and the organisation of healthcare are aligned in the four steps of the meta-model (context, value, manage, design). On a practical level the added values of real estate are to be regarded as a common language between the different disciplines.

Focus on quality of organisation, accommodation and spatial design

Connections between the disciplines and conceptual models were found by looking at the quality of the organisation, the management of the accommodation and the spatial design. The quality models can be used in practice to conceptualise, characterise and describe the organisation and its processes. In addition, existing models from the CREM literature can be used in connection with the basic principles of quality management to assess and develop the quality of the accommodation parallel to the organisation and its primary processes. The classification of added value in user-value, production-value and future-value demonstrates that the consideration of added value of real estate is the realisation of quality, as perceived by the stakeholders. With this in mind, the conscious and integral management of the added values of real estate with a focus on the quality of organisation, accommodation, spatial design and the input to support design and management of hospital real estate on a strategic level can be seen as the answer to the main research question of this thesis.

§ 11.7 Limitations and recommendations for further research

The literature on real estate management and more specifically Corporate Real Estate Management is used as the starting point. The results from the literature review are applied to the practice of hospitals with the aim of extending existing knowledge and gaining greater insight into the accommodation decisions of organisations in general. In addition, this research provides theoretical frameworks within which the accommodation decisions of hospitals in a changing context can be examined. To achieve this, knowledge from different disciplines is utilised. Real estate is considered to be a link between the organisation and the architecture of the physical environment. Knowledge about the organisational management and architectural design is therefore also used in addition to the literature on corporate real estate management. This research therefore has a broad base of different disciplines and connects different research areas. This study therefore meets the social demand for a transdisciplinary approach to contemporary problems by providing connections between the existing knowledge of different disciplines.

The comparison of the literature and hospitals' practice is based mixed methods: case studies, interviews, document analysis, and a brief survey. Combined with research-by-design, the different research methods resulted in triangulation, thus contributing to the reliability, validity and generalizability of the findings.

In the literature review, predominantly studies that compare different values and conceptual models were used. Literature that explores particular values in-depth, such as books and papers on flexibility, has not been incorporated. Follow-up research could focus on a further exploration and operationalization of the different values .

The case studies demonstrated the utility of the conceptual models in practice. However, given the limited number of cases the models and findings need to be further validated by a comparison of a larger number of hospitals. This also holds true for the generalizability of the conceptual models and meta-model to other sectors, including the link between the development phases according to the EFQM model, the organisational structures (Mintzberg, 1993) and the evolutionary steps of real estate (Joroff et al., 1993).

The research-by-design resulted in a toolbox with several tools that can be used to support the management and design of hospital real estate. The knowledge and insights from the literature study and empirical research have been integrated into the design of these tools. Further research is needed to test the validity of these tools by application in the practise of management and design of hospital real estate.

In addition to answers to the research questions considered, every piece of research also raises new questions. This study of real estate management, organisational management and the architecture of hospitals has yielded a number of new directions for further research:

- The comparison of health care systems in different countries based on contextual variables from the context-mapping model. This can provide insight into the impact of different healthcare systems in the accommodation choices of hospitals.
- International research on the impact of different healthcare systems in the prioritisation, definition and management of the added values of real estate from the perspective of different stakeholders.
- Design research of local healthcare centres including architectural design, stakeholder analysis and positioning within the urban context.
- Empirical research into the possibilities of the meta-model to be used as a management model in a decision making process. In this thesis, this model is mainly descriptive and like any other management model, the true validation of the theory can only be found in the applicability of the model by practice.
- Further operationalization of the various added values of accommodation through a specific literature review on, for example, flexibility in hospital architecture, sustainable hospital architecture or branding the organisation's image through housing.
- Additional design research to assess other added values of real estate in the design phase, such as adaptability.
- Validation of drawing techniques on aspects of patient satisfaction through comparative studies of hospital plans linked to Post Occupancy Evaluations.
- Replica of the research of Ulrich (1984) on evidence-based design and healing environment by using architectural analysis tools to test the design on user aspects such as quality of view outside, natural light and noise in any patient room linked to data on patient recovery, medication use and hospitalisation of patients.



References

- Ahaus, C. T. B., & Broekhuis, H. (2007). Bruikbaarheid en effectiviteit van kwaliteitsmodellen in de zorg. *M&O*, 2007(2), 87-107.
- Ahaus, C. T. B., Diepman, F. J., & Van der Lugt, A. (2001). *Balanced scorecard & model Nederlandse kwaliteit*. Deventer: Kluwer.
- Algra, H., Breedijk, M., Bijl, A. C., de Jong, H., Van Mil, C., & Poelmans, P. (2001). *Structuurplan nieuw Deventer Ziekenhuis*. Gouda / Deventer: Jong Gortemaker, Deerns v.o.f. & Projectbureau Nieuwbouw Deventer Ziekenhuis.
- Ambrosini, V., & Scholes, K. (1989). *Exploring Techniques of analyses and evaluation in strategic management*. London: Prentice Hall Europe.
- Andrews, C. J., Senick, J. A., & Wener, R. E. (2012). Incorporating Occupant Perceptions and behaviour into BIM. In S. Mallory-Hill, W. F. Preiser & C. G. Watson (Eds.), *Enhancing building performance* (pp. 19-31). Oxford: Wiley. com.
- Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. *The American economic review*, 941-973.
- Bacon, F. (1994). *Novum organum* (1620). The Works of Francis Bacon, 4.
- BDO Branchegroep Zorg. (2009). *BDO-Benchmark ziekenhuizen 2009*. Utrecht: BDO Accountants & adviseurs.
- BDO Branchegroep Zorg. (2010). *Wapenen tegen onzekere tijden, BDO-Benchmark ziekenhuizen 2010*. Utrecht: BDO Accountants & adviseurs.
- BDO Branchegroep Zorg. (2011). *Stilte voor de storm, BDO-Benchmark ziekenhuizen 2011*. Utrecht: BDO Accountants & adviseurs.
- BDO Branchegroep Zorg. (2012). *Zonder draagkracht geen toekomst, BDO-Benchmark ziekenhuizen 2012*. Utrecht: BDO Accountants & adviseurs.
- Becker, F., & Douglass, S. (2008). The ecology of the patient visit: physical attractiveness, waiting times, and perceived quality of care. *The Journal of ambulatory care management*, 31(2), 128-141.
- Benedikt, M. L. (1979). To take hold of space: isovists and isovist fields. *Environment and Planning B*, 6(1), 47-65.
- Bos, W. J., Koevoets, H. P. J., & Oosterwaal, A. (2011). *Ziekenhuislandschap 20/20 Niemandslaan of Droomland*. Den Haag: Raad voor de Volksgezondheid en Zorg.
- Bowman, C., & Ambrosini, V. (2000). Value creation versus value capture: towards a coherent definition of value in strategy. *British Journal of Management*, 11(1), 1-15.
- Bryman, A. (1988). *Doing research in organizations*. Oxford, UK: Taylor & Francis.
- Bryman, A., & Bell, E. (2003). *Business research methods*: Oxford University Press, New York.
- Cammock, R. (1981). *Primary Health Care Buildings: Briefing and Design Guide for Architects and Their Clients*: Architectural Press.
- CBS. (2011). *Gezondheidszorg in cijfers 2011*. Den Haag: Centraal Bureau voor de Statistiek.
- Cutler, D. M. (2002). Equality, efficiency, and market fundamentals: the dynamics of international medical-care reform. *Journal of Economic Literature*, 40(3), 881-906.
- De Chernatony, L., & Harris, F. (2000). Added value: its nature, roles and sustainability. *European Journal of Marketing*, 34(1/2), 39-56.
- De Hoogh, S. (2007). *Building differentiation of hospitals, layers approach*. Utrecht: College Bouw Zorginstellingen.
- De Jong, T. M. (2005). Comparing and evaluating drawings. In T. M. De Jong & D. J. M. Van der Voordt (Eds.), *Ways to study and research urban, architectural and technical design* (pp. 173-175). Delft: DUP Science.
- De Jonge, H. (1996). *De toegevoegde waarde van concernhuisvesting*. Paper presented at the NSC-conference.
- De Jonge, H., Arksteijn, M. H., Den Heijer, A. C., Vande Putte, H. J. M., De Vries, J. C., & Van der Zwart, J. (2008). *Designing an Accommodation Strategy*. Delft: Department Real Estate & Housing, Technical University Delft.
- De Leeuw, A. C. J. (2006). *Kennis voor besturing*. Assen: Koninklijke van Gorkum BV.
- De Vries, J. C. (2007). *Presteren door vastgoed: onderzoek naar de gevolgen van vastgoedinspreken voor de prestatie van hogescholen*. Delft: Eburon.
- De Vries, J. C., De Jonge, H., & Van der Voordt, D. J. M. (2008). Impact of real estate interventions on organisational performance. *Journal of Corporate Real Estate*, 10(4), 208-223.

- De Vries, J. C., Van der Voordt, D. J. M., & Arkesteijn, M. H. (2004). Afstemming organisatie en vastgoed. In D. J. M. Van der Voordt & A. C. Den Heijer (Eds.), *Inleiding vastgoedmanagement* (pp. 164-183). Delft: Real Estate & Housing, Delft University of Technology.
- Deming, W. E. (1950). *Elementary Principles of the Statistical Control of Quality*. Tokyo: Japanese Union of Science and Engineering.
- Den Heijer, A. C. (2011). *Managing the university campus, information to support real estate decisions*. Delft: Eburon.
- Den Heijer, A. C., & De Jonge, H. (2012). Linking decisions and performance: adding value theories applied to the university campus. In P. A. Jensen, D. J. M. Van der Voordt & C. Coenen (Eds.), *The added value of facilities management: concepts, findings and perspectives*. Lyngby: Polyteknisk Forlag.
- Deventer Ziekenhuis. (2008). *Nieuwbouwboek Deventer Ziekenhuis*.
- Dewulf, G., Den Heijer, A. C., De Puy, L., & Van der Schaaf, P. (1999). *Het managen van vastgoed binnen een publieke organisatie*: Delftse Universitaire Pers.
- Dewulf, G., Krumm, P., & De Jonge, H. (2000). *Successful corporate real estate strategies*: Arko Publishers.
- Donabedian, A. (1988). The quality of care. *JAMA: the journal of the American Medical Association*, 260(12), 1743-1748.
- Duchateau, D. C., & Vink, M. D. H. (2011). *Medisch technologische ontwikkelingen zorg 20/20 Medisch specialistische zorg in 20/20*. Den Haag: Raad voor Volksgezondheid en Zorg.
- Durgee, J. F., O'Conner, G. C., & Veryzer, R. W. (1996). Observations: translating values into product wants. *Journal of Advertising Research*, november/december, 90-110.
- EFQM. (1997). *Self assessment. Guidelines for Companies*. The Netherlands: Pabo Print BV.
- Freeman, R. E. (1984). *Strategic management: a stakeholder approach*. Boston: Pitman.
- Fritzsche, C., Hoepel, H., Kaper, L., & Van Ommeren, O. (2004). *Huisvesting is strategisch goed*. Amersfoort: Twynstra Gudde Adviseurs en Managers.
- Gaynor, M. (2006). *What do we know about competition and quality in health care markets?*: National Bureau of Economic Research.
- Gelre Ziekenhuizen. (2006). *Businessplan inzake nieuwbouw Gelre Ziekenhuizen locatie Zutphen*. Apeldoorn: Gelre Ziekenhuizen.
- Groat, L. N., & Wang, D. (2002). *Architectural research methods*. New York: Wiley.
- Hamilton, K. (2009). All designers use evidence. In B. Esser, K. Hamilton, B. Hansen, S. De Hoogh, J. Nauta, P. M. Schaap, M. Verweij & H. De Wijn (Eds.), *All designers use evidence*. Utrecht: Innovatieplatform Architecture in Health.
- Hammersley, M. (2002). The relationship between qualitative and quantitative research: paradigm loyalty versus methodological eclecticism. In J. T. E. Richardson (Ed.), *Handbook of research methods for psychology and the social sciences*. Leicester: BPS Books.
- Haq, S. (1999). *Can Space syntax Predict Environmental Cognition?* Paper presented at the 2nd Space Syntax Symposium.
- Hardjono, T. W., & Hes, F. (1993). *De Nederlandse kwaliteitsprijs en onderscheiding*. Deventer: Kluwer.
- Harmeling, Hurkmans, & van der Laan. (2011). *18-uurs observatie bezoekersstromen entreegebied Deventer Ziekenhuis*. Utrecht: Hoge school voor de Kunsten.
- Harris, P. B., McBride, G., Ross, C., & Curtis, L. (2002). A Place to Heal: Environmental Sources of Satisfaction Among Hospital Patients. *Journal of Applied Social Psychology*, 32(6), 1276-1299.
- Heo, Y., Choudhary, R., Bafna, S., Hendrich, A., & Kaiser, M. P. (2009). *A Modeling Approach for Estimating the Impact of Spatial Configuration on Nurses' Movement*. Paper presented at the 7th Space Syntax Symposium.
- Hiddema, F., Sol, K., & Vigeveno, F. A. H. (2007). *Publiek jaarverslag 2006*. Rotterdam: Rotterdam Eye Hospital.
- Hillier, B., & Hanson, J. (1984). *The social logic of space*. Cambridge: Cambridge University Press.
- Hillier, B., & Iida, S. (2005). Network effects and psychological effects. In A. Van Nes (Ed.), *Proceedings space syntax, 5th international symposium*. Delft.
- Hirschler-Schulte, C. J. W., & Kleinjan, J. L. (2010). *Maatschappelijk jaarverslag 2009*. Deventer: Deventer Ziekenhuis.
- Hoendervanger, J. G., Van der Voordt, D. J. M., & Wijnja, J. (2012). *Huisvestingsmanagement*. Groningen: Noordhoff Uitgevers.
- Hood, L., & Friend, S. H. (2011). Predictive, personalized, preventive, participatory (P4) cancer medicine. *Nature Reviews Clinical Oncology*, 8(3), 184-187.
- Hoogervorst, J. F. (2005). *Transparante en integrale tarieven in de gezondheidszorg*. In Ministerie VWS (Ed.), (Vol. 27659). The Hague: Ministerie van Volksgezondheid, Welzijn en Sport.

- Hooimeijer, P., Kroon, H., & Luttik, J. (2001). *Kwaliteit in meervoud. Conceptualisering en operationalisering van ruimtelijke kwaliteit voor meervoudig ruimtegebruik*. Gouda: Habiforum.
- inspectie der rijksfinanciën. (2010). *Rapport brede heroverwegingen Curatieve zorg 2.0*. Den Haag: inspectie der rijksfinanciën, bureau beleidsonderzoek.
- Jacobs, P. (2002). Potential maximization: Toward a micro-sociological approach in disability studies. *Disability Studies Quarterly*, 22(1).
- Jensen, P. A. (2010). The facilities management value map: A conceptual framework. *Facilities*, 28(3-4), 175-188.
- Jensen, P. A., Nielsen, K., & Nielsen, S. B. (2008). *Facilities Management Best Practice in the Nordic Countries - 36 Cases*.
- Jensen, P. A., Van der Voordt, D. J. M., & Coenen, C. (2012). *The Added Value of Facilities Management; concepts, findings and perspectives*. Lyngby: Polyteknisk Forlag.
- Jensen, P. A., Van der Voordt, D. J. M., Coenen, C., Von Fletten, D., A.L., S., Balslev Nielsen, S., . . . Pfenninger, M. (2012). The concept of added value of fm. In P. A. Jensen, D. J. M. v. d. Voordt & C. Coenen (Eds.), *The added value of facilities management, concepts, findings and perspectives*. Lyngby: Polyteknisk Forlag.
- Joroff, M., Louargand, M., Lambert, S., & Becker, F. (1993). *Strategic Management of the Fifth Resource: Corporate Real Estate*.
- Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: translating strategy into action*. Boston: Harvard Business Press.
- Keeris, W. G. (1997). *Vastgoedbeheer lexicon*: Ten Hagen Stam uitgevers.
- Khan, N. (2012). *Analyzing patient flow, reviewing literature to understand the contribution of space syntax to improve operational efficiency in healthcare settings*. Paper presented at the Eighth International Space Syntax Symposium, Santiago de Chile.
- Kim, Y., & Lee, H. W. (2010). Analyzing User cost In a Hospital Building: Methodological Implication of Space syntax to Support whole life Target Value Design. *Lean Construction Journal*, 55-65.
- Klazinga, N. (2000). Re-energizing trust: the adoption and adaption of four models for external quality assurance of health care services in western European health care systems. *International Journal for Quality in Health Care*, 12(3), 183-189.
- Klink, A. (2007a). *Besluit van houdende tweede wijziging van het uitvoeringsbesluit WTZi*. Den Haag: Ministerie Volksgezondheid, Welzijn en Sport.
- Klink, A. (2007b). *Met zorg ondernemen*. Den Haag: Ministerie van Volksgezondheid, Welzijn en Sport.
- Klink, A. (2008a). *Advies commissie nadeelcompensatie en kapitaalslasten*. Den Haag: Ministerie Volksgezondheid Welzijn en Sport.
- Klink, A. (2008b). *Regeling van de minister van Volksgezondheid welzijn en sport, houdende de instelling van de commissie nadeelcompensatie afschaffing bouwregime waaronder nacalculatie gebouwgebonden kapitaalslasten van ziekenhuizen*. Den Haag: Ministerie Volksgezondheid. Welzijn en Sport.
- Knight, A., & Ruddock, L. (2008). *Advanced Research Methods in the Built environment*. West Sussex: Wiley-Blackwell.
- KPMG. (2011). *Ziekenhuislandschap 20/20 Niemandslaan of Droomland*. Den Haag: Raad voor de Volksgezondheid en Zorg.
- Krumm, P. (1999). *Corporate Real Estate Management in Multinational Corporations, A comparative Analysis of Dutch Corporations*. Nieuwegein: Arko Publisher.
- Lavy, S., Garcia, J. A., & Dixit, M. K. (2010). Establishment of KPIs for facility performance measurement: review of literature. *Facilities*, 28(9/10), 440-462.
- Leupen, B. (1997). *Design and analysis*. Rotterdam: O10 Publishers.
- Leupen, B. (2006). *Frame and generic space*. Rotterdam: O10 Publishers.
- Lezinski, R., & Marn, M. V. (1997). Setting value, not price. *The McKinsey Quarterly*, 1, 99-115.
- Lindholm, A. L. (2008). A constructive study on creating core business relevant CREM strategy and performance measures. *Facilities*, 26(7-8), 343-358.
- Lindholm, A. L., Gibler, K. M., & Leviäinen, K. I. (2006). Modeling the value-adding attributes of real estate to the wealth maximization of the firm. *Journal of real estate research*, 28(4), 445-475.
- Loosemore, M., Hall, K., & Dainty, A. (1996). *Innovation and courage in construction management research*. Paper presented at the Proceedings of 12th Annual ARCOM Conference, Sheffield Hallam University.
- Lu, Y., Peponis, J., & Zimring, C. (2009). *Targeted Visibility Analysis in Buildings Correlating Targeted Visibility Analysis with Distribution of People and Their Interactions within an Intensive Care Unit*. Paper presented at the 7th Space Syntax Symposium.
- Macmillan, S. (2006). Added value of good design. *Building research & information*, 34(3), 257-271.

- Maljers, J. (1999). *Het Deventer Ziekenhuis, vraaggestuurd in zorg, gebouw en organisatie*. Amsterdam: Deventer Ziekenhuis and plexus medical group.
- Manning, C., Roddriguez, M., & Ghosh, C. (1999). Devising a corporate property function for greater bottom line impact. *JOURNAL OF REAL ESTATE RESEARCH*, 7(3), 351-359.
- Minkman, m., Ahaus, C. T. B., & Huijsman, R. (2007). Performance improvement based on integrated quality management models: what evidence do we have? A systematic literature review. *International Journal for Quality in Health Care*, 19(2), 90-104.
- Mintzberg, H. (1993). *Structure in fives: Designing effective organizations*. Prentice-Hall, Inc.
- Nabitz, U., Klazinga, N., & Walburg, J. (2000). The EFQM excellence model: European and Dutch experiences with the EFQM approach in health care. *International Journal for Quality in Health Care*, 12(3), 191-201.
- Naylor, G. (1999). Using the business Excellence Model to develop a strategy for a healthcare organisation. *International Journal of Health Care Quality Assurance*, 12(2), 37-44.
- Nederlandse Zorg autoriteit NZa. (2009a). *Advies over aanpassing van de beleidsregel overgangsregime kapitaalslasten*. Den Haag: Nederlandse Zorg autoriteit NZa.
- Nederlandse Zorg autoriteit NZa. (2009b). *Uitvoeringstoets Van budget naar prestatie, prestatiebekostiging binnen de medisch specialistische zorg*. Den Haag: Nederlandse Zorg autoriteit NZa.
- Niemeijer, C. E. A. (2013). *De toegevoegde waarde van architectuur*. delft: Eburon Uitgeverij BV.
- Nijhuis, S. (2011). Visual research in landscape architecture. In S. Nijhuis, R. Van Lammeren & F. Van Der Hoeven (Eds.), *Exploring the visual landscape: advances in physiognomic landscape research in the Netherlands*. IOS Press.
- Nourse, H. O., & Roulac, S. E. (1993). Linking Real Estate Decisions to Corporate Strategy. *Journal of real estate research*, 8(4), 475-494.
- O'Mara, M. A. (1999). *Strategy and Place: Managing Corporate Real Estate and Facilities for Competitive Advantage*. Free Press.
- Osgood, R. T. J. (2004). Translating organisational strategy into real estate action: The strategy alignment model. *Journal of Corporate Real Estate*, 6(2), 106-117.
- Peponis, J., & Zimring, C. (1996). User friendly hospital layouts: The contributions of space syntax. *Journal for Healthcare Design*, VIII, 109-115.
- Peponis, J., Zimring, C., & Choi, Y. K. (1990). Finding the building in Way finding. *Environment and Behavior*, 22(5), 555-590.
- Peter, J. P., & Olsen, J. C. (1987). *Consumer behavior, marketing strategy perspectives*. Irwin: Homewood.
- Porter, M. E. (1985). *Competitive advantage*. New York: Free Press.
- Preiser, W. F., & Schramm, U. (2012). A process Model for building Performance Evaluation (BPE). In S. Mallory-Hill, W. F. Preiser & C. G. Watson (Eds.), *Enhancing building performance* (pp. 19-31). Oxford: Wiley. com.
- PriceWaterhouseCoopers. (2009). *Rapport van feitelijke bevindingen naar aanleiding van specifiek overeengekomen werkzaamheden inzake financieringsbehoefte algemene ziekenhuizen*. Den Haag: Ministerie Volksgezondheid, Welzijn en Sport.
- Prismant. (2008). *Arbeid in zorg en welzijn 2008*. Utrecht: Raad voor Volksgezondheid en Zorg.
- Projectbureau Nieuwbouw. (2003). *Komt er straks ook kleur in uw kantoor?* Deventer: Bureau communicatie Deventer Ziekenhuis.
- Riratanaphong, C., Van der Voordt, D. J. M., & Sarasoja, A. L. (2012). Performance measurement in the context of CREM and FM. In P. A. Jensen, D. J. M. Van der Voordt & C. Coenen (Eds.), *The added value of facilities management: concepts, findings and perspectives*. Lyngby: Polyteknisk Forlag.
- Roulac, S. E. (2001). Corporate Property Strategy is Integral to Corporate Business Strategy. *Journal of real estate research*, 22(1/2), 129-152.
- Rouse, R. (2004). Measuring value or only cost: the need for new valuation methods. In S. Macmillan (Ed.), *Designing better buildings* (pp. 55-71). Londen: E&FN Spon.
- RVZ. (2010). *Zorg voor je gezondheid! Gedrag en gezondheid: de nieuwe ordening*. Den Haag: Raad voor de Volksgezondheid en Zorg.
- RVZ. (2011). *Medisch-specialistische zorg 20/20, dichtbij en ver weg*. Den Haag: Raad voor de Volksgezondheid en Zorg.
- Sarshar, M., & Pitt, M. (2009). Adding value to clients: Learning from four case-studies. *Facilities*, 27(9-10), 399-412.
- Scheffer, J. L., Singer, B. P., & Van Meerwijk, M. C. C. (2006). Enhancing the contribution of corporate real estate to corporate strategy. *Journal of Corporate Real Estate*, 8(4).
- Schut, E., & Rutten, F. (2009). *Economie van de gezondheidszorg*. Amsterdam: Elsevier Gezondheidszorg.

- Setola, N. (2009). *A New Approach to the Flows System Analysis in the Teaching Hospitals*. Paper presented at the 7th Space Syntax Symposium.
- Shaw, C. D. (2000). External quality mechanism for health care: summary of the ExPeRT project on visitatie, accreditation, EFQM and ISO assessment in European Union countries. *International Journal for Quality in Health Care*, 12(3), 169-175.
- Shergold, K., & Reed, D. M. (1996). Striving for excellence: how self-assessment using the Business Excellence Model can result in improvements in all areas of business activities. *The Total Quality Management Magazine*, 8(6), 48-52.
- Steenbergen, C. M., & Reh, W. (2003). *Architectuur en landschap: het ontwerpexperiment van de klassieke Europese tuinen en landschappen*: Uitgeverij Thoth Bussum.
- Steenbergen, C. M., & Reh, W. (2012). *Architecture and landscape: the design experiment of the great European gardens and landscapes*: Birkhauser.
- Tangen, S. (2005). Demystifying productivity and performance. *International Journal of Productivity and Performance Management*, 54(1), 34-46.
- Treacy, M., & Wiersema, M. T. F. (1995). *The Discipline of Market Leaders: Choose Your Customers, Narrow Your Focus, Dominate Your Market*: Perseus Books.
- Turner, A. (2007). From axial to road-centre lines: a new representation for space syntax and a new model of route choice for transport network analysis. *Environment and Planning B: Planning and Design*, 34(3), 539-555.
- Ulrich, R. (1984). View through a window may influence recovery. *Science*(224), 224-225.
- Ulrich, R., Zimring, C., Quan, X., Joseph, A., & Choudhary, R. (2004). *The role of the physical environment in the hospital of the 21st century: a once-in-a-lifetime opportunity*. Concord, CA: The Center for Health Design.
- Ulrich, R., Zimring, C., Zhu, X., DuBose, J., Seo, H., Choi, Y., . . . Joseph, A. (2008). A review of the research literature on evidence-based healthcare design. *Health Environment Research and Design (HERD) Journal*, 3, 1-13.
- Van der Voordt, D. J. M., & Prevosth, J. *De toegevoegde waarde van FM, begrippen, maatregelen en prioriteiten in de zorgsector*. Naarden / Delft: FMN & TU Delft.
- Van der Voordt, D. J. M., & Van der Zwart, J. (2011). *Value based design and management of hospital buildings*. Paper presented at the MISBE Conference, Amsterdam.
- Van Der Voordt, D. J. M., & Van Wegen, H. B. R. (2005). *Architecture in use: an introduction to the programming, design and evaluation of buildings*. Oxford: Elsevier Architectural Press.
- Van der Voordt, D. J. M., Vrielink, D., & Van Wegen, H. B. R. (1997). Comparative floorplan-analysis in programming and architectural design. *Design Studies*, 18(1), 67-88.
- Van der Zwart, J. (2011). *Real estate added value and decision-making in hospital infrastructure*. Paper presented at the HaCIRIC International Conference 2011, Global health infrastructure - challenges for the next decade, Manchester UK.
- Van der Zwart, J., Arkesteijn, M. H., & Van der Voordt, D. J. M. (2009). *Ways to study corporate real estate management in healthcare: an analytical framework*. Paper presented at the HaCIRIC Conference 2009, Brighton, UK.
- Van der Zwart, J., Van der Voordt, D. J. M., & De Jonge, H. (2010). Private Investment in Hospitals: a comparison of three healthcare systems and possible implications for real estate strategies. *Healthcare Environment Research and Design (HERD) Journal*, 3(3), 16.
- Van Driel, A. (2003). *Strategische inzet van vastgoed*. Nieuwegein: Arko Uitgeverij BV.
- Van Gennip, E. M. S., Linnebank, F., Sillevs-Smit, P. A. E., & Geldof, C. A. (1999). Op weg naar een accreditatiesysteem van Nederlandse Ziekenhuizen. *Ned Tijdschrift Geneeskde*, 143(2), 89-93.
- Van Ginneke, I. (2006). *OOG / EYE*. Rotterdam: Oogziekenhuis Rotterdam.
- Van Hasselt, C. A. J. (2005). *Corporate Real Estate Management in de ziekenhuiszorg*. Master Thesis Real Estate & Housing. Delft University of Technology. Delft.
- Van Hoogdalem, H., Van der Voordt, D. J. M., & Van Wegen, H. B. R. (1985). *Bouwen aan gezondheidscentra*. Delft: Delftse Universitaire Pers.
- Van Laarhoven, H., & Eskrine, J. (2009). Orbis Medical Park, Sittard, Netherlands. In B. rechel, J. erskine, B. Dowdeswell, S. Wright & M. McKee (Eds.), *Capital investment for health, case studies from Europe*. Copenhagen: World Health Organization 2009, on behalf of the European Observatory on Health Systems and Policies.
- Van Nes, A. (2011). The one- and two-dimensional isovists analysis in space syntax. In S. Nijhuis, R. Van Lammeren & F. Van der Hoeven (Eds.), *Exploring the visible landscape, advances in physiognomic landscape research in the Netherlands*. Delft: IOS Press.

- Van Otterdijk, Y. (2011). *Demografische krimp en ziekenhuiszorg*: RVZ.
- Van Wagenberg. (2009). *European Study on added values for customers in the facility service supply chain*. Paper presented at the EuroFM RNG, Helsinki.
- Van Wersch, S., Winters-van der Meer, S., & Zomerplaa, J. (2006). *Kwaliteitsmodellen in de zorgsector*. Amsterdam: Uitgeverij SWP.
- Veldhoen, E. (2001). *De toekomst op tafel, het geneeshuis van de 21ste eeuw, werkboek 1*. Maastricht: Veldhoen + Company.
- Veldhoen, E. (2003). *De steen in de vijver, het geneeshuis van de 21ste eeuw, werkboek 2*. Maastricht: Veldhoen + Company.
- Veldhoen, E. (2008). *De daad bij het woord, het geneeshuis van de 21ste eeuw, werkboek 3*. Maastricht: Veldhoen + Company / Orbis medisch en zorgconcern.
- Veldman, H. (2008). *Een ziekenhuisonderneming in de twintigste eeuw*. Sittard-Geleen: Orbis Medisch en Zorgconcern.
- Vernero, A., Nabitz, U., Bragnozi, G., Rebelli, A., & Molinari, R. (2007). A two-level EFQM self-assessment in an Italian hospital. *International Journal of Health Care Quality Assurance*, 20(3), 215-231.
- Vijverberg, G. (2002). Accommodation functionality assessment in office buildings. *Facilities*, 20(3-4), 94-103.
- Vroon, T. (2007). *Monitoring gebouwkwaliteit algemene ziekenhuizen, Macrorapportage*. Utrecht: College Bouw Zorginstellingen.
- Weisman, J. (1981). Evaluating architectural legibility. *Environment and Behavior*, 13, 189-204.
- Winch. (2010). *Managing construction projects 2nd edition*. Singapore: Wiley-Blackwell Ltd.
- WMA: Competition Authority Act (Wet Mededingings Autoriteit) (2004).
- WMG: Healthcare Market Arrangement Law (Wet Marktordening Gezondheidszorg) (2006).
- WMO: Social Support Act (Wet Maatschappelijke Ondersteuning) (2006).
- Woodruff, R. B. (1997). Customer value: the next source for competitive advantage. *Journal of the Academy of Marketing Science*, 25(2), 139-153.
- WTG: Healthcare Tariffs Law (Wet Tarieven Gezondheidszorg) (1980).
- WTZi: Admission Healthcare Facilities Law (Wet Toelating Zorgvoorzieningen) (2005).
- WVC and VROM. (1991). *Architectuurnota Ruimte voor architectuur*. Den Haag.
- WZV: Hospital Facilities Law (Wet Ziekenhuis Voorzieningen) (1971).
- Zw: health insurance law (Zorgverzekeringswet) (2006).

Illustration credits

- CBS StatLine: figure 13-18, the author adapted the demographic data.
- De Vries, J.C.: figure 12.
- Den Heijer, A.C.: figure 25.
- Deventer Ziekenhuis / De Jong Gortemaker Algra: figure 66-95; for the spatial analysis of the Deventer Hospital the author used several reproductions of the preliminary and final design as blue-print.
- INK: figure 35, 36.
- KPMG: figure 19.
- Orbis Medical Centre / Veldhoen+Company / Bonnema Architecten: figure 44-47.
- Preiser, W.F. & Schramm, U.: figure 54.
- RIVM : figure 9.
- Vroon. T.: figure 10,11.

Nederlandse samenvatting

(Dutch summary)

Gezondheidszorg is kostbaar en wordt steeds duurder onder invloed van een toenemende en veranderende vraag naar zorg door een vergrijzende samenleving, toenemende vraag naar kwaliteit van leven en nieuwe medisch technologische mogelijkheden. Recente deregulatie van wetgeving omtrent ziekenhuisvastgoed in Nederland betekent dat zorgorganisaties meer mogelijkheden hebben om zelfstandig huisvestingskeuzes te maken maar anderzijds ook zelf verantwoordelijk zijn geworden voor de risico's die zijn verbonden aan de investeringen. Deze deregulatie van investeringsbeslissingen in zorgvastgoed betekende het einde van vier belangrijke controle mechanismen op de bouw van zorginstellingen vanuit de overheid. Ten eerste de criteria voor bouw en renovatie van ziekenhuizen (bouwnormen), ten tweede de kosten voor nieuwbouw (normkosten), ten derde de capaciteitsplanning (planningsnormen) en als laatste het toezicht op het naleven van al deze normen door de overheid die werd uitgevoerd door het College Bouw Zorginstellingen (CbZ). Door de deregulatie zijn de instellingen zelf verantwoordelijk voor het bepalen en behalen van huisvestingsdoelen. Dat huisvestingskosten daarbij integraal onderdeel zijn geworden van de tarieven in de gezondheidszorg maakt dat de afstemming tussen de organisatie van zorg en de huisvesting in een nieuw daglicht zijn komen te staan: zorginstellingen dragen zelf het risico voor het terugverdienen van hun investeringen in huisvesting en hoge huisvestingskosten leiden tot hogere kostprijzen van de zorg ten opzichte van concurrerende instellingen.

Aan de hand van recente casussen van ziekenhuizen is onderzocht wat het gedachtegoed van Corporate Real Estate Management (CREM) te bieden heeft voor huisvestingsvraagstukken van ziekenhuizen. CREM wordt gedefinieerd als het managen van de huisvesting van een onderneming door de portefeuille en diensten af te stemmen op de primaire bedrijfsprocessen, met het doel maximale toegevoegde waarde te realiseren voor het bedrijf. Deze definitie veronderstelt dat huisvesting waarde kan toevoegen aan de organisatie en kan bijdragen aan haar prestatie. Het bespreekbaar, meetbaar en toepasbaar maken van toegevoegde waarde van ziekenhuisvastgoed staat centraal in dit onderzoek. Sturen op toegevoegde waarden is van belang in alle fasen van de cyclus van initiatief, ontwerp, constructie en beheer. Daarnaast functioneren de waarden als gemeenschappelijke taal tussen de disciplines die betrokken zijn bij de realisatie van huisvesting, zoals de zorginstelling als opdrachtgever, de zorgmanagers, de huisvestingsmanager en de architect.

Door bestaande denkkaders aan te scherpen en met elkaar te verbinden is handen en voeten gegeven aan verschillende concepten die bijdragen aan een bewustere besluitvorming omtrent huisvesting en organisatie van zorg. Conceptuele modellen uit verschillende disciplines zijn op elkaar afgestemd om tot een integrale aanpak te komen van organisatie- en huisvestingsmanagement. Het resultaat is een toolbox dat kan worden ingezet voor een beter onderbouwd huisvestingsbeleid en ondersteuning van de besluitvorming. De instrumenten zijn getoetst door ze te spiegelen aan recent gerealiseerde nieuwbouwprojecten van ziekenhuizen.

De continu veranderende context waarin ziekenhuizen investeringsbeslissingen moeten nemen vraagt om: (1) een analyse die de organisatie plaatst in haar *context*; (2) *management* waarin huisvesting wordt afgestemd op de organisatie van de zorg; (3) kennis over de manier waarop huisvesting *waarde* kan toevoegen aan de door de organisatie gestelde doelen en; (4) mogelijkheden om het behalen van deze doelen te testen in het *ontwerp* van het ziekenhuisgebouw. *Context* (deel 1), *Management* (deel 2), *Waarde* (deel 3) en *Ontwerp* (deel 4) staan voor aspecten in de besluitvorming over huisvesting die ieder apart zijn onderzocht. De bevindingen zijn samengevat en verwerkt in een toolbox ter ondersteuning van de besluitvorming over huisvesting in alle fasen van de vastgoedcyclus, in samenhang met de besluitvorming over de organisatie van de zorg.

1. Context

De context beschrijft het politieke, demografische, economische, maatschappelijke en technologische landschap waarbinnen zorginstellingen lange termijn investeringsbeslissingen moeten nemen. Ziekenhuizen moeten hun positie bepalen tussen deze omgevingsfactoren aan de ene kant en de belangen van hun interne en externe stakeholders aan de andere kant. Het instrument voor context-mapping is een hulpmiddel om deze stakeholdersbelangen, de externe omgevingsfactoren en sector specifieke trends en scenario's in kaart te brengen.

Een analyse van de ziekenhuissector op basis van context-mapping laat zien dat veranderingen in de politieke context er voor zorgen dat ziekenhuizen meer dan voorheen moeten werken vanuit hun eigen kracht en mogelijkheden en daarbij zelf verantwoordelijk zijn voor het terug verdienen van hun investeringen in huisvesting. Sinds de deregulatie van investeringsbeslissingen en het invoeren van integrale bekostiging zijn ziekenhuizen zich meer bewust van hun concurrentiepositie in de zorgmarkt en hun positie in de regio. Daarnaast is de invloed van verschillende externe stakeholders veranderd. De afnemende directe invloed van de overheid op investeringsbeslissingen en capaciteit van zorginstellingen betekende een toenemende

invloed van zorgverzekeraars bij het inkopen van zorg (capaciteit) en banken bij het financieren van huisvestingsinvesteringen. Consequenties van de veranderende context voor huisvestingskeuzes van ziekenhuizen zijn: een nieuwe positionering van het ziekenhuis in de samenleving met samenhangende locatiekeuzes; behoefte aan arbeidsbesparende innovaties door huisvesting; noodzaak tot sturen op waarde creatie door middel van huisvesting en; mogelijkheden om met het ontwerp van de huisvesting te anticiperen op veranderingen in de organisatie van de zorg.



Figure 104 Context-mapping.

2. Management

Huisvestingsmanagement wordt in dit onderzoek afgestemd op de organisatie van zorg door bestaande conceptuele modellen van CREM parallel te plaatsen aan modellen die sturen op de kwaliteit van de organisatieprocessen. Het basismodel hiervoor is een abstractie van het European Foundation for Quality Management (EFQM) model in vier stappen: (1) belangen van stakeholders; (2) succesfactoren van de organisatie; (3) sturen op de structuur van de organisatie om; (4) het primair proces te verbeteren. In dit basismodel is tevens de plan-do-check-act cyclus opgenomen.

Het meta-model dat ontstaat door bestaande CREM modellen parallel te plaatsen aan dit basismodel is een instrument om de besluitvorming rond huisvesting structuur te geven en in hoofdlijnen af te stemmen op de organisatie van zorg. Het integraal raamwerk voor het managen van ziekenhuisvastgoed is vervolgens een nadere uitwerking van het meta-model.

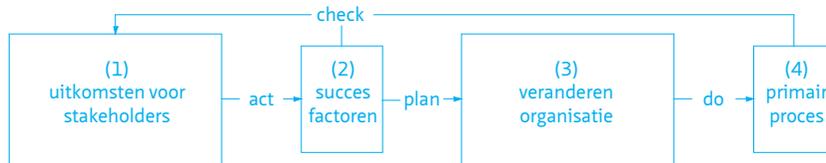


Figure 105 Basismodel voor aansturing van de zorgprocessen.

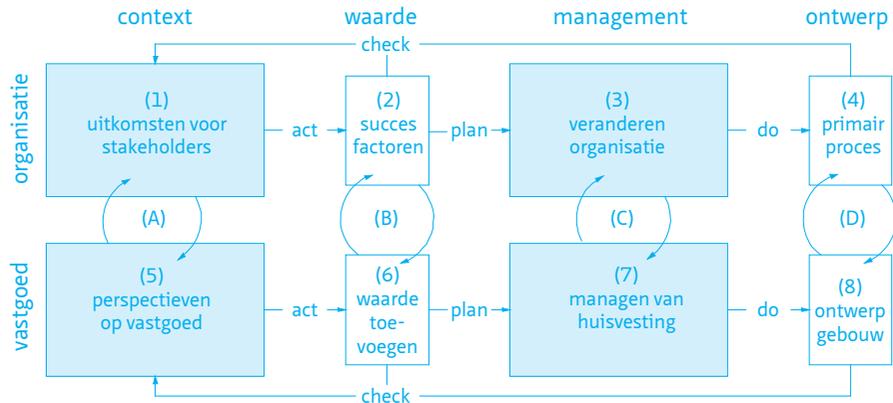


Figure 106 Meta-model voor het managen van huisvesting.

In het integraal raamwerk zijn de stappen op het niveau van de organisatie ingevuld met de stappen uit het EFQM-model en voor het vastgoed in: (5) de perspectieven op vastgoed (strategisch, financieel, functioneel en fysiek); (6) de toegevoegde waarden van vastgoed; (7) het DAS-frame (Designing an Accommodation Strategy) voor het afstemmen van vraag en aanbod aan huisvesting en; (8) het ontwerp van de huisvesting. De verbinding tussen bestaande managementmodellen leidt tot een integrale aanpak van organisatie- en huisvestingsmanagement door de afstemming tussen organisatie van zorg en de huisvesting inzichtelijk te maken in vier stappen:

- (A) tussen uitkomsten voor stakeholders (1) en perspectieven op vastgoed (5);
- (B) succesfactoren van de organisatie (2) en toegevoegde waarde van vastgoed (6);
- (C) tussen veranderen van de organisatie (3) en het managen van de huisvesting (7);
- (D) tussen het primair proces (4) en het ontwerp van het gebouw (8).

Tevens is een vijf-punts-schaal opgesteld om alle items in het integraal raamwerk te kunnen beoordelen op het ontwikkelingsstadium van de organisatie en haar huisvesting met een bijbehorende focus op product, proces, systeem, keten of maatschappij. Een parallelle assessment van organisatie en huisvesting laat zien waar de organisatie staat, op welke manier het vastgoed daarbinnen wordt aangestuurd en welk ambitieniveau wordt nagestreefd.

De toepassing van het integraal raamwerk bij een ex-post analyse van de initiatiefase van een ziekenhuis heeft aangetoond dat het expliciet benoemen van verbindingen tussen organisatie en huisvesting inzicht geeft hoe huisvesting bijdraagt aan het behalen van de door de organisatie gestelde doelen. De afstemming tussen context, waarde, management en ontwerp van zowel de organisatie als de huisvesting zorgt voor een integrale aanpak. In de benadering die in dit onderzoek is gepresenteerd spelen de toegevoegde waarden van vastgoed een centrale rol in de afstemming tussen succesfactoren van de organisatie en de perspectieven op vastgoed. In deze stap worden de doelen bepaald die met het managen van de huisvesting moeten worden behaald. Een tweede belangrijke stap is het toetsen in de ontwerpfase van de huisvesting of de gestelde doelen worden behaald ('check' ontwerpkeuzes op realisatie van huisvestingsdoelen). Dit vraagt om een assessment van het ontwerp op basis van de in de initiatiefase vastgestelde toegevoegde waarden van vastgoed.

3. Waarde

Waarde wordt in dit onderzoek gedefinieerd als de door de stakeholders gewaardeerde prestatie van een product of dienst die bijdraagt aan het behalen van de door deze stakeholders gestelde doelen. Dit betekent dat waarde afhankelijk is van de (subjectieve) beoordeling van stakeholders. Hierom moeten toegevoegde waarden van vastgoed dusdanig worden gedefinieerd dat zij vooraf (ex-ante) de doelen van de stakeholders vastleggen zodat deze achteraf (ex-post) kunnen worden getoetst in het ontwerp.

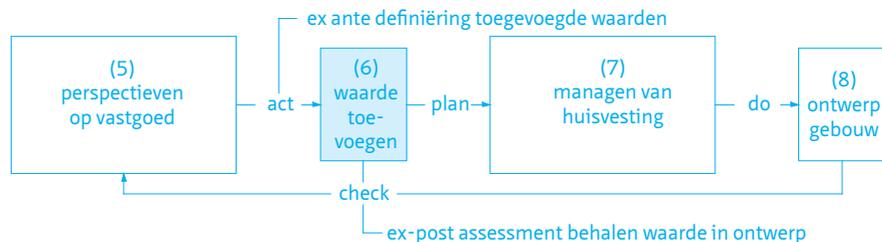


Figure 107 Ex-ante definiëring en ex-post assessment van toegevoegde waarden.

Interviews met vijftien ziekenhuizen hebben aangetoond dat het concept van waarde toevoegen met huisvesting aansluit op de praktijk van ziekenhuizen die recent een nieuw gebouw hebben gerealiseerd. De vijf belangrijkste bevindingen uit de interviews zijn: (1) de mens in het gebouw staat centraal; (2) in alle fasen van de planontwikkeling is aandacht nodig voor afstemming van de huisvesting op de organisatie van zorg; (3) prioriteit van waarden is afhankelijk van de fase in de bouwcyclus (initiatief,

ontwerp, constructie of beheer); (4) noodzaak tot sectorspecifieke definiëring van toegevoegde waarde en ; (5) waarde wordt bepaald door de stakeholders. Het spiegelen van de toegevoegde waarden van vastgoed uit de CREM-literatuur aan de realisatie van nieuwe ziekenhuizen in Nederland heeft geleid tot een sectorspecifieke definiëring van toegevoegde waarden van ziekenhuisvastgoed en een categorisering in drie clusters.

categorie		definitie toegevoegde waarden van ziekenhuis vastgoed	
gebruikerswaarde	De manier waarop de fysieke omgeving door mensen wordt ervaren en beoordeeld in het dagelijks gebruik. Dit sluit direct aan op de organisatie als samenwerkingsvorm tussen verschillende mensen die samen hun doelen willen verwezenlijken.	organisatiecultuur & innovatie	Communicatie en innovatie stimuleren door verbeteren van interpersoonlijke relaties binnen de organisatie.
		patiënttevredenheid & healing environment	Positief beïnvloeden van het genezingsproces door plezierige huisvesting voor patiënten.
		medewerker tevredenheid	Functionele, plezierige en comfortabele werkruimte voor medewerkers.
productiewaarde	Functionele geschiktheid en doelmatigheid in gebruik betekent dat een gebouw voldoet aan de gewenste gebruiksmogelijkheden. Passende afmetingen, plaatsing van de programma-onderdelen ten opzichte van elkaar en routing binnen het complex zijn belangrijke aspecten.	gebruikskosten reduceren	Reduceren van vastgoed gerelateerde kosten zoals investerings-, kapitaals-, gebruiks- en onderhoudskosten.
		productiviteit vergroten	Het vergroten van productiviteit door een effectiever gebruik van de huisvesting.
		aanpasbaarheid	Ruimtelijke en technische flexibiliteit om de huisvesting aan te kunnen passen aan veranderingen in zorgprocessen.
toekomstwaarde	Doelmatigheid in tijd betreft de duurzaamheid van het ontwerp en de geschiktheid voor andere bestemmingen en nieuwe ontwikkelingen waarbij het gebouw in constructieve zin kan voldoen aan behoud van kwaliteit en waarde.	imago ondersteunen	Het uitdragen van organisatiewaarden door het gebouw in te zetten als icoon van de organisatiecultuur.
		risico beheersen & financieringsmogelijkheden	Anticiperen op toekomstige technische en financiële risico's door het vastgoed als asset te beschouwen.
		duurzaamheid	Reduceren van energie-, water- en materiaal om met stijgende grondstofprijzen betaalbare zorg te leveren.

Table 52 Toegevoegde waarde van ziekenhuisvastgoed.

Gebruikerswaarden zoals het stimuleren van de organisatiecultuur en patiënt- en medewerker tevredenheid worden in de praktijk hoog geprioriteerd. Deze categorie wordt gevolgd door de meer tactisch georiënteerde productiewaarden zoals het verbeteren van de productiviteit, het reduceren van huisvestingskosten en het vergroten van de flexibiliteit om de gebouwde omgeving relatief eenvoudig te kunnen aanpassen aan nieuwe zorgprocessen. Toekomstwaarden zoals het imago van het gebouw, risico, financiering en duurzaamheid worden als laagst geprioriteerd.

Naast het definiëren van toegevoegde waarden van ziekenhuisvastgoed is de waarde-impact-matrix ontwikkeld als ondersteuning van de afstemming tussen de succesfactoren van de organisatie, de toegevoegde waarden van vastgoed en de perspectieven op vastgoed vanuit verschillende belangen van stakeholders.

Dit instrument maakt het mogelijk om toegevoegde waarden van vastgoed vanuit verschillende perspectieven op vastgoed (strategisch, financieel, functioneel en fysiek) te belichten om deze vervolgens in te vullen met specifieke huisvestingskeuzes zoals wel of niet flex-werkplekken, de keuze voor een drager-inbouw-constructie of het wel of niet opnemen van toekomstige uitbreidingen in het ontwerp. Table 53 toont een uitsnede van deze matrix voor de waarde patiënttevredenheid & healing environment.

		perspectief op vastgoed			
		strategisch	financieel	functioneel	fysiek
		Waarde toevoegen aan organisatie doelen: op welke manier worden strategische doelen van de organisatie ondersteund?	Waarde, middelen en kosten: wat zijn de consequenties en financiële impact op de middelen, vastgoedwaarde en levensduurkosten?	Passend voor gebruik: op welke manier worden de primaire processen van de gebruikers ondersteund?	(on)mogelijkheden van vastgoed: wat is technisch en fysiek mogelijk in een nieuw of bestaand gebouw?
patiënttevredenheid & healing environment		Patiënttevredenheid is gerelateerd aan het welzijn van de patiënten en de bijdrage van de fysieke omgeving op het genezingsproces. Belangrijke aspecten van patiënttevredenheid zijn zicht op natuur, daglicht, materiaalgebruik, geluidsreductie, oriëntatie & route en privacy in spreekkamers en verpleegkamers.			
gebruikerswaarde	Positief beïnvloeden van het genezingsproces door plezierige huisvesting voor patiënten.	Het gebouw draagt bij aan het genezingsproces van patiënten en zorgt op die manier voor een betere positionering van het ziekenhuis in de zorgmarkt.	Hogere huisvestingskosten worden terugverdiend door een kortere ligduur en hogere bezetting door een hogere patiënttevredenheid.	De gebouwde omgeving kan bijdragen aan reductie van stress bij patiënten waardoor het genezingsproces beter verloopt.	Architectonische kwaliteit van patiëntenruimten zoals spreekkamers en (eenpersoons-) verpleegkamers : zicht op natuur, daglicht, materiaalgebruik, geluidsreductie, privacy en oriëntatie en route.

Table 53 Waarde-impact-matrix uitsnede patiënttevredenheid en healing environment.

4. Ontwerp

De laatste stap in het meta-model is de toets of de vooraf vastgestelde toegevoegde waarden van vastgoed daadwerkelijk worden gerealiseerd in het architectonisch ontwerp. Deze toets kan achteraf (ex-post) plaatsvinden door Post Occupancy Evaluations (POE) of vooraf (ex-ante) door een assessment van het architectonisch ontwerp. Analyse van plattegronden door middel van tekentechnieken en modellering uit architectuur en stedenbouw maakt het mogelijk om verschillende aspecten van gebruikswaarde zichtbaar te maken in ontwerptekeningen. Hierdoor worden toegevoegde waarden van vastgoed onderdeel van de besluitvorming in het ontwerpproces. De in dit onderzoek

toegepaste vormen van design-assessment hebben zichtbaar gemaakt op welke manier aspecten van patiënttevredenheid zoals zicht op natuur, daglicht, reduceren van geluid, zichtbaarheid van receptie en wachtruimten en oriëntatie in het gebouw ex ante zijn te toetsen op basis van plattegronden. Ondanks dat dit deel van het onderzoek een eerste verkenning is van de mogelijkheden van design-assessment als toets van toegevoegde waarden van vastgoed in de ontwerpfase, zijn de resultaten veelbelovend. Meer validerend onderzoek is nodig om de uitkomsten uit een POE te kunnen koppelen aan de resultaten uit de plattegrondanalyses. Ook de mogelijkheden om andere waarden dan gebruikerswaarde te toetsen in de ontwerpfase vraagt om verder onderzoek.

Design-assessment werpt ook een nieuw licht op Evidence-Based Design (EBD). Daar waar traditioneel EBD gericht is op het toepassen van het best beschikbare wetenschappelijk bewijs in het ontwerp, richt design-assessment zich op het toepassen van de beste beschikbare analysetechnieken om het realiseren van toegevoegde waarde in plattegronden aan te tonen.

5. Een toolbox voor waardengericht management & ontwerp

Eén van de resultaten van dit onderzoek is het ontwerp van een toolbox met modellen en instrumenten die de besluitvorming over huisvesting van ziekenhuizen kunnen ondersteunen. Dit instrumentarium geeft grip op de context, waarden, management en ontwerp van huisvesting en is bedoeld als referentie voor de afstemming tussen de huisvesting en de organisatie van zorg. De instrumenten kunnen los van elkaar gebruikt worden, maar ook in combinatie. Het instrumentarium voorziet in richtlijnen voor de verdeling van verantwoordelijkheden en taken tussen de ziekenhuisdirectie, huisvestingsmanager, zorgmanagers en architect in de verschillende fasen van initiatief, ontwerp en gebruik van de huisvesting.

Bestaande modellen als uitgangspunt

De casestudies hebben de bruikbaarheid van de conceptuele modellen uit CREM in het afstemmen van huisvesting voor ziekenhuizen en organisatie van zorg aangetoond. De ordening van verschillende conceptuele modellen in het meta-model en de koppeling aan het EFQM-model als abstracte omschrijving van de organisatie heeft geresulteerd in een helder iteratief stappenplan waarin huisvesting en organisatie van zorg op elkaar kunnen worden afgestemd. Daar waar het meta-model op het niveau van de bestuurder overzicht geeft in de te maken afwegingen op hoofdlijnen, is het integraal model een uitgebreid hulpmiddel voor de huisvestingsmanagers om de verschillende stappen verder uit te werken.

Transdisciplinaire benadering van huisvesting en organisatie van zorg

De ordening van bestaande CREM modellen en de koppeling aan conceptuele kaders van kwaliteitsmanagement en ruimtelijke kwaliteit kan gezien worden als de belangrijkste bijdrage van dit onderzoek aan het wetenschappelijk debat. De toevoeging aan bestaande denkkaders is gericht op het verbinden van de verschillende disciplines, waardoor een nieuw fundament is ontstaan waarop iedere professional vanuit zijn eigen kennis en kracht kan bijdragen aan een betere afstemming tussen huisvesting en organisatie van zorg. Door verbindingen aan te brengen tussen bestaande kennis vanuit verschillende vakgebieden sluit dit onderzoek aan bij de maatschappelijke vraag naar een transdisciplinaire aanpak van hedendaagse problemen. Op conceptueel gebied zijn deze gemeenschappelijke uitgangspunten vertaald in het meta-model dat in vier stappen (context, waarde, managen, ontwerp) huisvestingsmanagement afstemt op de organisatie van de zorg.

Focus op kwaliteit van organisatie, huisvesting en ruimtelijk ontwerp

Verbindingen tussen disciplines en tussen conceptuele modellen zijn gevonden door te kijken naar de kwaliteit van zowel organisatie en huisvestingsmanagement als ruimtelijk ontwerp. Ten eerste zijn kwaliteitsmodellen gebruikt om de organisatie en haar processen te kunnen conceptualiseren, typeren en beschrijven. Daarnaast zijn bestaande modellen uit de CREM literatuur ten opzichte van elkaar gepositioneerd en gerelateerd aan het managen van de organisatie en haar primaire processen. Vervolgens is onderzocht hoe toegevoegde waarden van vastgoed aansluiten op ruimtelijke kwaliteit. De indeling van toegevoegde waarden in gebruikerswaarde, productiewaarde en toekomstwaarde blijkt een bruikbare categorisering. Dit opent een venster naar het beschouwen van toegevoegde waarde van vastgoed als het realiseren van kwaliteit, zoals deze ervaren wordt door de verschillende stakeholders. Vanuit deze gedachte kan het sturen op kwaliteit van organisatie, huisvesting en ruimtelijk ontwerp door bewust te sturen op toegevoegde waarden van vastgoed gezien worden als het antwoord op een continu veranderende context waarin ziekenhuizen lange termijn beslissingen moeten nemen over hun investeringen in huisvesting.

Epilogue

'We choose to go to the moon, not because it is easy, but because it is hard.' It was these words of John F. Kennedy in 1962 that changed the direction of the rat-race for innovation between two super states by defining an ambitious new goal.

In a similar way, six years ago I made a step from architecture and landscape to real estate and healthcare. My new direction as a PhD student in real estate in healthcare was a challenge to develop myself further as a researcher. That the transition would be hard, was obvious, but the belief was there that the direction was the right one. Gradually I have explored the breadth and depth of the research area and have been given the opportunity to discover how healthcare management, real estate and architecture come together. But most of all this research into the accommodation of healthcare organisations and the quest for innovation that followed developed me as a person.

"And what is your moon, what is the dream that you hunt for, what is that unattainable goal that you want to achieve in the coming years?" (Claudia de Breij).

Now this PhD has been completed, it turns out to be a next step for me in a continuous quest for more knowledge and understanding. It is this quest for knowledge in architecture for healthcare that has fascinated and motivated me to work every day, even when the target seemed to move further away rather than coming closer.

'They say we never landed on the moon, there is no wind there, they assume, I guess conspiracies are nothing new, but I am sure I have been there with you,' (Katie Melua)

Although my journey in Delft seems to have come to an end, it appears to be that the moon of which I have dreamt has not been reached yet. This means that I will keep moving on in the coming years by studying and exploring new research fields. One of my personal discoveries in recent years is that knowledge and understanding is mostly found by choosing another context. Besides my step to Real Estate & Housing, also my study in healthcare management during my PhD research is an obvious example of this.

'Okay Houston, we have had a problem here', was the announcement of the Apollo 13 crew, reporting a technical problem with the oxygen supply to the base control on the 14th of April 1970.

But like any expedition to faraway places, there are many who travel with you and help you along the way to reach your destination. The crew of my capsule consisted of Hans

as a navigator who tried to prevent me ending up somewhere between Mars and Venus every time, and Theo as the co-pilot who was available at any time for sparring and checking.

They were also the flight engineers on board that made sure that the research was methodologically sound and prevented it from falling apart during the flight. Once the goal was almost in sight Rachel helped me so much by making the English in my book understandable. But above all I want to thank Jaap and Toos for being my base control in recent years. The many telephone conversations helped me to keep going and not get lost along the way.

Little Nut Brown Hare, who was going to bed, held on tight to Big Nutbrown Hare's very long ears. He wanted to be sure that Big Nutbrown Hare was listening. "Guess how much I love you," he said. [...] Then he looked beyond the thorn bushes, out into the big dark night. Nothing could be further than the sky. "I love you right up to the moon," he said, and closed his eyes. "Oh, that's far" said Big Nut Brown Hare. "That is very far." Big Nutbrown Hare settled Little Nutbrown Hare into his bed of leaves. He leaned over and kissed him good night. Then he lay down close by and whispered with a smile, "I love you right up to the moon-and back." (Sam McBratney)

But at the end the best part of a journey is coming home and I am happy that Jana, Joris, Jella and Juri are always there for me, giving me the space to work on this book, but also regularly asking for my attention to keep me with both feet on the ground.

In the middle of the evening the ant clapped in his hands. It was quiet. "Now you get a present from everyone," he announced. The squirrel did not see any present. Then he saw that all the animals had climbed on each other's shoulders. It was a huge tower of animals. At the top was the ant who held the moon in one hand above his head. "Climb up quickly," cried the bear to the squirrel, who stood there as if nailed to the ground. The squirrel started to climb and stepped from one animal to another. It was a long journey. It was in the middle of the night when the squirrel reached the ant. "Hi squirrel," said the ant. "Here's the moon." And then the squirrel stepped onto the moon. (Toon Tellegen)

For you,

from me.

Johan van der Zwart

August 2014

Curriculum vitae



Johan van der Zwart graduated in 2001 from the Faculty of Architecture and the Built Environment of Delft University of Technology. From 2001 until 2004 he worked as a junior-architect in a firm specialised in primary schools, de-centralized healthcare facilities, nursing homes and housing for the elderly and people with physical disabilities. In addition, he worked from 2001 until 2008 as assistant-professor Landscape architecture at the department of Urbanism of the TU-Delft.

As lecturer landscape architecture he is co-author of the atlas of the '*New Dutch Water Defence Line*' (2010) and '*Living Landscape, manifesto for urbanism and landscape*' (*Levend Landschap, manifest voor stad en land*, 2012). As an architect he received an honourable mentioning for the competition-entry '*Care-4U*' in the design-competition '*Healthcare 2025, buildings for the future*' of the Netherlands' Board for Healthcare Institutions.

Whilst conducting his PhD research '*Building for better hospitals, value-adding management & design of healthcare real estate*' at the department Real Estate & Housing, he attended international and national conferences on healthcare real estate, published several scientific articles in Dutch and international journals and followed an intensive pre-master course in healthcare management at the Institute of Healthcare Policy and Management of the Erasmus University Rotterdam. In 2013 he started the master Healthcare Management at the same university.

As PhD candidate he is co-author of '*Private Investment in Hospitals: A Comparison of Three Healthcare Systems and Possible Implications for Real Estate Strategies*' (Van der Zwart, Van der Voordt & De Jonge, 2010) and '*Adding value by FM and CREM in Dutch hospitals*' (Van der Voordt, Prevosth & Van der Zwart, 2012) in the book '*The Added Value of Facilities Management; concepts, findings and perspectives*'.

International publications

- Van der Zwart, J., & Van der Voordt, D. J. M. (2013). Value adding management of hospital real estate, balancing different stakeholder perspectives. *EHospital*, 2013, 2 (3), 13-18.
- Van der Voordt, D. J. M., Prevosth, J., & Van der Zwart, J. (2012). ADDING VALUE BY FM AND CREM IN DUTCH HOSPITALS. In P. A. Jensen, D. J. M. van der Voordt & C. Coenen (Eds.), *The Added Value of Facilities Management; concepts, findings and perspectives* (pp. 205-222). Lyngby: Polyteknisk Forlag.
- Van der Zwart, J., Van der Voordt, D.J.M., & De Jonge, H. (2010). Private Investment in Hospitals: A Comparison of Three Healthcare Systems and Possible Implications for Real Estate Strategies. *Herd-Health Environments Research & Design Journal*, 3 (3), 70-86.

Conference papers

- Van der Voordt, D. J. M., & Van der Zwart, J. (2011). Value based design and management of hospital buildings. Paper presented at the MISBE Conference, Amsterdam.
- Van der Zwart, J. (2011). Real estate added value and decision-making in hospital infrastructure. Paper presented at the HaCIRIC International Conference 2011, Global health infrastructure - challenges for the next decade, Manchester UK.
- Van der Zwart, J., Arkesteijn, M. H., & Van der Voordt, D. J. M. (2009). Ways to study corporate real estate management in healthcare: an analytical framework. Paper presented at the HaCIRIC Conference 2009, Brighton, UK.
- Van der Zwart, J., De Jonge, H., & Van der Voordt, D. J. M. (2009). Private investment in hospitals, a comparison of three healthcare systems and possible implications for real estate strategies. Paper presented at the 3TU Research Day on Innovation in Design and Management of Health Care Facilities and Healthy Environments, Rotterdam.
- Van der Voordt, D. J. M., & Van der Zwart, J. (2008). Expert Workshop: dilemmas in Health Care Real Estate Management. Paper presented at the Colloquium Corporations and Cities Conference, Brussels, Belgium.
- Van der Zwart, J., Van der Zwart, J. C., Remijnse, R., Reukema, R., & Teerds, H. (2008). CARE-4U. In V. Staaldin (Ed.), *Healthcare 2025: buildings for the future* (pp. 14-15, 66-67). Utrecht: Netherlands Board for Healthcare Institutions.

Dutch publications

- Van der Zwart, J., & Van der Voordt, D. J. M. (2012). Sturen op toegevoegde waarden van ziekenhuisvastgoed. *Real estate Magazine*, 80 (3), 36-40.
- Van der Zwart, J., & van der Voordt, D. J. M. (2012). Deelstudie 3, Ziekenhuizen. In M. H. Arkesteijn & H. De Jonge (Eds.), *Eigendom vastgoed rijksmuseum, lessen voor een eventuele overdracht*. Delft: Faculteit Bouwkunde TU Delft, Afdeling Real Estate & Housing.
- Van der Zwart, J., & Van der Voordt, D. J. M. (2009). Zorgvastgoed in de stedelijke context, strategisch sturen op locatipotenties. *Real estate Magazine*, (63), 26-30.
- Van der Zwart, J. (2007). Zorg voor de toekomst, flexibiliteit en diversiteit in de zorg. *BouwIQ*, november 2007, 24-25.

Publications on landscape Architecture

- Teerds, H. & Van der Zwart, J. (2012); *Levend Landschap, manifest voor stad en land*; Uitgeverij SUN, Amsterdam
- Steenbergen, C.M., Van der Zwart, J. & Grootens, J. (2009), *Atlas Nieuwe Hollandse Waterlinie*; Uitgeverij 010, Rotterdam.
- Van der Zwart, J. (2004); *Tussen haard en horizon, landschapsarchitectonische bouwstenen*; Uitgeverij SUN, Amsterdam.

