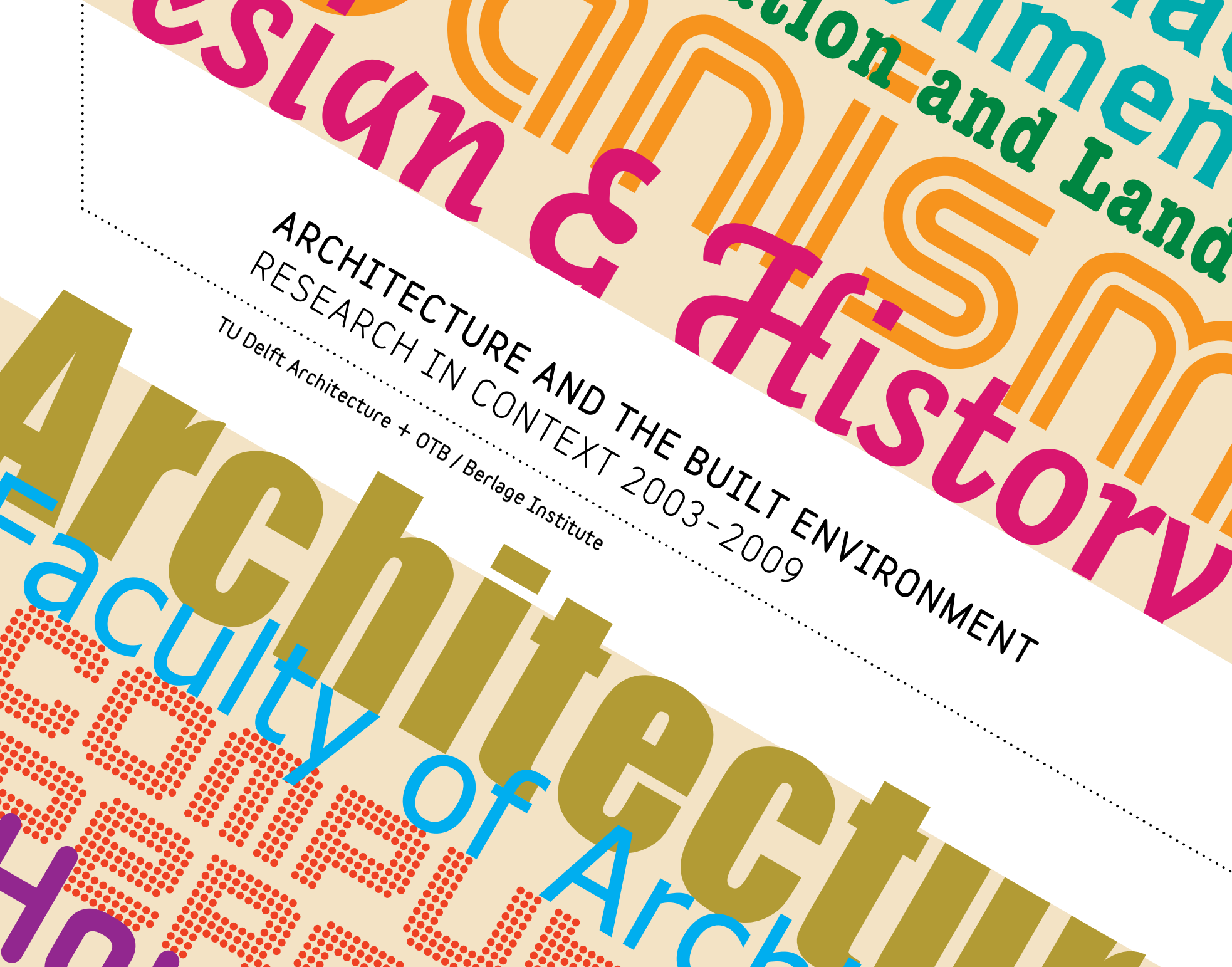
ARCHITECTURE AND THE BUILT ENVIRONMENT
RESEARCH IN CONTEXT 2003-2009
TU Delft Architecture + OTB / Berlage Institute
Architecture
Faculty of Architecture
Design & History
Urbanism
Landscape Architecture and Land
Building Technology

Foreword

TU Delft's Faculty of Architecture and OTB Research Institute, together with the independent Berlage Institute, have made great strides in their investigations into how design, engineering, planning and management can contribute to improving performance, quality of life and sustainability in the built environment of the Netherlands, the European Union and beyond.

As such we perceive the world around us as our laboratory. The way in which we communicate and interact with that world is through journal publications, books, dissertation, events, exhibitions and websites.

However, performance and excellence in our field is not just evidenced by publications alone. Stakeholder appreciation, academic reputation, impact on practice and policy making, involvement in externally commissioned research projects and participation in national and international consortia are just as strong performance indicators.

This publication *'Architecture and the Built Environment - Research in Context'* proudly presents the progress that we have made over the years 2003 - 2009 by presenting the best achievements in an extended range of performance categories.

It is the first joint publication by Architecture, OTB and Berlage and hints clearly at stronger future ties between the three institutes, which are strategically positioned in the Rotterdam/ Delft cluster of creative industries in architecture and urbanism.

I have full confidence that together Architecture, OTB and Berlage have sufficient capacity to weather the current crisis and emerge even stronger, ready to play an international leading role in the developments in the field of architecture and the built environment.

Prof. Wytze Patijn,
Dean of the Faculty of Architecture
Delft University of Technology

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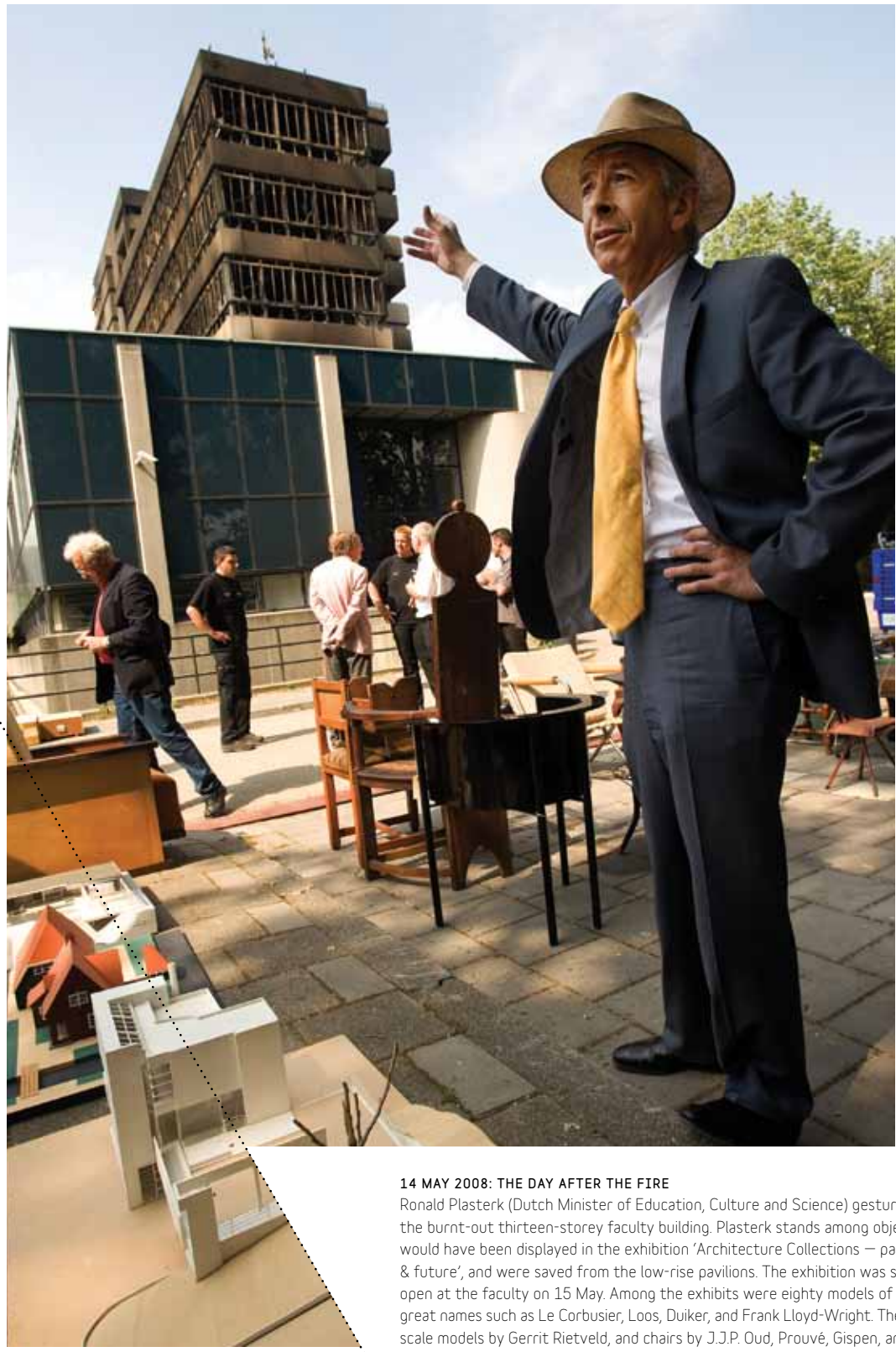


14 MAY 2008: THE DAY AFTER THE FIRE
Ronald Plasterk (Dutch Minister of Education, Culture and Science) gestures towards the burnt-out thirteen-storey faculty building. Plasterk stands among objects that would have been displayed in the exhibition 'Architecture Collections — past, present & future', and were saved from the low-rise pavilions. The exhibition was scheduled to open at the faculty on 15 May. Among the exhibits were eighty models of designs by great names such as Le Corbusier, Loos, Duiker, and Frank Lloyd-Wright. There were also scale models by Gerrit Rietveld, and chairs by J.J.P. Oud, Prouvé, Gispen, and Rietveld.

Introduction

This publication provides an overview of TU Delft's and Berlage's most significant research achievements in the field of architecture and the built environment, produced over the years 2003-2009. The publication is produced in preparation for the Dutch 2010 research assessment exercise Architecture and the Built Environment.

The system of research assessments in the Netherlands requires that an institute conducts what is known as a self-analysis, using a detailed format that is stipulated by a standard evaluation protocol or SEP. On the initiative of TU Delft's rector Prof. Jacob Fokkema PhD, the Faculty of Architecture worked with the Rathenau Institute to amend the system of research assessment in order to bring the presentation of societal research performance on a par with the presentation of more established performance indicators.

The Rathenau Institute is an autonomous organisation funded by the Ministry of Education, Culture and Science, with responsibility for governance falling to the Royal Netherlands Academy of Arts and Sciences (KNAW). Rathenau conducted a pilot study at the Faculty of Architecture in Delft during much of 2008 and 2009 within the framework of the Evaluating Research in Context (ERiC) project.

The objective of ERiC was to develop ways to measure the social impact of research. The project was supported by a wide range of key stakeholders in the field: the Royal Netherlands Academy of Arts and Sciences (KNAW), Netherlands Organisation for Scientific Research (NWO), Netherlands Association of Universities of Applied Sciences (HBO-Raad), and Quality Assurance Netherlands Universities (QANU).

The Architecture ERiC-pilot developed the format for the approach presented here. However, *Architecture and the Built Environment - Research in Context* is not just published to allow our achievements to be assessed. More importantly the book is intended to communicate those achievements. It provides a point of reference for research performance and excellence in architecture and the built environment. It can be read as a structured effort to establish a benchmark in our field.

Frank van der Hoeven PhD
Director of Research Faculty of Architecture
Delft University of Technology

Architecture

Faculty of Architecture

TU Delft's Faculty of Architecture (*'Faculteit Bouwkunde'* in Dutch) focuses on design, engineering, planning and management related to architecture and the built environment. With over 3,000 students and around 250 full time equivalent (FTE) scientific staff, Architecture is the largest faculty at TU Delft and one of the largest in its field in Europe. Over 500 first-year students enrol in its programme annually, of whom over 30% are female. Great importance is attached to the special relationships with a range of institutes at home and abroad, including TU Delft's OTB Research Institute and the Berlage Institute.

History

What was later to become *'Bouwkunde'* that we know today first emerged in 1904, when the Architecture Department originating from the Civil Engineering Department of the Technische Hogeschool Delft (TH-Delft) first began to offer an Architecture degree programme. In 1948, the Architecture degree programme was joined by the new Urban Development degree programme. This was followed in 1972 by the Public Housing programme. Since 1986, the *Technische Hogescholen* in the Netherlands have been known as *Technische Universiteiten* (Universities of Technology), of which there are three. From that point on, the Architecture Department was referred to as the Faculty of Architecture. In 1987, the Real Estate and Project Management programme was added to the three existing degree programmes, followed in 1989 by the Building Technology degree programme.
On 13 May 2008, the Faculty of Architecture building at TU Delft was reduced to ashes in a devastating fire and subsequently partially collapsed. The faculty library was one of the few elements that survived the disaster. In late 2008, the Faculty moved to what had been TU Delft's main building, located at Julianalaan 134 in Delft: *BK City*.

Profile

The Faculty of Architecture has five departments: Architecture, ®MIT, Building Technology, Urbanism, and Real Estate & Housing. Over the past few decades, the faculty has grown to become an institute of considerable stature. Both nationally and internationally, the faculty works with universities, private-sector companies and public bodies – conducting contract research for the latter. Furthermore, there is an extensive exchange of faculty members and students with similar faculties, both in the Netherlands and abroad. Thanks to increasing public interest in 'design, engineering, planning and management, the number of students who choose to attend the Faculty of Architecture in Delft has risen steadily. The faculty stands at the centre of such developments and has adapted its study programmes in response to them. Students are educated to become engineering designers who on the one hand contribute to the growth of scientific knowledge relating to architectural issues and, on the other, are able to devise practical solutions to tackle these issues.
Building practice requires architectural engineers who can combine a scientific approach with management qualities, and who are able to lead and manage the process of initiative, design, realisation and management.

BK City

Built environment

OTB Research Institute for the Built Environment

The OTB Research Institute for the Built Environment is an interfaculty research institute involving the faculties of Architecture, Technology, Policy and Management, and Civil Engineering and Geosciences. The OTB has its own independent status within TU Delft, functions as an autonomous unit and is the direct responsibility of TU Delft's Executive Board. The three deans of the constituent faculties make up the board of the OTB. They advise the management of the institute and the Executive Board. The institute has no formal professorships. All OTB chairs are located within the three constituent faculties or partly outside Delft. In 2010 TU Delft's Executive Board decided that the OTB should become a part of the Faculty of Architecture to reinforce the quality of the research of both the faculty and the institute.

Research Area

OTB is a hybrid organisation in the sense that it combines directly funded research with contract research. The aim of the institute is to maintain a broad fifty-fifty balance between its directly funded and contract-based activities.
OTB's research covers the areas of housing studies, urban studies, transport studies and geo-information studies. Its research activities relate to the built environment, and draw from aspects of technological sciences, policy and management sciences, behavioural sciences, spatial disciplines and information and communications technology. This research profile is directly linked to TU Delft's mission to conduct strategic research which has both fundamental and applied aspects. OTB's research portfolio consists of seven research programmes, as listed below.

1. Housing Systems aims to examine and explain the manner in which housing systems can be characterised, how they change over time, and whether they are and will continue to be sustainable in terms of their affordability, the quality of individual units, and the quality of the residential environment.
2. Housing Quality focuses on the physical quality of dwellings and their improvement in four research areas: technical knowledge on the health and sustainability of dwellings, innovation in building and maintenance processes, the management of housing providers, and policy instruments and enforcement procedures aimed at improving the quality of housing.
3. Urban and Regional Development deals with the interrelationship between the ever growing complexity of urban systems and the extent to which the development of these systems can be influenced through policies and governance.
4. Neighbourhood Change and Housing is concerned with the ways in which residential neighbourhoods are ordered, organised and experienced as everyday realities in a changing urban world.

5. Transport Studies focuses on the sustainability of particular intermodal (freight) and integrated (passenger) transport systems/networks.
6. Governance of Geoinformation and Land Development focuses on research in land law, the administrative, legal and organisational aspects of geo-information, and the institutions, such as organisations, processes, legal rules and financial instruments, that are (or may be) used in the spatial development of both urban and rural areas.
7. GIS Technology concentrates on developing and providing geo-information technology and knowledge for crisis management and spatial information infrastructure.

The programmes Housing Systems, Housing Quality, Urban and Regional Development, Neighbourhood Change and Housing, Transport Studies, and GIS Technology were evaluated in 2008. Since Housing Quality is a joint programme of the Faculty of Architecture and the OTB Research Institute, and only the OTB part of it was evaluated in 2008, we have included it in this publication together with the description of Governance of Geoinformation and Land Development which was not evaluated in 2008.

Faculty of Architecture

RESEARCH LEADERS: Frank van der Hoeven PhD & Research Council
RESEARCH COUNCIL: Prof. Andy van den Dobbelsteen PhD, Irem Erbas, Ipek Gursel, Frank van der Hoeven PhD, Prof. Vincent Nadin, Lara Schrijver PhD, Rudi Stouffs PhD, Marie-Thérèse van Thoor PhD, Prof. Henk Visscher PhD, Theo van der Voordt PhD

1 Objectives and research area

1.1 Vision, mission and objectives

Vision: The vision of the 'Architecture and the Built Environment' Research Portfolio is to consolidate the excellent international academic reputation of the Faculty of Architecture as a leading design academy; to be an international platform for innovation in architectural design, building engineering, urban planning, landscape architecture and management for the built environment; and to be a platform for the debate on current and social themes in architecture and the built environment.

Mission: The Faculty's mission is to educate leading international Master's and PhD students about architectural design, building engineering, urban planning and management for the built environment; to perform excellent and innovative design-oriented research; to transfer its knowledge through its Bachelor's and Master's degree programmes, through journal articles and book publications, exhibitions and events, and through consulting.

Objectives: The faculty's objective is to play a key role in the cluster of architectural and urban design industry in the western part of the Netherlands, and develop a strong international presence, exploiting the reputation of Dutch architecture and spatial planning and the significance of the Randstad as a leading European region.

1.2 Societal concerns and issues

The principal societal concern addressed by the Faculty's research is 'quality of life in buildings, cities and regions'. This quality of life is related to various issues such as aesthetics, energy efficiency, land-use efficiency and value creation. It affects the life styles of individuals and the social, economic and territorial cohesion of communities.

1.3 Position

The Faculty of Architecture at Delft University of Technology is one of the largest architecture faculties in Europe with more than 3,000 students and around 250 full time equivalent (FTE) scientific staff. Traditionally a high percentage of the scientific staff are also practitioners. Well-known designers such as Jo Coenen, Tony Fretton, Dick van Gameren, Winy Maas, Michiel Riedijk, Kas Oosterhuis and Dirk Sijmons conduct research and teach at this faculty. This produces innovative and revolutionary architects, building engineers, urban designers and managers.

1.4 Research area

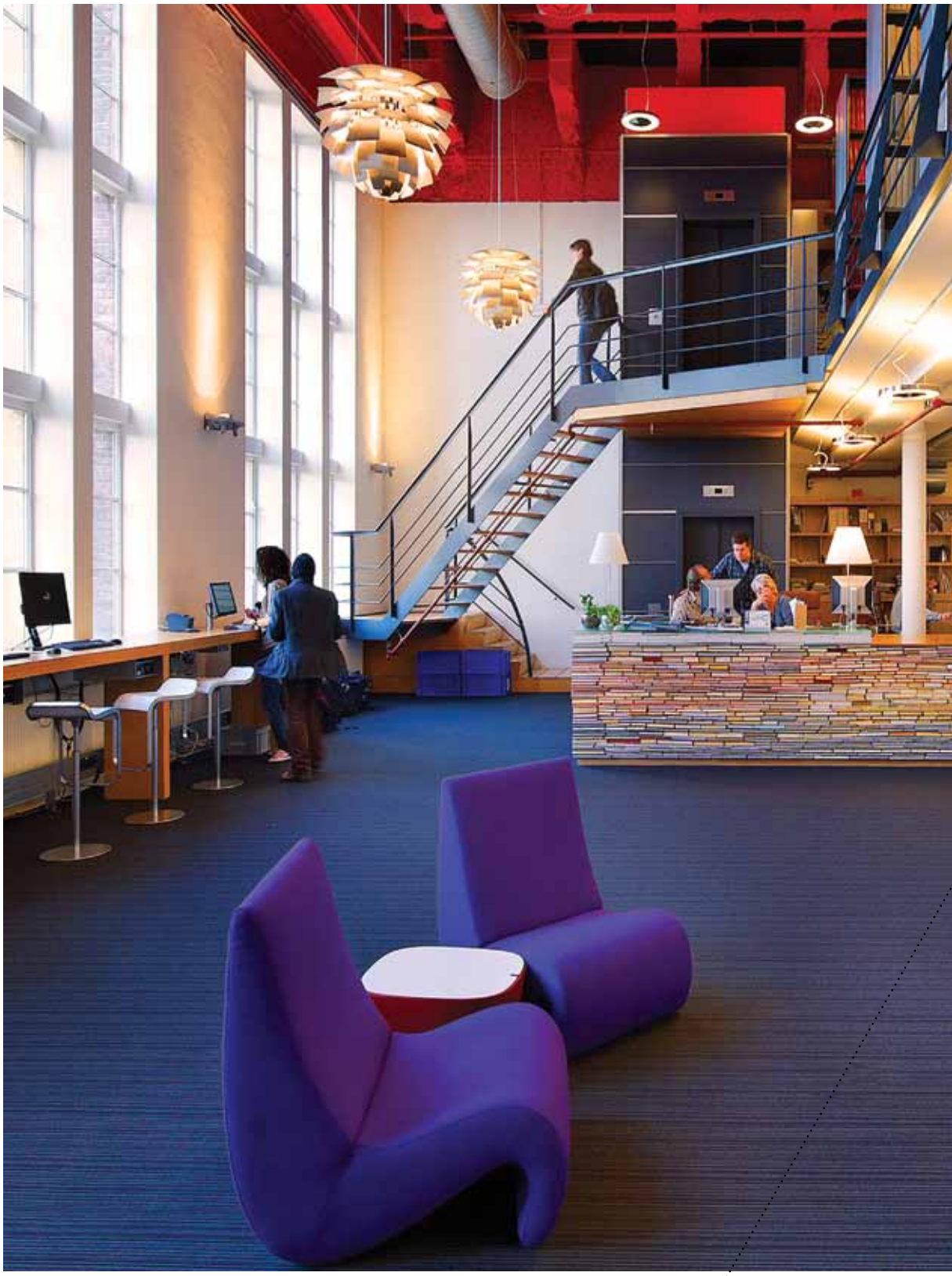
The specific characteristics of the faculty's research are referred to by the concept of 'design-oriented research'. Central to the discussion on 'design-oriented research' is the level of scientific rigour of the design activities. These activities involve building theory, appropriate research methods, communication patterns, scientific critique, and so on. This scientific rigour, however, has to be balanced with specific contextual demands of this field such as reflection and creativity in the design process. The concept thus encompasses a broad typology of research activities situated on an imaginary axis ranging between intuitive design on the 'art' side of the axis towards optimizing scientific research on the 'science' side of the axis. This broad typology is reflected in the various ways in which the concept of 'design-oriented research' is defined by the different Research Groups. The following categories of research can be distinguished:

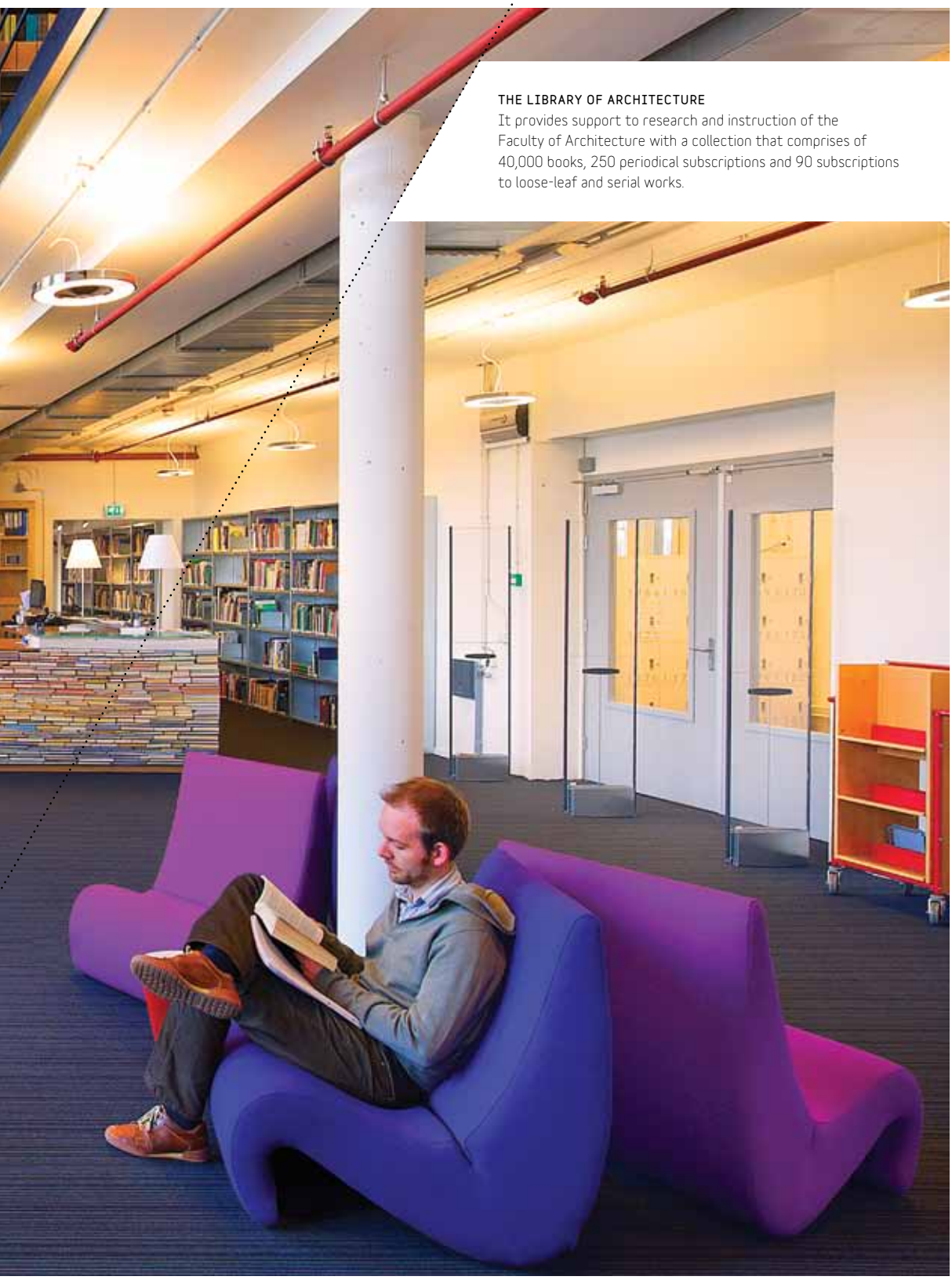
1. evaluation research, which is characterised as the empirical study of existing objects and processes. It analyses the effects and consequences which manifest themselves once architectural objects or processes have been realised.
2. historical research, which interprets, understands and explains designs, while taking site characteristics into account.
3. conceptual research is exploratory and experimental and aims at innovative, revolutionary concepts, manifestos and visions of the built environment.
4. practical research is research done for educational purposes and for professional practices and refers to the research architect's need to find optimum solutions for certain building assignments.

The Faculty of Architecture comprises seven research groups (including one joint group with OTB).

Table a. Research groups

DEPARTMENTS	RESEARCH GROUPS	LEADERS
Architecture	Architecture	Lara Schrijver PhD & Tom Avermaete PhD
®MIT & IHAAU	Design & History	Marie-Thérèse van Thoor PhD & Cor Wagenaar PhD
Building Technology	Computation & Performance	Rudi Stouffs PhD & Prof. Joop Paul PhD
	Green Building Innovation	Prof. Andy van den Dobbelsteen PhD
Urbanism	Urbanism	Prof. Vincent Nadin
Real Estate & Housing	Innovations in Management of the Built Environment	Prof. Hans Wamelink PhD & Prof. Hans de Jonge
	Housing Quality	Prof. Henk Visscher PhD & Vincent Gruis PhD





THE LIBRARY OF ARCHITECTURE

It provides support to research and instruction of the Faculty of Architecture with a collection that comprises of 40,000 books, 250 periodical subscriptions and 90 subscriptions to loose-leaf and serial works.

2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	141	34	149	34	130	32	137	36	159	40	168	45	169	43
Non-tenured staff	80	22	87	19	91	22	121	31	138	37	133	43	92	34
PhD-students	39	20	60	29	81	41	94	49	124	53	124	48	145	41
Guests	58		96		109		118		139		126		146	
TOTAL RESEARCH STAFF	**318**	**76**	**392**	**82**	**411**	**95**	**470**	**116**	**560**	**131**	**551**	**136**	**552**	**118**

Tenured staff (assistant professors, associate professors and professors) spend an average of 35% of their time on research, non-tenured staff (researchers) spend 70% of their time on research, PhD students spend 80%. These percentages are incorporated into the Full Time Equivalent (FTE) figures above. Much of difference between the FTE numbers and staff numbers can be explained by these percentages. However, the difference is also caused by a substantial number of part-time staff members, as is the case with many of the non-tenured staff.

'Guests' is something of an eclectic grouping. It includes people who make use of the faculty's facilities (such as the library or the model shop). It also includes visiting professors, emeritus professors and guest researchers, as well as staff that have moved to a new job but in the near future are expected to publish on the research they have conducted at TU Delft. Guests are not employed by the faculty and therefore not included in the FTE figures.

Chart a. Total research staff in numbers

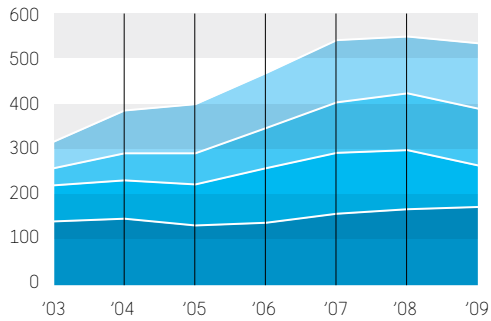
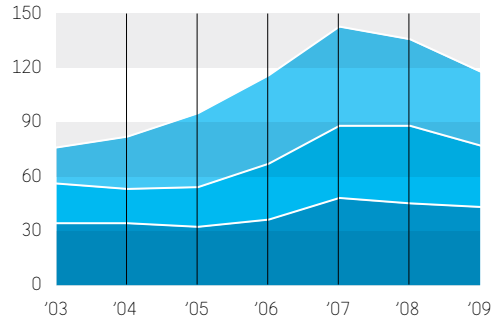


Chart b. Total research staff in fte



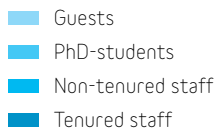


Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE	
Prof. Thijs Asselbergs	Director	aTA Architectuurcentrale	Haarlem	NL
Prof. Henco Bekkering	Partner and director	HKB Stedebouwkundigen	Rotterdam/ Groningen	NL
Prof. Monica Chao-Duivis PhD	Managing director	Dutch Institute for Construction Law	The Hague	NL
Prof. Jo Coenen	Founder and owner	Jo Coenen & Co Architects	Maastricht	NL
Prof. Mick Eekhout PhD	Director	Octatube International bv	Delft	NL
Prof. Tony Fretton	Founder and director	Tony Fretton Architects	London	UK
Prof. Dick van Gameren	Founder and director	Dick van Gameren Architecten	Amsterdam	NL
Prof. Anke van Hal PhD	Prof. Sustainable Building and Development	Nijenrode Business University	Breukelen	NL
Prof. Rob van Hees	Research coordinator	TNO Building Conservation	Delft	NL
Prof. Maurits de Hoog	Senior urban advisor	Urban Planning Department	Amsterdam	NL
Prof. Hans de Jonge	Managing director	Brink Groep bv	Leidschendam	NL
Prof. Kees Kaan	Founder, partner and director	Claus en Kaan Architecten	Rotterdam	NL
Prof. Ulrich Knaack PhD	Prof. Design and construction	Hochschule OWL	Detmold	DE
Prof. Marieke Kuipers PhD	Specialist	Cultural Heritage Agency	Amersfoort	NL
Prof. Eric Luiten	Advisor on Spatial Quality	Province of South Holland	The Hague	NL
Prof. Peter Luscuere	Director	Royal Haskoning Building Services	Rotterdam	NL
Prof. Winy Maas	Co-founder and director	MVRDV Architects	Rotterdam	NL
Prof. Paul Meurs PhD	Co-founder and owner	Steenhuis-Meurs bv	Schiedam	NL
Prof. Rob Nijsse	Managing partner	ABT bv	Velp	NL
Prof. Kas Oosterhuis	Principal	ONL	Rotterdam	NL
Prof. Joop Paul PhD	Managing director	Arup Netherlands	Amsterdam	NL
Prof. Michiel Riedijk	Founder, partner and director	Neutelings Riedijk Architecten	Rotterdam	NL
Prof. Joost Schrijnen	Director of Spatial and Mobility Planning	Province of South Holland	The Hague	NL
Prof. Dirk Sijmons	Owner and director	H+N+S Landscape Architects	Utrecht	NL
Prof. Patrick Teuffel PhD	Managing partner	Teuffel Engineering Consultants	Stuttgart	DE
Prof. Hans Wamelink PhD	Leading professional	DHV bv	Amersfoort	NL

3 Research environment and embedding

3.1 Embedding

The Faculty of Architecture is well embedded in the international design-oriented practices of Architecture and the Built Environment. In the past seven years, the faculty has seen an influx of foreign PhD students and staff members, while the geographical scope of its activities such as conferences, networks and consortia clearly hint at an increased level of interaction with both national and international stakeholders and partners.
The extent of the faculty's integration becomes evident in the positions that its professors and associate professors hold in industry, government and the community. The networks in which they participate, the research commissions they receive from industrial partners, local, regional and national authorities are evidence of their research endeavour, as are the exhibitions, conferences and congresses in which they participate. Detailed highlights of these performances are presented in chapter 8 'academic reputation'.

3.2 Number and affiliation of guest researchers

The number of staff that received academic hospitality has grown from about 60 (2003) to over 140 (2009). As explained on page 18 this is something of an eclectic grouping. Among their affiliations are:

Europe and the Middle East

- Bilkent University, TR
- Ghent University, BE
- Istanbul Technical University ITU, TR
- National Laboratory for Civil Engineering LNEC, PT
- Norwegian University of Science and Technology Trondheim, NO
- Tel Aviv University, IL
- TU Budapest, HU
- TU Lisbon (UTL), PT
- TU Wien, AT
- Université de Paris I-Panthéon-Sorbonne, FR
- University of Birmingham, UK
- University of Dortmund, DE
- University of Liverpool, UK
- University of Parma UNIPR, IT
- University of Reading, UK
- University of Salford, UK
- University of Torino UNITO, IT
- University IUAV of Venice, IT
- Utrecht University, NL
- Middle East Technical University METU, TR

North and South America

- Dalhousie University, CA
- Harvard University, US
- Massachusetts Institute of Technology MIT, US
- Princeton University, US
- Southern California Institute of Architecture Sci-Arc, US
- Universidade Federal da Bahia UFBA, BR
- University of Calgary, CA
- University of Tennessee, US
- University of Texas, US

South-East Asia:

- Hanyang University, KR
- Kyoto University, JP
- National University of Singapore, SG
- Southeast University SEU, CN
- Tsinghua University, CN

3.3 International and national positioning

In 2008/2009 the Faculty of Architecture took part in a pilot to explore evaluation methods, the NWO-funded Evaluating Research in Context (ERiC) project. The ERiC pilot concluded that: *"there is no stable publication pattern nor a core set of scientific journals to make a valid bibliometric benchmarking of architectural departments. Only a small sample of scientific journals is covered by ISI databases. Although these data can be included in an evaluation report, clearly for an assessment of the research quality of the programs, information about program, other scientific outputs and good peer assessment will be required and are of more value."*

However, we would still like to be clear about the institutes that we consider to be competitors. The faculty is positioned within a leading group of European, American, Asian and Australian design schools, including ETH, MIT, RMIT and NUS. Based on the SCOPUS index, we have visualised the publication record of these institutes based using the (sub)affiliation as indicated in the table on page 22.

The publication record is, as the ERiC project noted, not on a par with research excellence. RMIT Architecture, for example, has a modest publication record although the *discipline scored 5, the highest possible result, in the ERA trial to assess the research excellence of Australian Humanities and Creative Arts (HCA) disciplines for 2002-2007.* Bartlett, on the other hand, with its very substantial publication record has only one high-flying group. *The Space Group was noted as the highest performer of the Bartlett (which has the highest proportion of 4*, 'world leading', research in the field of Architecture and the Built Environment), in the 2008 Research Assessment Exercise.*

Although we would not wish to overstate the overall significance of publication records, we would like to point out the combined strength of the Faculty of Architecture and the OTB Research Institute. The OTB will be integrated into the Faculty of Architecture in the course of 2011, turning the joint institute a strong player indeed.

Table a. Score table academic publications listed in Scopus

THE NETHERLANDS										
WHERE	INSTITUTE		2003	2004	2005	2006	2007	2008	2009	TOTAL
NL	Berlage Institute		0	0	0	1	0	1	1	**3**
NL	TU Delft	Architecture	15	18	16	18	29	29	21	**146**
NL	TU Delft	OTB	34	37	43	39	53	68	70	**344**
NL	TU Delft	Architecture OR OTB	49	54	57	57	81	94	89	**481**
EUROPE & MIDDLE EAST										
WHERE	INSTITUTE		2003	2004	2005	2006	2007	2008	2009	TOTAL
AT	University of Applied Arts Vienna		2	5	0	3	4	4	5	**23**
BE	KU Leuven	Architecture OR Urbanism OR Planning	4	4	7	1	9	7	2	**34**
CH	ETH Zurich	Architecture	0	0	2	2	5	4	5	**18**
DE	Bauhaus Universität Weimar	Architecture	0	1	0	0	3	0	3	**7**
UK	University of Sheffield	Architecture	9	13	15	14	26	16	28	**121**
FR	École nationale supérieure d'architecture Paris-Malaquais		0	0	0	1	0	0	2	**3**
IL	Technion	Architecture	7	12	13	20	11	13	17	**93**
IT	Università Iuav di Venezia		7	14	17	12	28	30	33	**141**
NL	TU Eindhoven	Architecture OR Building Physics OR Urban	19	23	29	48	47	50	61	**277**
UK	Architectural Association		0	1	1	3	6	3	2	**16**
UK	Bartlett		22	32	41	55	58	55	56	**319**
NORTH AMERICA										
WHERE	INSTITUTE		2003	2004	2005	2006	2007	2008	2009	TOTAL
US	Carnegie Mellon	Architecture	5	13	8	13	12	7	20	**78**
US	Columbia University	Architecture OR Planning OR Preservation OR GSAPP	4	7	11	10	14	8	9	**63**
US	Cornell University	Architecture OR Art OR Planning	10	8	12	15	17	27	21	**110**
US	Harvard University	Architecture OR Design OR GSD	12	9	11	13	12	20	15	**92**
US	MIT	Architecture OR Planning	8	8	9	8	10	10	9	**62**
US	Rice University	Architecture	1	2	1	1	0	1	2	**8**
US	UC Berkeley	Design OR Architecture OR Planning	17	33	28	37	45	28	41	**229**
US	Yale University	Architecture	0	1	3	3	5	4	3	**19**
ASIA & AUSTRALIA										
WHERE	INSTITUTE		2003	2004	2005	2006	2007	2008	2009	TOTAL
AU	RMIT	Architecture	0	0	3	7	5	8	4	**27**
CN	Southeast University	Architecture	0	0	0	5	3	7	16	**31**
CN	Tongji University	Architecture	1	1	6	9	17	13	16	**63**
CN	Tsinghua University	Architecture	11	22	23	36	36	53	54	**235**
JP	Kyoto University	Architecture	8	6	7	23	18	11	23	**96**
SG	National University Singapore, NUS	Design AND Environment	40	49	37	38	25	20	20	**229**

Document types included in Scopus: Article, Article-in-Press, Conference Paper, Editorial, Erratum, Letter, Letter to or correspondence with the editor, Note, discussion or commentary, Review, Short Survey.

3.4 Actual collaborations with stakeholders

The faculty works with ministries and national agencies, regional and local authorities, European and national research funding agencies, industrial partners, research institutes and societal institutes and foundations.

Ministries and national agencies
- Ministry of Economic Affairs (EZ)
- Ministry of Education, Culture and Science (OCW)
- State Service for Cultural Heritage (RACM/RDMZ)
- Ministry of Foreign Affairs (BUZA)
- Ministry of Housing, Spatial Planning and the Environment (VROM)
- Dutch Government Buildings Agency (RGD)

Regional authorities
- Cityregion Eindhoven (SRE)
- Province of Groningen
- Province of Noord-Holland
- Province of Zuid-Holland

Local authorities
- Almere
- Amsterdam
- Graft-De Rijp
- Rotterdam
- Ootmarsum
- The Hague
- Tilburg
- Delft

European funding
- European Science Foundation (ESF)
- ALFA-IBIS
- Seventh Framework Programme (FP7)
- Interreg IIIB/IIIC
- Urbact

National research funding agencies
- Knowledge for Climate (KvK)
- Netherlands Organisation for Scientific Research (NWO)
- SenterNovem
- Technology Foundation (STW)

Industrial partners
- Amsterdam Airport Schiphol
- Bouwfonds
- INBO architecten
- Octatube International
- Raab Karcher Eshuis Bouwstoffen
- Saint-Gobain Isover Benelux
- Trespa International

Research institutes
- TNO
- WUR-Alterra
- WUR-PPO

Societal institutes and foundations
- Belvedere
- EFL Foundation
- European Association Architectural Education (EAAE)
- International New Town Institute (INTI) Netherlands Architecture Institute (NAi)
- The Netherlands Architecture Fund

3.5 Participation in consortia

Participation in consortia takes place in externally funded projects, international doctoral programmes, research centres, committees and networks, some highlights:

- Belvedère programme
- Centre for People and Buildings (CFPB)
- Centre for Process Innovation (CPI)
- Dutch Green Building Council (DGBC)
- EU ALFA-IBIS network
- EU Urbact Housing Praxis for Urban Sustainability (HOPUS)
- EU Interreg IIIB Spatial Metro
- EU Interreg IIIC Connected Cities CC
- EU FP7 Rural Future Networks (RUFUS)
- European Architectural History Network (EAHN)
- European Association Architectural Education (EAAE)
- Housing Quality 2020
- International Committee Documentation and Conservation of buildings, sites and neighbourhoods of the Modern Movement (DOCOMOMO)
- International Council for Building (CIB)
- International Forum on Urbanism (IFOU)
- Knowledge for Climate (KvK)
- Villard d'Honnecourt International Research Doctorate.

The model shop in Glasshouse South as a central place in BK City, the new faculty building. The glasshouse was designed by Prof. Mick Eekhout PhD.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The faculty's portfolio on Architecture and the Built Environment is unique in combining evaluation research, historical research, conceptual research and practical research. It includes architectural design and history, which generally tend towards the research methods of the humanities (discursive and interpretive); urban/spatial planning and management, which tend more towards the methods of the social sciences; and building technology, which is based primarily on the methods of the technical sciences. By arranging the portfolio around this diverse range of methods as well as the crucial component of design, a new generation of researchers is being 'schooled' whose approach includes the practical capabilities of design-oriented research as well as the reflective capabilities of scientific reasoning.

4.2 Significance of the contribution to the field

The Faculty of Architecture is the largest academic institute in the Netherlands conducting research into interventions in the built environment by means of design, engineering, planning and management. As such, its research work is able to consolidate the excellent international academic reputation of the Faculty of Architecture as a leading design academy; as an international platform for innovation in design, engineering, planning and management; and a vital platform for the debate on current and social themes in architecture and the built environment. The faculty has an outstanding reputation in Europe for its leading academics and designers, its PhDs, and its dissemination activities – book publications, seminars and conferences – and it has expanded its reach worldwide.

4.3 Coherence

The activities of the faculty's research groups spans architecture, building technology, urbanism, real estate and housing and specifically includes history, heritage, sustainability and innovation. Its coherence stems predominantly from the Dutch practice in which the government has influenced architecture, urban development and landscape design through its social housing programmes and spatial planning policies.

4.4 Quality of the scientific publications

The scientific output of the Faculty of Architecture bears the characteristics of arts & humanities, social sciences and technical sciences. It places a strong emphasis on high-quality book publications. The ISI coverage of academic (design-oriented) journals in the field of Architecture and the Built Environment is notoriously weak. This fact is compensated by a rich culture of journalism which blends academic writing and professional discussion. That is where we find the majority of the faculty's journal output, both in English and in other European languages such as Dutch, German, Spanish and Italian.

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

The Faculty of Architecture has made significant scientific progress in the areas of cultural heritage (buildings, cities and landscapes), energy-efficiency and climate (facades, housing, urban areas), design practice (architecture, building technology, urbanism), digital technologies (building technology, architecture and urbanism) and history (architecture, urbanism).

- Delft School of Design (DSD), 2002. Laboratory for emerging research and experimentation concerning doctoral research.
- ®MIT, 2006. Research centre for Restoration, Modification, Intervention, Transformation.
- The Why Factory, 2009. Think tank on urban futures.
- protoSPACE 3.0, 2010. State of the art multi-purpose facility designed for the development of nonstandard, virtual, and interactive architecture, replacing its two predecessors that were lost in the May 2008 fire.

KEY PUBLICATIONS

- Linden, A.C. van der, Boerstra, A.C., Raue, A.K., Kurvers, S.R. & Dear, R.J. de, 2006. `Adaptive temperature limits: A new guideline in the Netherlands: A new approach for the assessment of building performance with respect to thermal indoor climate.´ *Energy and Buildings*. Vol 38, No.21. Elsevier, Amsterdam, p. 8-17.
- Rots, J.G. & Invernizzi, S., 2004. `Regularized sequentially linear saw-tooth softening model.´ International Journal for *Numerical and Analytical Methods in Geomechanics*. Vol 28, No.7-8. Wiley, Malden, p. 821-856.
- Lubelli, B., Van Hees, R.P.J. & Brocken, H.J.P., 2004. `Experimental research on hygroscopic behaviour of porous specimens contaminated with salts.´ *Construction and Building Materials*. Vol 18, No.5. Elsevier, Amsterdam, p. 339-348.
- Gruis, V., Elsinga, M., Wolters, A. & Priemus, H., 2005. `Tenant empowerment through innovative tenures: An analysis of Woonbron-Maasoevers' client's choice programme.´ *Housing Studies*. Vol 20, No.1. Taylor & Francis, Oxford, p. 127-147.
- Nadin, V. & Stead, D., 2008. `European spatial planning systems, social models and learning.´ *DISP*. Vol 172, No.1. ETH, Zürich, p. 35-47.

KEY BOOKS OR CHAPTERS OF BOOKS

- Avermaete, T.L.P., Havik, K.M. & Teerds, P.J. (eds.), 2009. *Architectural Positions*. SUN Publishers, Amsterdam.
- Graafland, A.D., 2003. *Versailles and the Mechanics of Power*. 010 Publishers, Rotterdam.
- Maas, W. (ed.) 2006. Space fighter. The evolutionary city (Game:) MVRDV/DSD in collaboration with the Berlage Institute, MIT and cThrough. Actar, Barcelona.
- Oosterhuis, K. & Feireiss, L. (eds.) 2006. *GameSetandMatch II; On Computer Games Advanced Geometries and Digital Technologies*. Episode publishers, Rotterdam.

- Steenbergen, C.M. et al., 2009. *The Polderatlas of the Netherlands*. THOTH, Bussum.
- Uytenhaak, R., 2008. Cities full of space; Qualities of density. 010 Publishers, Rotterdam.

KEY DISSERTATIONS

- Baumeister, R.,2009. *Une Architecture Sauvage. Asger Jorn's Konzept und Kritik der Modernen Architektur* (publication forthcoming by 010 Publishers, Rotterdam).
- Berghauser Pont, M.Y. & Haupt, P.A., 2009. *Spacemate; Space, density and urban form* (published in 2010 by NAi Publishers, Rotterdam).
- Bitterman, M.S., 2009. *Intelligent Design Objects (IDO). A cognitive approach for performance-based design (cum laude).*
- Heer, de J., 2008. The Architectonic Colour. *The Polychromy in the Purist Architecture of Le Corbusier* (published in 2009 by 010 Publishers, Rotterdam).
- Peek, G.J., 2006. *Locatiesynergie* (published in 2006 by Eburon Academic Publishers, Delft).

KEY EVENTS

- GameSetandMatch II (2006) provided a fascinating, kaleidoscopic view of the most recent developments in the field of digital design.
- Third International Symposium on Restoration. World Heritage Site Olinda in Brazil. Proposals for Intervention, Delft University of Technology, the Netherlands 26 & 27 October 2006. Meurs, P.H. & Verhoef, L.G.W. (eds), 2006. *Proceedings*. IOS Press, Amsterdam.
- 10th International Docomomo Conference. The Challenge of Chance. Dealing with the Legacy of the Modern Movement, Rotterdam 2008. Heuvel, D. van den, Mesman, M., Quist, W. & Lemmens, B., 2008. *Proceedings*. IOS Press, Amsterdam.
- Architectural Positions (2009) presented the views of thirty-six international architects who, over the past fifty years, have made their voices heard in the debate on the public sphere.
- SASBE 2009 (2009) was one of the biggest events in sustainable building and development in the European region.
- Annual *Future Envelope conference series*, 2007-2010. Faculty of Architecture, TU Delft, Delft.

KEY EXHIBITIONS

- Redesigning Polderscapes (2005, NAi Rotterdam) – a major exhibition on polders as part of the 2nd International Architecture Biennale Rotterdam.
- Team 10 (2005/2006, NAI Rotterdam) – about the European architects who played a leading role in the debate on cities and architecture in the 1950s and 1960s.
- A Wider View (2008, Triënnale Apeldoorn) – had 37,000 national and international visitors and presented recognised cultural landscapes of undisputed historical significance in a dynamic perspective and placed them within the context of spatial planning and design.

5 Societal relevance and quality

- Team 10: A Utopia of the Present (Rotterdam, 2005 / New Haven (USA), 2006 / Paris, 2007) exhibition and publication.
- Energy potential studies in the new Provincial Environmental Plan (POP) of Groningen, 2007.
- The Netherlands Architecture Institute commission for research, analysis and building of 15 polder models, 2005.
- A tool with which to assess the potential for transformation of office buildings and the risks involved (Transformation Potential Meter, Vacancy Risk Meter), 2003.

5.1 Socio-cultural, technical and/or economic quality

The faculty's research interacts intensively with the practice of architecture, building technology, urbanism, landscape architecture, housing and management. Architecture, urban design and landscape architecture are regularly the subject of public debate in the Netherlands, Europe and beyond. The performance of buildings (including energy-efficiency and user satisfaction) is vital for both the building industry and individuals. The effectiveness of building processes and the institutional arrangements behind them impact our economy and influence the purchasing power of households. The impact of the faculty's research is predominantly design-oriented and deals with dimensions such as cultural heritage, quality of life, and sustainability. Valuable contributions to that practice are made by means of externally funded research projects (including PhDs), research in joint consortia of scientific and societal partners, and through publications, exhibitions and events. Little of our work is shielded from the public through patents or non-disclosure agreements.

5.2 Key results/highlights

- InteractiveWall: Prototype For An Emotive Wall, commissioned by Festo, Hannover Messe, Germany, 2009.
- Computational support for Lifecycle Integral Performance assessment (CLIP) software tool developed for use by the Dutch Government Buildings Agency (Rijksgebouwendienst), 2009.

5.3 Key knowledge contributions to practices and policies

The most significant knowledge contributions comprise fundamental insights, tools and instruments, and novel approaches.
Fundamental insights into theory, practice and territory:

- 'Team 10: A Utopia of the Present' that contributes to the understanding of one of the main paradigms in contemporary architecture culture and to general thinking on the built environment.
- The contributions by IHAAU to a Reinterpretation of the history of modernism.
- The research, analysis and documentation of Dutch polders by Steenbergen.

Tools and instruments to support design and engineering:

- Computational support for Lifecycle Integral Performance assessment (CLIP) software tool.
- Spacemate Instrument for Describing Space Usage in Quantitative and Qualitative Terms.
- Flextool model developed for the calculation of the transformation value of care dwellings.
- Harmonization protocol for LCA databases and calculation methods.

Novel approaches to design, planning and management:

- UNESCO WHC's Recommendations on Historic Urban Landscapes.
- Rotterdam Energy Approach and Planning (REAP).
- Managing the campus of the future in connection with the Knowledge City.

5.4 Evidence of the appreciation of stakeholders

In the summer of 2010, the Faculty of Architecture conducted an online survey among its stakeholders and received over 50 completed questionnaires. The partnership between the Faculty of Architecture and its stakeholders is predominantly based on joint research projects or proposals (47%), joint collaboration on book or journal publications (27%) and joint collaboration on conferences, seminars and workshops (24%).
The nature of the contacts is primarily focused on discussing projects, proposals and/or programming (44%), on conducting joint projects, proposals and/or programming (29%) and on developing formal partnerships with for example contractors and partners (31%).
There is a strong appreciation for general reputation, impartiality, methodology, creativity, competence and reliability. Contributions are made through providing information on developments in the field, encouraging innovation, contributing tools and designs, and participating in conferences and other events.

5.5 Dissemination strategies

The faculty's researchers produce high-quality commercial book publications and publish frequently in journals that target both a professional and academic readership. They organise academic and professional events such as exhibitions, seminars, expert meetings, conferences and design competitions. Key staff members are regularly interviewed for newspapers, magazines, websites and television programmes.
The best dissertations are often published as commercial books. Most dissertations are digitally stored in the TU Delft Library Repository. All dissertations are listed on the faculty website and (if available) linked to the full version in the repository. TU Delft is one of the signatories of the 2003 Berlin Declaration on Open Access and encourages open access publishing by its employees.

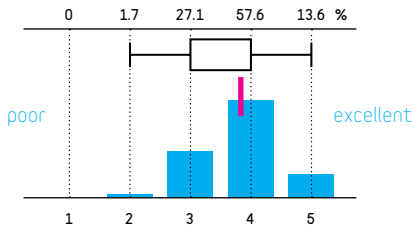
5.6 Evidence of impacts

Evidence of the social relevance and quality of the research can be found in the large number of books and dissertations published by faculty staff commercially, in the number of conferences and exhibitions attended, and in the implementation of the tools and instruments developed:

- The opening of the Why Factory in Delft by Dutch Minister of Education, Culture and Science, Ronald Plasterk, and the symposium "My Future City", where a variety of students, inhabitants, architects, urbanists, thinkers, developers, politicians, technicians presented their ideas on the future city. Delft, 2009.
- The conference and exhibition 'A Wider View on Cultural Landscape Challenges in Europe' during the Triënnale at the Radio Klootwijk, Apeldoorn, which attracted 35,000 visitors.
- Dutch Dialogues: workshops, conferences, publications and advice, which contributed to the reconstruction of New Orleans as a sustainable delta-city (Meyer and de Hoog) (2008-2009); 'Dutch Dialogue' assistance provided to New Orleans, South Louisiana and the United States Congress.
- The Genadendal Conference in South Africa, with the Ministries of Foreign Affairs and Education, Culture and Science, COST Europe, SenterNovem, 2003-2006.
- InteractiveWall: Prototype For An Emotive Wall, commissioned by Festo, Hannover Messe, Germany, 2009.
- Computational support for Lifecycle Integral Performance assessment (CLIP) software tool developed for use by the Dutch Government Buildings Agency (Rijksgebouwendienst), 2009.

Figure 1 Stakeholder analysis 2010

Figure 1a. General reputation



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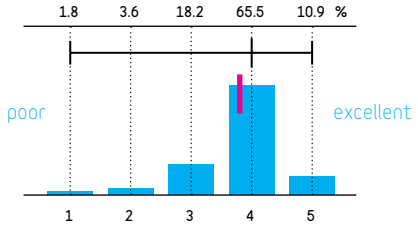
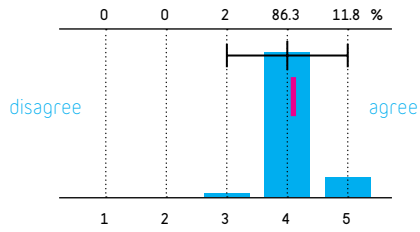
dev.=0.67

Figure 1b. Impartiality and independence



n=55
av.=3.8
dev.=0.76

Figure 1c. Providing a source of information on developments in the field



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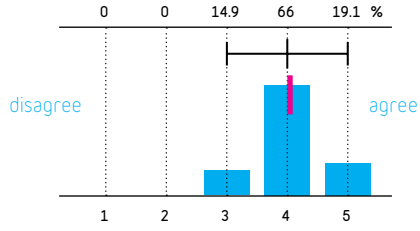
av.=4.1
dev.=0.36

Figure 1d. Encouraging innovation in our work



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dev.=0.59

Figure 1e. Involvement in conferences and other events

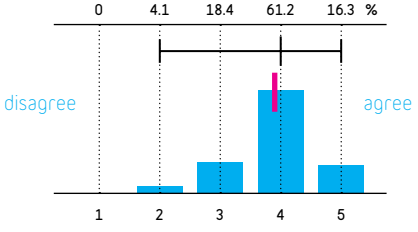

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Figure 1f. Understanding of methodology

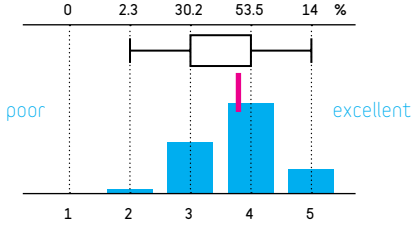

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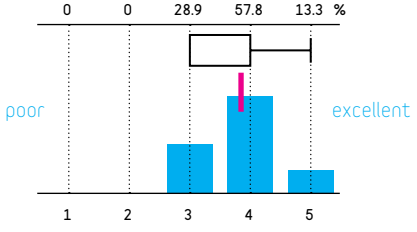
Figure 1g. Creativity



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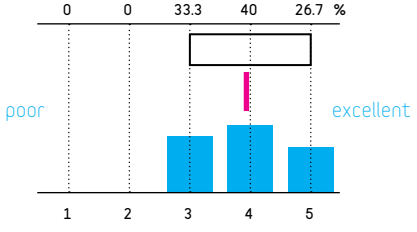
dev.=0.64

Figure 1j.. Competence and reliability



n=45
av.=3.93
dev.=0.78

5.7 Commissioned research by societal actors

- Computational support for Lifecycle Integral Performance assessment (CLIP) software tool, 2009, commissioned (in three consecutive projects) by the Dutch Government Buildings Agency (Rijksgebouwendienst).
- The Netherlands Architecture Fund (Stimuleringsfonds voor Architectuur): Beyond Clinical Buildings (2007-2008)
- National Housing and Town Planning Advisory Unit, UK: European Planning Systems and their Impact on the Provision of Housing, 2009.
- STAWON, Research foundation for dwelling and living environments of the Royal Institute of Dutch Architects (BNA): Parkeren in de woonomgeving (2008-2010)
- Spatial Metro Interreg IIIB North-west Europe: a project funded by the ERDF, Norwich, Koblenz, Rouen and Biel/Bienne investigating pedestrian mobility and regeneration of the European city centre (2005-2008).

THE 'URBANISM ON TRACK' SEMINAR, HELD AT THE DELFT SCHOOL OF DESIGN, JANUARY 2007. The Delft School of Design (DSD) was formally instituted in 2002 as a laboratory for emerging research and experimentation in the context of doctoral research within the faculty's departments of architecture and urbanism and building technology. Since its foundation, the DSD has provided both a platform – both academic and public – for events such as lectures and debates, conferences, colloquia, seminars and workshops.

6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	3,285	87%	5,255	77%	6,375	78%	6,882	79%	8,027	80%	7,930	78%	6,269	64%
External funding	486	13%	1,544	23%	1,806	22%	1,880	21%	1,961	20%	2,192	22%	3,467	36%
TOTAL FUNDING	**3,771**	**100%**	**6,799**	**100%**	**8,181**	**100%**	**8,762**	**100%**	**9,988**	**100%**	**10,122**	**100%**	**9,736**	**100%**

EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	3,255	91%	5,000	90%	5,605	87%	6,872	90%	9,337	92%	9,995	91%	7,656	88%
Other costs	318	9%	566	10%	869	13%	789	10%	858	8%	1,039	9%	1,050	12%
TOTAL EXPENDITURE	**3,573**	**100%**	**5,566**	**100%**	**6,474**	**100%**	**7,661**	**100%**	**10,195**	**100%**	**11,034**	**100%**	**8,706**	**100%**

Chart a. Research funding in M€

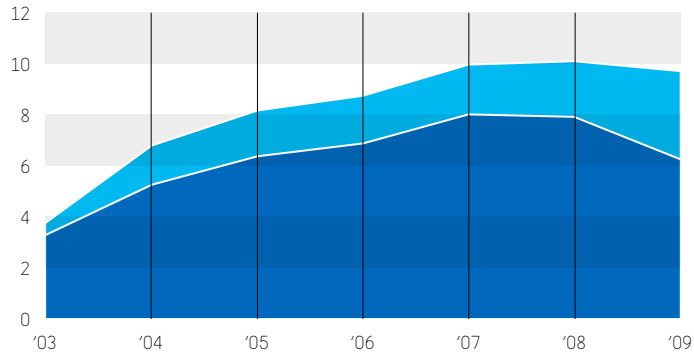
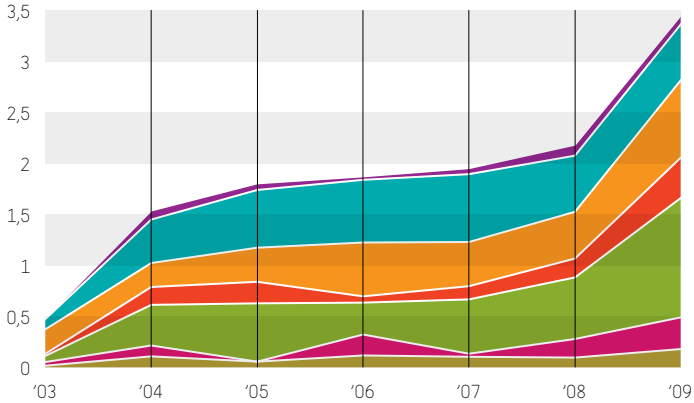


Chart b. External research funding in M€



*Faculty of Architecture's share in the Housing Quality research group

7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	27	1	26	6	17	1	27	3	37	1	26	2	24	5
Non-refereed articles	20	0	7	2	14	2	35	7	18	1	24	0	26	12
Books	27	2	31	14	52	15	62	15	84	5	55	11	59	11
Book chapters	132	15	150	31	268	72	229	37	309	52	197	62	225	53
PhD-theses	4	3	7	5	2	9	10	5	4	7	13	9	9	3
Conference papers	215	18	205	22	268	38	334	42	349	39	262	23	238	43
Professional publications	253	6	193	49	227	41	268	36	241	62	280	46	245	33
Editorships journals/book	26	5	27	7	39	9	36	11	52	16	80	7	67	10
TOTAL PUBLICATIONS	**704**	**50**	**646**	**136**	**887**	**187**	**1001**	**156**	**1094**	**183**	**937**	**160**	**893**	**170**

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	2	1	3	0	0%	2	67%	2	67%	2	67%	3	100%	0	0%	0	0%
2001	2	3	5	1	20%	4	80%	4	80%	4	80%	4	80%	0	0%	1	20%
2002	5	6	11	1	9%	6	55%	6	55%	6	55%	6	55%	2	18%	3	27%
2003	7	7	14	1	7%	4	29%	7	50%	7	50%	7	50%	5	36%	2	14%
2004	12	10	22	2	9%	10	45%	11	50%	11	50%	12	55%	4	18%	6	27%
2005	14	7	21	1	5%	6	29%	6	29%	6	29%	6	29%	11	52%	4	19%
TOTAL	**42**	**34**	**76**	**6**	**8%**	**32**	**42%**	**36**	**47%**	**36**	**47%**	**38**	**50%**	**22**	**29%**	**16**	**21%**

Table c. PhD-students with scholarship or external funding

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	1	1	2	0	0%	1	50%	1	50%	1	50%	2	100%	0	0%	0	0%
2001	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2002	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2003	1	1	2	1	50%	2	100%	2	100%	2	100%	2	100%	0	0%	0	0%
2004	1	0	1	0	0%	0	0%	1	100%	1	100%	1	100%	0	0%	0	0%
2005	4	3	7	3	43%	3	43%	3	43%	3	43%	3	43%	1	14%	3	43%
TOTAL	**7**	**5**	**12**	**4**	**33%**	**6**	**50%**	**7**	**58%**	**7**	**58%**	**8**	**67%**	**1**	**8%**	**3**	**25%**

Chart a. Refereed articles

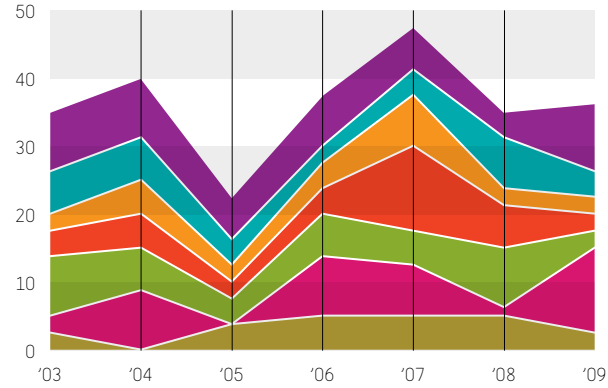


Chart b. Books

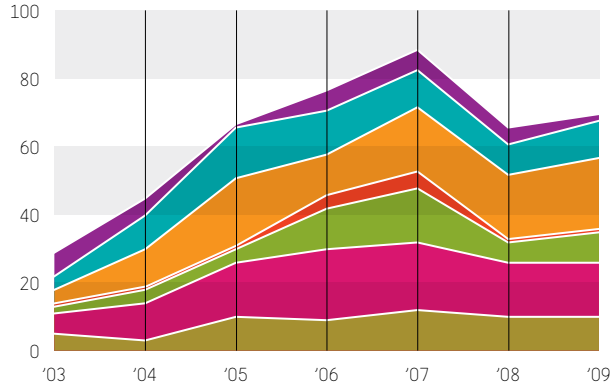


Chart c. Conference papers

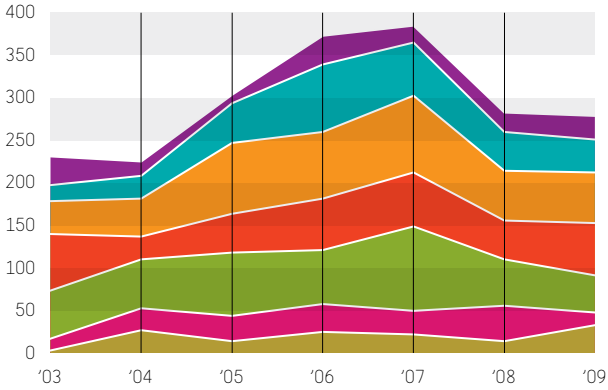
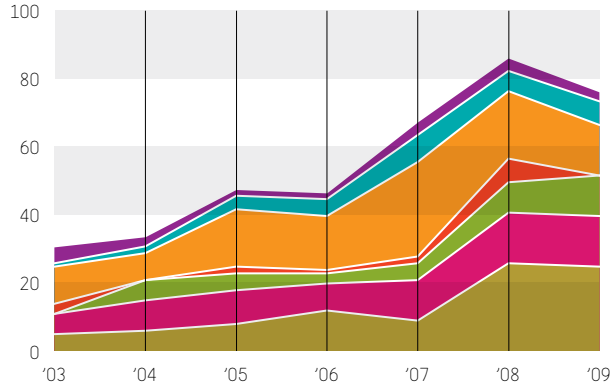


Chart d. Editorships journals/books



Housing Quality*
Innovations in the Management of the Built Environment
Urbanism
Computation & performance
Green Building Innovation
Design & History
Architecture

*Faculty of Architecture's share in the Housing Quality research group

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2004	Internationales Symposium 'Animation des Industrieerbes'.	Bollerey	Ostrava	SK
2007	5th Int Sem Urban Conservation, Changing Role and Relevance Urban Conservation Charters	Meurs	Recife	BR
2007	Architecture Now! Int Symposium on Architecture and Renewable Energy Sources MÉSZ	Schuetze	Budapest	HU
2008	6th Int Conf on Computation of Shell and Spatial Structures Cornell University IASS-IACM	Teuffel	Ithaca	US
2008	Design Firm Leadership Conference, Harvard University	Wamelink	Harvard	US
2006	2nd Int Conf on energy planning, energy saving, environmental education WSEAS/IASME	Jong	Corfu	GR

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2006	Modernization and Regionalism - Re-inventing Urban Identify, IFOU	Organisation	Wang	Beijing	CN
2006	The Architectur of Hospitals, UMC	Organisation	Wagenaar	Groningen	NL
2007	GameSetandMatch II: the architecture co-laboratory	Organisation	Oosterhuis	Delft	NL
2007/9	The Future Envelope I, II, III	Organisation	Knaack, Klein	Delft	NL
2009	SASBE2009 (Smart and Sustainable Built Environments), CIB	Organisation	Dobbelsteen, Dorst, Timmeren	Delft	NL

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2007	15 jaar Bouwbesluit (15 years Building code), Min VROM	Keynote, panel	Visscher	The Hague	NL
2007	Urbanism on Track - Expert meeting tracking technologies	Organiser	Spek, Schaick	Delft	NL
2007	RESPONSE-ABILITY - 2nd Congress of Croatian Architects	Organiser	Jerkovic	Opatija	HR
2008	International expert meeting Randstad 2040	Organiser	Hoeven	Delft	NL
2008	International open ideas competition Building for Bouwkunde	Organiser	Volker	Delft	NL

Table d. Involvement in exhibitions

YEAR	EXHIBITION	ROLE	WHO	WHERE	
2005	Team 10 - In Search of a Utopia of the Present, Cite de l'Architecture	Curator	Risselada, Heuvel	Paris	FR
2006	The Memory of the City	Curator	Meyer	Delft	NL
2008	A Wider View on Cultural Landscapes in Europe, Triënnale Apeldoorn	Curator	Luiten	Apeldoorn	NL
2009	Brazil contemporary; Architecture • Visals Culture • Art, NAi	Curator	Meurs	Rotterdam	NL
2009	From Berlage to Koolhaas, A Hundred Years of Dutch Architecture	Curator	Duin	Beijing	CN

Table e. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2005	European Steel Award: V-House, Nesya - Norway	ECCS	Nijsse	Brussels	BE
2007	Aga Khan Award for Architecture: Dutch Embassy Addis Ababa	Aga Khan	Gameren	Kuala Lumpur	MY
2008	International Architectural Award: OBA Amsterdam	Chicago Athenaeum	Coenen	Chicago	US
2009	RIBA Award: Fuglsang Kunstmuseum	RIBA	Fretton	London	UK
2009	GOOD DESIGN™ Award: FESTO Interactive Wall	Chicago Athenaeum	Oosterhuis	Chicago	US

Table f. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2003/>	Cornell's International Workplace Studies Program	Visiting professor	Voordt	Ithaca	US
2007	Royal Danish Academy of Fine Arts School of Architecture (KARCH)	Visiting professor	Leupen	Copenhagen	DK
2007/8	National University Singapore (NUS)	Visiting professor	Meyer	Singapore	SG
2008/9	Harvard University Graduate School of Design (GSD)	Visiting professor	Sijmons	Harvard	US
2009	American Institute of Architects (AIA)	Honorary fellowship	Coenen, Maas	New York	US

Table g. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2003/>	Royal Dutch Acadey of Arts & Science (KNAW)	Full member	Eekhout	Amsterdam	NL
2005/9	Advisory Committee for Architecture of the European Commission	Member	Duin	Brussels	EU
2009	Dutch professional organisation of urban designers and planners (BNSP)	Board member	Zonneveld	Amsterdam	NL
2009	Int. Association Computer Science and Information Technology (IACSIT)	Senior member	Bier	Singapore	SG

Table h. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2006/8	Belgian Federal Science Policy (BELSPO)	Evaluator	Thomsen/Itard	Brussels	BE
2008	EU 7th Framework Programme (FP7)	Evaluator	Stead	Brussels	EU
2009	Australian Research Council (ARC)	Evaluator	Stouffs	Canberra	AU
2009	Slovenian Research Agency (ARRS)	Evaluator	Zijlstra	Ljubljana	SI

Table i. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/>	ARQ - covering all aspects of architectural endeavour	Editorial board	Fretton	Cambridge	UK
2003/>	Journal of Design Research - human aspects as central issue of design	Editor	Klaasen	Olney	UK
2003/>	Oase - architecture, urban design and landscape design	Editors	Avermaete, Grafe, Havik, Teerds, Schrijver	Rotterdam	NL
2003/>	Planning Practice and Research	Editor-in-Chief	Nadin	Oxford	UK
2009/>	Positions - Journal on Modern Architecture and Urbanism	Editor	Wagenaar	Rotterdam	NL

Table j. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/>	Bulletin KNOB - Dutch Journal for Cultural Heritage	Editor	Thoor	Amersfoort	NL
2003/>	Tijdschrift voor de Volkshuisvesting	Editor	Flier	The Hague	NL
2006/>	Čovjek i prostor - bimonthly Croatian Architecture Association	Editorial board	Jerkovic	Zagreb	HR
2009/>	Delft Architectural Studies on Housing design (DASH)	Editor-in-Chief	Gameren	Delft	NL

Table k. Role in practice and policy making

YEAR	FIRM/ORGANISATION	ROLE	WHO	WHERE	
2003/>	H+N+S Landscape Architects	Director/owner	Sijmons	Utrecht	NL
2003/>	MVRDV	Principal architect	Maas	Rotterdam	NL
2005/>	Royal Haskoning, Buiding Services	Director	Luscuere	Nijmegen	NL
2005/>	Netherlands Architecture Fund	Advisory cmte	Grafe, Schrijver, Velde	Rotterdam	NL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THE WHY FACTORY (T?F), LOCATED IN GLASSHOUSE EAST AT BK CITY.
The Why Factory was opened in October 2009. It functions as a think tank on urban futures. T?F runs independent research projects, PhD programmes, Architecture and Urbanism Master studios, Postgraduate studios at the Berlage Institute in Rotterdam, master classes, workshops, debates and Q and A's. The Why Factory Tribune was awarded the ninth Lensvelt / De Architect interior Prize in 2009. The Why Factory Tribune was designed by MVRDV, where Winy Maas is principal architect.

9 Next generation

9.1 Objectives and institutional embedding

In 2008, the Faculty of Architecture produced 22 dissertations, the largest number in its history. This increased volume of PhD candidates meant rethinking the way the faculty deals with its doctoral research in terms of logistics, procedures, quality and viability. The faculty has developed (jointly with the OTB Research Institute and the Berlage Institute) a graduate school initiative that places it firmly within the new framework of the overall TU Delft Graduate School. Starting in 2010, it aims to:

[a] raise the quality of dissertations
[b] teach generic skills
[c] provide methodological and theoretical support
[d] devise and coordinate a Pre-PhD track in the MSc curriculum and the doctoral curriculum for PhD candidates.
[e] facilitate training on research competencies for PhD candidates.
[f] provide a collaborative platform where (associate) professors and PhD candidates develop externally funded research proposals.

9.2 Structure of the programmes

The Graduate School programme combines training in the Master's phase and training in the PhD phase. Courses on research skills, methodology, study and writing are introduced in the Master's phase. The training and education programme of the PhD phase includes courses that introduce students to the foundations and methods of design-oriented research in the humanities, social sciences and technical sciences, topical colloquia and peer-review presentations in which PhD students are invited to present their work in peer-review sessions.

9.3 Supervision

PhD students are motivated to find the supervisor that best matches his or her field of interest. The first supervisor is chosen in advance of the go/no go assessment. This first supervisor will guide the PhD student for the next three years. In special cases, the school may assign a second supervisor. The PhD student is free to choose a daily supervisor. PhD students may ask the Graduate School to switch supervisors but in such cases, must demonstrate how such a switch will benefit the quality of the research and dissertation before the request is granted.

9.4 Success rates

See tables 7b and 7c.
It should be noted that many of the PhD students did suffer a severe setback as a result of the May 2008 fire that destroyed the faculty building.

9.5 Educational resources

The Faculty of Architecture is home to a unique and dedicated library. Through the TU Delft Library, the faculty provides digital subscriptions to all major international scientific journals. The faculty is home to a large model shop and the protoSPACE 3.0 lab facility. The faculty shares the Building Technology Lab with the Faculty of Civil Engineering and the Faculty of Industrial Design Engineering.

10 Viability

10.1 Resource management

Researchers are supported by '100% Research', a team chaired by the Director of Research. In 2009, it created the Research Council as its main body to organise research at the faculty. The Research Council includes representatives of all Research Groups, the PhD Council, the Berlage Institute and the OTB Research Institute. The faculty staff are also supported by the TU Delft Valorisation Centre in applying for subsidised projects.

10.2 Available infrastructure

The faculty comprises a library with 40,000 items and a Map Room with an extensive collection documenting the Netherlands. TU Delft Library provides access to major online scientific journals. A digital repository allows staff members to store their output as open access. The faculty shares a Building Technology Lab with other faculties. The faculty is home to a large model shop and the protoSPACE 3.0 lab, a state of the art multi-purpose facility designed for the development of nonstandard, virtual, and interactive architecture.

10.3 Innovative capacity

The extensive MSc programme with the 1,000 students contributes significantly to the innovative capacity of the faculty's staff. The majority of MSc and PhD students are free to choose their own research topics and are able to respond quickly to the newest trends and developments. The faculty's innovative capacity is enhanced by the ever increasing number of PhDs on staff, by its close cooperation with professional practice and by the integration of the OTB Research Institute.

11 SWOT analysis

STRENGTHS

A considerable and enviable resource base through the confederation of the Faculty of Architecture, the OTB Research Institute and the Berlage Institute.
The institutions involved have an extremely high international standing.
Staff is increasingly PhD-educated. The staff is well integrated into the rich practice of Dutch architecture, urban design, spatial planning and housing.
A growing body of excellent PhD research, attracting PhD students from all over the world.
A sense of a vibrant young community of researchers interested in each other's work.
Successful in resolving the fragmentation of its research portfolio, replacing the eighteen research programmes with seven research groups.

WEAKNESSES

The Faculty of Architecture has not been successful in obtaining research grants from the Netherlands Organisation for Scientific Research (NWO). The community of researchers is rather pessimistic about its future chances in this respect.
External funding of specific research groups lags behind. Architecture is a field with a weak academic journal culture. In response to the internal TU Delft output bonus system, the faculty developed alternative publishing strategies, channelling its output towards books, professional magazines and conference proceedings. The community is adverse to publishing in ISI-indexed journals.
PhD supervisors do an average job in providing theoretical and methodological support.

OPPORTUNITIES

With its large contingent of PhD students, the Faculty of Architecture, the OTB Research Institute and the Berlage Institute can become a centre for research, not just in the Netherlands but in Europe and beyond. Design and engineering are increasingly accepted as mature academic activities in the Netherlands (ERiC-project, upcoming policy advise KNAW-TWINS committee).
Cooperation with TUe and UTwente in the 3TU. Federation Centre of Competence for the Built Environment. Emerging new challenges and funding opportunities: energy-efficiency, climate change, JPI Urban Europe.Abolition of TU Delft's bonus system in 2010 creates the opportunity for a new publishing environment.

THREATS

The May 2008 fire and subsequent collapse of the original faculty building posed the most challenging threat to the faculty's research so far. In that fire most of the personal libraries and research work has been lost. This setback was beyond any experienced in its 100 years of existence.
TU Delft faces severe austerity measures and cuts in direct funding of the Faculty of Architecture from an average €34 million a year to €29 million in 2010. Due to austerity measures, it is difficult to offer promising young researchers the prospect of tenure.

12 Strategy

12.1 Strategic planning; investments and collaboration

The Faculty of Architecture, the OTB Research Institute and the Berlage Institute are joining forces to benefit from mutual strengths and reputations.
Architecture, the OTB and the Berlage Institute are launching a joint Graduate School in 2010.
In 2011, the OTB will be integrated into the Faculty of Architecture.
The faculty will participate in the newly established 3TU.Federation Centre of Competence for the Built Environment: 3TU.BOUW.
The Faculty of Architecture establishes a reconfigured institute History and Theory.
The faculty will work with Elseviers' SCOPUS to develop an Architecture-rich journal index.

12.2 Research topics planned for the near future and their perspectives

New research topics and funding opportunities will be absorbed by thematic programming in the Graduate School: cross-disciplinary topics such as Energy-Efficiency, Climate Change and Urban Europe.
The faculty, working with the Valorisation Centre, will identify individual staff members that are likely to be successful in obtaining research grants, to support and coach them in developing proposals for NWO, FP7-EEB, IEE and Urban Europe JPI.

12.3 Flexibility and anticipation of expected changes

The Faculty of Architecture is moving from PhD employees towards PhD students, significantly reducing staff costs. The abolition of TU Delft's output bonus system in 2010 is creating the opportunity to introduce effective new incentives. Two-thirds of the direct funding will be allocated on the basis of staff size. One third will be allocated on the basis of performance indicators that are critical to the success of the Faculty's research (journals, NWO funding, external funding) and to cross-cutting topics and opportunities.

Architecture

RESEARCH LEADERS: Lara Schrijver PhD & Tom Avermaete PhD
KEY RESEARCHERS: Tom Avermaete PhD, Prof. Leen van Duin, Prof. Dick van Gameren, Prof. Arie Graafland PhD, Christoph Grafe PhD, Prof. Tony Fretton, Deborah Hauptmann, Patrick Healy, Dirk van den Heuvel, Susanne Komossa PhD, Lara Schrijver PhD, Thorsten Schuetze PhD, Prof. Max Risselada

1 Objectives and research area

1.1 Vision, mission and objectives

Vision: This research programme focuses explicitly on architecture as métier, or 'craft' in the broadest sense of the word; a field in which making and thinking are inextricably linked. The programme regards the 'architectural project' as the cornerstone of architectural practice and reflection. It holds that the architectural project forms the junction where a complex combination of cultural, social, functional, economical and ecological factors is articulated as a concrete spatial proposal. This articulation requires a specific expertise that characterises the discipline of architecture.

Mission: The aim of the research programme is to reposition architecture firmly as a field of expertise with its own specific logic, rationale and instruments. While in recent years, research in architecture has often implied a quest for intangible forces, the focus on architecture as 'craft' and 'project' entails a return to the history, tools and paradigms of the discipline. This encompasses an in-depth investigation of how architectural projects can perform at the scale of the building, the city and the territory as well as a study of existing approaches and perspectives, instruments and disciplinary boundaries.

Objectives: This research programme articulates a sustainable frame for future research in which pressing societal questions can co-exist in a coherent manner with timeless and fundamental questions pertaining to the discipline of architecture. It explores the status of architecture as a discipline that combines practical issues of design and the intellectual questions that underlie them. This status is also reflected in the department's educational programme. In addition, the programme aims to ensure a better and more systematic dissemination of the research results within the larger international scientific community.

1.2 Societal concerns and issues

The research group addresses societal concerns through the encompassing and integrating qualities of the architectural project. Indeed, the architectural project, by its very definition, incorporates a wide range of aspects (such as the material, the social, the cultural, the economic and the ecological) into a concrete spatial proposal. This offers the possibility of opening up a particular perspective on societal questions in the realms of dwelling (changing housing needs caused by shifting demographics), public buildings (new educational or care models) and interiors (spaces for a multi-cultural society). As such, the research programme offers an alternative to the highly specialised and disparate perspectives on these societal concerns typically put forward in fields such as technology, material studies, cultural theory and real estate. The architectural project not only brings these perspectives together, but also puts forward design proposals such as new typologies, alternative material solutions and reconfigurations of spatial organisation. Perennial issues such as sustainability, and also explicitly normative questions such as 'how do we wish to live?' are of central concern in the research activities.

The research programme 'The Architectural Project and its Foundations' (APF) was recently initiated, in 2008. The programme brings together a number of research strands from within the department. It provides an umbrella to facilitate better exchange between practical and theoretical research, while equally supporting the necessity for interesting and innovative, individual research. The programme involves three primary components: the sub-programme 'The Architectural

Project' (primarily design-led research and material explorations), the sub-programme 'Foundations' (primarily historical and theoretical perspectives on the architecture project) and the Delft School of Design (DSD).
Within this programme, the DSD holds a unique position, being both incorporated within the Department, and an autonomous institute since 2002. For the purposes of this assessment, the research of the DSD has been included in the general assessment. For further information, please refer to the website of the DSD which includes the school's mission statement and accomplishments: www.delftschoolofdesign.eu.

1.3 Position

The research group presents itself nationally and internationally as a centre of expertise for the public and private sector, approaching important societal issues through the concrete spatial dimension of the architectural project.

For many years the research group has maintained a strong international reputation in the fields of typological and design-oriented research, as highlighted by the various international exhibitions, publications and keynote lectures undertaken by group members.

1.4 Research area

- Building typologies
- Materialisation
- Urban Forms
- Public Space
- Architecture of the City
- Historiography
- Criticism
- Theory
- Design instruments.

2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	24	4,9	29	5,8	26	5,8	26	7,1	33	8,3	33	8,8	37	9,3
Non-tenured staff	7	2,5	9	1,9	11	3,0	15	3,9	28	8,1	34	10,4	20	8,0
PhD-students	2	1,4	5	2,6	7	5,0	8	5,8	15	7,1	14	5,9	13	3,1
Guests	0		0		4		5		20		18		17	
TOTAL RESEARCH STAFF	**33**	**8,8**	**43**	**10,3**	**48**	**13,9**	**54**	**16,8**	**96**	**23,4**	**99**	**25,1**	**87**	**20,5**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE	
Prof. Dick van Gameren	Founder, director	Dick van Gameren architecten	Amsterdam	NL
Prof. Michiel Riedijk	Founder, partner/director	Neutelings Riedijk Architecten	Rotterdam	NL
Prof. Kees Kaan	Founder, partner/director	Claus en Kaan Architecten	Rotterdam	NL
Prof. Tony Fretton	Founder, director	Tony Fretton Architects	London	UK

3 Research environment and embedding

3.1 Embedding

Due to the reputation of both the Department and the DSD, the research group as a whole is well integrated into the architecture and the built environment community. It is involved in many active national and international partnerships, both within academia and the professional field. These contacts include various institutions, publishers, research centres and scholars at other universities. They also include municipalities such as the City of Groningen, the Netherlands Architecture Institute (NAi), 010 and Routledge publishers, VU University Amsterdam, Utrecht University, Leiden University, the Bartlett, ETH Zurich and Princeton University, to name a few.

With the installation of the new research programme and a research committee, the Department of Architecture has taken a new step towards the development of a vibrant research culture. The new programme requires scholars to collaborate and exchange research results between chairs and sections. This culture of exchange and debate is further enhanced by the activity of the research committee (peer-review colloquia, research monitoring, etc), as well as by the appointment of young staff members with a strong track record in architectural research who are actively looking for professional partnerships.

3.2 Number and affiliation of guest researchers

Among the visiting professors were M. Christine Boyer PhD (Princeton University), Michael Speaks (then: Sci-Arc, now: Dean Kentucky School of Architecture), and K. Michael Hays, (Harvard University).

3.3 International and national positioning

Various members of the group have played central roles in national and international research bodies such as the European Association for Architectural Education (EAAE), the European Architectural History Network (EAHN), and DOCOMOMO.
In addition, they have acquired leading positions with academic journals and publications such as the Journal of Architecture, OASE. Architectural Journal, DASH, Footprint, OverHolland, the Routledge Series on Interiors, and the DSD publication series on Architecture and Urbanism.

3.4 Actual collaborations with stakeholders

Collaborations are typically maintained at the individual level, with each researcher having a high degree of autonomy. Gathering these contacts into a more coherent network that is more accessible to the entire department is one of the priorities for the years to come, as evidenced by, for example, the appointment of a research coordinator at the Department of Architecture who is specifically responsible for improving the exchange of network information.

3.5 Participation in consortia

In addition, researchers at the department work within a range of research networks such as Stichting Architecten Onderzoek Wonen en Woonomgeving (STAWON), Team 10 Online and Humanities in the European Research Area (HERA), the European Consortium on Modern Architecture and the Construction of Cultural Identity. Since its founding, the DSD has served as a platform for international research gatherings.
Within the Faculty, the research programme has a long-standing working relationship with the History section (Randstad project) and is strengthening its connections with other departments such as Urbanism, while also reaching out to related faculties such as Technology, Policy and Management.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The Department of Architecture has a strong reputation and a unique international position in design-related research (plan analysis, project analysis, method and approach analysis). This has resulted in a strong history of exhibitions in the field of design typology and analysis. This kind of work is only now being understood as systematic research that appeals to scientific expertise.

4.2 Significance of the contribution to the field

Architecture is a field of research that spans design-related research methods (plan analysis, project analysis, method and approach analysis) as well as a number of relatively well-established methodologies (informed by social sciences, humanities and the natural sciences). The contribution of this research programme consists primarily of the connection of design-led and humanities-inspired research approaches. In light of the current attention for intangible forces in the field of architectural research, the research programme focuses explicitly on a more systematic examination of the architectural project. As such the programme aims to offer the paradigms and tools of the discipline a more central place in architectural research.

4.3 Coherence

The research group is diverse, but the various projects contain a coherent core of questions relating to the cultural significance of the architectural project and its conceptual foundations. This offers a systematic understanding of design and its influence on the built environment.

4.4 Quality of the scientific publications

The scientific publications in this programme generally fall into two categories: the traditional publications in the humanities, which consist of peer-reviewed articles and (scientific) monographs, and the alternative productions specific to architecture, such as exhibits or project evaluations in professional journals.

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

- DASH, Delft Architectural Studies on Housing (journal, founded 2009).
- Footprint (international peer-reviewed journal, founded 2007).
- Routledge Interior Architecture Series (international peer-reviewed series, first edition 2007).
- DSD Series on Architecture and Urbanism (international peer-reviewed series, 3 books presented at Venice Biennale in 2006).
- OverHolland (peer-reviewed journal, founded 2004).

KEY PUBLICATIONS

- Graafland, A.D., 2003. Versailles and the Mechanics of Power. 010 Publishers, Rotterdam.
- Avermaete, T., 2005. Another Modern: The Post-war Architecture and Urbanism of Candilis-Josic-Woods. NAi Publishers, Rotterdam.
- Risselada, M., Heuvel, D. van den (eds.), 2005. Team 10: A Utopia of the Present. NAi Publishers, Rotterdam.

KEY BOOKS OR CHAPTERS OF BOOKS

- Healy, P. 2003. Beauty and the Sublime. SUN Publishers, Nijmegen.
- Healy, P., 2005. Images of Knowledge. An Introduction to contemporary philosophy of science. SUN Publishers, Nijmegen.
- Hauptmann, D. (ed.), 2006. The Body in Architecture. 010 Publishers, Rotterdam.
- Grafe, C., Bollerey, F., 2007. Cafés and Bars – The Architecture of Public Display. Routledge, London/New York.
- Schrijver, L., 2009. Radical Games: Popping the Bubble of 1960s' Architecture. NAi Publishers, Rotterdam.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

- Gameren, D. van, 2005. Revisions of Space: An Architectural Manual. NAi Publishers, Rotterdam.
- Pimlott, M., 2007. Without and within: Essays on the urban interior. Episode Publishers, Rotterdam.
- Fretton, T., 2008. Tony Fretton Architects. Gustavo Gili, Barcelona.
- Healy, P., 2008. The Model and its Architecture. 010 Publishers, Rotterdam.
- Kuitenbrouwer, P., 2009. Intense Laagbouw: Woningbouw in hoge dichtheden. Platform GRAS, Groningen.
- Riedijk, M., 2009. The drawing. The architect´s raison d´être. 010 Publishers, Rotterdam.

KEY DISSERTATIONS

- Claessens, F., 2005. De stad als architectonische constructie. Het architectonisch discours van de stad. Duitsland 1871-1914. Publicatiebureau Bouwkunde, Delft.
- Kaminer, T., 2008. The idealist refuge: architecture, crisis, and resuscitation. TU Delft Architecture, Delft.
- Komossa, S., 2008. The transformation of the Dutch urban block; Model, rule and ideal. TU Delft Architecture, Delft.
- Stanek, L., 2008. Henri Lefebvre and the concrete research of space: urban theory, empirical studies, architecture. TU Delft Architecture, Delft.
- Alturk, E., 2009. Drawing architecture theory on the city. TU Delft Architecture, Delft.

KEY EVENTS

- DSD Inaugural Conference, (Delft, 2004). conference and publication: Graafland, A.D., Kavanaugh L.J., (eds.) Crossover. Rotterdam: 010 Publishers, 2006.
- The Projective Landscape (Delft, 2006), conference.
- Architectural Positions: Architecture, Modernity and the Public Sphere (Delft, 2007), colloquia and publication: Avermaete, T., Havik, K., Teerds, H. (eds.) 2009. Architectural Positions: Architecture, Modernity and the Public Sphere. SUN Publishers, Amsterdam.
- Rethinking theory, space, and production: Henri Lefebvre today. (Delft, 2008), conference.
- TransThinking: Architecture in Mind, from noopolitics to bio-politics. (Delft, 2008), symposium.

KEY EXHIBITIONS

- Peter and Alison Smithson: From the House of the Future to the House for Today (Rotterdam, 2004), exhibition and publication: (Heuvel, D. van den, Risselada, M. (eds.) 2004. From the House of the Future to the House for Today. Rotterdam: 010 Publishers, 2004).
- 100 Years of Dutch Architecture (Delft, 2005/Bejing, 2009) exhibition and publication: Barbieri, U., Duin, L. van (eds.), 2003. A Hundred Years of Dutch Architecture: Trends and highlights. NAi Publishers/SUN Publishers, Rotterdam/Nijmegen.
- Team 10: A Utopia of the Present (Rotterdam, 2005/New Haven (USA), 2006/Paris, 2007). exhibition and publication: Heuvel, D. van den, Risselada, M. (eds.), 2005. Team 10: A Utopia of the Present. NAi Publishers, Rotterdam.
- The Dutch Urban Block (Milano, Madrid, Barcelona, Budapest, Seattle, 2006) exhibition and publication: Komossa, S., Meyer, H., Risselada, M. (eds.), 2005. Atlas of the Dutch Urban Block. Thoth, Bussum.
- In the Desert of Modernity: Colonial Planning and After (Berlin, 2008 & Casablanca, 2009), exhibition and publication: Avermaete, T., Karakayali, S. & Osten, M. Von. (eds.) 2010. Colonial Modern: Aesthetics of the Past, Rebellions for the Future. Blackdog Publishers, London.

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The 'Architecture Project and its Foundations' research programme holds that several important societal issues (such as the shifting needs caused by demographic changes, new educational models, or the issues of a multi-cultural society) can be approached through the integrated and concrete perspective of the architectural project. By using this approach, the programme offers new perspectives on societal issues that differ significantly from the disparate viewpoints offered in other domains.

The valorisation of the research results of this programme typically occurs through articles, books and exhibitions. Often, these different kinds of output are not only directed towards academics, but also reach a broader audience of professionals and others with an interest in the built environment. As a result many of the programme's research results influence - directly or indirectly - design practices, as well as broader socio-cultural debates on the built environment and related issues. The large variety of publications in which our researchers have a central role *(DASH, Footprint, Routledge Interior Architecture Series, DSD Series on Architecture and Urbanism, OverHolland, OASE. Architectural Journal)* contributes to the broad socio-cultural valorisation of research results.

5.2 Key results/highlights

- Team 10: A Utopia of the Present (Rotterdam, 2005/New Haven (USA), 2006/Paris, 2007). exhibition and publication: Heuvel, D. van den, Risselada, M. (eds.), 2005. Team 10: A Utopia of the Present. NAi Publishers, Rotterdam.

  This research project has made a very important contribution to understanding one of the main paradigms in contemporary architecture culture and general thinking on the built environment. The high level of interest in the exhibition and the large number of books (second print) that were sold illustrate the broad societal relevance of this research.

- Barbieri, U., Duin, L. van (eds.), 2003. A Hundred Years of Dutch Architecture: Trends and highlights. NAi Publishers/SUN Publishers, Rotterdam/Nijmegen

  The book offers an overview of the specific qualities of Dutch architecture, and the exhibition it accompanies has played a significant role in international dissemination of Dutch architecture, having recently traveled to Beijing.

- Komossa, S., Meyer, H., Risselada, M. (eds.), 2005. Atlas of the Dutch Urban Block. Thoth, Bussum.

  This book is an example of the tradition of plan analysis in Delft that shows the value of design-led research.

- DSD Inaugural Conference, (Delft, 2004). conference and publication: Graafland, A.D., Kavanaugh L.J., (eds.) Crossover. Rotterdam: 010 Publishers, 2006.

  The conference offered a repositioning of Europe in architecture discourse, as discussed by George Baird in his article 'Criticality and its Discontents' in Harvard Design magazine, winter 2005.

5.3 Key knowledge contributions to practices and policies

- Kuitenbrouwer, P., 2009. *Intense Laagbouw: Woningbouw in hoge dichtheden.* Platform GRAS, Groningen.
- Uytenhaak, R., 2008. *Cities Full of Space: Qualities of Density*. 010 Publishers, Rotterdam.
- Hansen, B.L., 2008. *Beyond Clinical Buildings*. Netherlands Architecture Fund & TU Delft.
- Bijlsma, L., Groenland J., 2006. *The intermediate size: a Handbook for Collective Dwellings.* SUN, Nijmegen.
- Maas, W. (ed.) 2006. *Space fighter.* The evolutionary city (Game:) MVRDV/DSD in collaboration with the Berlage Institute, MIT and cThrough. Actar, Barcelona.

5.4 Evidence of the appreciation of stakeholders

The value placed by stakeholders on the contributions to knowledge mentioned above can be evidenced in three ways: a) it has been evident in interviews with stakeholders which have been performed within the framework of the ERIC (Evaluating Research in Context) project; b) by the continuing involvement of stakeholders with researchers, as expressed by the commission of new research projects for example; and c) the research results have been used within concrete policies and plans (as in the case of planning high-density/low-rise neighbourhoods in the municipality of Groningen).

5.5 Dissemination strategies

The research results of this programme are typically disseminated through articles and books that are directed not only towards academics, but also towards a broader readership. In addition, many researchers publish public versions of their work in periodicals such as De Architect, the primary Dutch professional magazine on architecture, or on Archined, an important digital forum on architecture and urbanism.

International exhibitions play a central role in the dissemination of research results. Many of the outcomes of this research programme are presented in major exhibitions at important cultural institutions and designed for a broader audience (Nederlands Architectuurinstituut NAi, Rotterdam), Cité de l'Architecture et du Patrimoine (Chaillot, Paris), Design Museum (London), Haus der Kulturen der Welt (HKW, Berlin).

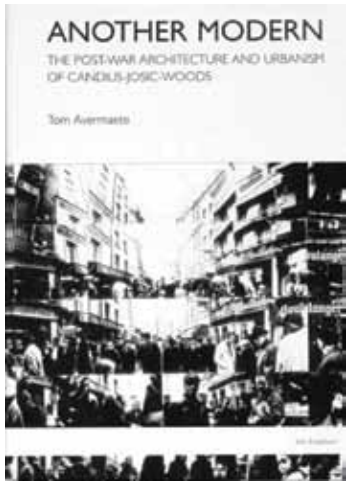
5.6 Evidence of impacts

Many books and especially exhibitions that have resulted from this research programme are reviewed and discussed in the professional and general press (newspapers, magazines, websites). Introducing the research results into the public media demonstrates the resonance of the research with broader societal concerns.

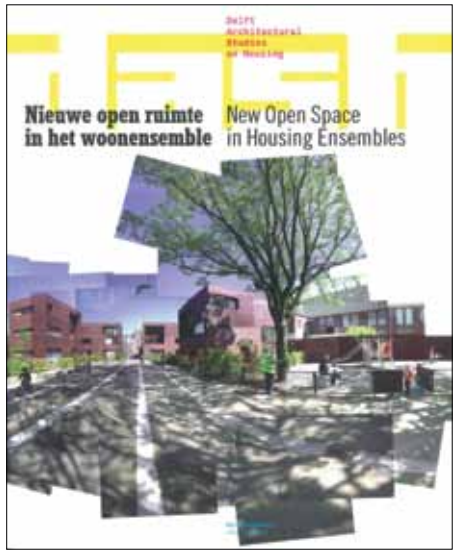
5.7 Commissioned research by societal actors

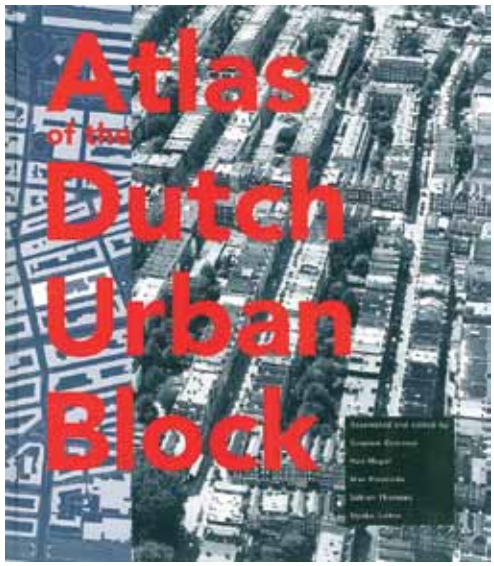
Examples of commissioned research by societal actors are:

- Municipality of Groningen (2008-2009): Intense Laagbouw: Woningbouw in hoge dichtheden.
- STAWON, Research foundation for dwelling and living environments of the Dutch Federation of Architects BNA (2008-2010): Parkeren in de woonomgeving.
- Netherlands Architecture Fund (2007-2008): Beyond Clinical Buildings.



Selected publications of the Department of Architecture.

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of the
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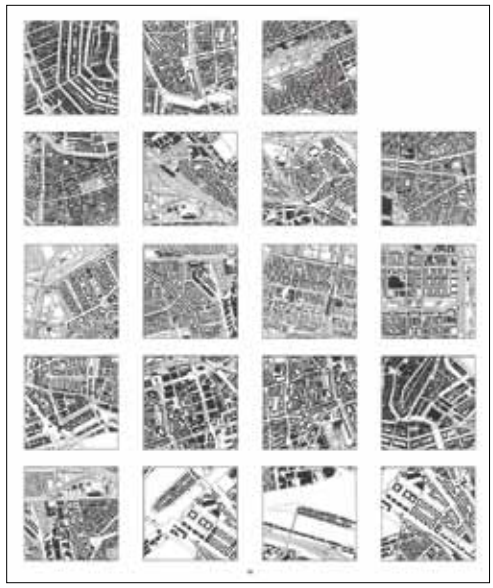
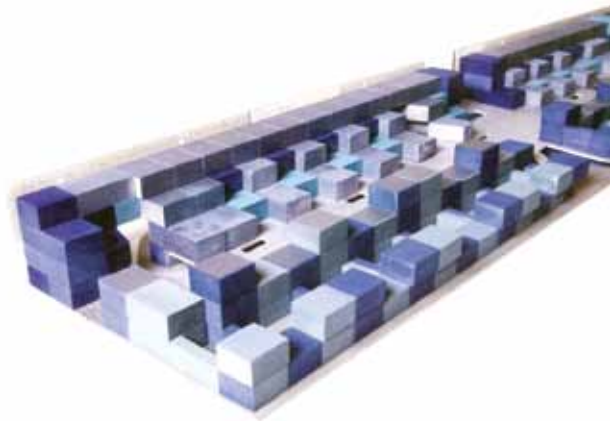
Block




INTENSE
LAAGBOUW
WONINGBOUW IN HOGE DICHTHEDEN

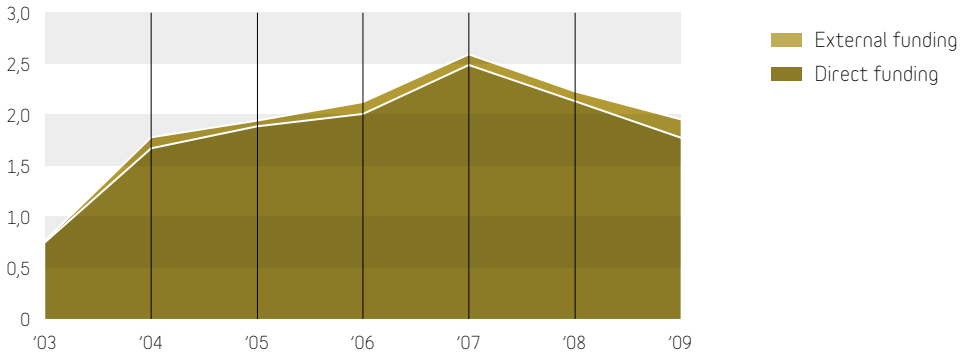


6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	756	98%	1,677	94%	1,893	97%	2,015	95%	2,496	96%	2,141	96%	1,782	91%
External funding	16	2%	108	6%	56	3%	117	5%	104	4%	96	4%	180	9%
TOTAL FUNDING	**772**	**100%**	**1,785**	**100%**	**1,949**	**100%**	**2,132**	**100%**	**2,600**	**100%**	**2,237**	**100%**	**1,962**	**100%**
EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	737	93%	1,454	91%	1,568	88%	1,968	88%	2,605	90%	2,485	90%	1,873	90%
Other costs	56	7%	141	9%	215	12%	263	12%	286	10%	272	10%	200	10%
TOTAL EXPENDITURE	**793**	**100%**	**1,595**	**100%**	**1,783**	**100%**	**2,231**	**100%**	**2,891**	**100%**	**2,757**	**100%**	**2,073**	**100%**

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	2	0	0	0	3	0	4	0	4	0	4	0	2	0
Non-refereed articles	7	0	0	0	7	0	15	0	4	0	12	0	8	4
Books	5	0	3	0	10	0	9	0	12	0	10	0	9	1
Book chapters	33	0	32	0	105	20	54	0	68	1	52	17	74	6
PhD-theses	3	0	1	0	0	6	1	0	0	1	5	4	3	0
Conference papers	3	0	27	0	13	1	23	2	17	5	12	2	26	7
Professional publications	28	0	26	0	29	0	43	0	38	1	55	1	32	5
Editorships journals/book	5	0	6	0	8	0	12	0	9	0	24	2	23	2
TOTAL PUBLICATIONS	**86**	**0**	**95**	**0**	**175**	**27**	**161**	**2**	**152**	**8**	**174**	**26**	**177**	**25**

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	0	0	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%
2001	0	1	1	1	100%	1	1	1	100%	1	100%	1	100%	0	0%	0	0%
2002	1	1	2	1	50%	1	1	1	50%	1	50%	1	50%	0	0%	1	50%
2003	2	0	2	1	50%	1	1	1	50%	1	50%	1	50%	0	0%	1	50%
2004	1	5	6	2	33%	3	1	3	50%	3	50%	3	50%	0	0%	3	50%
2005	1	0	1	1	100%	1	1	1	100%	1	100%	1	100%	0	0%	0	0%
TOTAL	**5**	**7**	**12**	**6**	**50%**	**7**	**58%**	**7**	**58%**	**7**	**58%**	**7**	**58%**	**0**	**0%**	**5**	**42%**

Table c. PhD-students with scholarship or external funding

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	0	0	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%
2001	0	0	0	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%
2002	0	0	0	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%
2003	0	1	1	1	100%	1	1	1	100%	1	100%	1	100%	0	0%	0	0%
2004	0	0	0	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%
2005	3	3	6	3	50%	3	1	3	50%	3	50%	3	50%	0	0%	3	50%
TOTAL	**3**	**4**	**7**	**4**	**57%**	**4**	**57%**	**4**	**57%**	**4**	**57%**	**4**	**57%**	**0**	**0%**	**3**	**43%**

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2006	3rd Annual AHRA International Conference St. Catherine's College	Fretton	Oxford	UK
2006	The International Mega Cities Conference	Graafland	Guangzhou	CN
2008	10th International Docomomo Conference: The Challenge of Change'	Avermaete	Rotterdam	NL
2009	African perspectives, University of Pretoria	Gameren	Pretoria	ZA
2009	Int Conf on Sustainable Water Infrastructure for Cities and Villages of the Future	Schuetze	Beijing	CN
2009	Int Conf on Walter Benjamin, Technicon, Israel Institute of Technology	Healy	Haifa	IL

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2004/8	EAAE conf 'The European City', (2004), 'Research by Design' (2008)	Organisation, Chair	Duin, Barbieri, Claessens, Cavallo	Delft	NL
2007/8	The Colonial Modern' I (2007) and II (2008)	Organisation	Avermaete	Berlin	DE
2007	Urban Development, African Perspectives', international Conference	Organisation	Graafland, Bruyns, Avermaete	Delft	NL
2008	Docomomo international conference	Organizing cmte	Heuvel	Rotterdam	NL
2008	Rethinking Theory, Space and Production: Henri Lefebvre Today'	Organisation	Stanek	Delft	NL

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2007	Lecture series 'Architectural Positions' TU Delft, Faculty Architecture	Organisers	Avermaete, Havik, Teerds	Delft	NL
2007	RESPONSE-ABILITY - 2nd Congress of Croatian Architects	Organiser	Jerkovic	Opatija	HR
2007	'Modern architecture archive' meeting - V&A museum London	Invited lecturer	Heuvel	London	UK
2008	'Day of Philosophy', University of Tilburg	Invited lecturer	Schrijver	Tilburg	NL

Table d. Involvement in exhibitions

YEAR	EVENT	ISSUER	WHO	WHERE	
2005	Team 10 - In Search of a Utopia of the Present, Cite de l'Architecture	Curator	Risselada, Heuvel	Paris	FR
2006/7	The Dutch Urban Block. Milan, Madrid, Barcelona, Budapest, Seattle	Organizer, lecturer	Komossa, Jutten	Worldwide	UN
2008	In The Desert of Modernity: Colonial Planning and After	Curator	Avermaete	Berlin	DE
2009	INTENSE LAAGBOUW exhibition at Dienst RO/EZ Groningen	Curator, co-organizer	Gameren, Kuitenbrouwer	Groningen	NL
2009	From Berlage to Koolhaas, A Hundred Years of Dutch Architecture	Curator	Duin	Beijing	CN

Table e. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2007	Aga Khan Award for Architecture: Dutch Embassy Addis Ababa	Aga Khan	Gameren	Kuala Lumpur	MY
2009	RIBA Award: Fuglsang Kunstmuseum	RIBA	Fretton	London	UK

Table f. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2005	Japan Society for the Promotion of Science (JSPS)	Fellow	Graafland	Tokyo	JP
2006	University of Aarhus, Dep of Social Anthropology & Ethnography	Visiting Professor	Hauptmann	Aarhus	DK
2007	Royal Danish Academy of Fine Arts School of Architecture (KARCH)	Visiting professor	Leupen	Copenhagen	DK
2007	University of Edinburgh, Department of Architecture	Visiting Professor	Hauptmann	Edinburgh	UK
2009	Bezalel Academy of Arts and Design	Visiting professor	Healy	Jerusalem	IL

Table g. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2004/9	State Examination for Architects	Head	Duin	The Hague	NL
2005/9	Advisory Committee for Architecture of the European Commission	Member	Duin	Brussels	EU
2009	Int Ass Computer Science and Information Technology IACSIT	Senior member	Bier	Singapore	SG
2007/9	EAHN General Committee - European Architectural History Network	Member	Theunissen	Delft	NL

Table h. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2008	Postgraduate Research Program, University of Hong Kong	Assessor	Graafland	Hong Kong	HK
2008/9	PhD-program Villard d'Honnecourt	Reviewer	Komossa, Schrijver	Venice	IT

Table i. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003	Urban Morphology	Editorial board	Marzot	Birmingham	UK
2003/>	Oase - architecture, urban design and landscape design	Editors	Avermaete, Grafe, Havik, Teerds, Schrijver	Rotterdam	NL
2003/>	ARQ - covering all aspects of architectural endeavour	Editorial board	Fretton	Cambridge	UK
2007	Journal of Architecture	Commiss. editor	Grafe	London	UK
2007/>	Footprint on-line journal	Founders, editors	Bier, Bracken, Heuvel, Kaminer, Stanek, Schoonderbeek, Sohn	Delft	NL

Table j. Editorship professional journal

YEAR	JOURNAL	POSITION	WHO	WHERE	
2005	Rassegna	Editorial board	Marzot	Bologna	IT
2006/>	Čovjek i prostor - bimonthly Croatian Architecture Association	Editorial board	Jerkovic	Zagreb	HR
2007/>	Time-based Architecture International	Editorial board	Leupen	Tyne & Wear	UK
2009/>	Interiors: Architecture, Design, Culture	Editorial board	Grafe	Oxford	UK
2009/>	Delft Architectural Studies on Housing design (DASH)	Editor-in-Chief	Gameren	Delft	NL

Table k. Role in practice and policy making

YEAR	FIRM / ORGANISATION	ROLE	WHO	WHERE	
2004	ARCAM Amsterdam - advisory board	Chairman	Gameren		NL
2004/>	Netherlands Architecture Fund	Advisory committee	Grafe, Schrijver	Rotterdam	NL
2006	Flemish Minister of Culture - Advisory Committee on Architecture	Member	Avermaete	Brussels	BE
2006	Cultuurprijs Architectuur Vlaamse Gemeenschap	Jury Member	Avermaete	Kortrijk	BE
2009	Maaskant Prijs - Award for Young Architects	Jury Member	Avermaete	Rotterdam	NL
	Heritage Decree, Ministry of Culture. Belgium, Flanders	Contributor to Architecture	Avermaete	Brussel	BE

Final presentation,
Master's Studio Dwelling.

9 Next generation

9.1 Objectives and institutional embedding

PhD candidates in the Architecture research group traditionally follow a relatively individualised research track, supported primarily by their supervisor(s) rather than coursework. In the near future, this autonomous research track will be supported by basic integration into the department's wider research questions through a shared core curriculum of PhD courses.

9.2 Structure of programmes

The research programme itself offers an initial guidance structure for PhD candidates: it is divided into projects which are staffed by a population of researchers that differ in their degree of experience and involvement. Each project is headed by a senior researcher (professor or associate/assistant professor level with PhD) that has a more substantial research appointment. This project leader is supported by other experienced staff (associate or assistant level) and a limited number of junior researchers or PhD candidates.
In addition, beginning this academic year (2010) the department will be offering PhD seminars that are related more directly to the research areas of the research programme. Alongside these topical seminars, the faculty will be offering general research courses (see 9.5, next page).

9.3 Supervision

In recent years, the Department of Architecture has been actively investing in the development and further professionalisation of a three-fold system of support for PhD candidates. The primary supervision responsibilities are carried out by the main supervisor (a professor within the department), with an additional daily supervisor when possible (associate or assistant professors with a PhD degree). At a secondary level (bringing together all PhD candidates within a research project or chair), small PhD seminars are organised which are based on a close reading of texts and discussions on method as on content. A third level (bringing together all researchers in the department) consists of Peer-review Colloquia, which are organised two or three times a year. During these seminars, external specialists in the particular research fields are invited to give their opinions on the work of PhD candidates. A month prior to the colloquium, a reader containing texts by the candidates is prepared as a basis for these discussions. Each PhD candidate is required to participate in at least two Peer-Review Colloquia (after the first year of research (outline presentation) and after approximately 2.5 years (chapter presentation)) over the course of the PhD research period.

9.4 Success rates

PhD candidates in the Architecture research group can generally be divided into two categories: a) staff members that have educational duties alongside their research duties; and b) PhD students that have a research contract (internally or externally funded). The first category of researchers is successful but generally takes longer than four years to complete the PhD due to a heavy teaching load. The second category of PhD candidates completes the PhD within the limits of the projected timeframe. Although the number of PhDs is not very high, the Department of Architecture has made substantial progress during recent years in attracting PhD researchers who have completed their research work.

9.5 Educational resources

The PhD candidates of the Department of Architecture can benefit from the various general courses offered by TU Delft (such as technical writing in English, software skills).
Faculty-wide graduate courses are being developed which will be open to advanced Master's programme students as well as to starting PhD candidates. These focus on developing research skills (writing abstracts, research methods, organising data).

In addition, to complement the university-level and faculty-level initiatives, a stronger framework of specific research education is currently being developed by the Department of Architecture. This will take the form of PhD seminars focusing on architectural research approaches and methodologies, as well as on the specific themes of the research programme (post-war architectural culture, the instruments of architecture, etc). These seminars are being developed in cooperation with the DSD and the Institute of the History of Art, Architecture and Urbanism (IHAAU).

10 Viability

10.1 Resource management

The viability of the research being performed within Architecture is reasonably strong, if only due to its sheer mass: it is currently the largest department in the faculty, with many researchers and students.
Nevertheless, the department has also been forced to terminate the employment of a number of extremely promising young researchers as part of the restructuring process necessitated by the continuing budget cuts. As a result, we have focused on bringing the various strands of research together, maintaining a critical mass of research despite dwindling numbers. We remain confident that in the long term, this repositioning will help the department to grow more robust both in terms of its research culture and design education.
The main problem still facing the department in terms of viability is the drastic fall in the number of professors due to retirement. The department is currently, and has been for two years, dramatically understaffed in terms of its senior faculty.
The department is currently lucky enough to have a number of distinguished practising architects who have accepted part-time professorships (0.4-0.6 FTE). Other than the Antoni van Leeuwenhoek Professorship in Theory (Arie Graafland, DSD), the department currently employs no academic professors. This matter is a pressing issue that is being felt throughout the organisation of the department, not only at the level of the associate faculty, but also the junior faculty.

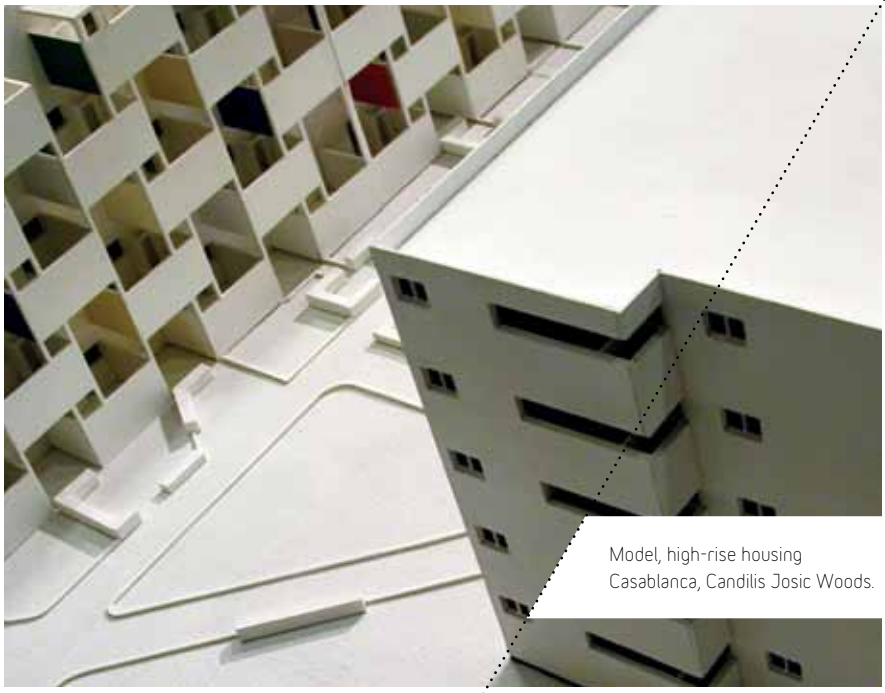
10.2 Available infrastructure

In the past years, the Department of Architecture has invested substantially in the support of researchers. This has resulted in the appointment of a part-time research coordinator, who is responsible for the target-oriented dissemination of information concerning research (calls for papers, funding, training) including through the research web page.

The research coordinator provides (together with the secretary of the department) support for funding applications and organises the Peer-Review Colloquia of the Department of Architecture. Together with the programme coordinator, the research nestor and the chairman of the department, the research coordinator forms the Research Committee that monitors research within the Department of Architecture. The research coordinator functions as the first contact for all researchers of the department. At the level of material infrastructure, the researchers of the Department of Architecture can rely on the extensive library of the Faculty of Architecture, the Map Collection, and the model workshop when carrying out their research.

10.3 Innovative capacity

The Department of Architecture has an energetic group of junior faculty members that has taken up the challenge of restructuring research. New ways of combining studio education and research are being explored, and collaborative projects have been formed over the boundaries of chairs, departments and disciplines. Despite a lack of authoritative senior faculty members to turn to for guidance, the junior faculty has proven itself capable of fostering a positive attitude towards critically rethinking their own discipline within the realm of scientific inquiry and design capability. The generally broad and international orientation of the junior faculty places the department in a favourable position for fuller engagement in the global arena of architectural research.



Model, high-rise housing Casablanca, Candilis Josic Woods.

11 SWOT-analysis

STRENGTHS

One of the greatest strengths of the Architecture department is the diversity, energy and enthusiasm of its junior staff. This has ensured a strong innovative capacity, with the ability to explore beyond the established boundaries of research and the structure of the chairs.
The international orientation of the Architecture department has aided in improving intellectual exchange. The members of the research staff are active in both formal and informal international networks. In addition, there are a great number of foreign students at Master's level, most of who choose to study in Delft specifically due to the reputation of Dutch architecture.

WEAKNESSES

A significant weakness is the ability to acquire external funding. The faculty is mainly dependent on direct government funding. This poses a threat to the viability of research, particularly in light of current budget constraints. The Netherlands Organisation for Scientific Research (NWO) does not include a category of research funding which accommodates the design disciplines. Funding requests from the Department of Architecture must choose between the Humanities, the Applied Sciences, or the Social and Behavioural Sciences. Although architecture shares characteristics with all of these areas, there is no perfect fit with any one of them.

OPPORTUNITIES

The current round of restructuring, which includes the bulk of the 'Architectural Project and Foundations' programme, as well as a reconfigured institute or graduate programme in history and theory (consisting of IHAAU, the Department of Architecture and the DSD), uses the strength of the junior staff – its energy and readiness to collaborate – to maintain cohesion. The programme brings together the various research strands, allowing the various perspectives and methodological approaches to complement one another rather than compete. The Peer Review Colloquia have played a central role in fostering an atmosphere of open academic debate.

THREATS

One of the greatest threats to the restructuring of the programme is the long-standing tradition of fragmentation and the autonomy of individual researchers and projects. This was also the central criticism of the mid-term review.
The main challenge in the coming years will be to maintain more cohesion than has previously been the case, without losing the energy generated by the personal efforts of individual researchers.
In other words, we must guarantee a certain level of autonomy while simultaneously encouraging greater collaboration and more exchange of ideas; this is the central task of the new research programme.

12 Strategy

The near future is both uncertain and exciting. The lack of senior faculty members is a pressing issue, posing a real threat to the viability of the department. Collaborations have been increasing and are encouraged not only in the spirit of academic exchange, but also as a manner to increase stability through networks (and thus the viability of the research).

Viability is also aided by strengthening PhD research: today's PhD candidates will form tomorrow's pool of junior staff. At departmental and faculty level, steps have been taken to incorporate a PhD course structure as part of a more comprehensive graduate programme that is supportive of the existing individual research. The Architecture department's peer-review seminar formula has proven successful and we hope to be equally successful in initiating PhD courses. The experiences of the DSD in creating a research-oriented Master's programme will be invaluable in this process.

In terms of evaluating research in architecture, two initial steps have been taken. First, the Architecture programme has cooperated with 'Evaluating Research in Context', a nationally funded study of evaluation criteria for other forms of research than the traditional domains. We will actively contribute to any follow-up studies. Second, the knowledge base of architecture resides not only in analytic study but also in the creative generation of design solutions found in the studios. A number of our most innovative studio teachers have begun to make systematic inventories of their studio approaches and results.

This same exploration of the discipline forms the strategy to approach the funding institutions. If architecture typically falls short by adhering to the traditional categories of scientific research, it is time to put forward robust categories of academic research in the design disciplines. By emphasising the qualities of the discipline itself, such as the exploratory qualities of design and the scientific aspects of analysis, we stand to encourage innovative research in the field itself, and perhaps achieve more success in acquiring funding along the way.

This also necessitates a reassessment of the journal indexes for architecture. Some of the most reputable scholarly journals in the field are not allocated a scientific status on the basis of traditional domains of academic research. On a faculty level, SCOPUS will be approached with this question of evaluation criteria and the scholarly quality of journals such as OASE and Footprint, both peer-reviewed, and DASH, as an exemplary journal of design-based research.

Design & History

RESEARCH LEADERS: Marie-Thérèse van Thoor PhD & Cor Wagenaar PhD
KEY RESEARCHERS: Prof. Franziska Bollerey PhD, Herman Bergeijk PhD, Prof. Jo Coenen PhD, Prof. Rob van Hees, Prof. Marieke Kuipers PhD, Barbara Lubelli PhD, Otakar Macel PhD, Prof. Paul Meurs PhD, Reinout Rutte PhD, Marie-Therese van Thoor PhD, Cor Wagenaar PhD, Hielkje Zijlstra PhD

1 Objectives and research area

Objectives: The objectives of the Design & History research group are threefold: to provide decision makers, planners and designers with the intellectual and practical tools to approach the reconstruction work that awaits them in the most responsible way that scientific research and practical expertise can provide; to produce in-depth historical analysis of architectural movements; and to unravel the often quite explicit philosophical, social, cultural and theoretical implications involved in specific design approaches.

1.1 Vision, mission and objectives

Vision: Whether planned or evolved, whether the result of a single planning perspective or the accumulated effect of a series of interventions over time, the human habitat has been made by man. In most parts of the world - not only in cities - planning implies transformation. Transformation processes usually oscillate between two poles: replacing existing phenomena, or adapting them to new needs. Only in special cases is the conservation of buildings or even urban ensembles considered to be a sensible or culturally valid approach.

Mission: Design & History is a joint research group run by the Department ®MIT and the Institute of History of Art, Architecture and Urbanism (IHAAU). ®MIT neatly distinguishes between three different scale levels: modification (material), intervention (buildings) and transformation. The IHAAU focuses on history, historiography and theories that are related to the fields of art, architecture and urbanism. The unifying theme is a specifically historical focus. ®MIT concentrates on 'operative' history, whereas the IHAAU sees the analysis of decision-making processes as a prerequisite for understanding the past and the future production of architectural, urban and landscape phenomena. These approaches are distinct but perfectly complementary.

1.2 Societal concerns and issues

Transformations will become the principal challenge in the built environment of the future. This will require an awareness of the qualities inherent in areas that are now being redeveloped. ®MIT addresses this basic aspect while focusing on the artefacts themselves, on every scale. What are their original design qualities? Have they played a particular role in the further evolution of the typology they represent? What changes have occurred since their original conception? Which qualities can be seen as vital? How do the existing qualities of the built environment and the cultural values they represent relate to projects for the future? The IHAAU sees artefacts as representative of the evolution of the design disciplines, the decision-making processes (the actors involved such as politicians, contraction firms, design disciplines), and the historical meaning they embody.

1.3 Position

Both the ®MIT and the IHAAU are now at the centre of extensive national and international networks of experts working in the fields of transformation and history. ®MIT's professors and associate professors are directly linked with research organisations, such as TNO and national and international heritage organisations like RCE, KNOB (and the journal Bulletin KNOB), Unesco, Docomomo and architectural offices. The IHAAU has many connections within the international scientific scene, as shown by its advisory board, its involvement in Positions, the first international blind peer-reviewed journal on Modernism (University of Minnesota Press, Minneapolis, and NAi-publishers, Rotterdam), and the international activities of its staff members.

1.4 Research area

The ®MIT's research area combines three research lines 'Knowledge of the Past', 'Intervention' and 'Societal Framework', concentrating on the central theme Legacy of the Twentieth century. The IHAAU research area is to devote its attention to large-scale developments (Metropolis) and the history of modern architecture (Modernity and Tradition). A close analysis of continuity and rupture in twentieth century architecture reveals to what extent the existing historiography was influenced by propaganda rather than being based on thorough historical research. A fundamental revision of our knowledge in this field is badly needed if we are to arrive at a proper evaluation of the legacy of twentieth century architecture and urbanism. Since most of the transformation and modification work in the near future will have to deal with this legacy, such a revision is long overdue.

Portico Rubenshuis - Antwerp. Involvement of ®MIT in assessment of the state of conservation and development of conservation approach.

2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	15	3,6	16	3,1	14	2,6	13	2,3	17	3,4	16	3,64	16	3,5
Non-tenured staff	11	2,5	10	2,2	12	2,6	19	4,3	22	5,0	22	6,72	16	6,6
PhD-students	8	0,8	6	0,8	9	2,8	13	4,0	16	4,4	14	3,84	20	3,2
Guests	6		11		12		17		16		15		21	
TOTAL RESEARCH STAFF	**40**	**6,9**	**43**	**6,1**	**47**	**8,0**	**62**	**10,7**	**71**	**12,8**	**67**	**14,2**	**73**	**13,3**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE	
Prof. Jo Coenen	Founder, owner	Jo Coenen & Co Architects	Maastricht	NL
Prof. Paul Meurs PhD	Co-founder + owner	Steenhuis-Meurs b.v.	Schiedam	NL
Prof. Rob van Hees	Research coordinator	TNO Building Conservation	Delft	NL
Prof. Marieke Kuipers PhD	Specialist	Cultural Heritage Agency	Amersfoort	NL
Visiting Prof. Dirk Jan de Vries PhD	Specialist	Cultural Heritage Agency	Amersfoort	NL
Job Roos	Co-founder + owner	Braaksma en Roos Architectenbureau	The Hague	NL
Bert van Bommel	Adv. Heritage Care	Government Building Agency	The Hague	NL
Henny Brouwer	Senior architect	Government Building Agency	The Hague	NL
Ron van Oers PhD	Programme spec.	Unesco World Heritage Centre	Paris	FR

3 Research environment and integration

3.1 Embedding

Limited to design and policy professionals, ®MIT is has fairly permanent working relationships with a number of partners in this field, such as the RCE, TNO, Unesco, Docomomo, Icomos and a number of architecture firms (see Table 2.b. Societal Relevance & Quality). IHAAU, on the other hand, prefers to cultivate its relative independence by choosing its partners in relation to specific projects: STAGG (specialist healthcare architects), publishers, sometimes municipal planning boards, and so on. If one defines the Architecture and Built Environment Community in a broader sense, including academic circles, research councils, and so on, both the IHAAU and ®MIT cherish their contacts with the international community and can lay claim to an extensive network of professionals within the Netherlands and abroad.

3.2 Number and affiliation of guest researchers

Guest researchers (not including PhD students) at IHAAU are: Prof. W Schache PhD (Environmental Planning, University of Dortmund), Prof. P Kahlfeldt PhD (Principles and Theory of Building Construction at the University of Dortmund), R. Baumeister PhD, T. Budantseva, A. Broekhuizen, A. Fohl, R. Garcia, B. Heine Hippler, M. IJsselstijn, I.B. Jacob, B. Kérekgyarto (TU Budapest), A. Koch, O. Macel, I. Ostermann, P. van Roosmalen, D.W. Schmidt, M. Simon (TU Budapest), C. Smeenk, H. Pump Uhlmann.

Guest researchers at ®MIT: W. de Jonge and iH.J. Henket (arch), Prof. D.J. de Vries PhD (RCE), J. Molema PhD, S. Leemans (Stag), A.J. van Bommel (RGD), M. de Miguel I Capdevilla (City of Rotterdam); Prof. B. Mariolle (Paris).

3.3 International and national positioning

Providing the perfect background for a combination of historical and theoretical work on the one hand, and the design professions on the other, TU Delft gives ®MIT and IHAAU a distinct advantage. Comparable research groups within the Netherlands are hard to find: the field covered by ®MIT coincides partly with that of the national conservation board and some local conservation agencies, IHAAU shares part of its terrain with art historical fields at Groningen, Amsterdam, Utrecht and Leiden.

3.4/5 Current partnerships with stakeholders and participation in consortia

®MIT regularly works with research organisations and societal and government institutions like TNO, RCE, the Government Buildings Agency (RGD), UNESCO, Docomomo, and Icomos. Book projects include partnerships with clients and publishing firms, like those of IHAAU. Since 2008, ®MIT has been part of the international consortium 'KIK (Brussels), TNO and ®MIT/TU Delft', regarding the research and conservation of the Rubenshouse in Antwerp.

IHAAU: Most, if not all of the book projects in which IHAAU participates are realised in close cooperation with publishing firms such as 010, Thoth, Birkhäuser, Minnesota University Press, NAi-publishers, Wolters Noordhof, and so on. In addition to this, long-term projects always involve close cooperation with stakeholders (healthcare architecture: University Medical Centre of Groningen, for instance). IHAAU works together with the universities of Groningen and Ghent in the preparation of an international network focusing on colonial cultural heritage.

4 Research environment and integration

4.1 Quality and scientific relevance of the research

The programme wishes to establish a solid basis for the evaluation of existing bodies of knowledge; the shifting position of design disciplines relative to research work on the one hand (some of which used to be part of architecture and urbanism but have now become specialist disciplines), and the main actors in decision-making processes on the other hand; taking positions in debates on the quality and value of the past; heritage and its modernisation, the nature of conservation; the attitude and theory of intervention and transformation; the policy and conservation of World Heritage.

4.2 Significance of the contribution to the field

The conservation and transformation of the architectural and urban heritage in a broad sense have become an important aspect of the practice of architecture. However, the approach, attitude and toolbox of architects and planners are not keeping pace with this reality. To improve and innovate the spatial quality and process quality of interventions in the built environment, it is necessary to reflect on the history of architectural ideas and how they have materialised, on conservation, and on current and previous practice. The Design and History programme provides such instruments, concentrating particularly on the legacy of the twentieth century.

4.3 Coherence

Within the Faculty of Architecture of TU Delft, the research approach of ®MIT and IHAAU is unique. ®MIT and IHAAU embody the historical dimensions of architecture and urbanism. Their research programme expands and modifies existing bodies of knowledge and positions the work of its members in its historical context. Exploring architectural traditions, theory, philosophy, history and the historical context of existing buildings and urban structures, this research programme informs the educational activities of ®MIT and IHAAU. Both IHAAU and ®MIT are engaged in preserving the memory of architectural history and architectural traditions, and consider this to be a primary condition for a full understanding of the present situation and the issues involved in today's transformation processes.

4.4 Quality of the scientific publications

The publications of ®MIT and IHAAU demonstrate a balance between purely scholarly and scientific output, in terms of the scientific ranking of the university, and the 'professional publications'. Both are indispensible for the production of architecture and urbanism. Scientific ranking informs all players in the field, focusing on key players in decision-making processes as well as the 'general public', while the professional publications address architectural and urban practitioners directly.

One Architecture, Health centre Sint Jozef, Deventer 2009. Illustration taken from 'Health care architecture in the Netherlands', IHAAU.

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

- ®MIT was involved in the COST action C-16 to improve "the quality of existing urban building envelopes" with COST Europe and SenterNovem (2003-2006). The acronym "COST" stands for European COoperation in the field of Scientific and Technical research. This resulted in 5 books in the series research in architectural engineering:
  Verhoef L.G.W. e.a. (ed.), 2007. *Cost C16. Improving Quality of Existing Urban Building Envelopes.* Volumes 1-5, IOS Press, Amsterdam.
- The Genadendal Conference in South Africa, with the Ministries of Foreign Affairs and Education, Culture and Science, COST Europe and SenterNovem (2003-2006):
  Preez, H. du, Oers, R. van, Roos, J. & Verhoef, L.G.W. (eds.), 2009. *The Challenge of Genadendal.* IOS Press, Amsterdam.
- UNESCO World Heritage Centre, Recommendation on Historic Urban Landscapes (2006-2009).
- The IHAAU contributed to the international conference The Architecture of Hospitals and its offspring (2005/2010, in cooperation with key players in the field).
- Randstad Research Project: mapping the cities of the Randstad Holland 1200-2000, ongoing.

KEY PUBLICATIONS

- Bergeijk, H. van, 2007. *Jan Wils. De Stijl en verder,* 010 Publishers, Rotterdam.
- Deben, L., Salet, W. & Thoor, M.-Th. van (eds.), 2004. *Cultural Heritage and the Future of the Historic Inner City of Amsterdam,* Aksant, Amsterdam.
- Hees, R.P.J. van & Lubelli, B.A. (Guest Editors), 2009. *Special Issue on Compatibility of Plasters and Renders on Salt Loaded Substrates, Construction and Building Materials,* Vol. 23, no. 5. Elsevier, Amsterdam, Boston, London et al.
- Rutte, R. & Engen, H. van (ed.), 2008. *Stadwording in de Nederlanden. Op zoek naar overzicht,* Verloren , Hilversum.
- Wagenaar, C. & Mens, N., 2009. *De architectuur van de ouderenhuisvesting: bouwen voor wonen en zorg,* NAi Publishers, Rotterdam.

KEY BOOKS OR CHAPTERS OF BOOKS

- Bergeijk, H. van, 2009. 'American influences on Dutch Architecture and Urban Design', in: *Four Centuries of Dutch-American Relations 1609-2009,* Boom, Amsterdam, Albany (NY).
- Bollerey, F., 2008. 'The global march of a stimulant and the birth of modern cultural transfer', in: *The Viennese Café as an Urban Site of Cultural Exchange,* Birkbeck, London, p. 13-26.
- Hees, R.P.J. van, Binda, L., Papayanni, I. & Toumbakari, E., 2004. 'Damage analysis as a step towards compatible repair mortars', in: Groot, C., Ashall, G. & Hughes, J. (eds.). *Characterisation of Old Mortars with Respect to their Repair* – RILEM report 28, p. 105-150.

- Macel, O., 2008. Chairs. *Catalogue of the Delft Faculty of Architecture Collection,* 010 Publishers, Rotterdam.
- Molema, J., 2006. 'Berlage's Beurs – concept and method', in: Madge, J. & Peckham, P. (eds.). *Narrating Architecture. A retrospective anthology,* Routledge, London/New York, p. 287-313.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

- Kuipers, M., 2007. *Monumenten van Herrezen Nederland.* Rijksdienst Cultureel Erfgoed, Amersfoort.
- Wagenaar, C. & Mens, N., 2009. *Healing Environment: anders bouwen voor betere zorg.* Thoth, Bussum.

KEY DISSERTATIONS

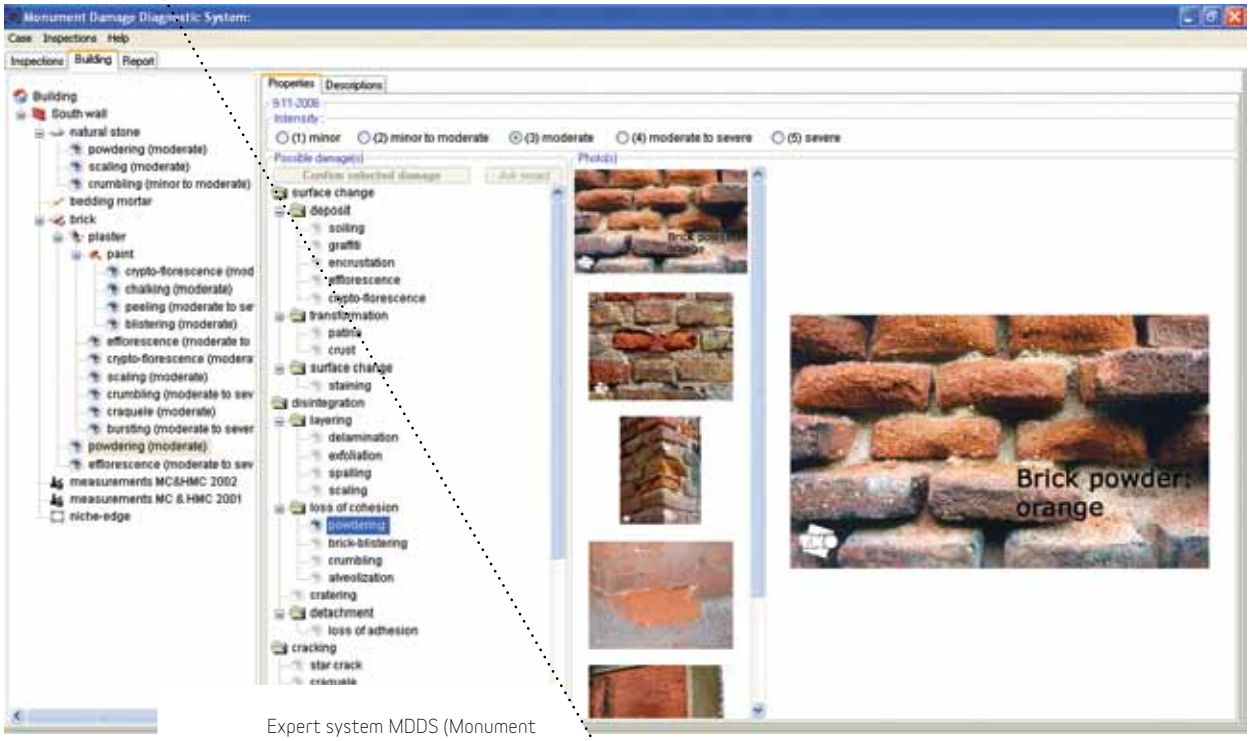
- Baumeister, R., 2009. *L'Architecture Sauvage: Asger Jorn's critique and concept of architecture,* Delft.
- Heer, de J., 2008. *The Architectonic Colour. The Polychromy in the Purist Architecture of Le Corbusier* (published in 2009 by 010 Publishers, Rotterdam).
- Lubelli, B.A., 2006. *Sodiumchloride damage to porous building materials,* Delft, 2006: Print Partners Ipskamp, Enschede.
- Martire, A., 2008. *Leisure Coast City. A comparative history of the urban waterfront,* Delft
- Nellessen, D., 2009. *Von Baudenkmälern zu Baudenkmalen. Die Entwicklung des Denkmalrechts in land Berlin von 1949 bis heute,* Delft.
- Zijlstra, H., 2006. *Building construction in the Netherlands 1940-1970: continuity + changeability = durability (Bouwen in Nederland 1940-1970 continuïteit + veranderbaarheid = duurzaamheid), Delft (2009, Analysing Buildings from Context to Detail in time.* ABCD research method. IOS Press, Amsterdam).

KEY EVENTS

- Third International Symposium on Restoration. World Heritage Site Olinda in Brazil. Proposals for Intervention, Delft University of Technology, the Netherlands 26 & 27 October 2006. Meurs, P.H. & Verhoef, L.G.W. (eds.), 2006. *Proceedings.* IOS Press, Amsterdam.
- 10th International Docomomo Conference. The Challenge of Chance. Dealing with the Legacy of the Modern Movement, Rotterdam 2008. Heuvel, D. van den, Mesman, M., Quist, W. & Lemmens, B., 2008. *Proceedings.* IOS Press, Amsterdam.

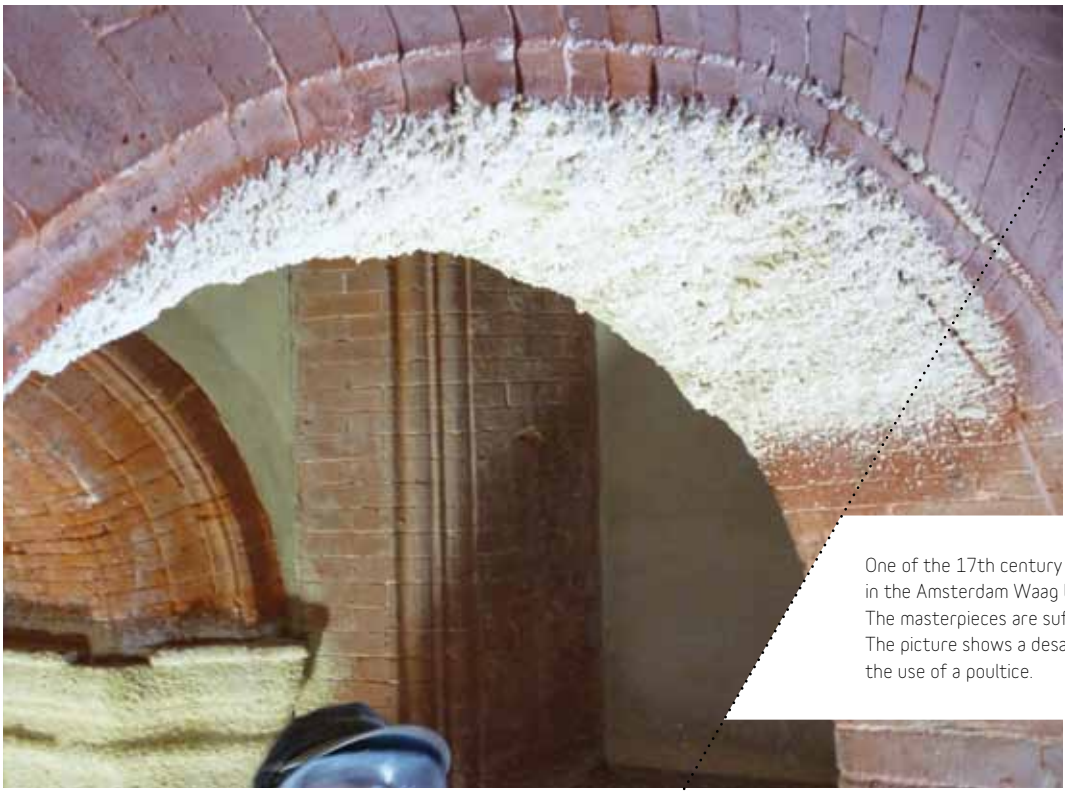
KEY EXHIBITIONS

- K.S. Melnikov and the Reconstruction of Moscow, 2006. Vienna – Galerie am Ringturm etc.: Macel, O. , curator.
- Brazil contemporary Sao Paolo, 2009. NAi Rotterdam: Meurs, P.H., curator.



Expert system MDDS (Monument Damage Diagnostic System) - Screenprint of an analysis of brick decay.

Console of the garden pavilion of the Rubens House in Antwerp.



One of the 17th century masonry masterpieces in the Amsterdam Waag building.
The masterpieces are suffering severe salt decay. The picture shows a desalination operation with the use of a poultice.

Plater on a salt laden wall (Venice), showing bursting due to crypto-florescence of salts.

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The joint research programme undertaken by ®MIT and IHAAU is essential to establish architecture and urbanism as professional disciplines in their own right. They target design professions as well as policy makers. IHAAU's involvement in the Randstadproject epitomises the direct link between analyses and future programming. ®MIT staff cooperate with research organisations, societal & government institutions (TNO, RCE, Government Building Agency, Unesco, Docomomo, Icomos), culminating in joint research programmes or projects. ®MIT's chairs and researchers have contributed to TNO's Monument Damage Diagnostic System (MDDS). They monitor (indoor) climate, (salt) damage (EU project on desalination), materials, building history, and transformation and re-development (conversion) processes assigned by public and private partners.

5.2 Key results/highlights

Research and analysis carried out by Job Roos, one of the ®MIT staff members who provided the basis for converting the former head office of TU Delft into the Faculty of Architecture. Roos became the coordinating architect of the project. Members of staff of the IHAAU are closely involved in re-thinking healthcare architecture (they are often assigned to do so by relevant stakeholders).

5.3 Key knowledge contributions to practices and policies

To facilitate the use of existing and new research, ®MIT has contributed to the development of communication tools such as the damage atlas and the stone atlas. These have been integrated into the expert system MDDS, and widely used in the national and international field of heritage. Unesco WHC's Recommendations on Historic Urban Landscapes (2006-2009) led to policies and recommendations on conservation practices in World Heritage cities. Jo Coenen was one of the main initiators on the revision of the Architects Title Act (WAT). IHAAU's publications have contributed to significant advances in knowledge in the fields of: historical geography; urbanisation, the history of urbanisation and urban concepts; interaction between design concepts and innovations; the founding of Positions.

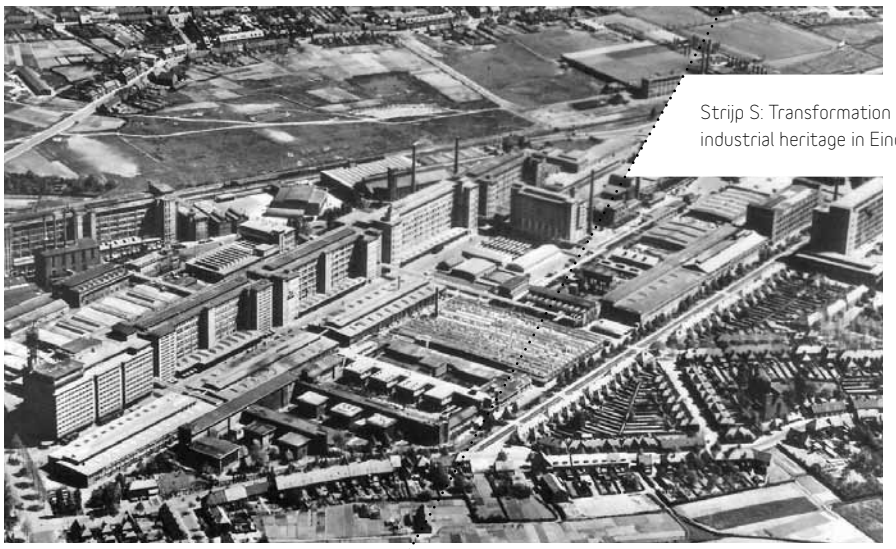
5.4 Evidence of the appreciation of stakeholders

Evidence of the appreciation of the research is provided by the assignment of staff members as advisors on desalination and damage processes in major national and international monuments. Following the conference on the Future of Urban Conservation Policies in the Netherlands (Commissie Weevers), IHAAU was commissioned by the Government Building Agency and the National Advisor of Heritage to carry out further research and advise on these policies. The IHAAU is continuously asked to coordinate books. ®MIT collaborates with the Centraal Museum Utrecht/Utrecht University on 'Rietveld's Universe' (exhibition and publication in October 2010), Landgoed Zonnestraal-de Alliantie/Nai publishers on the publication 'Zonnestraal' (December 2010), the Pieterskerk Leiden (indoor climate/desalination), the Government Buildings Agency/National Advisor of Heritage/NRF (research and advice on urban conservation policies), and Eusebius Church Arnhem (monitoring conservation).

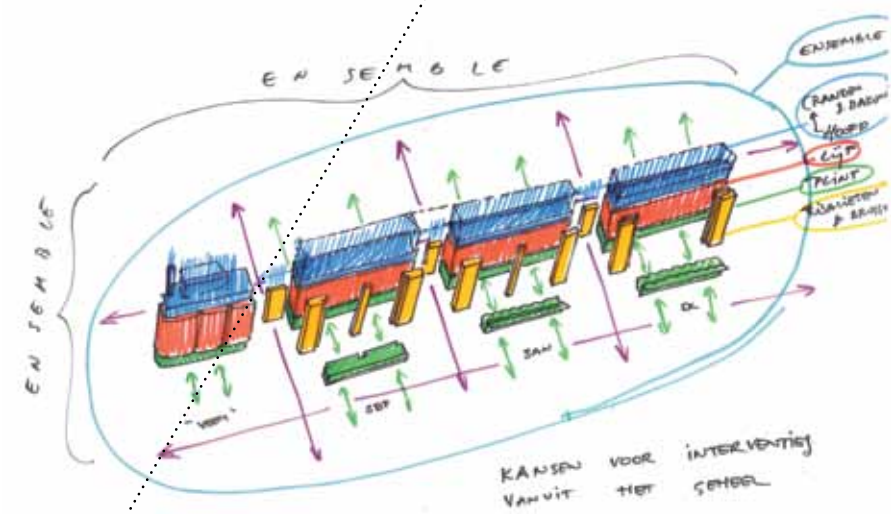
IHAAU is involved in a collaborative effort with VU University Amsterdam, RUU and other partners on the Randstad project; with 010 Publishers, EFL foundation and foundation Architecturalia on a series of monographs of Dutch urbanists; and with 010 Publishers on a publication project Dutch Urbanism in its international context.

5.5 Dissemination strategies

Combined ®MIT/Unesco research has resulted in a Conservation Management Plan for Olinda, and Intervention Strategies for WH cities Paramaribo, Willemstad and Djenné. Furthermore, one of the chairs of ®MIT is involved in developing the Strategic Research Agenda for Focus on Cultural Heritage (FP7). Both ®MIT and IHAAU are implementing research in the educational programme within the faculty, across the Netherlands and abroad.



Strijp S: Transformation of the Philips industrial heritage in Eindhoven.



5.6 Evidence of impacts

The impact of the contributions is demonstrated by the use of the systems developed by ®MIT's staff members. The desalination project of the Waag Building in Amsterdam, for example, was based on advice, research and product development of ®MIT. The WTA Conference of 2005 led to research and advice on the use of restoration mortars in the fortification systems of Den Bosch. IHAAU has contributed to a reinterpretation of the history of modernism.

5.7 Commissioned research by societal actors

®MIT's portfolio of socially relevant projects extends to all scale levels and disciplines of its researchers. Research has been commissioned by: the Ministry of Education, Culture and Science; Strijp S Beheer; private development companies; Stichting Pieterskerk Leiden; Stad Antwerpen/ Rubenshouse; Government Building Agency. Both ®MIT and IHAAU successfully acquired research projects for publications and exhibitions (atlas productions, healthcare architecture, Rietveld's Universe, Restoration of Zonnestraal, monographies).

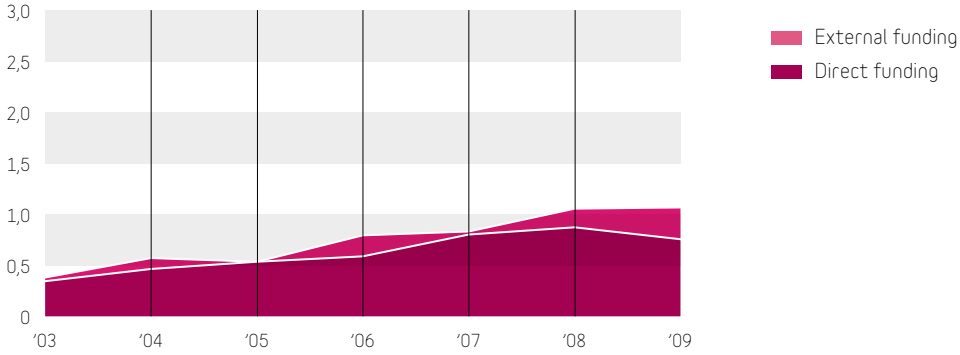
6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	345	91%	465	81%	536	101%	589	74%	803	96%	874	83%	757	71%
External funding	36	9%	107	19%	-5	-1%	206	26%	30	4%	183	17%	312	29%
TOTAL FUNDING	**381**	**100%**	**572**	**100%**	**531**	**100%**	**795**	**100%**	**833**	**100%**	**1,057**	**100%**	**1,069**	**100%**

EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	259	83%	351	82%	393	77%	550	81%	829	95%	1,154	86%	921	85%
Other costs	54	17%	77	18%	118	23%	125	19%	48	5%	185	14%	157	15%
TOTAL EXPENDITURE	**313**	**100%**	**428**	**100%**	**511**	**100%**	**675**	**100%**	**877**	**100%**	**1,339**	**100%**	**1,078**	**100%**

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	1	1	7	0	0	0	5	2	5	1	0	1	6	4
Non-refereed articles	9	0	2	1	1	2	2	7	2	0	6	0	4	7
Books	5	1	6	5	11	5	13	8	17	3	7	9	11	5
Book chapters	20	7	41	8	40	21	27	22	68	20	22	19	30	26
PhD-theses	0	0	1	2	0	0	2	3	0	2	0	2	1	1
Conference papers	13	1	24	2	28	2	27	6	22	6	33	9	10	5
Professional publications	13	4	22	18	31	18	22	12	20	12	35	8	20	11
Editorships journals/book	4	2	7	2	6	4	4	4	11	1	13	2	9	6
TOTAL PUBLICATIONS	**65**	**16**	**110**	**38**	**117**	**52**	**102**	**64**	**145**	**45**	**116**	**50**	**91**	**65**

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	1	1	1	100%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2001	1	0	1	0	0%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2002	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2003	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2004	2	1	3	1	33%	2	67%	2	67%	2	67%	2	67%	1	33%	0	0%
2005	2	0	2	0	0%	0	0%	0	0%	0	0%	0	0%	2	100%	0	0%
TOTAL	**5**	**2**	**7**	**2**	**29%**	**4**	**57%**	**4**	**57%**	**4**	**57%**	**4**	**57%**	**3**	**43%**	**0**	**0%**

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2004	Internationales Symposium 'Animation des Industrieerbes'.	Bollerey	Ostrava	SK
2006	Historic Urban Landscapes /World Heritage Centre, Unesco	Meurs	Jerusalem	IL
2007	5th Int Sem Urban Conservation, Changing Role and Relevance Urban Conservation Charters	Meurs	Recife	BR
2007	Symposium 'The challenge of Genadendal'	Roos	Genadendal	ZA
2008	Cryspom – Crystallization in Porous Media (Ecole Nationale des Ponts et Chausees Paris)	Hees	Paris	FR
2009	City limits: urban identity, specialization and autonomy in the 17th Century Dutch Art	Korthals Altes	Dublin	IE

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2006	The Architectur of Hospitals, UMC	Organisation	Wagenaar	Groningen	NL
2006	World Heritage Site Olinda in Brazil	Organisation	Meurs	Delft	NL
2007	COST C16 'Improving the quality of urban building envelopes' Final Conf	Co-organisation	Koopman	Delft	NL
2008	Rietveld's Universe, international conference at the Nai	Organisation	Thoor	Rotterdam	NL
2008	10th International Docomomo Conference 'The Challenge of Change'	Organisation	Emstede, Quist	Rotterdam	NL

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2004	Int Conf on Surface Technology Water Repellent Agents, Hydrophobe IV	Mbr. Scientific Cmte	Hees	Gent	BE
2007	Int Symp on Conservation of Monuments in the Mediterranean Basin	Mbr. Scientific Cmte	Hees	Orléans	FR
2007	International jury for a children's hospital in Kiev	Jury member	Wagenaar	Kiev	UA

Table d. Involvement in exhibitions

YEAR	EVENT	ROLE	WHO	WHERE	
2004	Central and Eastern European Architecture, Nai	Co-organisation	Wagenaar	Rotterdam	NL
2006	Moscow - The Architecture and Urban Planning of Melnikov 1921-1937	Organisation	Macel	Vienna	AT
2006/9	Rietveld's Universe, Centraal Museum Utrecht (2010)	Co-organisation	Thoor	Utrecht	NL
2009	Brazil contemporary; Architecture • Visals Culture • Art, NAi	Curator	Meurs	Rotterdam	NL
2009	All or nothing - Robert van 't Hoff, architect of a new society (2010)	Research team	Bergeijk	Kröller-Müller	NL

Table e. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2007	Dutch Architecture award: Vestedatoren Eindhoven	BNA	Coenen	Amsterdam	NL
2008	International Architectural Award: OBA Amsterdam	Chicago Athenaeum	Coenen	Chicago	US
2009	Quatrannual Dutch award for art criticism (Prijs voor de kunstkritiek)	BKVB	Dijk	Amsterdam	NL

Table f. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2003/2	Barcelona, Berlin, Braunschweig, Budapest, Istanbul, London, Stockholm and Zurich	Visiting professor	Bollerey	Europe	EU
2003/4	Ministry of Housing Spatial Planning and the Environment (Min VROM)	Chief Government Architect	Coenen	The Hague	NL
2009	American Institute of Architects (AIA)	Honorary fellowship	Coenen	New York	US

Table g. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2003/>	Architecturalia: foundation on the history of architecture and urbanism	Secretary	Wagenaar	Groningen	NL
2009	Maastricht University, Postgraduate Architecture Program	Professor, chair	Coenen	Maastricht	NL

Table h. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2003	EU 6th Framework Programme (FP6) - Cultural heritage	Evaluator	Hees	Brussels	EU
2009	Slovenian Research Agency (ARRS)	Evaluator	Zijlstra	Ljubljana	SL

Table i. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/9	Journal of Design History	Mbr Advisory board	Macel	Oxford	UK
2009	Quaderni dell Dipartmento di Progettazione dell'Architettura	Mbr Scientific board	Macel	Milano	IT
2009/>	Positions - Journal on Modern Architecture and Urbanism	Editor	Wagenaar	Rotterdam	NL

Table j. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2008/>	Bulletin KNOB - Dutch Journal for Cultural Heritage	Editor-in-Chief	Thoor	Amersfoort	NL
2008/>	Bulletin KNOB - Dutch Journal for Cultural Heritage	Editor	Kuipers	Amersfoort	NL

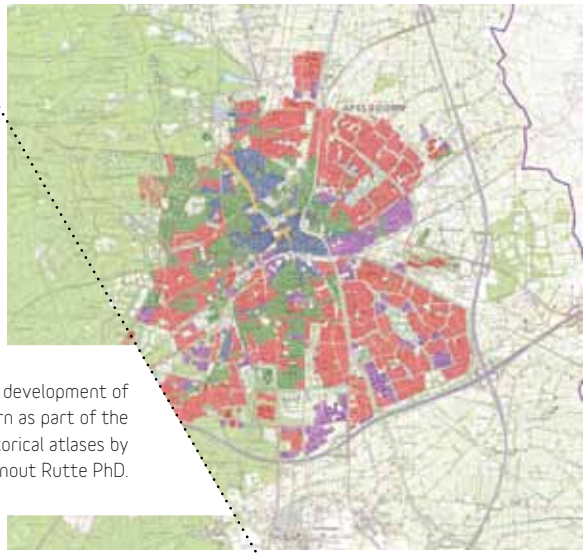
Table k. Role in practice and policy making

YEAR	FIRM/ORGANISATION	ROLE	WHO	WHERE	
2003/9	Bauhaus Universität Dessau, scientific advisory board	Member	Bollerey	Dessau	DE
2003/9	TNO, Building Conservation Technology Team	Coordinator	Hees	Delft	NL
2004	City of Brno, Selection committee Restoration of Villa Tugendhat	Member	Macel	Brno	CZ
2006	Dutch Council for Culture, cmte architecture, urbanism, landscape architecture, monuments and archeology	Member	Meurs	The Hague	NL
2006/>	The Netherlands Foundation for Visual Art Design and Architecture, cmte architecture	Member	Wagenaar	Amsterdam	NL
2007	Unesco: Conservation Management Plan Paramaribo	Project leader	Meurs	Paramaribo	SR
2008	Strategic Research Agenda ECTP, Field Cultural Heritage Materials	Coordinator	Hees	Brussels	EU
2008/9	Council of Europe, Experts Group 'Heritage – Identities – Belonging'	Member	Kuipers	Brussels	EU
2008/9	DOCOMOMO, International Specialist Committee on Registers	Vice-chair	Kuipers	Antwerp	BE
2009	Future development National Park de Hoge Veluwe	Advisor	Kuipers	Otterlo	NL

9 Next generation

9.1 Objectives and institutional embedding

The objectives of the Design and History research programme are quite clear: continuation, expansion and the exploration of new terrains, and strengthening of the imbedding of research and research tracks in the educational curriculum of the faculty. Whether or not these objectives can be realised within the framework of this programme depends largely on current reorganisation processes that may imply a virtual merger between the IHAAU and the DSD. If this merger materialises, it will result in a completely new institutional embedding of part of the work that is presented here as contributing to the Design and History portfolio.



Historical development of Apeldoorn as part of the work on historical atlases by Reinout Rutte PhD.

9.2 Structure of programmes

The programme's structure will be streamlined - e.g. in the Graduate School - the internal cooperation strengthened, and links with colleagues abroad intensified by the organisation at regular intervals of themed seminars and PhD reviews.

9.3 Supervision

The chairs formally constituting the top layer of the IHAAU being vacant, the Associate Professors working here are expected to bridge the gap between the present situation, the appointment of new Professors and the institutional reorganisation. ®MIT continues to supervise its part of the programme in much the same way as it has been doing so far. Each PhD candidate has a supervisor (Professor), with two-monthly meetings, and a daily supervisor. PhD reviews are organised every 4-5 times a year. The future programme will be in line with the Graduate School.

9.4 Success rates

In terms of academic recognition, involvement in practical design projects, and links to public opinion, the success rates have been satisfactory and, on this basis, can be further improved. (Naturally, this is a prerequisite for finding external funding in a very difficult market.)

9.5 Educational resources

There are several parallel initiatives to improve education in Delft - e.g. in cooperation with Eindhoven University of Technology - and to find ways to overcome the shortage of personnel trained as historians working specifically on twentieth century topics (this implies the possibility to graduate as a historian rather than a designer).

10 Viability

10.1 Resource management

In terms of the financial basis, ®MIT and IHAAU manage their own budget. This is unlikely to change in the near future. If IHAAU intensifies its relations with DSD, this may lead to new resource management structures. In terms of personnel, we are facing a bottleneck but work on solving the problems caused by it has already started. The decrease in the lump sum budget that ®MIT has faced in the last two years – leading to a substantial reduction in young, talented researches with temporary contracts – has made the valorisation task more difficult.

10.2 Available infrastructure

The infrastructure - libraries, etc. - is functioning quite well, though there is a need to coordinate the acquisition policy of the libraries with the new courses explored in the Design and History portfolio.

10.3 Innovative capacity

Thanks to the staff's close contacts with the international scientific world and fuelled by the typical, in some ways rather extreme, Dutch situation, there is no doubt that new approaches will be formulated and put into practice, innovation being one of the Design and History programme's outspoken ambitions.

St Jan Cathedral, s'Hertogenbosch. View of flying buttresses during the current restoration campaign (2009). Stone replacement is visible in the light coloured elements.

11 SWOT-analysis

STRENGTHS

®MIT and IHAAU benefit from being part of a major technological university with expertise in research and education in adjacent fields.
Moreover, the long-standing Dutch tradition in planning and research - that fostered the emergence of freelance markets capable of delivering state of the art scientific and scholarly research - provides our work with a context that, from an international perspective, is quite unique. The work of ®MIT and IHAAU is credited for its high productivity and high standard. Delft University of Technology offers high-grade supporting facilities such as the faculty library, the maps room, and the full range of expertise to support mapping, drawing, photography, and multimedia.

WEAKNESSES

®MIT and IHAAU may benefit from closer cooperation in the domains they both cover, albeit from different angles: scientific research either directly or not directly related to concrete restoration and transformation processes.
IHAAU should improve its public relations; ®MIT may want to clarify its position relative to the historical disciplines.
IHAAU should stay out of the concrete transformation and reconstruction issues and focus on the general expertise needed to efficiently tackle the problems inherent in these matters.
®MIT, on the other hand, may benefit from avoiding all too generic theoretical and philosophical work.

OPPORTUNITIES

The reconsideration of modernism is a major undertaking slowly taking off. One of the triggers is the emergence of totally new geopolitical frameworks that, for the first time, trigger scientists to question the inherent relations between modernism and the European and later American domination of the 'western' world. The awareness that at least part of the scientific body of knowledge is tainted by propaganda also tends to reconfigure international cooperation in this field. Another trend is the awareness that in architectural history, until now, links between theory and materialisation, especially in the field of the twentieth century, have been neglected. Moreover, the scope of our work should include Central and Eastern Europe.

THREATS

Rather than facing serious competition, ®MIT and IHAAU see the field they cover threatened by the lack of adequate educational facilities where qualified personnel for this type of work are trained.
There is a growing discrepancy between the urgency and relevance of the work and the availability of adequate staff. This carries the risk that part of the work will be delegated to parties that cannot deliver the required level of expertise, which can only be harmful to the field. The decrease in the number of temporary contracts, regarding young personnel in particular, is not helpful for expanding research. So far, the staff of IHAAU have been relatively stable. ®MIT has faced substantial reduction in research personnel in 2009.

12 Strategy

The financial situation of ®MIT and IHAAU is determined largely by the budget allocated by the university, opportunities for funding being rather limited. Nevertheless, ®MIT has successfully managed to obtain a respectable part of external funding (see Table 6a. Earning capacity), and the IHAAU wishes to expand the range of projects financed and co-financed with 'European' money. Qualified personnel is increasingly hard to find, a consequence not of growing competition but of failing education. Once found, it is hard to keep qualified personnel as a result of cutbacks in the faculty's budget.

12.1 Strategic planning: investments and collaboration

IHAAU contributes to the formulation of a programme that leads to the training of officially acknowledged historians. ®MIT is strengthening cooperation with major stakeholders and research partners like RCE, the Government Buildings Agency and TNO.

12.2 Research topics planned for the near future and their perspectives

- comparative urbanism: identification of key concept in urbanism during the Cold War (mapping the context: socialism vs. welfare state)
- Americanisation of European architecture and urbanism
- the legacy of the 1970s: Germany and the Netherlands
- healthcare architecture: a design manual
- the legacy of the 20th Century: building production, conservation policy, materialisation
- the legacy of the 20th Century: theory of heritage and conservation after 1975

12.3 Flexibility and anticipation of expected changes

Both ®MIT and IHAAU anticipate future changes - less funding for a widening field, insufficient qualified personnel, the emergence of new topics in the international academic world - by actively seeking coalitions with stakeholders and universities in the Netherlands and abroad. By strengthening historical education in Delft, both seek to broaden the basis of the field they are working in.

Danish chair by Rietveld, published in the book 'Chairs' by Otokar Macel PhD. The chair was referred to as the 'Danisch chair' after Rietveld had presented it at an exhibition in Denmark in 1952.

Green Building Innovation

RESEARCH LEADER: Prof. Andy van den Dobbelsteen PhD
KEY RESEARCHERS: Prof. Thijs Asselbergs, Truus de Bruin-Hordijk PhD, Prof. Andy van den Dobbelsteen PhD, Prof. Mick Eekhout PhD, Tillmann Klein, Prof. Ulrich Knaack PhD, Kees van der Linden, Prof. Peter Luscuere, Prof. Patrick Teuffel PhD, Arjan van Timmeren PhD

1 Objectives and research area

1.1 Mission, vision and objectives

Mission: The mission of the Green Building Innovation research group (GBI) is to expand the realm of what is possible in architectural and urban terms, and to help guide the construction sector to a more sustainable future. GBI aims to be an excellent research group in the area of sustainable technology for the built environment, and to build a worldwide reputation for its science-based green innovation at various scale levels. For the building industry as well as for research funding institutes, the GBI group should be considered the foremost partner for research involving sustainability and innovation.

Vision: Society must undergo a transition towards an economy based on renewable or recyclable resources and a built environment that is largely self-sustaining. The greatest challenge lies in the alteration of existing areas: with 90% of the building stock of the near future already built, effective improvements can only be achieved by immediate action to improve entire regions, cities, districts, neighbourhoods, buildings and building elements. In addition, the quest for research unison is deeply rooted in what we consider to be research that is relevant to future developments.

Objectives: GBI aims to continuously enhance its basic competences in order to promote the long-term intrinsic value of our area of science. For the medium-range viability of its research focus, GBI focuses on socially urgent themes which often straddle the boundaries of building technology – themes such as sustainability. For its short-term financial feasibility, GBI responds to the day-to-day demands of society and commerce for research in the fruitful area of building technology, wherever scientific challenges are involved.

1.2 Societal concerns and issues

GBI focuses solely on those issues of societal and scientific concern that relate to the sector and thus affect the construction sector as a whole and building engineers, architects and urban planners in particular. Related societal issues – such as reducing dependence on finite resources like fossil fuels through energy-effective design and planning, as well as contributing to closed cycles of building products and materials through the development of 'cradle-to-cradle' products and processes, for example – are taken on as joint assignments. This work is carried out on the basis that the constraints for design and planning in the future will be totally different from those of today. GBI translates these issues into themes that are not just urgent for society but also need to be approached from a scientific perspective as they have not yet been thoroughly investigated.

1.3 Position

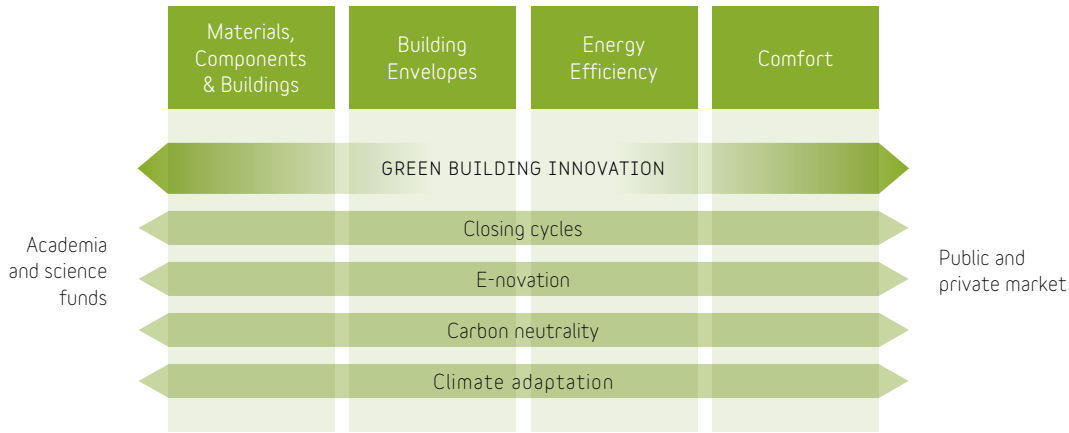
The GBI research group is based within the scientific areas of Climate Design (chairs of Building Physics, Building Services, and Climate Design & Sustainability) and Building Technological Design (chairs of Design of Construction, Product Development and Architectural Engineering). Within the Department of Building Technology, GBI cooperates well with the Computation & Performance Group. GBI cooperates with many other bodies both inside and outside TU Delft (see section 3).

1.4 Research area

The basic competences of the GBI research group are defined by Materials, Components & Buildings, Building Envelopes, Energy Efficiency, and Comfort. These specialist areas are under continuous development and enhancement. The following priority research themes which link the basic competences are: Closing Cycles, E-novation, Carbon Neutrality and Climate Adaptation. These themes are the subject of particular attention because of their societal urgency. They will remain on the agenda for at least the next five years and may be extended beyond that.

Figure 1. Structure of the GBI research programme

The columns represent the basic competences, areas of long-term research related to the chairs involved. Horizontally displayed are the urgent societal and scientific themes currently focused on in the programme. They are meant to last al least five years.



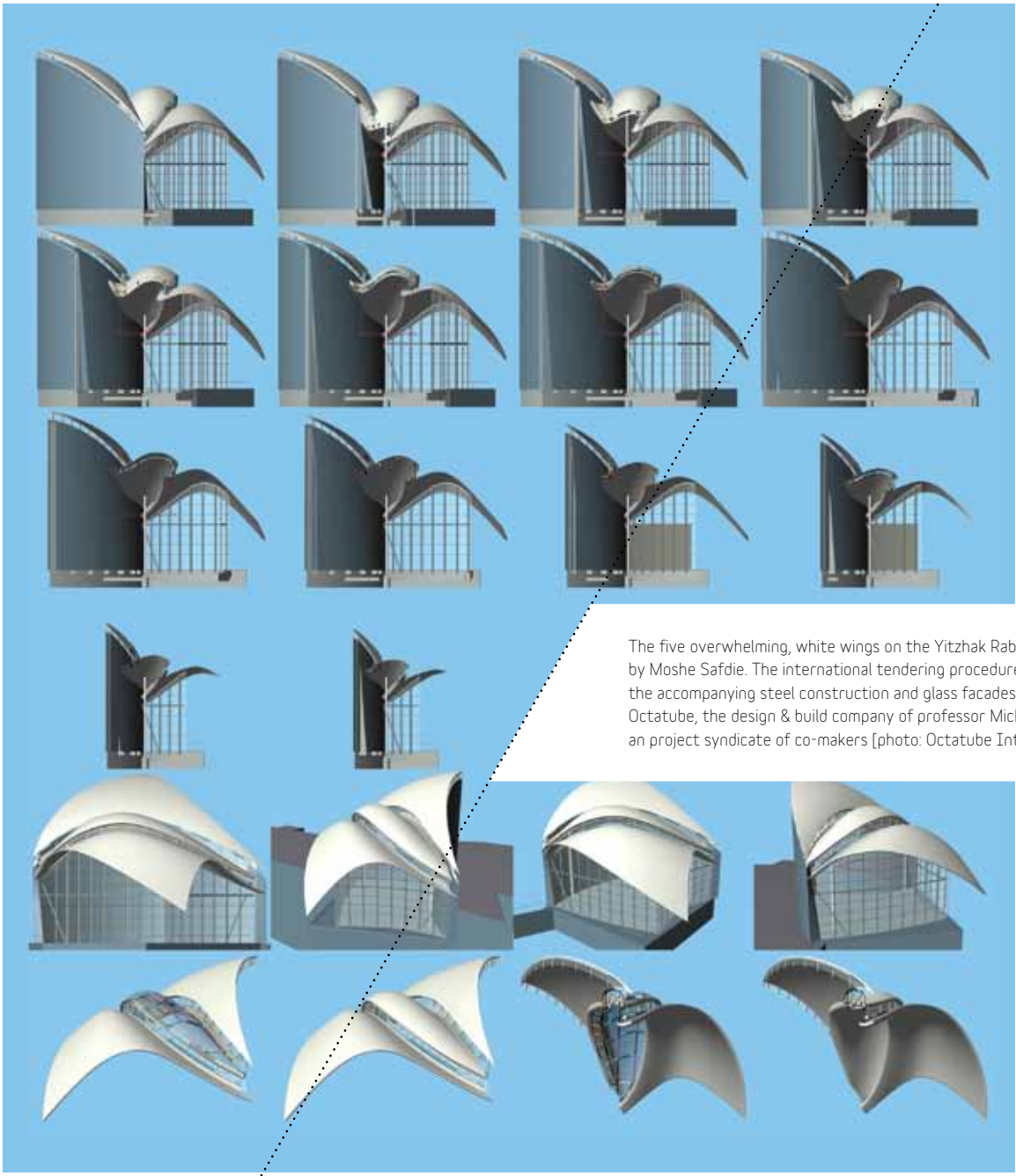
2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	26	6,1	24	5,1	20	4,2	19	4,0	19	4,4	19	4,8	16	3,4
Non-tenured staff	20	6,2	23	4,6	15	3,8	22	6,3	22	6,6	22	7,8	17	5,9
PhD-students	3	1,6	6	3,4	10	6,2	14	8,5	15	8,5	18	8,0	23	9,7
Guests	3		15		18		17		25		17		19	
TOTAL RESEARCH STAFF	**52**	**13,8**	**68**	**13,0**	**63**	**14,1**	**72**	**18,8**	**81**	**19,5**	**76**	**20,6**	**75**	**19,0**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE	
Prof. Mick Eekhout PhD	Director	Octatube International bv	Delft	NL
Arjen van Timmeren PhD	Founder, partner/director	Atelier 2T	Haarlem	NL
Prof. Thijs Asselbergs	Director	aTA Architectuurcentrale	Haarlem	NL
Prof. Patrick Teuffel PhD	Director	Teuffel Engineering Consultants	Stuttgart	NL
Prof. Ulrich Knaack PhD	Prof. For Design & construction	Hochschule OWL	Detmold	DE
Prof. Ulrich Knaack PhD	Co-founder, consultant	Imagine envelope b.v.	The Hague	NL
Prof. Peter Luscuere	Director	Royal Haskoning Building Services	Rotterdam	NL
Prof. Andy van den Dobbelsteen PhD	Advisory Board Chair	Dutch Green Building Council	Rotterdam	NL
Leo Gommans	Senior advisor sustainable building	BOOM Maastricht	Maastricht	NL



The five overwhelming, white wings on the Yitzhak Rabin Center in Tel Aviv by Moshe Safdie. The international tendering procedure for the roofs with the accompanying steel construction and glass facades was won in 2005 by Octatube, the design & build company of professor Mick Eekhout PhD, and an project syndicate of co-makers [photo: Octatube International].

3 Research environment and embedding

3.1 Embedding

The Green Building Innovation research group has a strong position in the academic world, including its own Faculty of Architecture, other faculties of TU Delft (especially the Faculties of Industrial Design Engineering, Civil Engineering & Geosciences and Applied Sciences), other universities and schools, research networks, as well as funding organisations such as Agentschap NL, FES programmes (e.g. Knowledge for Climate), STW/NWO and the EU.

3.2 Number and affiliation of guest researchers

As Table 2.1 shows, since the group started in around the year 2003, the number of guest research staff has remained fairly constant at around 15-20 people. Since 2006, the number of guest PhD candidates has increased steadily, and continues to do so. The GBI programme draws considerable interest from external parties and international PhD candidates in particular. The research group currently hosts PhD candidates from Germany, Greece, China, Indonesia, Iran and Turkey, to name only a few. These guests bring their own funding or scholarships.

3.3 National and international positioning

Within the Netherlands, the GBI group regularly works in partnership with the Universities of Eindhoven, Twente and Wageningen. International partnerships include the Detmold Hochschule, TU Darmstadt, Royal Art Institute Copenhagen, Catholic University of Leuven, Leeds Metropolitan University, Carnegie Mellon and Queensland University of Technology.
Moreover, GBI staff members participate in international networks with various actors from academia and commercial practice, such as EIA (Annex 39, 44, 45), CIB (W116), Wessex Institute of Technology (WIT), Passive and Low-Energy Architecture (PLEA) and the European Façade Network (EFN).

3.4 Actual collaborations with stakeholders

A few examples that demonstrate the breadth and depth of GBI's stakeholder partnerships:

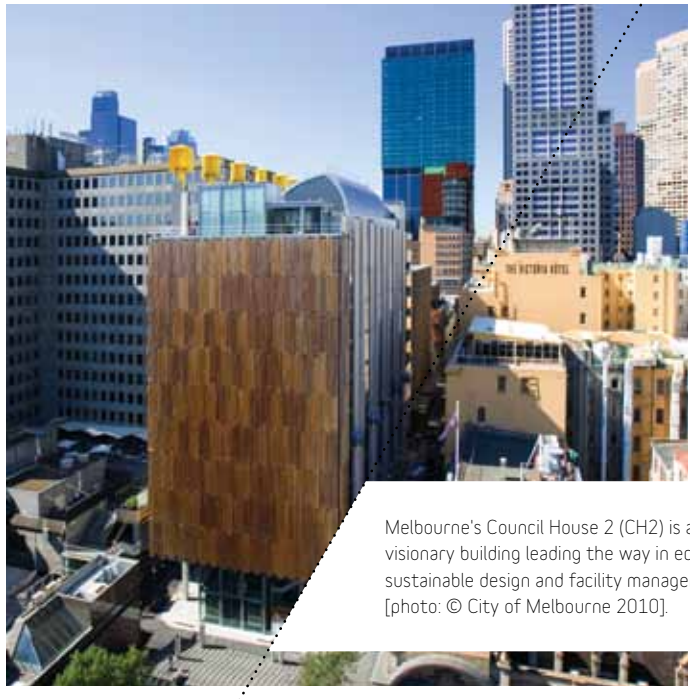
- CAScade Park Almere, funded by DuraVermeer (Houten), in a consortium with Deerns (Rijswijk), Claus en Kaan Architecten (Amsterdam).
- DIEMIGO: 'Public Electric Vehicle Charging Integration in the Built Environment; Case Schiphol The Grounds'; interdisciplinary TUD research project together with Schiphol Group within TRANSUMO (National Dutch research programme).
- Energy Potential Mapping for De Groene Compagnie: funded by the Province of Groningen, together with Wageningen University, the Municipality of Hoogezand-Sappemeer and the Province of Groningen.
- PGDEPW (Projectgroep Duurzame Energie in Projectontwikkeling van Woningbouw): Agentschap NL funded interdisciplinary long-term EOS research, in partnership with the universities of Eindhoven and Maastricht, Cauberg Huygen engineers, in cooperation with EIA Annex 44.
- REAP (Rotterdam Energy Approach & Planning): funded by the Rotterdam Climate Initiative, together with DSA and JA architects, Rotterdam Public Works and the City Planning & Traffic Department.

- SREX (Synergy of Regional Planning and Exergy): Agentschap NL funded interdisciplinary long-term EOS research, together with the Universities of Wageningen and Groningen, Hogeschool Zuyd Heerlen, and TNO Building and Underground.
- VMRG – Dutch Association of Metal Façade manufactures: several research projects, SenterNovem IPC research grants, collaboration in Conferences

3.5 Participation in consortia

GBI participates and plays an active role in the following ongoing or recently launched consortia:

- Closing Cycles in the Built Environment, a consortium of GBI with market parties Dura Vermeer, Search, Unica and energy company Delta.
- Concept House: funded by a consortium of market parties (Eneco, Faay, Rotterdam GW, Living Lab, Raab Karcher, Renson, R&R systems, Schöck, Unica, Uniline, VDM), with real-time case studies as the Concept House Village in the Rotterdam City Harbours, for Clean Tech Delta
- Climate Proof Cities, involving TU Delft (GBI, Urbanism, OTB and Applied Sciences), TU Eindhoven, Utrecht University, Wageningen University, Deltares consultants, TNO and KWR, and various municipalities (Haaglanden, Rotterdam, Amsterdam, Tilburg, Arnhem-Nijmegen-Tiel, Utrecht)
- E-novation IEE consortium: GBI and the Universities of Leuven, Leeds, Prague, Paris, Nicosia and Copenhagen, together with the Municipality of Delft and Biesterbos Plan Development
- IPC (Innovation Performance Contract) studies with the VMRG on the Add-on Façade (partially funded by ASW gevelbouw, Solarlux, and Hallington Doors) and on the Breathing Window (partially funded by Facadis, Merford, Heycop, Kremers Aluminium, De Groot en Visser, Licotec Daklicht, Van Hengstum bv, and Vorsselmans).



Melbourne's Council House 2 (CH2) is a visionary building leading the way in ecologically sustainable design and facility management [photo: © City of Melbourne 2010].

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

Green Building Innovation (GBI) traditionally covers technical aspects of the indoor environment, the outdoor environment and the dividing line between the two, as well as the essential flows that enable living, working and travelling: energy, water and materials. These latter aspects have led GBI to propose innovative concepts at various scale levels. Based firmly on existing knowledge and experience, GBI focuses on themes that are currently significant in terms of their societal and scientific value. Examples of such themes are climate and energy planning and design, e-novation (energy renovation of buildings), autonomous housing concepts, closing cycles (control of the essential flows), comfort and health, and green product development (materials, elements, building artefacts and services).

4.2 Significance of the contribution to the field

We firmly believe that innovation, particularly in the area of sustainability, is brought about by technology, not as a separate discipline but as an integrated part of design and planning. New technology is developed with the support of fundamental technical knowledge and new technical design and planning strategies are introduced and disseminated onto the market. This is demonstrated by externally funded research projects.

4.3 Coherence

The chairs and staff involved in the GBI programme form a strong, coherent group which covers the fields of building technology that are essential to the mission, vision and objectives presented. The chairs of Building Physics, Building Services and Climate Design & Sustainability form a tripod of fundamentals, technology and application of climate design. They have close links with the chairs of Design of Constructions and Product Development, which focus respectively on facades, buildings, products and components. Finally, Architectural Engineering encompasses the entire field of the integration of technology into sustainable architecture and urban planning, with a research emphasis on the development of new 'smart' or adaptive materials.

4.4 Quality of the scientific publications

The two Building Technology sections involved in the GBI programme have performed well over the last seven years, as demonstrated by their scientific output and the funding acquired, as well as by the extensive attention and cooperation the group has received from both the market and media.

Most significant results and highlights

The Professors of GBI, Mick Eekhout, Thijs Asselbergs, Patrick Teuffel, Ulrich Knaack, Peter Luscuere and Andy van den Dobbelsteen, as well as its associate professors, including Arjan van Timmeren and Kees van der Linden, are well-known in their respective scientific areas as

a result of their various honorary functions, a wide range and large number of peer-reviewed publications, and a number of awards from both academia and commercial practice. Eekhout, for instance, won the World Wide Quality Award XXI Century and the Pioneers Award for Space Structures in 2002. Timmeren and Roggema & Dobbelsteen won, respectively, the SB05 and SB08 best scientific paper awards.

Eekhout is an acclaimed member of the Netherlands Academy for Technology and Innovation and the first designer since 1856 to be admitted to the Royal Dutch Academy of Arts & Sciences (KNAW). Asselbergs was previously the city architect of Haarlem. Knaack organises an appraised series of façade conferences.
The GBI research group recently organised the acclaimed international conference Smart and Sustainable Built Environments (SASBE2009), chaired by Prof. Andy van den Dobbelsteen PhD and Arjan van Timmeren PhD. SASBE2009 hosted lectures by speakers including Sir David King, Ken Yeang, Michael Braungart and the Dutch Crown Prince Willem Alexander. Dobbelsteen has received much acclaim for his energy research in Rotterdam, which was broadcast on the national news. Linden has set a new ISSO standard for adaptive thermal comfort, an academic innovation based on Fanger's comfort research in the 1970s [Linden et al. 2006].
The group has a long research tradition within the framework of SenterNovem (now part of Agentschap NL) and fundamental research projects with applied qualities co-funded by the construction industry, provinces and municipalities. Examples of these are the EOS-LT LOWEX research project (on low-exergetic design) and DESAR EET project (on Decentralised Sanitation and Reuse).

4.5 Results and outputs

KEY PUBLICATIONS

- Dobbelsteen A. van den, Arets M. & Nunes R., 2007. *Sustainable design of supporting structures – Optimal structural spans and component combinations for effective improvement of environmental performance,* in: Construction Innovation, Vol. 7, No. 1 (54-71).
- Eekhout M. & Tomiyama T. (eds.), 2008. *Delft Science in Design 2.* IOS Press, Amsterdam.
- Linden A.C. van der, Boerstra A.C., Raue A.K., Kurvers S.R. & De Dear R.J., 2006. ' Adaptive temperature limits: A new guideline in The Netherlands – A new approach for the assessment of building performance with respect to thermal indoor climate '. *Energy and Buildings.* Vol 38. No.21. Elsevier, Amsterdam, p. 8-17.
- Timmeren A. van, Sidler D. & Kaptein M., 2008. ' Sustainable decentralized energy generation & sanitation '. *Journal of Green Building.* Vol 2. No.4. College Publishing, Glen Allen, p. 137-150.
- Wilde S. de & Dobbelsteen A. van den, 2004. ' Space use optimisation and sustainability - Environmental comparison of international cases '. *Journal of Environmental Management.* Vol. 73, No. 2. Elsevier, Amsterdam, p. 91-101.

KEY BOOKS OR CHAPTERS OF BOOKS

- Dobbelsteen A. van den, Dorst M. van & Timmeren A. van (eds.), 2009. *Smart Building in a Changing Climate*. Techne Press, Amsterdam.
- Eekhout M., 2009. *Tubular Structures in Architecture*. Cidect, Geneva.
- Gommans L.J.J.H.M. & Dobbelsteen A.A.J.F. van den, 2007. Synergy between Exergy and Regional. Planning. In: Brebbia, C.A., Popov, V. (eds.) 2007. *Energy and Sustainability*, p. 103-112. WIT press, Southampton.
- Knaack U. , Klein T. , Bilow M. & Auer T., 2007. Facades. Birkhauser, Basel.
- Roggema R., 2009. Adaptation to Climate Change: A Spatial Challenge. Springer, Dordrecht/Heidelberg/London/New York.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

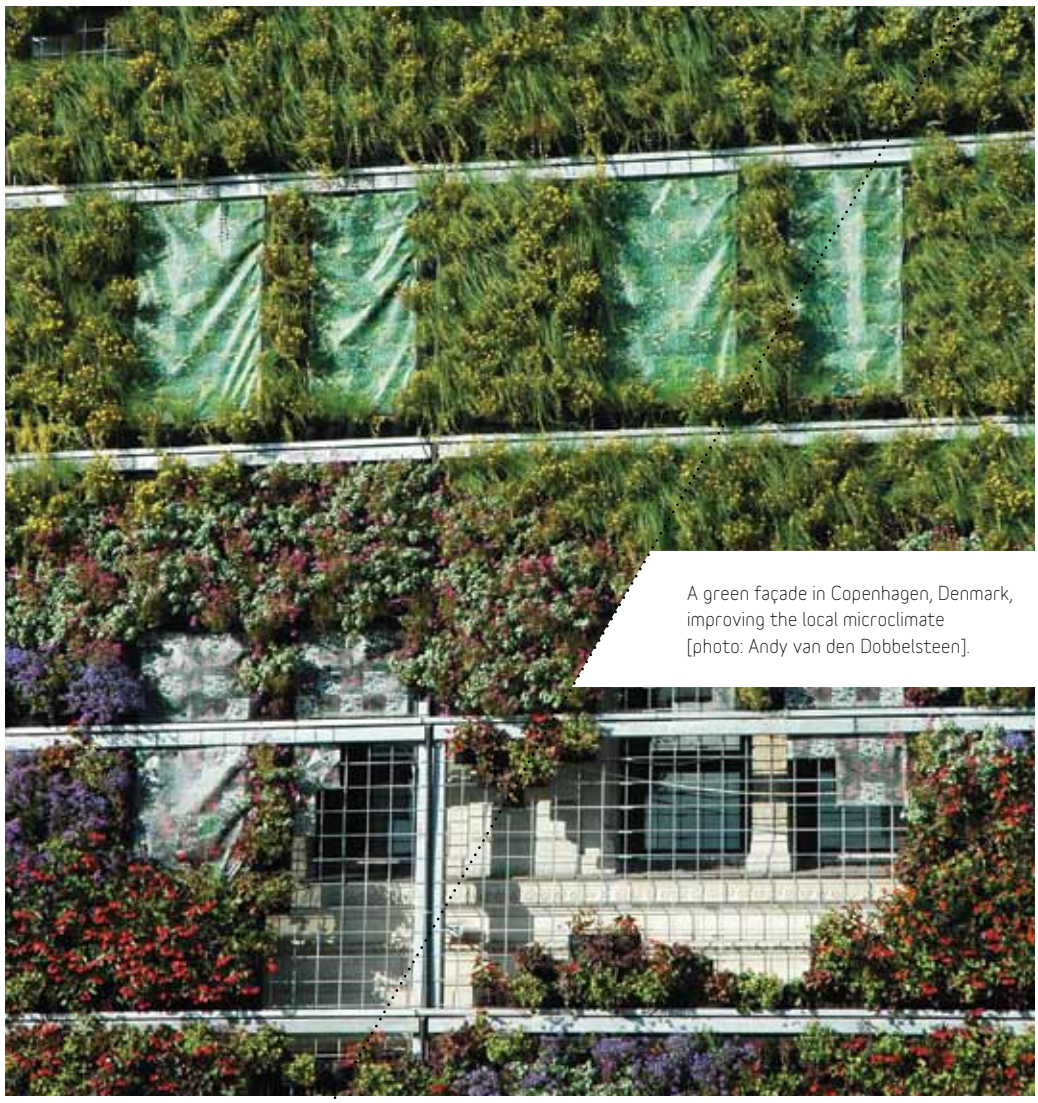
- Dobbelsteen A. van den, Jansen S. & Timmeren A. van, 2007. *Naar een energiegestuurd Omgevingsplan voor Groningen*. TU Delft, Delft. Results of the study are included in the provincial environmental plan (POP) of the Province of Groningen. Presented to the Prince of Orange.
- Eekhout M., 2008. *Methodology for Product Development in Architecture*. IOS Press, Amsterdam.
- Façade Group/Knaack et al., various years. *The Future Envelope book series*. Distributed internationally by IOS Press Amsterdam – widely acclaimed book series/
- Façade Group/Knaack et al., various years. *Imagine book series*. Distributed internationally by 010 Publishers Rotterdam – widely acclaimed book series aiming at architects.
- Tillie N., Dobbelsteen A. van den, Doepel D., Jager W. de, Joubert M. & Mayenburg D., 2009. REAP – Rotterdam Energy Approach & Planning; Rotterdam Climate Initiative – TV news broadcast and radio coverage resulting in significant spin-off.

KEY DISSERTATIONS

- Dobbelsteen A. van den, 2004. The Sustainable Office – *An exploration of the potential for factor 20 environmental improvement of office accommodation*. Copie Sjop, Delft.
- Ebbert, T., 2009. *ReFace*. TU Delft Architecture, Delft.
- Poelman, W., 2005. *Technology Diffusion in Product Design*. TU Delft Architecture, Delft.
- Tenpierik, M.J. (2009); *Vacuum Insulation Panels Applied in Building Constructions*. Wöhrmann Print Services, Zutphen.
- Timmeren A. van, 2006. *Autonomie & Heteronomie – Integratie en verduurzaming van essentiële stromen in de gebouwde omgeving*. Eburon, Delft.

KEY EVENTS

- 1st and 2nd Congress of Design Platform: *Delft Science in Design.* 2005, 2007. TU Delft, Delft.
- Kennisdag Nederlands-Vlaamse Bouwfysicavereniging (NVBV), 2005 and 2009; TU Delft, Delft.
- *HRH The Prince of Orange's visit to Groningen,* 1st April 2008. Personal presentation to the prince by Andy van den Dobbelsteen, on Energy potential mapping studies. Eemshaven.
- SASBE2009, *3rd CIB international conference on Smart and Sustainable Built Environments,* 15-19 June 2009. TU Delft, Delft.
- *Annual Future Envelope conference series,* 2007-2010. Faculty of Architecture, TU Delft, Delft.



A green façade in Copenhagen, Denmark, improving the local microclimate [photo: Andy van den Dobbelsteen].

Poster of yet another book launch from the Facades Research Group, held in the DSD.

Front cover picture of the second book in the imagine book-series: Deflate-ables.

5 Societal Relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The research of the Green Building Innovation research group is closely linked to societal issues in the field of sustainable development and technological innovation. Many of its research projects, both completed and ongoing, were initiated with parties from the public and commercial market and have served both scientific development in new areas and dissemination in the built environment or building industry. The latter would not be possible without a solid foundation of financial, material and human resources.
The Department of Building Technology in general and the Green Building Innovation programme in particular (or its predecessors) have always had a strong bond with the market.

5.2 Key results/highlights

The impact of GBI's research is generally highly visible: the results have been adopted by stakeholders outside the university, such as in the planning, design and manufacturing sectors. These can be seen in the general studies and publications by GBI's architectural staff, based on a strong relationship between private practice and academia. Energy potential studies have been integrated into official plans such as the Provincial Environmental Plan (POP) of Groningen, Rotterdam Energy Approach and Planning (REAP) and the application of the bent scale elements developed and tested by our group in high-quality architectural projects. Further examples are the design and use of renovation facades on German offices and NEXT, an innovative solution for a service-integrated façade. A number of prototypes have been manufactured (e.g. in the Building Technology Laboratory) and used in presentations to academic and industrial audiences.
The many conferences and seminars organised by GBI staff for academia and commercial practice also demonstrate the relevance of the GBI's work to architecture and the built environment – these include The Future Envelope conference series, *Challenging Glass and SASBE2009,* which received a commendation from the CIB.

5.4 Evidence of the appreciation of stakeholders

The best evidence of the value placed on these contributions by stakeholders is probably the continuing demand for contributions in the form of research and consultancy, as well as repeated requests for the presentation of earlier findings and proposals. Provinces, municipalities and the building industry continue to approach GBI's research staff concerning innovative projects that are seen as cutting edge in both the market and the academic world.

A stakeholder analysis based on a questionnaire sent to around 30 stakeholders – with 11 responses received – also revealed the value that academic, institutional and commercial organisations place on GBI's projects. A wide range of questions were answered with an average score of 4 on a scale from 1 to 5. Where standard deviations were relatively large, we intend to improve the lower scores in order to raise the average to improve our research even further.

5.5 Dissemination strategies

The output record of GBI staff members includes scientific publications in journals and books, as well as expert publications for the market and prototypes for academia and industry. Our strategy is to disseminate research findings and ideas for the improvement of the built environment or the building industry through a balanced cross-section of media: not just scientific journals but also specialist magazines, websites and newspapers – including for example a regular GBI column in the daily building newspaper *Cobouw*. The books by the Façade Research Group are also internationally renowned.

5.6 Evidence of impacts

Again, repeated demands for more contributions, new books and interviews is good evidence of this impact, which cannot be gauged from scientific output alone. Many interviews have been given by key GBI staff members, who have been asked for their expertise and research projects, published in expert magazines, newspapers and even glossy magazines and also in several expert appearances on television and radio broadcasts.

Other evidence can be found in the honorary functions of GBI key staff on boards and committees, most notably the position of Eekhout in the Royal Dutch Academy of Arts and Sciences (KNAW) and his special professorship in Nottingham, Luscuere's guest professorship in Tianjin, China, and Knaack's professorship at Detmold Hochschule, Germany.

5.7 Commissioned research by societal actors

As stated, the activities of GBI are grounded in both the private-sector (building industry, developers, contractors, architects, urban planners, consulting companies) and the public-sector markets (state authorities, provinces, municipalities) and a great deal of research is funded by institutions such as NL Agency, KvR programme, STW and the EU.

The Prince of Orange (right) and Rector Prof. Jacob Fokkema PhD (left) listen to the keynote speech by Ken Yeang PhD (middle) at the opening ceremony of the 3rd CIB international conference on Smart and Sustainable Built Environments (SASBE2009), organised by the GBI research group [photo: Michiel Fremouw].

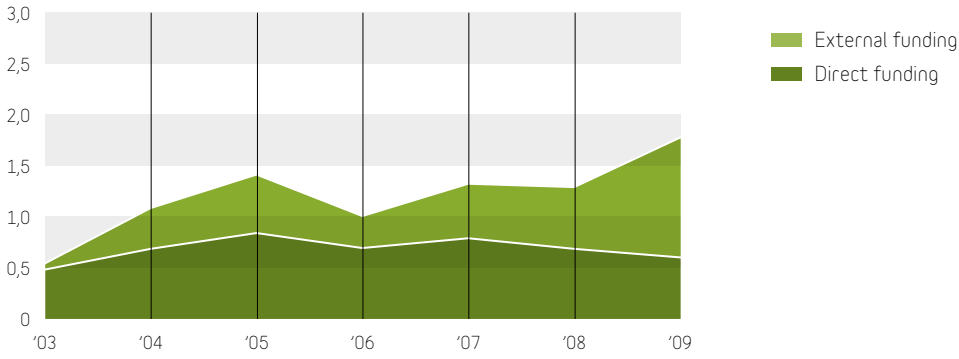
6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	484	89%	688	63%	843	59%	696	69%	792	60%	688	53%	604	34%
External funding	60	11%	400	37%	574	41%	314	31%	535	40%	606	47%	1,176	66%
TOTAL FUNDING	**544**	100%	**1,088**	100%	**1,417**	100%	**1,010**	100%	**1,327**	100%	**1,294**	100%	**1,780**	100%

EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	561	94%	736	91%	788	84%	750	92%	1,064	91%	1,027	93%	759	85%
Other costs	35	6%	70	9%	145	16%	66	8%	99	9%	77	7%	129	15%
TOTAL EXPENDITURE	**596**	100%	**806**	100%	**933**	100%	**816**	100%	**1,163**	100%	**1,104**	100%	**888**	100%

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	7	0	5	0	3	0	5	0	4	0	7	0	2	0
Non-refereed articles	0	0	1	0	0	0	0	0	1	0	0	0	3	0
Books	2	0	4	0	4	0	10	2	16	0	6	0	9	0
Book chapters	7	2	19	0	13	0	14	1	39	2	17	0	12	0
PhD-theses	0	0	2	1	0	1	2	1	1	0	2	0	0	0
Conference papers	54	3	56	2	69	6	53	11	95	5	54	1	41	3
Professional publications	41	0	41	0	41	2	59	1	44	4	28	7	31	5
Editorships journals/book	0	0	5	1	5	0	2	1	5	0	9	0	11	1
TOTAL PUBLICATIONS	**111**	**5**	**133**	**4**	**135**	**9**	**145**	**17**	**205**	**11**	**123**	**8**	**109**	**9**

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	1	0	1	1	100%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2001	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2002	2	1	3	1	33%	1	33%	1	33%	1	33%	1	33%	1	33%	1	33%
2003	1	0	1	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%
2004	3	1	4	1	25%	1	25%	2	50%	2	50%	2	50%	1	25%	1	25%
2005	4	1	5	0	0%	0	0%	0	0%	0	0%	0	0%	3	60%	2	40%
TOTAL	**11**	**3**	**14**	**3**	**21%**	**3**	**21%**	**4**	**29%**	**4**	**29%**	**4**	**29%**	**5**	**36%**	**5**	**36%**

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2007	Transparancy in Glass Architecture	Knaack	New York	US
2007	Energy 2007	Timmeren	Southampton	UK
2008	NUA2008, German conference on climate change	Dobbelsteen	Gelsenkirchen	DE
2008	IASS-IACM 2008 (Computation of Shell and Spatial Structures)	Teuffel	Ithaca, NY	US
2009	International Conference on Advances in Steel Structures	Eekhout	Singapore	SG

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2005/7	Delft Science in Design 1,2	Organiser, chair	Eekhout	Delft	NL
2007	The Future of the Landscape KNAW	Co-organiser	Eekhout	Amsterdam	NL
2007/9	The Future Envelope 1, 2, 3	Organiser, chair	Klein/Knaack	Delft	NL
2007/9	Dutch-Flemish Building Physics Day	Organiser, chair	Jansen	Eindhoven	NL
2009	Cradle to Cradle in the Polder	Organiser, chair	Luscuere	Delft	NL
2009	SASBE2009	Organiser, chair	Dobbelsteen	Delft	NL
2009	IGLC 17	Scientific chair	Cuperus	Taipei	TW
2009	Urban Emergencies	Co-chair	Timmeren	Delft	NL
2009	Glass Performing Days	Organiser, chair	Knaack	Tampere	US

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2005	Grounds for Change	Design team leader	Roggema	Groningen	NL
2008	ENCI-Quarry Design session	Advisor sustainability	Gommans	Maastricht	NL
2009	Decentralized Water Infrastructures	Expert panel	Timmeren	Berlin	DE
2009	Integration un Koordination	Expert Panel	Teuffel	Hamburg	DE
2009	INCREASE II	Design team leaders	Roggema/ Dobbelsteen	China	CN

Table d. Spotlight

YEAR	OCCASION	WHAT	WHO	WHERE	
2006	Order of the Dutch Lion	Knighthood	Kristinsson	Deventer	NL
2008	Prince of Orange visit to Groningen	Personal address	Dobbelsteen	Eemshaven	NL
2009	Center for Architecture	Presentation recent projects	Teuffel	New York	US
2009	Urban Emergencies	Organiser	Timmeren	Delft	NL
2009	TV news (Het Journaal) and radio news broadcast: REAP	Interview	Dobbelsteen	Rotterdam	NL

Table e. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2003	World Wide Quality Award	XXI Century	Eekhout	Geneva	CH
2003	Euregio-Umweltpreis 2003	Aachener Stiftung	Gommans	Aachen	DE
2004	Prigogine Awards - Best Young Researcher	University of Siena	Timmeren	Siena	IT
2005	Best paper award	SB05 conference	Timmeren, Röling	Tokyo	JP
2008	Best scientific paper award	SB08 conference	Roggema, Dobbelsteen	Melbourne	AU
2008	German Steel Structures Award: ESTA office building	DSTV	Teuffel	Senden	DE
2009	CIB PC Commendation	SASBE2009	Dobbelsteen	Manchester	UK

Table f. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2003/>	Society for Renewable Insulation Materials	Honorary member	Tenpierik	Blaricum	NL
2003/>	University of Nottingham	Special Professor	Eekhout	Nottingham	UK
2007/8	3TU Speerpunt Bouw	Formateur	Eekhout	Delft	NL
2007/>	Tianjin University	Guest professor	Luscuere	Tianjin	CN
2008/>	Dutch-Flemish Building Physics Society	Honorary Chair	Linden	Arnhem	NL

Table g. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2003/>	Royal Dutch Acadey of Arts & Science (KNAW)	Full member	Eekhout	Amsterdam	NL
2003/>	Academy for Technology and Innovation	Full member	Eekhout	Amsterdam	NL
2006/>	CIB Working Commission 116	Joint coordinator	Dobbelsteen	World	UN
2009/>	Post-Academic Education (PAO)	Advisory Board	Knaack	Delft	NL
2009/>	European Façade Network	Co-founder	Knaack	Europe	EU

Table h. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2005	HBO Bouwkunde - Assessment	Evaluator	Eekhout	Amsterdam	NL
2007/>	MA Urbanism + Architecture	External examiner	Dobbelsteen	Manchester	UK
2009/>	Centre for Socio-Technical Systems Design - Scientific Advisory Board	Member	Teuffel	Leeds	UK

Table i. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2005/8	Nieuwsbrief Duurzaam Bouwen	Editor-in-chief	Dobbelsteen	Amsterdam	NL
2006	Bouwfysica	Guest editor	De Bruin-Hordijk	Arnhem	NL
2006/8	The Architectural Annual	Co-editor	Knaack	Delft	HR

9 Next generation

9.1 Objectives and institutional embedding

Within GBI there is a strong link between the PhD research and the MSc theses, which is highly unusual among architecture faculties. The International Façade Master's programme organised by the GBI group is a clear example of this. GBI encourages MSc students to choose a research subject that fits the research themes of the GBI programme. To do this, bi-annual presentations are held on the latest research projects and topics related to the GBI programme, so that they can be taken up by students.

9.2 Structure of programmes

As discussed in section 1, GBI addresses themes that include the basic competences of the scientific areas involved, as well as urgent societal and scientific themes. PhD candidates working within GBI usually fall under one of these themes, but they may also overlap with more than one theme. As described under 9.3, general meetings are held both for the GBI programme as a whole and on a thematic basis, under the coordination of a responsible GBI staff member. Continuous background research and involvement in academic and market groups is taking place to enhance our competences.

9.3 Supervision

Depending on the complexity or multi-disciplinarity of the project, PhD students are supervised by one or more professors. PhD candidates also have a daily supervisor (usually an associate professor or senior researcher who has already attained a PhD). Candidates need to show their progress and research plan after approximately nine months, and a 'go/no go' decision will be made concerning continuation after one year. After this 'go/no go' decision, PhD candidates continue to present to their supervisors and group members at various occasions in the later years of their research. They critically review the contents and progress, but also help the candidate to further their progress. In addition, GBI's PhD candidates fall under the Graduation School, providing a broader platform for exchange.

PhD candidates are encouraged to contribute to and participate in national and international conferences, symposia and workshops, to present and obtain feedback on their results so far, to build up an international network and learn from other research projects.

Every PhD candidate draws up a personal education plan with their supervisor and discusses their progress (or otherwise) in annual result and development meetings, for which annual reports are written and an evaluation form is filled in by the candidate and their supervisor.

9.4 Success rates

Beginning with a faculty with a limited tradition of fundamental research and few PhD projects, the GBI group has over the past seven years developed increasing numbers of PhD projects of good to very good quality. Because of the Netherlands' four-year PhD model, GBI has only recently begun to produce significant numbers of finished doctorates, receiving honours appreciation above the TU Delft average of 10%. It should be emphasised that a high number of PhD candidates will finish their doctoral research during or shortly after this research review. In spite of the difficult financial situation in which the university and faculty find themselves, the acquisition of new GBI

PhD candidates who are fully externally funded has continued, which has kept PhD numbers in balance, while continuing to ensure improvements in PhD supervision, guidance and output performance.

9.5 Educational resources

TU Delft offers an excellent infrastructure for courses to improve research skills, such as the 'PROM' series, of which PROM-1 (or -5), -2, -3 and -4 – on starting a PhD, (design) research methods, presentation skills, writing a dissertation and scientific writing in English – are obligatory for PhD candidates in GBI. Depending on the qualities or shortcomings of the individual PhD candidate, other courses can be offered.

The next generation of architectural engineers? A Delft primary school class visiting BK City's Glasshouse East [photo: Andy van den Dobbelsteen].

10 Viability

10.1 Resource management

At the university level, the Valorisation Centre supports the acquisition of research subsidies. The Research Council is the main body that organises research at the Faculty of Architecture and from that level the staff are supported by '100% Research'. Since 2008, key staff from the research programmes of Green Building Innovation and Computation & Performance have worked together on the Valorisation Task (VTF), which compiles information on recent studies updated, identifies viable areas of funding and collaboration possibilities and enables the coordination and enhancement of C&P and GBI activities.

10.2 Available infrastructure

With the wireless internet and printing facilities, personal laptops and mobile phones for staff, a large range of working places, support services and not least, a pleasant and vibrant community building, the Faculty of Architecture provides fertile ground for excellent research. Ironically things have improved since the 2008 fire. A large model shop, the protoSPACE 3.0 lab and a shared Building Technology Lab is available for use by GBI staff. The 'Straat van Bouwkunde' offers a bookshop, reproduction facilities and an espresso bar, which all add to the ambience of creativity. The Department of Building Technology is centrally housed in a wing of the same building, which enables easy communication between staff. Although the flexible office concept sometimes presents problems to some of the researchers, most find it an inspiring working environment which stimulates positive communication. Moreover, continuous improvements in accommodation are undertaken by the faculty's facility management.

10.3 Innovative capacity

GBI's innovative capacity is probably best demonstrated by the research projects conducted over the past seven years, as well as the innovative products that they have produced. Our young staff are encouraged to work and think independently, while contributing to a better built environment, including innovation. The faculty's 1000 MSc students constitute a creative and innovative community. Within GBI in particular, this number is swollen further by MSc students from Civil Engineering and Industrial Design Engineering. Graduate students are free to choose their own thesis topics but in the case of GBI are often tied to existing research projects and research staff, which leads to advantages on both sides and secures the loyalty of promising new researchers.

Detail of mock-up cardboard facade.

Function integrated façade..

11 SWOT analysis

STRENGTHS

GBI is run by relatively young associate professors and experienced older professors who cooperate well together and are enthusiastic to take on new assignments. GBI works easily with other academia, institutes and market parties.
GBI's programme is relevant and urgent to society and science.
GBI staff include a growing proportion of PhD candidates and staff who have already completed PhDs themselves. Productivity per FTE research staff is relatively good. GBI's published output is well-balanced between scientific, expert and popular publications.
Building Technology has excellent connections and partnerships and is a forerunner in inter-university partnerships.

WEAKNESSES

As with other groups in the Faculty of Architecture, GBI has so far had little experience with funding from major scientific funding organisations, such as NWO/STW, who do not provide many opportunities for technology or design-focused research. Nevertheless, more effort could be put into the acquisition of funding in several subject areas.
GBI staff have produced too few publications in international peer-reviewed CFIS journals. This should be improved.

OPPORTUNITIES

There are many possibilities for funding and partnerships in the area of sustainability, climate and energy. Many parties show interest in cooperating with the GBI research group, both from academia and the market. 'Bridging the Gap' [Eekhout, 2009] proposes a novel research plan for all construction-related faculties in the Netherlands, culminating in the 3TU.BOUW (the 3TU Federation Centre of Competence for the Built Environment). This approach will create opportunities to establish permanent partnerships with the industry and society, ensuring a regular flow of income for researchers. In addition, GBI receives a great number of requests for PhD internships from across the world.

THREATS

Due to further cuts in direct government funding, money for fundamental or specialist research in the basic GBI competence areas will probably be reduced; this may involve too much focus on short-term and temporary projects. Furthermore, decoupling primary research funding from output performance will takes away an incentive to publish more and better quality.
The drawback to the many opportunities for funding and cooperation from national and international requests is that most time is spent on preparing project proposals, instead of research itself.

12 Strategy

12.1 Strategic planning; investments and collaboration

GBI aims at viable and suitable project proposals, in cooperation with partners from the academic world, consulting companies and other commercial and industrial bodies, each in their respective role. There is still a world to be won out there. Active involvement in 3TU.BOUW (the 3TU Federation Centre of Competence for the Built Environment) will support this.
With the Valorisation Task Force (VTF), the TU Delft Valorisation Centre and 3TU.BOUW, a structural approach to major scientific funding organisations, such as the EU and NWO/STW, will enable us to learn about the qualities of a good proposal from other faculties and through reviewing processes.

Our intention is to keep the number of PhD candidates constant or growing. This can only be realised with external money, and is therefore related to larger research projects. Where PhD funding through externally funding is not possible, we admit self-funded PhD candidates for topics that are relevant to the programme. Together with the Graduate School, PhD candidates will receive proper supervision and encouragement. This will be made possible by an additional tier between the (associate) professors and PhD candidates, formed by young doctors who can take responsibility for daily doctoral supervision and research project leadership. There will be a strong emphasis on publications in international peer-reviewed CFIS journals, starting with PhD candidates at their earliest stages.

12.2 Research topics planned for the near future and their prospects

Just like the GBI as a whole, the research programme is based on stable, permanent basic competences, which in the near future (the next 5 to 10 years) will focus on the temporary sustainability themes as presented in section 1.4. Sustainability will remain an important issue, and is in fact an open-ended issue, but its themes may vary in the near future, as instigated by parties involved with the 3TU.BOUW, for example. It is quite possible that in the near future the focus will be on becoming 'fossil-free', on smart grids and networks in the built environment, and on sustainable mobility, developments to be seen already in our recent projects.

12.3 Flexibility and anticipation of expected changes

In view of recent financial difficulties, but in fact already in practice with the GBI group for several years already, we intend to become relatively independent from primary academic funding (initially coming from the Ministry of Education) by acquiring external funding for our projects. Prerequisite to this will be a direct coupling of these finances to the group involved, so that where money is attracted in, money can be spent. At present the faculty is working on the preliminary stage of this transition.

1 Objectives and research area

1.1 Vision, mission and objectives

Vision: The developments of architecture and building design are driven by attempts to achieve step changes in performance; the most important way to attain this is to use innovative computational tools, techniques and methods in the design, manufacturing and construction process. Considering performance as a driver in the building design and planning process is a prerequisite to achieve buildings that better perform, function and operate, consume fewer resources in construction and operation, and offer a healthier and more comfortable environment to its occupants, while still being economically viable.

Mission: The mission of the Computation & Performance research programme is to improve the performance of buildings and the built environment through scientific inquiry into novel ways of evaluating and influencing building performance using computational methods for measurement, prediction and simulation of buildings' performances, form finding, design generation and analysis, information modelling, decision-making and design communication. Performance in this context refers to technical performance as well as qualitative performance —physical and psychological.

Objectives: Through a multi-disciplinary approach, we aim to meet four challenges:

- To define building performance and quality, and to develop the computational means to assess in design the many various aspects that constitute them.
- To apply the understanding of performance and quality to the computational design process, so as to plan, construct and operate buildings where the reality meets or exceeds the aspirations that motivated their production.
- To develop design, communication and decision-making practices, and their computational support, which enable stakeholders to effectively apply the understanding of building performance and quality in an informed and balanced way so as to achieve mutually acceptable outcomes.
- To continually re-examine the relations between performance/quality, function, materials, systems, society, and architectural form within an investigation of computationally enhanced holistic design strategies.

1.2 Societal concerns and issues

In recent years there has been a clear change in perspective on the efficiency of the built environment, driven by the appreciation that resources of materials and energy are not endless and that the environmental performance of the built environment should be improved drastically. This has strengthened the observation that many facilities comprising the built environment, particularly offices, residences and various public-building types, underperform. "Performance" in this context denotes the ability of buildings to meet technical and non-technical requirements (e.g., physical as well as psychological) placed upon them by their owners, users and society at large.

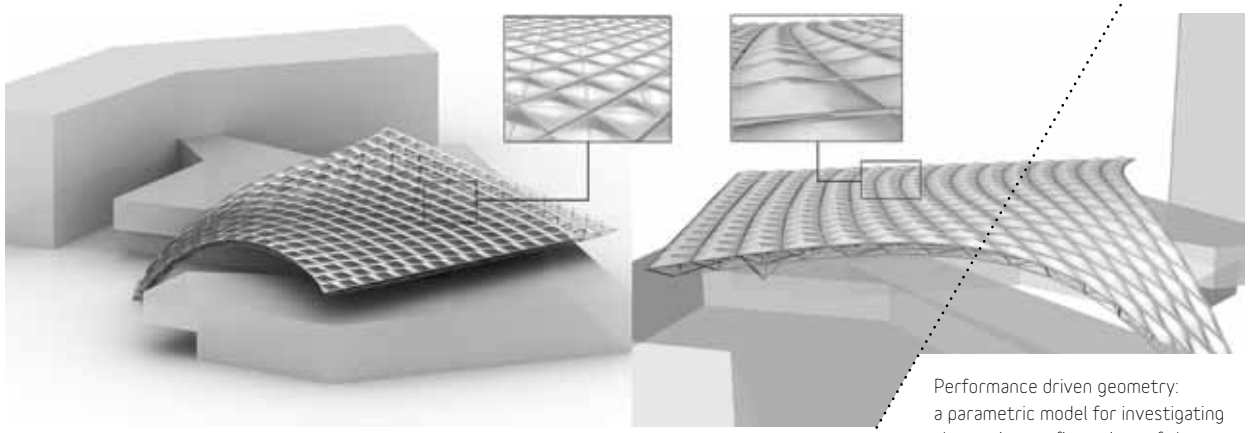
1.3 Position

The Computation & Performance (C&P) research group plays a prominent role internationally in the area of computational design research and its application to performative architecture in

practice. The Hyperbody research group, specifically, plays a dominant role in the area of interactive architecture, real-time collaborative design and non-standard architecture. Through collaborations with other prominent researchers and research groups, the C&P research group actively participates in a strong, international research network. The group's contribution to the international SmartGeometry Group emphasises its prominence in both research and practice. Group members also collaborate closely through commissioned design and research with industry partners and public and semi-public organisations.

1.4 Research area

The performance and computation driven design of buildings and the built environment: Structural design and analysis; Performative morphologies; Glass and transparency; Decision support systems for sustainable buildings; Adaptive material systems; Interactive architecture; Building information modelling, File-to-factory and digital manufacturing; Urban prediction, generation and simulation models; Collaborative design and engineering; Non-standard architecture and generative geometry; Parametric and algorithmic design.



Performance driven geometry: a parametric model for investigating alternative configurations of the cladding for reducing direct solar exposure (by Michela Turrin et al.).

Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	15	3,7	15	3,7	12	3,9	13	4,0	16	4,3	19	5,2	19	5,3
Non-tenured staff	9	3,8	9	3,8	12	3,8	14	4,3	14	6,1	13	5,1	10	4,2
PhD-students	6	4,4	6	4,4	9	6,6	12	7,6	21	8,9	21	10,5	22	7,8
Guests	0		2		6		9		7		9		12	
TOTAL RESEARCH STAFF	**30**	**11,9**	**32**	**11,9**	**39**	**14,3**	**48**	**15,9**	**58**	**19,3**	**62**	**20,8**	**63**	**17,3**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE	
Prof. Kas Oosterhuis	Principal	ONL	Rotterdam	NL
Prof. Joop Paul PhD	Managing director	Arup Netherlands	Amsterdam	NL
Rob Nijsse	Managing partner	ABT bv	Velp	NL
Prof. Patrick Teuffel PhD	Managing partner	Teuffel Engineering Consultants	Stuttgart	DE
Andre Chaszar	Owner	0 Design Consulting and Research	New York	US
Florian Heinzelmann	Partner	SHAU	Rotterdam	NL
Jeroen Coenders	Senior engineer	Arup Netherlands	Amsterdam	NL
Michael Bittermann PhD	Design executive	Bittermann & Weiss Holzhaus GmBH	Gerchsheim	DE
Michela Turrin	Partner	Novarc*Studio	London	UK
Jelle Feringa	Partner	EZCT Architecture & Design Research	Paris	FR

Designer as tool builder: integration of custom-made computational tools in the design process (Graduation project by Sander Mulders).

Research environment and embedding

3.1 Embedding

The Computation & Performance research programme joins chairs and groups from the Department of Building Technology (Design Informatics [DI], Structures [S] and Adaptive Building Systems [ABS]), the Department of Architecture (Hyperbody [HY}) and the Faculty of Civil Engineering and Geosciences (Structural Design Lab [SDL]). The resulting interdisciplinary research group is nationally and internationally embedded in Architecture (e.g., BNA – Royal Institute of Dutch Architects) and Building and Civil Engineering (e.g., Research School Integral Design of Structures), in Computational Design (e.g., SmartGeometry Group, eCAADe – European CAAD association), Non-standard and Interactive Architecture, and Structural Design and Engineering (e.g., IASS – International Association for Shell and Spatial Structures, IASBE – International Association for Bridge and Structural Engineering).

3.2 Number and affiliation of guest researchers

Forty guest researchers joined the Computation & Performance research group during the period 2003-2009, including both visiting fellows and guest PhDs. Their affiliations are spread across the globe and include both knowledge institutes and companies.

In the Netherlands

- Utrecht University (Faculty of Social Sciences)
- The Hague University of Applied Sciences
- University of Applied Sciences Utrecht
- TNO
- EGM Architects
- Nilofar Architects
- Crux Consultants
- Witteveen & Bos
- Berenbak Structural Design

In Europe and the Middle East

- Ghent University
- Salford University
- TU Lisbon (UTL)
- TU Wien
- University Iuav of Venice
- University of Torino (UNITO)
- University of Parma (UNIPR)
- Istanbul Technical University (ITU)
- Middle East Technical University (METU)
- Bilkent University
- Bill Harvey Associates

In North and South America

- Massachusetts Institute of Technology (MIT)
- Princeton University
- University of Tennessee
- Universidade Federal da Bahia

In South-East Asia

- Kyoto University (Japan)
- Hanyang University (South Korea)
- Southeast University (SEU) (China)

3.3 International and national positioning

We consider ETH Zurich, MIT, and Carnegie Mellon University as our main competitors (and partners). In comparison, we take a leading role internationally in interactive architecture and computational intelligent design. In addition to these particular areas, we also embrace a wide range of other research areas and topics under the umbrella of Computation & Performance. This enables us to attract strongly motivated international PhD students of a high calibre who are able to explore and develop their own research interests and topics. The breadth of research and knowledge available at the faculty, as a whole, further supports this.

3.4 Actual collaborations with stakeholders

We actively collaborate with other researchers and research groups, architectural and engineering offices, industry and public and semi-public organisations.

Our university partners are

- ETH Zurich (Prof. Schmitt)
- MIT (Prof. Knight, Prof. Sass)
- Carnegie Mellon University (Prof. Krishnamurti, Prof. Akin)
- Simon Fraser University (Prof. Woodbury)
- Pennsylvania State University (Prof. Anumba)
- University of Michigan (Prof. von Buelow)
- Istanbul Technical University (Prof. Cagdas)
- Middle East Technical University (Prof. Savas)
- University Iuav of Venice (Prof. Siviero, Prof. Majowiecki)
- University of Ghent (Prof. van Impe)
- TU Eindhoven (Prof. de Vries)
- University of Kassel (Prof. Grohmann)
- University of Montpellier (Prof. Motro)
- TU Lisbon (Prof. Duarte).

Partners from the professional field are

- Arup
- ABT
- ONL
- Mecanoo
- Open Project Office
- Studio Tecnico Majowiecki
- Bollinger + Grohmann
- Van Noordenne Groep
- Festo
- Philips
- Bentley Systems
- Autodesk
- Dutch Government Building Agency (Rijksgebouwendienst)
- Netherlands Board for Healthcare Institutions (Bouwcollege)
- etc.

We also collaborate with researchers from other research programmes/groups within the university and faculty, especially Green Building Innovation and Urbanism.

3.5 Participation in consortia

- Turkish Technical Universities Long-term International Project (TULIP): cooperation between TU Delft, Middle East Technical University and Istanbul Technical University, including joint PhDs (led by Prof. Sevil Sariyildiz PhD).
- International Fire Group: research cooperation between TU Delft, TNO, Efectis, Worcester Polytechnic institute, University of Texas and Michigan State University (co-organised by prof. Kees van Weeren).
- SmartGeometry Group: partnership between practice, research and academia; Foster+Partners, KPF, Grimshaw, Arup, Buro Happold, Architectural Association, MIT, TU Delft, University of Bath (TU Delft core members Jeroen Coenders and Axel Kilian).
- Research School Integral Design of Structures: inter-university research institute, accredited by the KNAW (the Royal Netherlands Academy of Arts and Sciences), with participation from TU Delft, TU Eindhoven and University of Twente.
- Joint application (in collaboration with the Green Building Innovation research group) with the University of Tennessee for the U.S. Department of Energy Solar Decathlon 2011 (started in 2009), in preparation for the Solar Decathlon Europe 2012. The consortium includes numerous industrial companies.

Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The Computation & Performance research programme is very well received in academia and practice. The combination of computational and performative design and research is considered very important in today's academic and professional world, as has been emphasised in our contacts with internationally renowned architecture and engineering offices and the expressions of interest we have received from researchers interested in joining our research group as PhD student or postdoc. The approach expressed through the four research challenges and the ideas generated on the topics of adaptive building systems, interactive architecture and decision support systems for sustainable buildings generate a lot of positive reactions. The quality of the research expressed through research results, publications and collaborations is recognised as high.

4.2 Significance of the contribution to the field

The developments of architecture and building design are driven by attempts to achieve step changes in performance and the most important way is the use of innovative computation in the design, manufacturing and construction process. This is highly recognised in the field of architecture and the built environment and forms the central idea behind the research programme. The significance of the research contributions stands out clearly in our collaborations with other research institutes and with the professional world, exemplified in numerous design and research projects commissioned from industry and practice.

4.3 Coherence

Originally, in 2003, the research group was divided in four parts, with a large part contributing to the BLOB-ICT research programme, and a smaller part contributing to the ZAPPI research programme, the Hyperbody research group, which had just started, and the Structural Design Lab in the Faculty of Civil Engineering. Since then, the research portfolio has been realigned and consolidated and the Computation & Performance research group was formed in summer 2008. Its formation acknowledges the overlapping research fields and interests of the constituent groups, the underlying chairs/groups as core subgroups and anchor points for the researchers, the existing, bottom-up research and educational relations and collaborations, and the shared vision. The coherence of the research group has since been strengthened by allowing researchers to participate in more than one subgroup. In terms of FTE, the Design Informatics and Hyperbody research groups form the primary research centres of the C&P research group.

4.4 Quality of the scientific publications

The research group has grown over the review period, as has the output. This growth, however, is not only quantitative, but also qualitative. Most of the chairs/groups participating in the programme do not have a very long research history and have developed and matured their research activities significantly during the review period. This qualitative growth is also apparent in the scientific publications, with an emphasis on conference papers during the first years, while there is a better balance between journal papers, books, conference papers and professional publications in the second half of the review period. The last year, however, reveals a remarkably different figure, following the faculty fire in 2008 and the recent financial cutbacks. We aim to rebuild and strengthen the trend towards quality, emphasising journal papers and books even more, without neglecting other publications.

Intelligent Design Objects: a cognitive approach for performance-based design (PhD thesis by Michael Bittermann).

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

- A formalism for representational flexibility for design supporting information exchange and design querying (results from a five-year personal grant of Rudi Stouffs from NWO (Netherlands Organization for Scientific Research), 2005). Has led to a joint project with researchers from Carnegie Mellon University in the context of a research project funded by the National Science Foundation concerning the comparison of as-built with as-designed building information.
- A knowledge model with which to assess a building's transformation, applied to the transformation value of nursing homes in the Netherlands (with the Netherlands Board for Healthcare Institutions, 2007).
- Theory of unbiased human vision enabling the analysis of perceptual properties of spaces by means of computation (part of the PhD dissertation of Michael Bittermann, 2009).

KEY PUBLICATIONS

- Bier, H., Bodt, K. de & Galle, J., 2006. 'Prototypes for Interactive Architecture'. *Interactive Technologies and Sociotechnical Systems*. Springer-Verlag, Berling Heidelberg, p. 21-28.
- Coenders, J.L., 2007. 'Barriers in computational structural design'. *Journal of the International Association for Shell and Spatial Structures* (IASS). Volume 48, No. 4, IASS Madrid, p. 51-62.
- Bittermann, M.S., Sariyildiz, I.S. & Ciftcioglu, Ö, 2007. 'Visual perception in design and robotics'. *Integrated Computer-Aided Engineering*. Volume 14, No. 1, IOS Press, Amsterdam, p. 73-91.
- Stouffs, R., Krishnamurti, R. & Park, K., 2007. 'Sortal structures: supporting representational flexibility for building domain processes'. *Computer-Aided Civil and Infrastructure Engineering*. Volume 22, No. 2, Wiley-Blackwell, Hoboken, p. 98-116.
- Gürsel, I., Sariyildiz, S., Akin, Ö & Stouffs, R. , 2009. 'Modeling and visualization of building lifecycle performance assessment'. *Advanced Engineering Informatics*. Vol 23, No. 4, Elsevier, Amsterdam, p. 396-417.

KEY BOOKS OR CHAPTERS OF BOOKS

- Oosterhuis, K., 2003. *Hyperbodies: Towards an E-motive Architecture*. Birkhäuser, Basel.
- Nijsse, R., 2005. *Glass in Structures*. Birkhäuser, Basel. (also in German and Chinese edition).
- Chaszar, A. (ed.), 2006. *Blurring the Lines: Computer-Aided Design and Manufacturing in Contemporary Architecture*. Academy Press, Seattle.
- Oosterhuis, K. & Feireiss, L. (eds.), 2006. *GameSetandMatch II:* On Computer Games, Advanced Geometries and Digital Technologies. Episode Publishers, Rotterdam.
- Pottmann, H., Asperl, A., Hofer, M. & Kilian, A., 2007. *Architectural Geometry*. Bentley Institute Press, Horsham.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

- Final report on "Thermal comfort in summer; general preliminary aspects concerning daylight and sunlight" for the "Vela" roof - UNIPOL project in Bologna, Italy, July 2009 (in collaboration with Green Building Innovation research group).
- Computational support for Lifecycle Integral Performance assessment (CLIP), software tool for the EU-funded Energy Performance Integration for public Corporate Real Estate (EPI-CREM) project in partnership with Dutch Government Building Agency (Rijksgebouwendienst), November 2009.
- iWEB, real-time collaborative design laboratory opening, 2006.

KEY DISSERTATIONS

- Biloria, N., 2007. *Adaptive corporate environments: Creating real-time interactive spatial systems for corporate offices incorporating computation techniques*. T.U. Delft.
- Bier, H., 2008. *System-embedded Intelligence in Architecture*. T.U. Delft.
- Bittermann, M.S., 2009. *Intelligent Design Objects (IDO): a cognitive approach for performance-based design*. Boekenbent, Barneveld.

- Tunçer, E.B., 2009. *The Architectural Information Map: Semantic modeling in conceptual architectural design*. TU Delft.
- Bos, F.P., 2009. *Safety Concepts in Structural Glass Engineering: Towards an Integrated Approach*. TU Delft.

KEY EVENTS

- 9th EuropIA International Conference, 2003. Istanbul, Turkey (in collaboration with Istanbul Technical University).
- 3rd International Conference on Innovation in Architecture, Engineering and Construction (AEC) 2005. Rotterdam, The Netherlands.
- Game Set and Match II International Conference, 2006. Delft, The Netherlands.
- Challenging Glass International Conference On Architectural And Structural Applications Of Glass, 2008. Delft, The Netherlands.
- Open Platform, SmartGeometry international workshop, 2009. San Francisco, USA.

KEY EXHIBITIONS

- A glass pavilion – 10 years of Zappi research, 2004.
- Virtual Operation Room, 2004. Techniekmuseum, Delft, The Netherlands (in collaboration with ONL).
- Muscle Non-Standard Architecture, 2005. Centre Pompidou, Paris, France (in collaboration with ONL).
- InteractiveWall: Prototype For An Emotive Wall, 2009. Hannover Messe, Germany (commissioned by Festo).

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The Computation & Performance research is highly valued within the professional field. The combination of computational and performative design and research is considered very important to further their practices, as has been emphasised in our contacts and collaborations with internationally-renowned architectural and engineering offices. The emphasis on both technical performance and socio-cultural performance is quintessential to our research approach and is also emphasised in commissioned research, design explorations and public exhibitions. These projects commissioned by industry partners and public and semi-public organisations, such as Festo, Philips, Dutch Government Building Agency (Rijksgebouwendienst), Netherlands Board for Healthcare Institutions (Bouwcollege), etc., also illustrate the growing attention to valorisation within the research programme.

5.2 Key results/highlights

- protoSPACE Laboratory for multidisciplinary collaborative design and new media research established, 2006 [HY}
- Flextool model developed for the calculation of the transformation value of care dwellings, 2006 [DI]
- InteractiveWall: Prototype For An Emotive Wall, commissioned by Festo, Hannover Messe, Germany, 2009 {HY]
- Computational support for Lifecycle Integral Performance assessment (CLIP) software tool developed for use by the Dutch Government Building Agency (Rijksgebouwendienst), 2009 [DI]

5.3 Key knowledge contributions to practices and policies

- Knowledge on semantic information modelling in conceptual design to Mecanoo and Philips, 2007 [DI]
- Knowledge on thermal performance evaluations considering summer overheating, daylight and wind and their impact on the design of a large roof structure in Bologna for the Open Project Office, Bologna, 2009 [DI]

5.4 Evidence of the appreciation of stakeholders

Presenting our research findings at meetings (symposia, workshops, network meetings, stakeholder meetings, tradeshows, exhibitions, etc.) with societal stakeholders (in industry, practice, public and semi-public organisations) yields wide approval. The best evidence of this is follow-up projects commissioned by the same or related stakeholders.

5.5 Dissemination strategies

Research findings are disseminated through a variety of different media, taking into consideration both the appropriate audience and the appropriate means of reaching this audience. These include publications in scientific journals and books as well as professional magazines, presentations at scientific conferences, symposia organised for

industry and practice and other network meetings, exhibitions at tradeshows and in museums, interviews in newspapers and on TV, and specialist websites.

5.6 Evidence of impact of these contributions.

As an example, the CLIP (Computational support for Lifecycle Integral Performance assessment) software tool developed for the Dutch Government Building Agency (Rijksgebouwendienst) will be integrated in their inspection and decision-making processes and has yielded new project proposals linking the result to RFID readings or climate systems for diagnosis.

5.7 Commissioned research by societal actors

- InteractiveWall: Prototype For An Emotive Wall, Hannover Messe, Germany, 2009, commissioned by Festo [HY]
- Flextool model developed for the calculation of the transformation value of care dwellings, 2006, commissioned by Netherlands Board for Healthcare Institutions (Bouwcollege) [DI]
- Computational support for Lifecycle Integral Performance assessment (CLIP) software tool, 2009, commissioned (in three consecutive projects) by the Dutch Government Building Agency (Rijksgebouwendienst) [DI]
- Thermal comfort in summer; general preliminary aspects concerning daylight and sunlight for the "Vela" roof - UNIPOL project in Bologna, 2009, commissioned (in two consecutive projects) by the Open Project Office [DI]

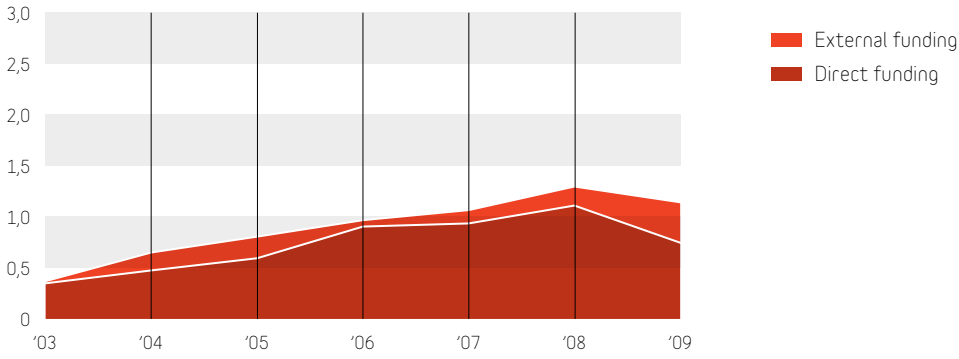
Protospace 3.0: laboratory for multidisciplinary collaborative design and new media research.

Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	351	94%	478	73%	598	74%	910	94%	941	88%	1,117	86%	751	65%
External funding	21	6%	176	27%	212	26%	62	6%	130	12%	186	14%	397	35%
TOTAL FUNDING	**372**	**100%**	**654**	**100%**	**810**	**100%**	**972**	**100%**	**1,071**	**100%**	**1,303**	**100%**	**1,148**	**100%**
EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	358	94%	491	92%	619	92%	872	92%	1,228	93%	1,435	91%	1,159	91%
Other costs	23	6%	45	8%	51	8%	79	8%	94	7%	140	9%	118	9%
TOTAL EXPENDITURE	**381**	**100%**	**536**	**100%**	**670**	**100%**	**951**	**100%**	**1,322**	**100%**	**1,575**	**100%**	**1,277**	**100%**

Chart a. Research funding in M€



Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	3	0	3	1	2	0	3	0	10	0	5	0	2	0
Non-refereed articles	1	0	0	0	2	0	2	0	4	1	1	0	0	0
Books	1	0	1	0	1	0	4	0	4	1	1	0	0	1
Book chapters	16	0	1	0	17	0	33	0	23	20	16	9	8	2
PhD-theses	0	0	0	0	0	1	1	1	0	0	1	0	3	0
Conference papers	67	0	24	3	46	0	60	1	60	4	42	4	50	12
Professional publications	25	0	7	0	19	0	23	3	7	5	22	5	13	0
Editorships journals/book	3	0	0	0	2	0	1	0	1	1	7	0	0	0
TOTAL PUBLICATIONS	**116**	**0**	**36**	**4**	**89**	**1**	**127**	**5**	**109**	**32**	**95**	**18**	**76**	**15**

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	1	0	1	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%	0	0%
2001	0	1	1	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%
2002	0	1	1	1	100%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2003	1	1	2	1	50%	1	50%	1	50%	1	50%	1	50%	1	50%	0	0%
2004	1	2	3	1	33%	3	100%	3	100%	3	100%	3	100%	0	0%	0	0%
2005	3	0	3	1	33%	1	33%	1	33%	1	33%	1	33%	1	33%	1	33%
TOTAL	**6**	**5**	**11**	**4**	**36%**	**6**	**55%**	**6**	**55%**	**6**	**55%**	**7**	**64%**	**2**	**18%**	**2**	**18%**

Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2003	Euro-C Computational Modeling of Concrete Structures	Rots	Pongau	AT
2007	13th Int. Conf. On Concurrent Enterprising, ICE	Jaskiewicz	Nice	FR
2008	6th Int Conf on Computation of Shell and Spatial Structures Cornell University IASS-IACM	Teuffel	Ithaca	US
2009	Int. South America conference	Biloria	Sao Paulo	BR
2009	27th eCAADe conf. Computation: The new realm of Architectural Design	Sariyildiz	Istanbul	TR

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2003	9th EuropIA Int Conf; E-activities & Intelligent Support in Design and BE	Organisation/chair	Sariyildiz	Istanbul	TR
2005	3rd Int Conf on Innovation in Architecture, Engineering and Construction	Organisation	Tuncer	Rotterdam	NL
2007	GameSetandMatch II: the architecture co-laboratory	Organisation	Oosterhuis	Delft	NL
2008	Challenging Glass Int Conf on Arch. and Structural Applications of Glass	Organisation	Rots	Delft	NL
2009	12th EuropIA Int Conf on Innovations for Building and Construction	Co-organisation	Stouffs	Paris	FR

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2004	First International Conference on Design Computing and Cognition	Vice chair	Stouffs	Cambridge	US
2005	AEC2005 Int Conf on Architecture, Engineering and Management	Organisation/chair	Sariyildiz	Rotterdam	NL
2006	Dutch Pavilion Big 5	Design and build	Oosterhuis	Dubai	UAE
2007	Computation Group - lecture series at MIT	Invited lecturer	Bier	Cambridge	US
2009	IEEE Congress on Evolutionary Computation	Paper presentation	Bitterman	Trondheim	NO

Table d. Involvement in exhibitions

YEAR	EVENT	ROLE	WHO	WHERE	
2004	Non Standard Architecture Centre Pompidou	Exhibitor	Oosterhuis	Paris	FR
2006	ONL/Hyperbody Shanghai Suzhou Creek Warehouse	Solo exhibition	Oosterhuis	Shanghai	CN
2007	TOP Delft - Muscle Projects	Coordinator	Hubers	Delft	NL
2007	BONAS, Faculty of Architecture, TU Delft	Co-organiser	Bitterman	Delft	NL
2009	AIA New York "Make it Work"	Exhibitor	Teuffel	New York	US

Table e. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2005	European Steel Award: V-House, Nesya - Norway	ECCS	Nijsse	Brussels	BE
2006	National Steel Award: Cockpit in Acoustic Barrier	Bouwen met Staal	Oosterhuis	Zoetermeer	NL
2007	Arthur G. Hayden Medal: innovative bridge design: Nescio bridge A'dam	ESWP	Paul (Arup)	Pittsburgh	US
2007	Hangai prize; most talented young engineer in the IASS	IASS	Coenders	Beijing	CN
2009	GOOD DESIGN™ Award: FESTO Interactive Wall	Chicago Athenaeum	Oosterhuis	Chicago	US

Table f. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2003	Foundation Arts and Public Space, SKOR	Board member	Sariyildiz	Amsterdam	NL
2009	Delft University of Technology	Research fellow	Bitterman	Delft	NL

Table g. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2004	IEEE Computational Intelligence Society	Senior member	Ciftcioglu	New York	US
2009	Structural Morphology Group, Int Ass for Shell and Spatial Structures (IASS)	Chair	Borgart	Madrid	ES
2009	Int Association Computer Science and Information Technology (IACSIT)	Senior member	Bier	Singapore	SG

Table h. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2004	Norwegian Technology Research	Evaluator	Rots	Trondheim	NO
2007	Natural Sciences and Engineering Research Council of Canada	Evaluator	Stouffs	Ottawa	CA
2009	Australian Research Council (ARC)	Evaluator	Stouffs	Canberra	AU

Table i. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/9	Journal of Design Research	Editorial board	Sariyildiz	London	UK
2005	International Journal of Design Sciences and Technology	Guest editor	Tuncer	Paris	FR
2006	Artificial Intelligence for Engineering Design, Analysis and Manufacturing	Guest editor	Stouffs	Cambridge	UK
2007/9	Footprint	Editor	Bier	Delft	NL

Table j. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2009	Cement	Editor	van Weeren	Boxtel	NL

Table k. Role in practice and policy making

YEAR	FIRM / ORGANISATION	ROLE	WHO	WHERE	
2003/8	Delft Women in Science DEWIS	Founder and chair	Sariyildiz	Delft	NL
2003/4	Ministry of Housing, Spatial Planning & the Environment	Member council	Sariyildiz	The Hague	NL
2003/9	CUR Building & Infrastructure, general code committee	Chairman	Weeren, van	Gouda	NL
2006/9	Delft University of Technology Board of Doctorates	Rector in PhD cmte	Sariyildiz	Delft	NL
2007/9	City Induction, Portuguese Science and Technology Foundation (FCT)	Consultant	Stouffs	Lisbon	PT
2007/9	EPI-CREM: Energy Performance Integration in Corporate public Real Estate Management, Intelligent Energy Europe programme - National Feedback Committee	Member	Stouffs	Brussels	EU
2008/9	Building Information Council BIR	Board member	Oosterhuis	Gouda	NL
2009	Institute for Smart Structures, University of Tennessee	Ext scientific advisor	Teuffel	Knoville	US
2009	Leeds Business School, Centre of Socio-Technical System Design - Scientific Advisory Board	Member	Teuffel	Leeds	UK

9 Next generation

9.1 Objectives and institutional embedding

Starting with highly motivated PhD candidates with research and/or experience in practice, or a significantly demonstrated potential for research, the objective of our PhD training is to develop the candidates' academic potential and their ability to independently conclude a rigorous and intensive four-year PhD research programme. This is achieved through solid supervision and structural support in the form of training courses (PhD skills and knowledge development), peer reviews, and conference participation (research school and international scientific conferences). We aim to further strengthen this structural support at faculty level, focusing both on the personal development of the PhD student and high-quality supervision.

9.2 Structure of programmes

PhD students are encouraged to participate in, and take advantage of, the following programmes:

- Yearly PhD research reviews with peers and/or stakeholders
- The Faculty of Technology, Policy and Management offers courses and workshops for PhD students, to train people in communication and didactical skills
- The Research School Integral Design of Structures organises a yearly symposium for PhD students to foster knowledge exchange and offer PhD students feedback on their work
- The newly established Graduate School for Architecture and the Built Environment will formally organise PhD support and supervision at faculty level and offer courses on research methods, skills, study and writing

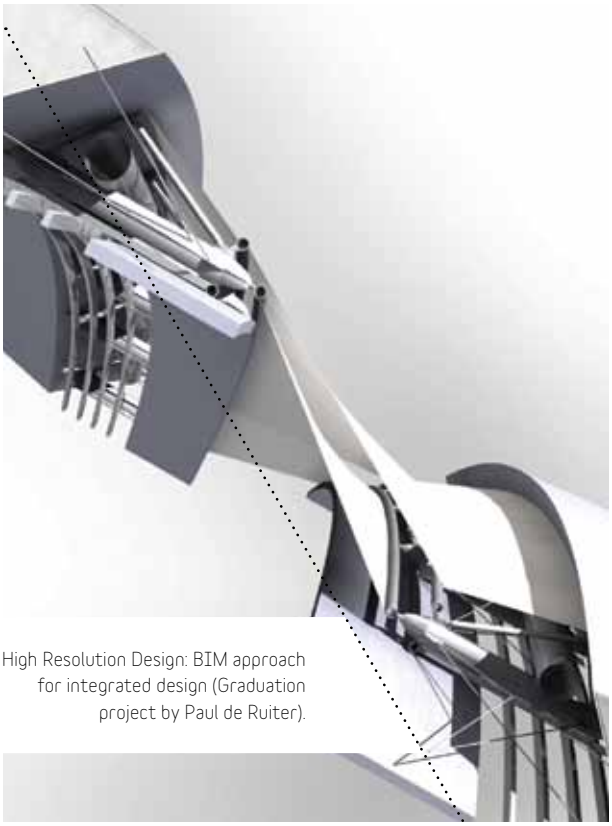
We also have joint PhD students with Istanbul Technical University and Middle East Technical University, taking advantage of additional supervision and support at the partner university.

9.3 Supervision

Each PhD student is being supervised by at least one professor and one co-supervisor or daily supervisor, usually a senior researcher with a PhD. The supervisor and co-supervisor are always from the chair/group the PhD student is affiliated with. If the interdisciplinary character of the research project warrants a second supervisor (professor) from a different chair/group or research programme, this second supervisor is brought into the research project. Double supervision will become more and more the norm in order to increase collaboration and cross-fertilisation.
The PhD student has monthly meetings with all supervisors, and more often with the daily supervisor. PhD students are encouraged to participate in symposia, workshops and international conferences to learn from other participants and to receive feedback on their work.

9.4 Success rates

The number of PhD students has grown over the review period. At the same time, success rates have increased and the average length of a PhD research has dropped as the chairs/groups in the programme have developed and matured their research activities. The need and support for PhD students to complete their PhD within four years has increased significantly as a result of new financial discipline and the increase in self-funded PhD students (or those who have their own scholarship). While the increase in success rates may not be fully obvious from Table b in section 7, PhD inflow has further increased since 2006 and the majority of them are on track to complete their PhD in four to five years.



High Resolution Design: BIM approach for integrated design (Graduation project by Paul de Ruiter).

9.5 Educational resources

The faculty has a wide range of study and research facilities, including:

- The faculty library offers a large collection of scientific specialist literature in the field of architecture and related disciplines, and a virtual knowledge centre for Architecture
- The Building Technology laboratory allows for the production of scale 1:1 designed building elements (or parts thereof), and contains special facilities for research on glass
- The CAM-Lab brings together two 3D printers (one colour, one white), four laser cutters (two large-format, two small-format) and one 3-axis milling machine
- The protoSPACE laboratory for multidisciplinary collaborative design and new media research has been established by the Hyperbody group

10 Viability

10.1 Resource management

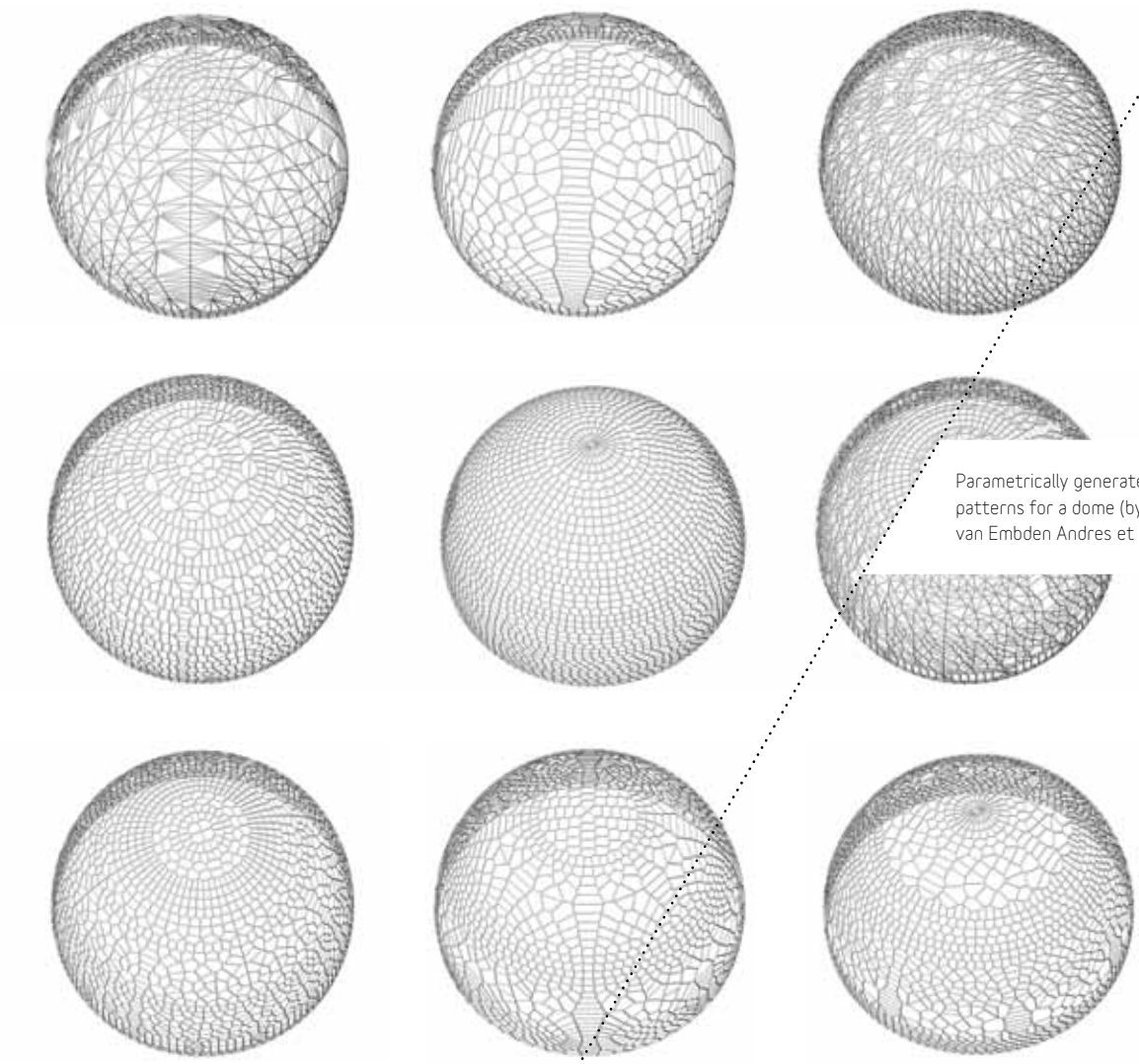
Our most important resource is our human resource, that is, our research staff and PhD students. Much effort is spent on consolidating our research group, in spite of financial cutbacks, and adding already internationally established or highly promising new members (visiting fellows, self-funded PhD students and, if possible, research staff members). Networking is another important activity in order to gain new members with high potential. The second most important resource is financial resources. Here, networking is complemented with building long-term relationships with stakeholders and support from the university's Valorisation Centre. The harmonisation of resource management with other research groups within and outside the faculty takes place in a structured way through the Building Technology department's Valorisation Task Force, the faculty's Research Council and the newly established Graduate School for Architecture and the Built Environment (in collaboration with the OTB Research Institute and the Berlage Institute).

10.2 Available infrastructure

Laptops and mobile phones for staff, and a university-wide wireless network, allow researchers to work wherever their research activities require. Dedicated PhD rooms allow PhD students to work without much distraction, while bringing them in contact with other PhD students. The faculty further accommodates a library offering a large collection of scientific specialist literature in the field of architecture and related disciplines, a large model shop and CAM-Lab, a Building Technology laboratory for the production of scale 1:1 designed building elements and research on glass, and the protoSPACE laboratory for multi-disciplinary collaborative design and new media research (established by the Hyperbody group). All laboratories are available to the entire faculty and are regularly updated and improved in order to fully support education and research.

10.3 Innovative capacity

The innovative capacity of the Computation & Performance research group is captured within the young, enthusiastic and highly motivated group of researchers and PhD students, and their combined breadth of knowledge and expertise. While staff members are stimulated to work and think independently, they are also encouraged to initiate and develop collaborations with other staff members, as well as MSc students in the context of research and design studios and graduation projects. Together they form a vibrant community in which creativity and innovation are held high and supported by the use of computational tools, techniques and methods. Design simulation and generation in support of performance prediction and modelling is the key to innovation in the building industry.



Parametrically generated structural patterns for a dome (by Maria Vera van Embden Andres et al.).

SWOT analysis

STRENGTHS

Our research staff brings together a wealth of national and international experience in innovative research and practice. Our research bridges fundamental technical research and application design, and includes both mono-disciplinary and interdisciplinary research. Staff members with a strong scientific background (in architecture, civil engineering, material science, and/or computer science) contribute the fundamental technical research, while part-time researchers with a position in practice keep a finger on the pulse with respect to social needs and changes. The protoSPACE laboratory for multidisciplinary collaborative design and new media research, established by the Hyperbody group, is a one-of-a-kind research environment.

WEAKNESSES

While one of our group members (Rudi Stouffs) has received a large personal research grant from the Netherlands Organisation for Scientific Research (NWO), we must acknowledge that we are not successful enough in gaining funding from national and European research and science foundations (e.g., NWO, STW, European Commission). While this is a problem common to most research groups within the faculty, partly because there have not been many opportunities for research on design and technology for the built environment, greater effort is required. Our research output in international, peer-reviewed, academic journals (preferable with significant citation index ranking) should be increased as well.

OPPORTUNITIES

There is an increasing pressure from developers/users and from legislation to increase building performance, improving design quality and reducing design cost. This drives the way forward to automated processes. Increasing use of BIM, parametric modelling and bottom-up simulation driven generative design, the exploration of real-time collaborative design processes, and the study of dynamically adaptive buildings and building systems, offer opportunities to support this revolution. We see an increased interest from researchers and PhD students elsewhere to join us, often bringing their own funds, or to collaborate on research projects and proposals. Opportunities to receive research funding have improved.

THREATS

Financial cutbacks are not only reducing the size of the research group but are also requiring research staff to spend more time on teaching and other activities. This threatens to impact the necessary critical mass to develop and maintain a research group and programme, and to reduce the supervisory support available to PhD students to develop their research project and their own research capacity. We must also guard against joining the rat race of proposal writing and running after funding opportunities from national and European research and science foundations. In the same vein, we must refrain from focusing only on short-term successes while failing to maintain our strategic advantages.

12 Strategy

12.1 Strategic planning; investments and collaboration

In the past (2005-2007), we have invested our financial resources strongly in building a critical body of PhD students. From here on, we are considering a different strategy. Firstly, emphasising self-funded PhD students (or ones who have their own scholarship). Secondly, post-docs may prove to be a better financial investment. They tend to be easier to assess (as applicants) based on past experience, they can be productive much faster, they can be assigned to upcoming projects more easily or actively participate in seeking external funding, and they can strengthen the support structure for PhD students. In order to increase success with external funding, it is important that we collaborate even more with other research groups within and outside the faculty in order to gain critical mass as well as the multidisciplinary knowledge and expertise that is often necessary to target the changing societal concerns and research topics to be addressed in funding programmes.

12.2 Research topics planned for the near future and their perspectives

Considering our current research activities and the opportunities presented in section 11, we can identify the following research topics for future development:

- Adaptive building systems: Instant adaptation of the building to environmental impacts and user behaviour, such as sun, wind, temperatures, function, occupancy and socio-cultural aspects. Multidisciplinary approach brings together researchers from different subgroups and the Green Building Innovation research group and opens up opportunities for funding applications.
- Eco-city modelling: Applying our knowledge and expertise in information and knowledge modelling to sustainable planning at urban or regional level. Builds upon current PhD research and collaborations with the Green Building Innovation research group, ETH Zurich and TU Lisbon.
- protoBIM: The next generation of BIM must be a dynamic BIM in support of both parametric modelling and the design and operation of dynamic buildings, right from the conceptual level to the detail level of any building project. Real-time links with multiple stakeholders of varying specialisations through cutting edge adaptive interfaces and dynamic data base systems would define a major step change in computation and performance for the built environment.

12.3 Flexibility and anticipation of expected changes

We specifically chose not to fully centralise any decision-making on research directions within the Computation & Performance research group, but to retain and foster strong research subgroups with their own research foci, while facilitating and encouraging collaboration between subgroups both at the strategic level and at the research activity level. This decentralised approach offers subgroups the flexibility to foster and develop their own strengths and makes the research group less dependent on individual key researchers. Above all, we must ensure to maintain a positive, creative and challenging atmosphere in which researchers remain highly motivated and strive to bring out the best in themselves.

Urbanism

RESEARCH LEADER: Prof. Vincent Nadin
KEY RESEARCHERS: Meta Berghauser Pont PhD, Ana Maria Fernandez-Maldonado PhD, Frank van der Hoeven PhD, Fransje Hooimeijer, Prof. Taeke de Jong PhD, Ina Klaasen PhD, Prof. Eric Luiten, Prof. Winy Maas, Prof. Han Meyer PhD, Prof. Vincent Nadin, Stephen Read PhD, Thorsten Schuetze PhD, Prof. Dirk Sijmons, Stefan van der Spek PhD, Dominic Stead PhD, Prof. Clemens Steenbergen PhD, Rene van der Velde, Prof. Wil Zonneveld PhD

1 Mission, vision and objectives

1.1 Mission, vision and objectives

Mission: The *Urbanism* research group's core task is to mobilise its multidisciplinary knowledge, skills and reputation to create more sustainable living environments. The priority is to contribute solutions to the urgent challenges of urbanisation in the context of climate change. We must achieve excellence in research, international recognition for the quality and value of our scientific work, and raise the standing of urbanism as an academic research discipline in science and society.

Vision: The *Urbanism* research group aspires to make a major contribution to urbanism research and practice in the Netherlands, and to be among the very best in its peer group. We will exploit the worldwide prestige of the Dutch tradition of urbanism to maintain active international knowledge exchange, lead research consortia and attract eminent guest professors and high-quality PhD and Master's students. The truly international composition of the group will create a rich academic environment for investigating the physical, social and cultural variations in which urbanism is practised. The research group will provide a flagship for the internationalisation of TU Delft in the European Research Area, Asia and Latin America.

Objectives: The substantive research objective of Urbanism is to strengthen the group's reputation for excellence in research, especially in delta urbanism and urban resilience, design support systems, mobility and networks in complex city regions, the urban landscape and cross-national comparisons. The aim is to deepen our contribution to knowledge in our specific disciplines and methodologies whilst also enabling interdisciplinary research.

1.2 Societal concerns and issues

The urban environment is a subject of intense public concern. The impact of rapid change in the physical form and the distribution of urban development on the quality of the environment, economic opportunities, social cohesion and cultural identity is widely debated. The patterns and effects of urban change, their wider impacts on society, and the appropriate means of intervention are all of increasing complexity and uncertainty. The Urbanism research group addresses these concerns in relation to research on: the impact of urbanisation of deltas and coastal areas in which 60 percent of urban development is located; the contribution of urban and landscape design and planning to adapting urban areas for climate change and rising sea levels; the creation of decision tools to assist in designing more sustainable patterns of urban development and renewal; and methods of territorial management that empower communities and balance the need for both continuity and change.

1.3 Position

The Urbanism research group holds a unique position in this field, resulting from a very particular tradition of urbanism in the Netherlands, which combines design, engineering and policy disciplines and professions. Thus, the Urbanism group enjoys a wide multidisciplinary composition encompassing the disciplines of landscape and urban design, urban development, spatial planning and environmental technology.

1.4 Research area

The Urbanism research group focuses on important issues within urbanisation around the world. It considers the Dutch territory as an important laboratory. Four teams work simultaneously in this field, each of which addresses specific topics:

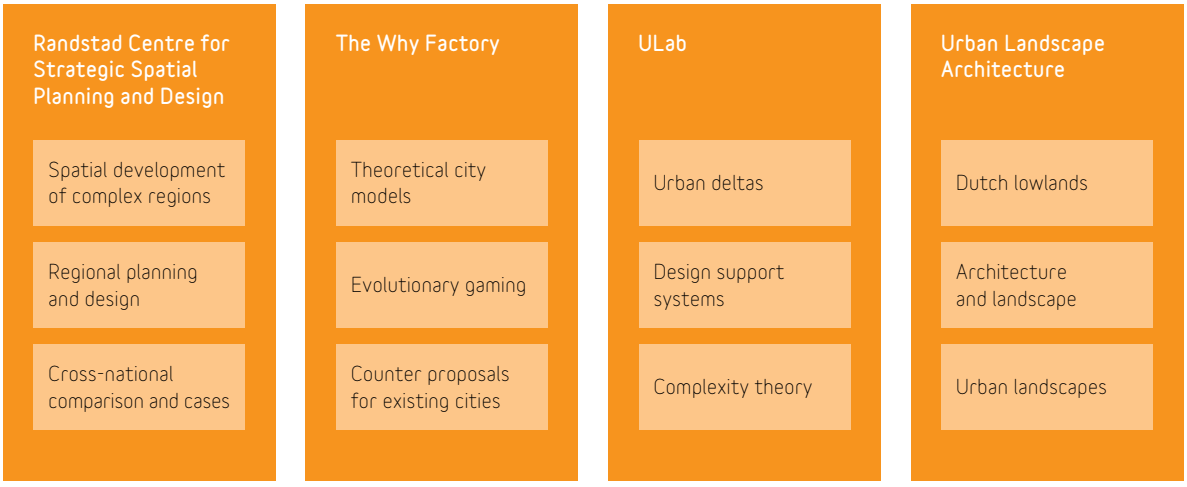
The Randstad Centre for Strategic Spatial Planning and Design: the question of the regional scale is an increasingly dominant issue within urbanisation worldwide, and one which makes it necessary to develop new concepts, approaches and methods of planning and design. In the international literature The Randstad Holland has for many years been considered a key example of a poly-nuclear urban region. Contributing to concepts and strategies for the future development of the Randstad and conducting studies are among the centre's most important goals.

The Why Factory (T?F): T?F is a global urban think tank and research institute, run by Faculty of Architecture, Delft University of Technology and MVRDV. It was founded in 2008 with the ambition of expanding the argumentative power of the architectural and urbanistic professions. Research on the Future City is carried out through the interactive composition of three fields. It speculates on possible theoretical models in the model city programme, makes counter-proposals for existing cities and stores its knowledge using an evolutionary gaming programme.

U-Lab: Today's issues and challenges demand a fundamental renewal of the techniques and instruments of design and planning. The fact that the Netherlands is located on a delta, which will create new challenges as a result of climate-change and ecology, makes it necessary to reorganise the technical nature of urban design and consider partnerships with other disciplines such as hydraulic engineering.

Urban Landscape Architecture: the unique Dutch tradition and future of making Dutch landscapes are relevant at more than just the local level. The transformation of these landscapes through continuing urbanisation, changing land use and climate change is creating unprecedented challenges for the designs of the future landscapes and urban landscapes. This focus on landscape design is organised within the Urban Landscape Architecture team.

Figure 1. Urbanism teams and themes



Seminar and exhibition
'Memory of the City', 2005.

2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	33	8,1	35	7,9	30	7,3	33	9,3	39	10,2	44	11,6	42	10,5
Non-tenured staff	27	4,9	33	5,6	36	6,5	41	8,3	43	8,8	29	9,1	19	6,7
PhD-students	13	6,8	29	11,7	33	12,1	33	13,8	41	15,1	38	10,4	52	9,0
Guests	43		58		60		61		50		39		40	
TOTAL RESEARCH STAFF	**116**	**19,8**	**155**	**25,2**	**159**	**25,9**	**168**	**31,3**	**173**	**34,2**	**150**	**31,0**	**153**	**26,1**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE	
Prof. Henco Bekkering	Partner/director	HKB Stedebouwkundigen	Rotterdam/ Groningen	NL
Prof. Eric Luiten	Advisor on Spatial Quality	Province of South Holland	The Hague	NL
Prof. Han Meyer PhD	Chairman Board	International New Town Institute	Almere	NL
Prof. Joost Schrijnen	Director of Spatial and Mobility Planning	Province of South Holland	The Hague	NL
Prof. Dirk Sijmons	Owner and Director	H+N+S Landscape Architects	Utrecht	NL
Meta Berghauser Pont PhD	Owner and Director	PERMETA architects	Amsterdam	NL
Prof. Winy Maas	Co-founder, Director	MVRDV Architects	Rotterdam	NL
Rene van der Velde	Landscape architect	Strootman Landscape Architects	Amsterdam	NL
Prof. Maurits de Hoog	Senior Urban Advisor	Urban Planning Department	Amsterdam	NL

3 Research environment and embedding

3.1 Embedding

The Urbanism research group is integrated into three layers of the wider academic and practice communities:

- Firstly, in Dutch urbanist networks, by, for example, hosting the annual Foundation for Lectures on Intensive and Multiple Land Use (sLIM) which presents national and international experience to a Dutch audience, and collaborating with other Belvedere Chairs in Cultural History and Design at VU University Amsterdam and Wageningen University;
- Secondly, in European networks on urban design, landscape architecture and planning, by, for example, organising the International Review of the *Randstad 2040* statement in cooperation with the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM), participating in the Association of European Schools of Planning (AESOP), hosting the European PhD workshop on Pubic Space, cooperating with three other universities in the European Masters in Urbanism, and through the Why Factory, the think tank on urban futures;
- Thirdly, in wider international networks in Asia, Latin America and North America by, for example, initiating and contributing to the International Forum on Urbanism, the Alfa-Ibis programme with Latin America; hosting guest researchers and international summer schools on design and planning, such as the Randstad 2040 school; and presenting keynote lectures at international conferences.

3.2 Number and affiliation of guest researchers

In 2009 alone, the *Urbanism* research group hosted 79 guest researchers, 39 of whom are conducting a PhD. The current guest researchers hail from a wide range of countries and are a very important means of maintaining contact with partner universities. They include Prof. Gabriel Dupuy (Université de Paris I-Panthéon-Sorbonne), Prof. Juval Portugali (Tel Aviv University), and Prof. Nikos Salingaros (University of Texas). Among the guest are Prof. Paul Drewe and Prof. Jurgen Rosemann (National University of Singapore).

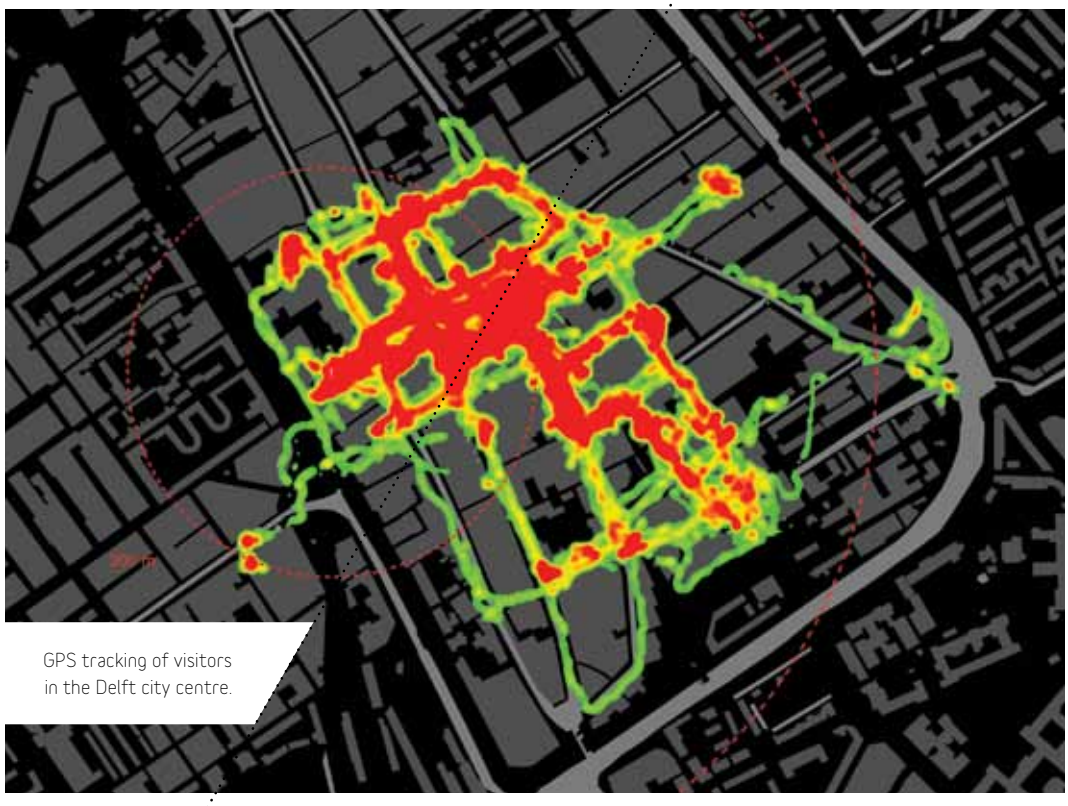
In addition, Urbanism has hosted visiting PhD and post-doctoral researchers from many countries, including in 2008, a university funded one-year visiting fellowship for the appointment of Associate Prof. Zhengnan Zhou of Tsinghua University in China. This later led to a joint TU Delft - Tsinghua research bid to the NWO Joint Scientific Thematic Research Programme (JSTP).

3.3 International and national positioning

The Urbanism research group has an exceptionally strong national and international presence. The faculty stakeholder analysis revealed that the *Urbanism* group has a very good or excellent reputation. Though there are only a few other research groups with a similar composition to *Urbanism*, the individual disciplines are aware of their competitors at home and abroad. The particular mix of disciplines (design, engineering and policy) and the quality of research outputs are undoubtedly important factors in the recruitment of Master's and PhD students.

The international standing of the *Urbanism* group is also confirmed by numerous invitations to contribute to international conferences or provide high-level consultancy services in other countries. For example, Urbanism played an important role in the highly successful 'Dutch Dialogue' assistance provided to New Orleans and South Louisiana, as acknowledged by US Senator Mary Landrieu on visiting TU Delft.

Mary Landrieu (Senior United States Senator from the State of Louisiana) receives during her 2009 visit to Delft the publication Dutch Dialogues, 2009.



GPS tracking of visitors in the Delft city centre.

3.4 Actual collaborations with stakeholders

We are involved in a very large number of collaborations, only a selection of which can be given here:

- American Planning Association (APA), Tulane University (New Orleans) and Harvard University (Boston Mass) on delta-urbanism (Meyer & Hoog).
- European Commission DG Agri, DG Regio, the Commission Inter-Service Group on Rural Development and numerous regional governments in nine countries of the EU through the EU 7th Framework Project: RUFUS (Nadin, Nes, Wandl).
- Ministry of Housing, Spatial Planning and the Environment (VROM), City of Amsterdam, City of Rotterdam, and Municipality Westland on Spacemate research (density in urban development) (Berghauser Pont and others).
- Nieuwland Erfgoedcentrum Lelystad and Provincie Flevoland on the Digital Polder Atlas of the Netherlands.
- RijksInstituut voor Volksgezondheid en Milieu (National Institute for Public Health and the Environment) (RIVM).
- United Nations Environment Programme and International Environment Technology Centre (IETC) on the project: 'Every Drop Counts' (Schuetze and others).
- International New Town Institute (INTI) and the Universities of Tel Aviv, Istanbul Bilgi, Istanbul Mimar Sinan, and the Istanbul Metropolitan Planning and Urban Design Centre on the application of complexity theory in urban development.
- Connected Cities Interreg IIIC €1.3 million network of 25 partners in 10 European countries, combining both local and regional authorities and research organisations (Hoeven, Spek).
- Why Factory collaboration with ABT Consultancy, Berlage Institute, Arup, DGMR Consultancy, the Netherlands Architecture Institute and many others (Maas).

3.5 Participation in consortia

- Adaptive Strategies (Dutch Knowledge for Climate Programme): TU Delft, City of Rotterdam, Arcadis Engineers, Deltares, UNESCO-IHE, INBO Architects and Dura-Vermeer Constructors.
- Atlas of the Dutch Water Defence Line: University of Amsterdam, Wageningen University and Atelier Rijksbouwmeester.
- Closed-Open Rijnmond (Knowledge for Climate Programme): TU Delft Faculty of Civil Engineering, HKV-Engineers, RIVM, ABF-research.
- Comparative Planning Systems and Methodology: German Academy of Spatial Research, Dortmund University, Turin Polytechnic University, Nordic Centre for Spatial Development Stockholm, KU Leuven, Technical University Prague and the University of Thessaly.
- Delta Flood Technology: Participants - TU Delft (ULab and representatives of the Faculty of Civil Engineering), University of Twente, TU Eindhoven, Wageningen University, Deltares, UNESCO-IHE.
- European Planning Systems (for National Housing and Planning Advice Unit, UK): De Montfort University Leicester and advisors at HafenCity University Hamburg, University College Cork Ireland, and the Université de Bretagne Occidentale Brest, France.
- Rural Futures (RUFUS): Leibniz University Hannover, INRA INRA-SAD Mirecourt France, University of East Anglia UK, Lund University Sweden, Wageningen University, SPRINTconsult Germany.
- The Green City Calculator: City of Rotterdam, Rotterdam Climate Initiative, City of Almere, Ministry of Housing, Spatial Planning and the Environment, Dutch Green Building Council.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The quality of the urban environment is a determining factor in the social, economic and environmental performance of societies and the quality of life of their citizens. National and international research programmes are giving increasing focus to the engineering, design and policy questions prompted by these changes, for example opportunities arising from the Dutch government's *Report on Architecture 2008*, which adopts the policy to strengthen the position of *Urbanism*.

Research activity and skills in the *Urbanism* group are very relevant to these questions and often innovative in their approach. For example: research on urbanising deltas brings together urban design, spatial planning and civil engineering in an original and much- needed combined research project (Meyer and others); advanced tracking technologies are used to investigate pedestrian oriented urban designs (Spek and others); space syntax methodology has been applied to understanding neighbourhood security and archaeological remains (Nes); and a combination of quantitative, qualitative and mapping methods is informing strategies to improve the resilience of cities to climate change (Ronwiriyaphanich, Lin, Esch and others).

4.2 Significance of the contribution to the field

The *Urbanism* group is a major player within this field, employing an average of 65 FTE staff during the seven-year review period and dedicating an average of 30 FTE to research. Also, the research culture is relatively strongly embedded in *Urbanism* within the context of the Built Environment disciplines.

4.3 Coherence

Much progress has been made in strengthening the coherence of research within the *Urbanism group* by combining the efforts of staff skilled in urban and environmental design, landscape architecture and spatial planning. There are three research programmes: Randstad, ULab and Urban Landscape, which are currently being incorporated into research groups at the OTB Research Institute and the Why Factory. A new Chair in Politics and Design (from 2009) is giving particular emphasis to working across the design engineering and policy fields.

4.4 Quality of the scientific publications

The full list of outputs from 2003 to 2009 demonstrates a significant increase in the number of publications since 2003 with a peak in 2007. The trend in outputs mirrors changes in staff numbers dedicated to research. The overwhelming weight of publication is in books, book chapters and conferences with relatively few journal articles.

The Urbanism group is also playing a significant editorship role in peer-review journals: *Journal Design Research*, Inderscience (Klaasen) and *Planning Practice and Research*, Routledge (Nadin), *l'Architecture d'Aujourdhui*, Archipress (Maas); and in the book series Design, *Science and Planning*, Techne Press (Klaasen) and Research in Urbanism Series, IOSpress (Hoeven).

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

- Expansion of PhD programme with 90 PhD registrations and 44 doctoral degrees during the seven-year period, with scholarship funding from Alfa-Ibis, NWO, Nuffic and national and regional governments.
- Series of International Forums on Urbanism (IFOU) conferences *Modernization and Regionalization* (2006), *Permacity* (2007), *City and Water* (2008), *The New Urban Question* (2009).
- EU 7th Framework Project RUFUS: Rural Futures (2008-11), led by Leibniz University, Hannover with seven partners, and a €269K value to the Department of Urbanism.
- The first comprehensive survey and analysis of the formal properties of Dutch polder types resulting in an inventory of the 9000 polders in the Netherlands and publication of results in the now standard text in Dutch and English.
- The Green City Calculator that quantifies and compares the "greenness" of a city. This programme computes data from the city and turns it into an accessible, comparable and measurable statement on its sustainability.

KEY PUBLICATIONS

- Fernando Maldonado, A. M., 2008. Expanding networks for the urban poor: water and telecommunications services in Lima, Peru, *Geoforum*. Vol 39, No.6. Elsevier, Amsterdam, p. 1884-1896.
- Meyer H., 2009. Reinventing the Dutch Delta: Complexity and conflicts, *Built Environment*, Vol 35, No.1. Elsevier, Amsterdam, p. 432-451.
- Nadin, V. & Stead, D., 2008. European spatial planning systems, social models and learning, *DISP*. Vol 172, No.1. ETH, Zürich, p. 35-47 (shortlisted for AESOP best journal paper annual award).
- Steenbergen, C., 2003. *The Design Experiment of the Great European Gardens and Landscapes*, Birkhaüser, Basel.

KEY BOOKS OR CHAPTERS OF BOOKS

- Steenbergen, C., Reh, W., Nijhuis S. & Pouderoijen M., 2009. *De Polderatlas van Nederland, Pantheon der Lage Landen*, Thoth, Bussum.
- Drewe, P. Klein, J. L. and Hulsbergen, E. K. Fernandez Maldonado, A. M. and Nasrallah, R., 2008. *The Challenge of Social Innovation: in Urban Revitalization*, Techne Press, Amsterdam.
- Hooimeijer, F. & Toorn Vrijthoff, W. (eds.) 2007. *More Urban Water: Design and Management of Dutch Water Cities*, Taylor & Francis, London/Leiden.
- Read, S. J., Rosemann and J. van Eldijk (eds.) 2005. *Future City*, Spon Press, London.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

- sLIM-seminars for professional practitioners and policy makers 2004 – 2009: *Intensive Land-use and Public Space* (2004), *Living on the Edge* (2005), *Urban Densities* (2007), *Self-Organization and the City* (2008), *Urban Deltas* (2009).
- Connected Cities: An EU Interreg IIIC North-west Europe funded project exploring urbanism, sustainable transport and territorial cohesion. TU Delft was lead partner of 25. Results were published in five theme issues of the *Nova Terra* professional journal, NIROV. (Netherlands Institute for Spatial Planning and Housing), The Hague.
- Spatial Metro: An EU Interreg North-west Europe funded project investigating pedestrian mobility and city regeneration. Outputs included the book: Hoeven, F. D., van der, Smit, M. G. J. and Spek S. van der (eds.) 2008. *Street-level Desires: Discovering the City on Foot, Pedestrian Mobility and the Regeneration of the European City Centre,* TU Delft, Delft.
- The Why Factory, 2009. Visionary Cities, 12 reasons for claiming the future of our cities. NAi Publishers, Rotterdam.
- Dutch Dialogues cooperation resulting in the book: Meyer, H., Morris, D. & Waggonner, D. 2009. *Dutch Dialogues, New Orleans – Netherlands: Common Challenges in Urbanized Deltas,* Sun, Amsterdam.
- UNEP cooperation on water management resulting in the major report: Schütze T. (ed.) 2008. Every Drop Counts. *Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency.* United Nations Environment Programme – Environment Management Centre, Osaka/Shiga.

KEY DISSERTATIONS

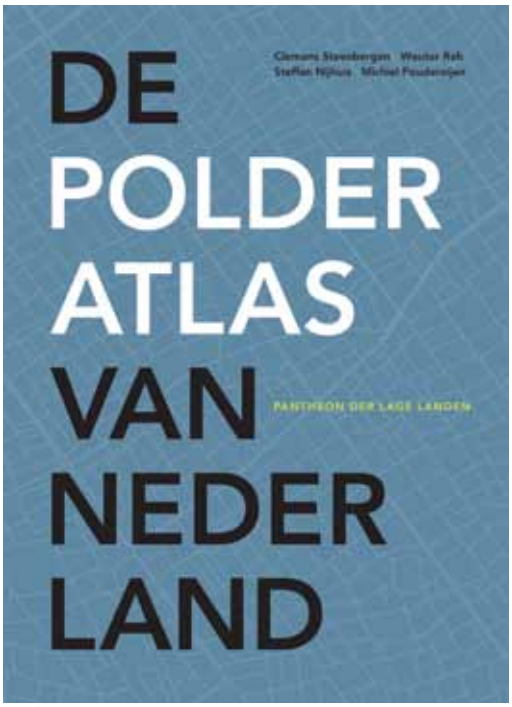
- Berghauser Pont, M.Y. & Haupt, P.A., 2009. *Space, Density and Urban Form.* Delft University Press, Amsterdam.
- Klaasen, IT (2003) *Knowledge-based Design: Developing Urban & Regional Design into a Science,* Delft University Press, Amsterdam.
- Pinzon Cortes, C.E., 2009. *Mapping Urban Form: Morphology studies in the contemporary urban landscape.* TU Delft.
- Spek, S. C. van der, 2003. *Connectors: the Way Beyond Transferring,* Delft University Press.

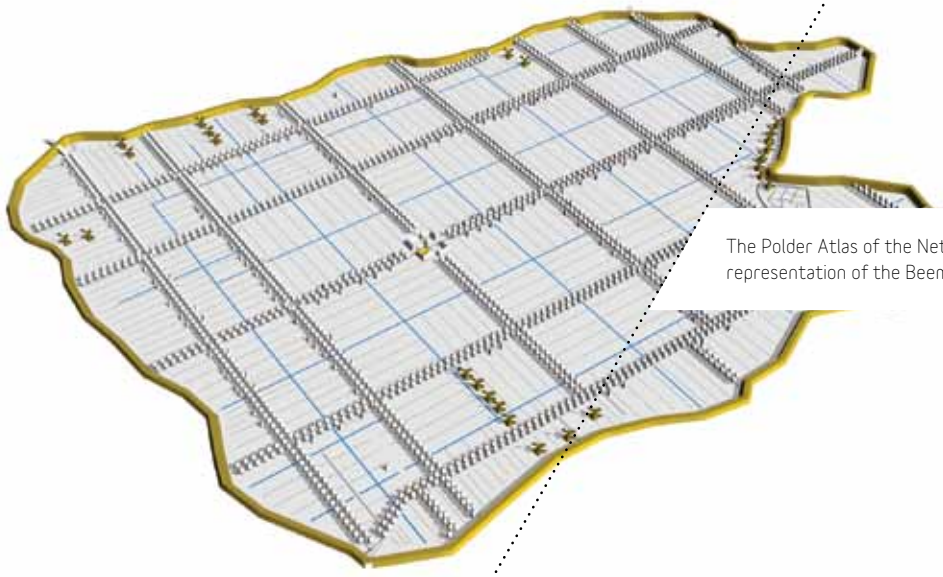
KEY EVENTS

- *Complexity Theories of Cities,* International Conference, 2009. Delft (Funded by the Royal Netherlands Academy of Arts and Sciences, KNAW).
- *Fifth International Space Syntax* Symposium, Delft, 2005.
- *International Symposium Polders: a Theatre of Land and Water,* International Architecture Biennale, Rotterdam, 2005.
- *Smart Architecture & Sustainable Built Environments (SABSE) 2009 International Conference,* 2009. Delft.
- Why Factory launch in Delft by the Dutch Minister of Education, Culture and Science, Ronald Plasterk, and the symposium *My Future City,* Delft, 2009.

KEY EXHIBITIONS

- Three expositions and public debates on Dutch Urbanism Today: *Transformations of the Urban Landscape,* 2003. *Working for the City,* 2005. *The Memory of the City,* 2006.
- International exhibition: *A Wider View on Cultural Landscape Challenges in Europe*, Apeldoorn 2008.





The Polder Atlas of the Netherlands, and a 3D representation of the Beemster polder.

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The agenda for Urbanism research is strongly conditioned by societal priorities. We recognise that patterns of physical urban development are critical to the objectives of economic competitiveness, sustainability and social cohesion.

In the Netherlands, researchers are working on socially relevant projects, such as the impact of climate change on urban and rural development, urban containment and dispersal, the well-being of people in the built environment, the post-war housing stock, accessibility to services, the quality of landscape and public places, and the effectiveness of tools for design and planning.

In other countries, many of our staff and PhDs are conducting research on urgent questions regarding the social and economic impacts of rapid urbanisation. The international staffing and orientation in Urbanism has provided a platform for international research including research-led studios organised by Read, Sepulveda, Vollebregt and others.

5.2 Key results/highlights

- *Dutch Dialogues: workshops, conferences, publication and advice contributing to reconstruction of New Orleans as a sustainable delta-city* (Meyer and de Hoog) (2008-2009).
- Editing of the collected papers of Nikos Salingaros in *Principles of Urban Structures;* and Gabriel Dupuy (formerly only available in French) in *Urban Networks - Network Urbanism,* Amsterdam, Techne Press, 2009 (eds. Klaasen & Schaick).
- Netherlands Architecture Institute commission for research and, analysis and building of 15 polder models.
- Rotterdam Stadsregio commission for comparative research into public open space provision in the metropolitan context.

5.3 Key knowledge contributions to practices and policies

- Schütze T. (ed.) 2008. Every Drop Counts. *Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency.* United Nations Environment Programme - Environment Management Centre, Osaka/Shiga.
- Berghauser Pont, M.Y. & Haupt, P.A. 2001/2009. *Spacemate Instrument for Describing Space Usage in Quantitative and Qualitative Terms,* (was first developed by Ermeta Architects in 2001 in cooperation with Bureau Parkstad but has been further developed, disseminated and applied through PhD research.
- Stead, D. & Nadin, V., 2008. *Spatial Planning: Key Instrument for Development and Effective Governance for the Countries of Central and Eastern Europe,* Geneva, United Nations Economic Commission for Europe, Geneva, UNECE (also translated into Russian and other languages).

5.4 Evidence of the appreciation of stakeholders

Strong evidence of stakeholders' appreciation can be found in the sources of funding from EU Interreg programmes, national ministries, provinces, municipalities, the Netherlands Architecture Fund, and NGOs. A reasonable amount of external income for client-led research has come from social actors who are prepared to pay for the work – evidence of the importance they assign to this research. Over the latter part of the review period we have set aside resources in the form of staff time to make more substantial funding bids on issues of social and academic interest defined by the group.

Delta urbanism research was commended by the US Senator Mary Landrieu after a Congressional delegation visited the Netherlands. Senator Landrieu reported in writing that she was 'inspired' by the innovative methods for water management.

Research outputs regularly lead to further work through follow-up projects for the same or new clients. For example, previous work on mapping polders is to be continued by the Nieuwland Heritage Centre and extended to the Province of North Holland.

Dutch Minister of Education, Culture and Science, Ronald Plasterk, opened the Why Factory laboratory.

The Ministry of Housing, Spatial Planning and the Environment (VROM) funds Urbanism's chair of Design and Politics.

5.5 Dissemination strategies

Important media for the dissemination of research includes: edited books through one of our three book series (such as Hulsbergen et al. (eds.), *Shifting Sense in Spatial Planning, Looking Back to the Future* (2005, Techne Press); and special editions of journals (e.g. *Nova Terra*). These media allow for the publication of personal research and conference papers and support the skills development of less experienced staff. PhD theses are published in collaboration with Techne Press and others are summarised on the web and held in the TU Delft repository. Independent projects communicate their results through websites such as www.connectedcities.eu, www.rufus-eu.de, www.spacemate.nl and www.thewhyfactory.com.

T?F publishes studies through a series of books in collaboration with NAi Publishers in Rotterdam and Tonik graphic design office in Amsterdam and through Films in collaboration with Wieland en Gouwens, animators in Rotterdam and the BBC in London. It discusses them through television programs with the VPRO in Hilversum and exhibitions in different places (in 2008: Netherlands Architecture institute, Hong Kong Design Institute. In 2009: NAI and Aedes Gallery Berlin).

5.6 Evidence of impacts

Urbanism research is cited in other academic and professional publications. Books and dissertations are sold internationally on a commercial basis by publishers keen to continue working with the group. Evidence is also found in the numbers attending exhibitions, such as the 35,000 visitors who came to see Luiten's *A Wider View on Cultural Landscape Challenges in Europe* in Apeldoorn in 2008.

5.7 Commissioned research by societal actors

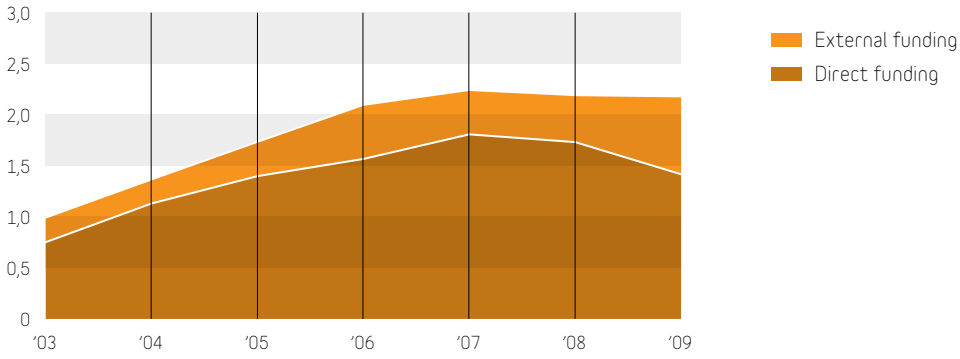
- American Planning Association, City of New Orleans and The Netherlands Embassy in Washington DC, USA: *Dutch Dialogues.*
- National Housing and Town Planning Advisory Unit, UK: *European Planning Systems and their Impact on the Provision of Housing.*
- Municipal Office for Spatial Planning Amsterdam (DRO): *New Waterscapes in Amsterdam.*

Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	752	76%	1,131	83%	1,399	81%	1,567	75%	1,808	81%	1,730	79%	1,415	65%
External funding	241	24%	236	17%	336	19%	530	25%	435	19%	460	21%	763	35%
TOTAL FUNDING	**993**	**100%**	**1,367**	**100%**	**1,735**	**100%**	**2,097**	**100%**	**2,243**	**100%**	**2,190**	**100%**	**2,178**	**100%**
EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	768	88%	1,092	89%	1,260	85%	1,551	91%	2,036	90%	2,080	90%	1,619	84%
Other costs	101	12%	132	11%	230	15%	161	9%	216	10%	232	10%	299	16%
TOTAL EXPENDITURE	**869**	**100%**	**1,224**	**100%**	**1,490**	**100%**	**1,712**	**100%**	**2,252**	**100%**	**2,312**	**100%**	**1,918**	**100%**

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	2	0	0	4	1	1	3	0	6	0	2	0	2	0
Non-refereed articles	0	0	2	0	1	0	7	0	3	0	2	0	9	1
Books	3	1	8	3	16	4	12	0	19	0	18	1	17	4
Book chapters	38	6	28	13	80	30	79	13	64	7	69	16	61	10
PhD-theses	1	3	3	2	2	0	2	0	0	4	4	3	2	2
Conference papers	25	14	39	6	64	20	67	12	85	6	58	1	49	11
Professional publications	44	1	38	29	53	15	35	9	54	5	46	5	46	2
Editorships journals/book	8	3	4	4	15	2	13	3	15	13	18	2	15	0
TOTAL PUBLICATIONS	121	28	122	61	232	72	218	37	246	35	217	28	201	30

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2001	1	1	2	0	0%	2	100%	2	100%	2	100%	2	100%	0	0%	0	0%
2002	0	2	2	0	0%	1	50%	1	50%	1	50%	1	50%	0	0%	1	50%
2003	3	3	6	0	0%	0	0%	3	50%	3	50%	3	50%	3	50%	0	0%
2004	4	0	4	1	25%	1	25%	1	25%	1	25%	1	25%	1	25%	2	50%
2005	2	2	4	0	0%	0	0%	0	0%	0	0%	0	0%	4	100%	0	0%
TOTAL	10	8	18	1	6%	4	22%	7	39%	7	39%	7	39%	8	44%	3	17%

Table c. PhD-students with scholarship or external funding

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	1	1	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%	0	0%
2001	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2002	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2003	1	0	1	0	0%	1	100%	1	-	1	100%	1	100%	0	0%	0	0%
2004	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2005	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
TOTAL	1	1	2	0	0%	1	50%	1	50%	1	50%	2	100%	0	0%	0	0%

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2004	UNESCO International Conference on Sustainable Land Use Decisions	Nadin	Beijing	CN
2006	Korea City Forum "everyone's ideal city"	De Bois	Seoul	KR
2007	Int Symp Architecture and Renewable Energy Sources, Ass. of Hungarian Architects (MÉSZ)	Schuetze	Budapest	HU
2008	2nd WSEAS/IASME Int Conf Energy planning, energy saving, environmental education	de Jong	Corfu	GR
2008	Conf Security of Global Port Cities, Indiana University	Meyer	Bloomington	US
2009	Int Conf on Cultural and Ecological Landscapes - CYUT	Luiten	Taichung	TW
2009	Sustainable architecture and urbanism conference, Univ of Petra	van Nes	Petra	JO

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2005	5th international space syntax symposium	Organisation, chair	van Nes	Delft	NL
2006	International Forum on Urbanism 2006	Organisation, chair	Rosemann, Bekkering et al.	Beijing	CN
2008	German Academy for Spatial Research (ARL) Seminar Series on Comparative Planning Systems, Delft, Torino, Dortmund	Joint convener	Nadin, Stead	Hannover, Turin, Delft	EU
2008	SASBE2009 Smart and Sustainable Built Environments, CIB	Co-chair	Dorst	Delft	NL
2008	A Wider View on Cultural Landscapes in Europe, Triënnale Apeldoorn	Conference director	Luiten	Apeldoorn	NL

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2007	Urbanism on Track - Expert meeting tracking technologies	Organiser	Spek, Schaick	Delft	NL
2008	International expert meeting Randstad 2040	Organiser	Hoeven, Nadin	Delft	NL
2008	IFLA world conference in the Netherlands	Chair	Luiten	Quebec	CA
2008	Workshops Reconstruction New Orleans 'Dutch Dialogues'	Co-leader Dutch delegation	Meyer	New Orleans	US
2009	Opening of the Why Factory / Symposium "My Future City	Organiser	Maas	Delft	NL

Table d. Involvement in exhibitions

YEAR	EVENT	ROLE	WHO	WHERE	
2005	Polders. A Theatre of Land and Water IABR	Curator	Steenbergen	Rotterdam	NL
2006	The Memory of the City	Curator	Meyer	Delft	NL
2008	A Wider View on Cultural Landscapes in Europe, Triënnale Apeldoorn	Curator	Luiten	Apeldoorn	NL
2008	Triennale Landscape Architecture 2008, consisting of 12 exhibitions	Board member	Sijmons	Various	

Table e. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2007	Award for Best Paper at the Planning Cultures Int Symp	HafenCity Univ	Nadin/Stead	Hamburg	DE
2009	Gerd Albers Award 2009 Best publication: 'New Rhythms of the City'	ISOCARP	de Hoog	The Hague	NL

Table f. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2006	The Netherlands Architecture Fund/Nieuwe Hollandse Waterlinie Belvedere programme: Design Strategies and Design Grammar NHW	Supervisor	Steenbergen	Netherlands	NL
2007	Bartlett School of Planning, University College London	Honorary Fellow	Stead	London	UK
2007/8	National University Singapore (NUS)	Visiting professor	Meyer	Singapore	SG
2008/9	Harvard University Graduate School of Design (GSD)	Visiting professor	Sijmons	Harvard	US

Table g. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2007	SuSanA - Sustainable Sanitation Alliance	Member	Schuetze		
2009	Dutch professional organisation of urban designers and planners (BNSP)	Board member	Zonneveld	Amsterdam	NL
2009	Directors Dutch Schools of Landscape Architecture foundation	Board member	van der Velde	Netherlands	NL

Table h. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2005	Bodembescherming in Behoud en Ontwikkeling - mid term review	Cmte member	Luiten	The Hague	NL
2008	EU 7th Framework Programme (FP7)	Evaluator	Stead	Brussels	EU
2009	STW Open Technology Programme	Evaluator	van der Hoeven	Utrecht	NL
2005/>	Netherlands Architecture Fund	Advisory cmte	Velde	Rotterdam	NL
2009	Luxembourg National Research Funds Core Programme	Reviewer	Nadin	Luxembourg	LU

Table i. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/>	Journal of Design Research - human aspects as central issue of design	Editor-in-Chief	Klaasen	Olney	UK
2004	Scientific series Design/Science/Planning (Techne Press)	Editor	Klaasen	Amsterdam	NL
2003/>	Planning Practice and Research (Routledge)	Editor-in-Chief	Nadin	Oxford	UK
2003	Town Planning Review (Liverpool Univ Press)	Editorial board	Nadin	Liverpool	UK
2005	European Journal of Transport and Infrastructure	Editorial board	Stead	Delft	NL

Table j. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003	Blauwe Kamer - Journal for Landscape	Co-editor, Chief-advisor	Luiten	Wageningen	NL
2003/>	Nova Terra NIROV	Editor	Hoeven	The Hague	NL
2008/>	Vitale Stad (Vital City), trade journal urban renewal and vitality	Editor in Chief	de Bois	Amsterdam	NL

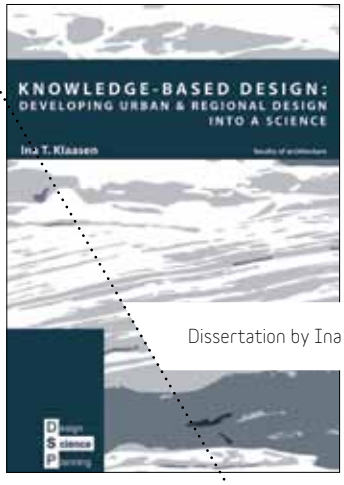
Table k. Role in practice and policy making

YEAR	FIRM/ORGANISATION	ROLE	WHO	WHERE	
2003	Een Cultuur van Ontwerpen	Ministerial Advisor	Sijmons	The Hague	NL
2003/>	Dutch Architects Register	Vice chair of board	Bekkering	The Hague	NL
2009	Advisory team City of Dublin, Ireland	Member	Schrijnen	Dublin	IE
2009	Kunst van Leven - Modernisering Monumentenzorg	Ministerial scientific advisor	Luiten	The Hague	NL
2008	City of New Orleans	Scientific Advisor	Meyer	New Orleans	US

9 Next generation

9.1 Objectives and institutional embedding

Over the review period, the *Urbanism* group has pursued an explicit objective to expand PhD research with the result that it now has the largest number of PhD candidates and successful doctoral degrees in the faculty. The objective of expansion has been achieved with a very positive impact on the group. Numbers have grown from 12 in 2003 to 52 in 2009. The ratio of PhD candidates to research FTEs was 2:1 in 2009. The new objective is to maintain PhD numbers at this level but to widen the pool of supervisors. Since 2008, there has been a decline in the proportion of candidates on TU Delft salaries and a sharp increase in those funded by scholarships, including grants from Nuffic, the China Scholarship Council, INTI, and national governments.



Dissertation by Ina Klaasen PhD.

Increasing PhD numbers, applications and the wider variety of funding mechanisms has prompted the introduction of many changes in the management of the PhD process. All PhDs undergo a first-year peer-review procedure with external professorial level panel members. In 2008, a departmental level admissions procedure was introduced which involved the collective scrutiny of applications, together with a more systematic approach to PhD training. These are all important precursors to the new Faculty Graduate School. The group fully supports the creation of the Graduate School, which will provide a platform for PhD training, interaction of PhDs across the faculty and debate on themes relevant to architecture and the built environment.

9.2 Structure of programmes

PhDs are organised in a four-year programme. In the first year, the candidate prepares a comprehensive research proposal and a long paper, which is assessed by a professorial panel following a public presentation. The European Postgraduate Master's in Urbanism programme (EMU) provides a pre-PhD track for exceptional students who may graduate from EMU and move directly into PhD research. For these candidates the PhD can be completed in three years.

During the review period, PhD training has been based primarily on the TU Delft-wide provision, including courses on generic PhD skills with needs determined on an individual basis. Candidates have also been able to join other courses in the Master's and EMU programmes including those on methodology. A few candidates have taken courses at other universities. From 2008, the *Urbanism* group introduced its own course, with the help of external consultants, specifically to support academic writing skills. In future the Graduate School will provide courses introducing students to the rudiments and methods of design, urban studies and technical research. The programmes incorporate a variety of existing teaching forms, including advanced EMU, MSc and graduation studio courses and seminars.

9.3 Supervision

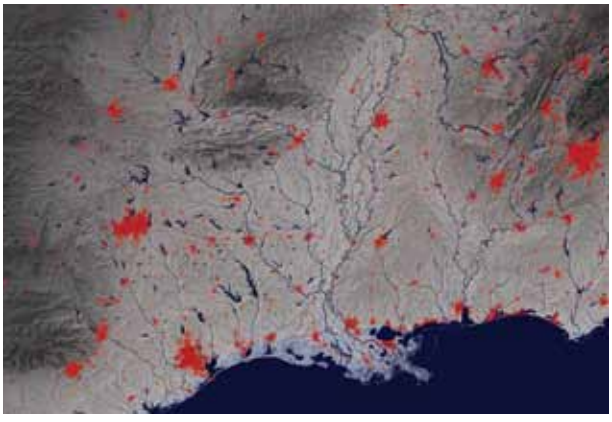
PhD candidates typically have a chief supervisor and a daily supervisor. They are given assistance in finding the supervisor best able to supervise the research. In special cases the school may assign a second supervisor. Supervisors may only be changed under exceptional circumstances when judged beneficial to the research performance and dissertation. TU Delft provides training for supervisors.

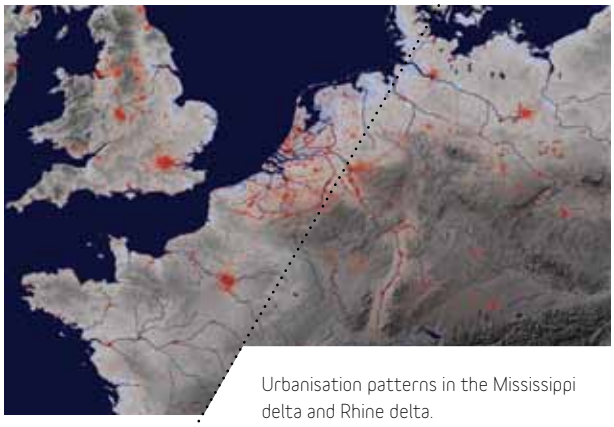
9.4 Success rates

Doctoral study is a significant and successful part of Urbanism's research output. From 1999 to February 2010, 105 candidates started a PhD in *Urbanism*; 39 have obtained their doctoral degrees, 14 withdrew from the programme and 52 are still working towards their PhD. The output and recruitment of PhD candidates to the *Urbanism* group has been fairly even across the period from 1999. A comprehensive review of progress at the end of 2009 indicated that of the 52 candidates still doing research, 29 percent were having difficulties making progress. The group has reviewed supervision and support to these students and is trying to ensure that they get additional support.

9.5 Educational resources

The faculty has excellent study facilities in the university and faculty libraries, and special facilities such as computer hardware and software.
The admission, reception and induction of international PhDs have not always been trouble-free and in 2009, the university introduced new procedures and an induction course for all PhDs.





Urbanisation patterns in the Mississippi delta and Rhine delta.

10 Viability

10.1 Resource management

Resource management is undertaken by the department's management group – the daily board and the core chairs. During the review period, the Urbanism group was led by a group of professors with wide and complementary experience. Retirements in the latter part of the period have required consolidation and a new 'chair plan', identifying priorities for future appointments, including leadership of the international development and environmental design areas.
There is fairly close correspondence between the core chairs and the research programmes, which assists in management. There has been good organisation of resources around joint publications but some fragmentation of research effort in relation to external funding bids.
A falling staff resource overall has required more attention to resource and time management.
We are working towards a necessary change in culture with less discretion in research activity for individual staff, allocation of resources in line with actual outputs, and closer monitoring through the appraisal (R&D) process.

10.2 Available infrastructure

In addition to the faculty's overall infrastructure, the Urbanism group calls on good, and in places, exceptional research infrastructure. Of note is the extensive digital library of landscape analysis and design drawings from the Netherlands and abroad. It contains a thematic GIS database of maps and is equipped with the most advanced hardware and software, putting it amongst the best facilities in a faculty of architecture in Europe.

10.3 Innovative capacity

Research outputs demonstrate the innovative capacity of staff, including a willingness to work across traditional boundaries. Other important contributions to innovative capacity come from the body of PhD and Master's students who heighten our awareness of current problems and future possibilities. Urbanism has previously been very successful in winning funding for innovative work from the TU Delft Centre for Sustainable Urban Areas.

Opening of The Why Factory attended by Ronald Plasterk (Dutch Minister of Education, Culture and Science), standing left of Prof. Winy Maas in Glasshouse East, 2009.

SWOT analysis

STRENGTHS

Our location and knowledge of the Dutch 'landscape metropolis' the Randstad, and the reputation of Dutch urbanism are major advantages. We have an international body of committed researchers with links to domestic practice and global networks, a large body of PhDs, and an emphasis on research-driven Master's studios.
There is a breadth of disciplinary expertise in design, engineering and policy in urban studies; strong integration of research and social concerns through client-led research.
Our key resources are staff time and enthusiasm; a steady stream of research commissions; and good specialist design and media facilities in the faculty.

WEAKNESSES

Experience and skills in peer-reviewed publications and academic research bidding is concentrated among a few people. The research programmes are not managing research activity as closely as we would like.
We need to focus more on the proportion of women in senior positions, the visibility of the research programmes, planning and organising of research teams around bidding opportunities, the management of PhDs, and support for research using GIS.
There is a risk of becoming over-committed to short-term client-led research with insufficient focus on proactive bidding and publication.

OPPORTUNITIES

There is increasing interest in the vital contribution that urbanism can make to adaptation for climate change, building urban resilience, and avoiding the costs of poorly coordinated urban development.
The strong interest in Dutch expertise in urbanism and planning from elsewhere in Europe, Asia and Latin America continues to be a major advantage.
Research funding bodies are paying more attention to urban development.
The planned merger of OTB and the faculty will bring research staff with more experience in contract funding, academic publishing, and scientific expertise into the research group.
The inclusion of the Why Factory brings practical experience.

THREATS

Some competitors are more productive in peer-reviewed publications and in accessing funding.
The great losses in research materials and time suffered as a result of the 2008 fire remain an issue for some staff.
Decreasing resources may squeeze out research activity, prevent us from making a change in culture and damage PhD completion rates.
There are competing demands from teaching, speculative bidding for short-term income generation and many international links.
We have fewer resources for promoting new research. Additional demands are made on departmental budgets. Promotion of excellent PhD students to academic posts is rarely possible.
We risk losing excellent young researchers.

12 Strategy

A reorientation of research activity in the *Urbanism* group has begun and will continue. This will require greater focus on academic programme-led research projects, which in turn means much more responsive mode external funding bids. There will also be a rebalancing of professional publication and academic peer-reviewed publication. This is a change in emphasis rather than a transformation; we must continue to make the most of what we do best.

The necessary steps to achieving this shift in balance are

1. to give revised research programmes (which will be combined with the OTB programmes) a more significant and visible role in the creation of research teams, the determining of individual research areas and the recruitment of PhDs;
2. to strengthen the 'research culture' by further developing staff competencies in academic publication, contract funding and PhD supervision;
3. to consolidate our extensive international relationships and use the reputation of *Urbanism* at TU Delft and our international studios to access or create strong multinational research groups; and
4. to improve the cohesion of the *Urbanism* PhD community, widen the pool of supervisors, and increase monitoring and support within the framework of the Graduate School and TU Delft PhD initiatives.

Professor Louis Albrechts addresses the International Expert Meeting Randstad 2040, 2008.

Innovations in the Management of the Built Environment

RESEARCH LEADERS: Prof. Hans Wamelink PhD & Prof. Hans de Jonge
KEY RESEARCHERS: Prof. Monika Chao Duivis PhD, Tom Daamen PhD, Fred Hobma PhD, Peter Paul van Loon PhD, Matthijs Prins PhD, Hilde Remøy PhD, Jo Soeter PhD, Leentje Volker PhD, Theo van der Voordt PhD, Friso de Zeeuw

1 Objectives and research area

1.1 Vision, mission and objectives

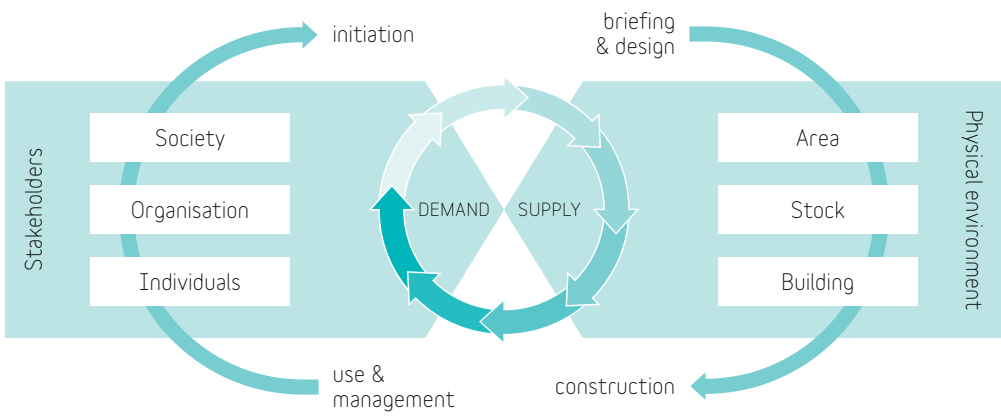
Vision: In order to attain a built environment that performs well in terms of spatial, functional and technical quality, cost effectiveness and sustainability, it is necessary to incorporate the interests, requirements and constraints of the various stakeholders in all phases of the lifecycle (from initiation to use) and at different levels of scale (buildings, real estate portfolios and urban areas) (figure 1). The "Innovations in Management of the Built Environment" research group (IMBE) therefore combines knowledge from public administration, strategic management, economics, law, mathematics, sociology and psychology with insights from the field of design and engineering – mainly architecture, urbanism, and building technology.

Mission: The IMBE research group aims to encourage and evaluate innovations in the management of the built environment and contribute to the best possible alignment between supply and demand by developing and testing evidence-based knowledge on a) performance requirements and constraints, adding value through real estate, and successful and sustainable real estate strategies (product-oriented research); and b) the planning, briefing, design, construction, management and redevelopment of the built environment (process-oriented research).

Objectives: We aim to stimulate innovative and evidence-based decision making on the part of clients, developers, investors, architects, engineers, consultants, policy makers, product developers, contractors and users involved in the initiation, design, construction and the development or redevelopment of the built environment:

1. to contribute to the best possible alignment between the supply of relatively static real estate and the dynamic market demand for up-to-date buildings, infrastructure and public space;
2. to promote and facilitate cooperation, innovation and integration in planning, design and construction processes of buildings and urban areas.

Figure 1. Managing the process of accommodating people, activities and connections.



We aim to become a recognised key academic player in this field by delivering theories, conceptual frameworks, (benchmark) data, key performance indicators, guidelines, process models and decision-support systems based on empirical research and research-by-design.

1.2 Societal concerns and issues

The research of the IMBE group focuses primarily on utilities such as offices, educational institutions, retail and leisure facilities, healthcare facilities and urban infrastructure. A substantial proportion of this stock is vacant (currently about 15%) and/or is in need of transformation, renovation or demolition. The research includes post-occupancy evaluations, case studies into briefing, designing and construction of real estate and urban area development strategies, the analysis and forecasting of market trends, scenario analyses, feasibility studies, valuation research and stakeholder analyses. Research questions include, for instance:

- Which choices should policy makers, clients, investors, developers and designers make in order to provide enduring high-quality performance of the built environment?
- What are the main performance requirements with regard to sustainability, affordability, accessibility, satisfaction, health and well-being in order to add value for society?
- How can integration and collaboration be managed during design and construction to attain the best possible quality with respect to time, money, information and other constraints?

Supporting Corporate Identity by Real Estate.

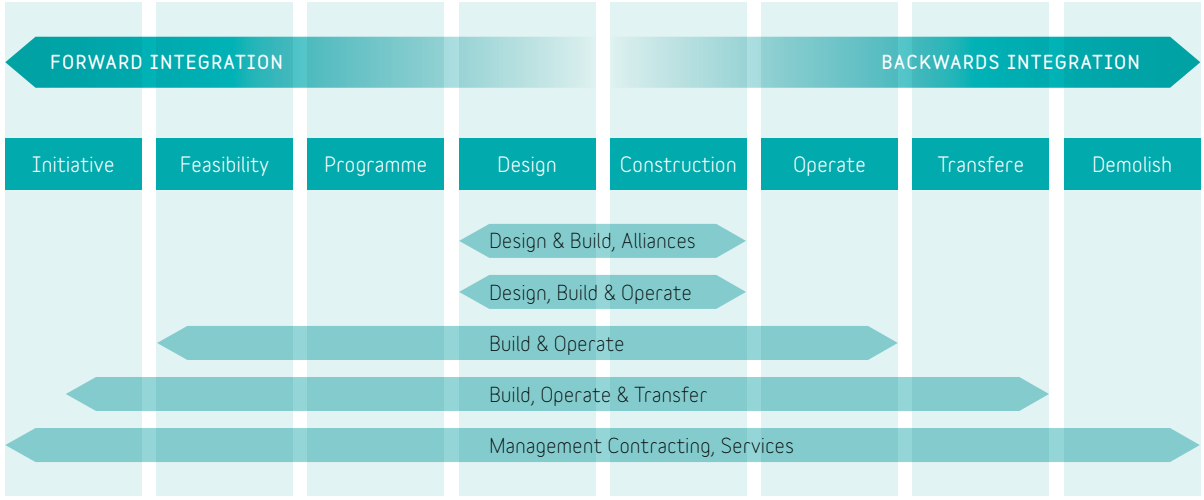
1.3 Position

The particular contribution of our group to the field is its integrated and multidisciplinary approach to the design, development and maintenance of buildings and urban areas. In order to achieve the optimum connection between the process of planning, design and construction and the quality of the product, we conduct in-depth studies of the phases prior to design (initiation and briefing, exploring performance criteria, stakeholder analysis) and after construction (maintenance, renovation, transformation) and of the processes of partnership and innovation during the design and construction phase, with particular regard to spatial quality, utility value, stakeholder needs and constraints, legal issues and decision making.

1.4 Research Area

- Real Estate Management
- Design & Construction Management
- Urban Area Development
- Stakeholders
- Design Quality
- Economics of the Built Environment
- Life Cycle Approach
- Sustainability
- Decision Making

Figure 2. Development and testing of new ways of organizing building processes



2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	22	6,6	22	7,0	21	6,6	26	7,8	27	8,3	28	8,9	30	9,6
Non-tenured staff	2	0,6	2	0,6	5	1,9	8	3,1	6	2,2	8	2,9	4	1,0
PhD-students	7	5,0	7	5,4	12	7,9	11	7,8	11	6,9	11	8,2	7	4,9
Guests	6		10		9		7		19		24		31	
TOTAL RESEARCH STAFF	**37**	**12,2**	**41**	**13,0**	**47**	**16,4**	**52**	**18,7**	**63**	**17,4**	**71**	**20,0**	**72**	**15,5**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE
Theo van der Voordt PhD	Senior researcher	Center for People and Buildings	Delft NL
Prof. Hans Wamelink PhD	Leading Professional	DHV b.v.	Amersfoort NL
Prof. Hans de Jonge	Managing director	Brink Groep b.v.	Leidschendam NL
Prof. Monica Chao-Duivis PhD	Managing director	Dutch Institute for Construction Law	The Hague NL

2.1 Staff with part-time position in external organisations (architecture firms, policy bodies, consultancy)

Most of our professors are also board members of independent institutions or Dutch consultancy firms: de Jonge (CEO Brink Groep); Wamelink (former CEO/owner InFocus, leading professional DHV); de Zeeuw (CEO Bouwfonds); Chao-Duivis (CEO IBR); Hordijk (former CEO ROZ IPD); Keeris (CEO Keeris Vastgoed-Consultancy/Fontys Hogeschool). Some researchers run their own consultancy firms on a part-time basis (Lousberg, Vrijhoef, Arkesteijn, van Doorn), have worked for consultancy firms (Chen, Franzen) or have sat on the advisory board of a public or private organisation (den Heijer, Prins, van der Voordt) in order to apply research findings in entrepreneurship and valorisation.

3 Research environment and embedding

3.1 Embedding

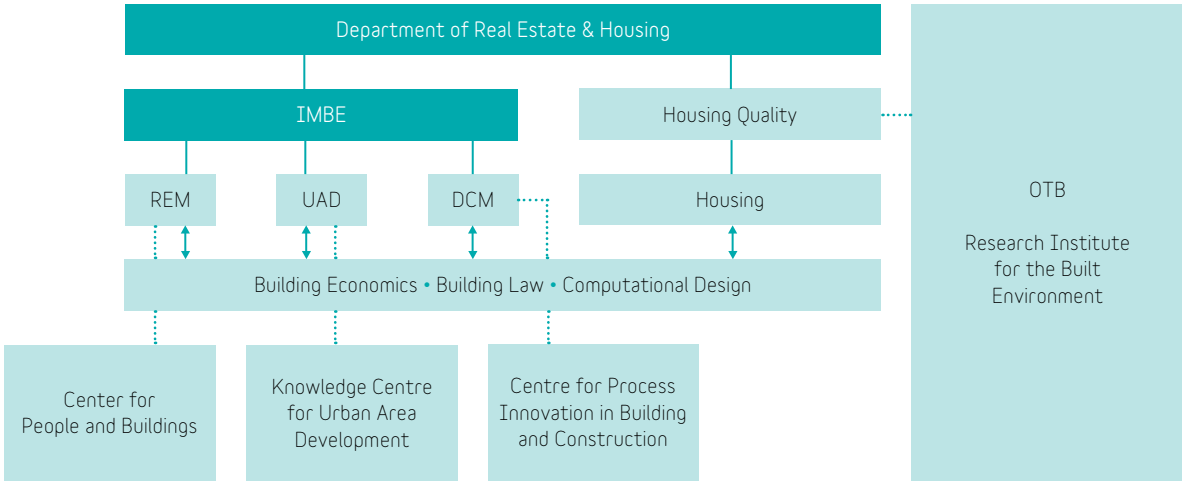
The IMBE research group has close connections with the Housing Quality research group of the same Real Estate & Housing Department). We run a number of joint projects with Architecture (e.g. on the Transformation of Vacant Buildings and the Future Role of the Architect), Urbanism (e.g. the Knowledge City and Corporations & Cities) and Building Technology (e.g. Sustainability) and work with the Delft Faculties of Industrial Design Engineering (e.g. Deciding about Design Quality), Civil Engineering and Geosciences (e.g. Supply Chain Integration), and Technology, Policy and Management (e.g. Environmental Law).

In order to improve our connections with practitioners (demand and supply side), extend our research capacity, and support the multidisciplinary research approach, we have founded three knowledge centres together with external parties:

1. The *Center for People & Buildings* (CfPB) was founded with the Governmental Building Agency and ABN AMRO Bank in 2001. Its research focuses on the relationships between people, working processes and places of work.
2. The *Centre for Process Innovation in Building and Construction* (CPI) was founded in 2002 with the Faculty of Civil Engineering and Geosciences and TNO. The centre's objective is to promote innovation in the area of building processes throughout the building industry.

Figure 3. Position of IMBE in the organisational structure of RE&H

The Department of Real Estate & Housing runs two research groups (IMBE and Housing Quality). It includes four sections: Real Estate Management (REM), Urban Area Development (UAD), Design & Construction Management (DCM) and Housing (H). Three fundamentals deliver input to all sections. The department is strongly connected to three knowledge centres and the OTB Research Institute.

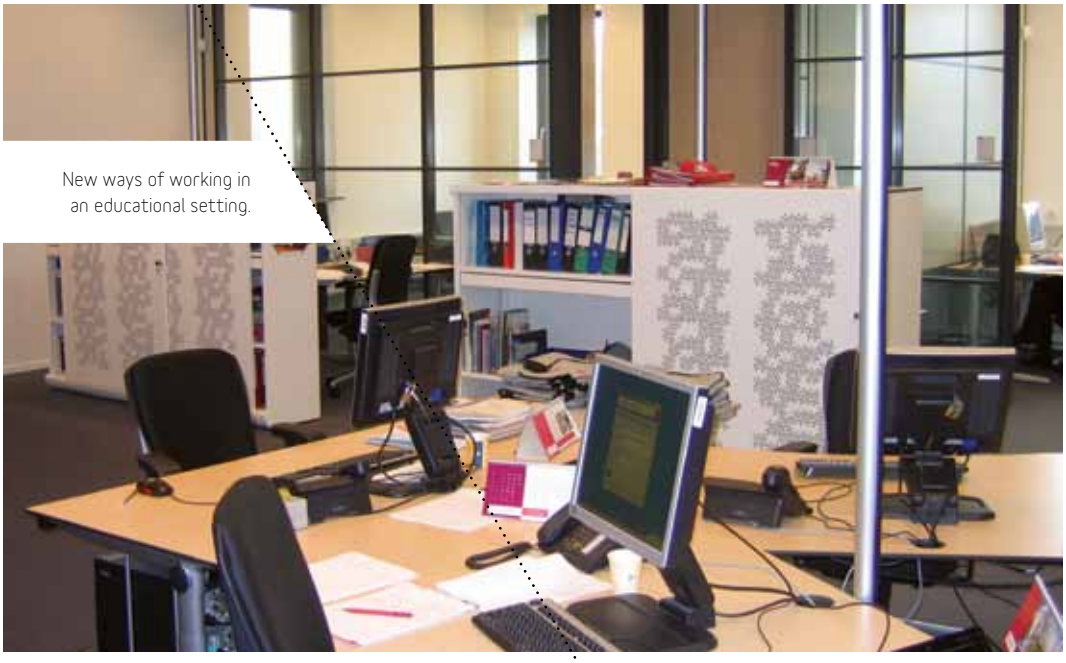


3. The *Knowledge Centre for Urban Area Development* (SKG) was founded in 2006 with the Ministry of Spatial Planning (VROM), TU Delft and other public and private partners. The research focuses on the formation of partnerships between public and private partners and interaction between different knowledge fields such as real estate, design, process management and finance.

The IMBE group works with other universities and business schools in the Netherlands. It also has close working relationships with universities in the USA, the UK, Asia and Brazil. Our researchers participate in international networks such as the International Council for Building Research Studies and Documentation (CIB), the Association of European Schools of Planning (AESOP) and EuroFM.

3.2 Number and affiliation of guest researchers

A number of our staff members are visiting professors at other universities, just as we receive external academic staff visits to our group in Delft from time to time, such as Rick Peiser (Harvard), Francis Duffy (DEGW), Rachel Luck (University of Reading), Spiro Pollalis (Harvard), Siri Hunnes Blakstad (Norwegian University of Science and Technology Trondheim), and Jonathan Barzelai (Dalhousie University Canada).



New ways of working in an educational setting.

3.3 International and national positioning

The international position of the research group can be demonstrated by:

- the invitation of IMBE staff members as (key note) speakers at international conferences such as CIB (Working committees W096, W104, W060, T57), the Association of European Schools of Planning (AESOP), the Association of Researchers in Construction Management (ARCOM), the eCAADe (European CAAD association).
- its organisation of workshops (ENHR- W19, Knowledge Management in Design Projects).
- its memberships of the editorial boards of national and international journals, such as Tijdschrift voor Bouwrecht, Building Innovations, Engineering Construction & Architectural Management Journal, International Construction Law Review, Journal of Corporate Real Estate, Facilities, and Real Estate Magazine.
- its memberships of professional organisations, such as the Royal Institute of Dutch Architects (BNA), the Design Research Society (DRS), EuroFM (European Facility Management Network), the VOGON (Association of Researchers in Real Estate), the CAAD Futures, the CAADRIA, the Royal Institution of Chartered Surveyors (RICS), the European Group for Organisational Studies (EGOS), the International Planning History Society (IPHS).
- its participation in steering groups, scientific committees, juries, professional boards and expert platforms.

3.4/5 Actual collaborations with stakeholders and participation in consortia

IMBE regularly collaborates with:

- TNO (Netherlands Organisation for Applied Scientific Research)
- Ministry of VROM
- Dutch Government Building Agency (Rijksgebouwendienst)
- Institute for Construction Law
- Regieraad Bouw
- the PSIBouw
- Bouwend Nederland
- the Forum Gebiedsontwikkeling
- Agentschap NL (formerly Senter Novem)
- Dutch municipalities
- institutions of higher education
- business schools
- universities
- housing providers
- consultancy firms
- contractors & developers

Internationally, we participated in an EU-funded project with Manchester University (Voluntary Agreements for Collaborative Working in the Construction Industry) and an educational project with the Faculty of Technology, Policy and Management (Blend XL). In co-operation with Urbanism, we applied for a FES programme and a FP7 proposal on Sustainable Urbanism in China.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The quality that distinguishes us is our multidisciplinary approach, which integrates the interests and constraints of various stakeholders over the whole life cycle in order to achieve a high-quality built environment from the social, cultural, functional, technological, legal and economic perspectives. We constantly seek to combine our fundamental research themes with issues that arise from the field in practice. Before 2003, we focused mainly on successful real estate strategies in the office and retail sectors, on design management, and on market analysis and forecasting. This was due to the academic and societal debates and demand for knowledge. The particular themes that we currently focus on are integrated urban area development, supply chain integration, information management systems, strategies to reduce and prevent vacancy, willingness to pay, and real estate strategies for higher education on a campus level. Future priorities will include the alignment of organisations and cities, integrated contracts, SMEs in construction, valuation studies, designing for flexible demand, real estate strategies of health care organisations and municipalities, and sustainability by transformation.

2010, the IMBE research leader prof. Hans de Jonge received a Royal Award ('Officier in de Orde van Oranje Nassau') for his valuable contributions to education, research, valorisation consultancy and debates in the field of real estate management.

4.2 Significance of the contribution to the field

The research group contributes to:

- Improved understanding of the spatial impact of trends on the labour market, organisational change, changing activity patterns and work flows, and technological innovations in communication.
- Concepts and theories with regard to identifying critical success factors for cooperation, innovation and integration in design and construction management processes.
- Ways to cope with a growing need for spatial quality and cost effectiveness, adding value through real estate management and design and construction management, and sustainability in a dynamic market.

We have contributed in the following areas:

1. Theory of and tools for performance measurement and added value of corporate and public real estate.
2. Methods to cope with vacancy and variations in the demand for real estate.
3. Ways to organise building processes successfully while integrating different phases of the design and construction process and the interests of different stakeholders.
4. Tools to support decision making in planning, briefing, design, management and the use of the built environment.

4.3 Coherence

The IMBE research group is divided into three units:

1. Real estate management.
2. Urban area development.
3. Design and construction management (Figure 2).

The researchers that represent the 'fundaments' of building law, computational design and building economics support all three units. Researchers meet on a regular basis during lunch presentations, unit meetings and (PhD) colloquia to discuss their work in progress, the academic and practical lessons to be learned, and the initiation of new research projects.

4.4 Quality of the scientific publications

The group publishes in both professional journals and double blind peer-reviewed international journals, such as:

- Cities
- Design Studies
- Design Issues
- Facilities
- Journal of Corporate Real Estate
- Journal of Property Investment and Finance.

Our staff have published a number of books with:

- Architecture Press (Elsevier)
- Taylor & Francis,
- Wiley-Blackwell
- IOS Press
- 010 Publishers
- Sun publishers

4.5 Results and outputs

KEY PUBLICATIONS

- Vries, J.C. de, Jonge, H. de & van der Voordt, D.J.M., 2008. 'Impact of real estate interventions on organisational performance.' *Journal of Corporate Real Estate*. Vol 10, No.3. Emerald Group Publishing Ltd., Bingley, p. 208-223.
- Volker, L., Lauche, K., Heintz, L. & de Jonge, H., 2008. 'Deciding about design quality: design perception during a European tendering procedure.' *Design Studies*. Vol 29, Elsevier, Amsterdam, p. 387-409.
- Keeris, W.G., 2008. 'A different look on risk by property investments.' *Journal of European Real Estate Research*. Vol 1, No.2. Emerald Group Publishing Ltd., Bingley, p. 151-161.
- Remoy, H. & Voordt, D.J.M. van der, 2007. 'A new life: conversion of vacant office buildings into housing.' *Facilities*. Vol 25, No.3/4. Emerald Group Publishing Ltd., Bingley, p. 88-113.
- Chao-Duivis, M.A.B., 2006. 'An analysis and comparison of the Dutch standard contract for integrated contracts (turnkey/design and build) and the FIDIC yellow book.' *International Construction Law Review*. Vol 23, No.4. Informa UK Ltd., United Kingdom, p. 450-478.

KEY BOOKS OR CHAPTERS OF BOOKS

- Emmitt, S., Prins, M. & Otter, A. (eds.), 2009. *Architectural management: international research & practice*. Wiley-Blackwell, Oxford.
- Soeter, J.P., Koppels, P.W. & Jong, P. de, 2009. *The future development in the Dutch construction market*. In: Les Ruddock (ed.), Economics for the modern built environment, p. 229-248. Taylor & Francis/Spon Press, London.
- Loon, P.P. van, Heurkens, E., Bronkhorst, S., 2008. *The Urban Decision Room; an urban management instrument*. IOS Press, Amsterdam.
- Hooimeijer, F. & Toorn Vrijthoff, W. van der (eds.), 2006. *More urban water; design and management of dutch water cities*. Urban Water Series, 10. Taylor & Francis/Balkema, Leiden.
- Voordt, D.J.M. van der, & Wegen, H.B.R. van, 2005. *Architecture in use; an introduction to the programming, design and evaluation of buildings*. Elsevier Architectural Press, Oxford.

KEY DISSERTATIONS

- Gehner, E., 2008. *Knowingly taking risk; Investment decision making in real estate development* (published in 2008 by Eburon Academic Publishers, Delft).
- Chen, Y., 2007. *Shanhai Pudong; urban development in an era of global-local interaction* (published in 2007 by IOS Press Academic Publishers, Amsterdam).
- Sebastian, R., 2007. *Managing Collaborative Design* (published in 2007 by Eburon Academic Publishers, Delft).
- De Vries, J.C., 2007. *Presteren door vastgoed* (Performance by Real Estate) (published in 2007 by Eburon Academic Publishers, Delft).
- Peek, G.J. 2006. *Locatie-synergie; een participatieve start van de herontwikkeling van binnenstedelijke stationslocaties (Location synergy, a participatory start of the redevelopment of inner city railway locations)* (published in 2006 by Eburon Academic Publishers, Delft).

KEY EVENTS

- International Conference Changing roles: *New Roles, New Challenges* (2009) organising committee including conference proceedings.
- International Conference Corporations and Cities (2008) organising committee including a book publication.
- European Facility Management Conference (2008) scientific committee including conference proceedings.
- 2nd International Conference: World of Construction Project Management (2007) organising committee including conference proceedings.
- CIB meeting of W096 on Architectural Management (Yearly from 1998 to recent) organising committee including conference proceedings.

KEY EXHIBITIONS

- Building for Bouwkunde (2009, NAi Rotterdam) – exhibition and award ceremony of the open international ideas competition new Faculty of Architecture TU Delft.

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The social relevance of the research is evidenced by the research projects commissioned and by the knowledge centres affiliated with the department of Real Estate and Housing. Professors from IMBE are involved in the management teams of the research centres. Both junior and senior researchers are involved in the management and implementation of projects. The problem statements and aims of the projects are being discussed with public and private partners. Preliminary findings, conclusions and recommendations are discussed in workshops and at national and international conferences and usually attract positive feedback. Clients and related organisations are often involved in follow-up activities. This indicates that the research issues have a high level of societal relevance and are useful to the stakeholders.

5.2 Key results/highlights

Our research activities resulted in, among other things, a tool with which to assess the potential for transformation of office buildings and the risks involved (Transformation Potential Meter, Vacancy Risk Meter), PaPer (a past performance tool), WODI© (a toolkit to measure the performance of office workers), IGOMOD and PARAP (cost modelling systems), the Urban Decision Room (a multi-actor decision support tool), and the development of partnership models for PPP projects. A particular example of the valorisation of our research is our extensive involvement in realising a new building for the Faculty of Architecture after the fire of 13 May 2008 (Ideas Competition, Thinktank, Campus vision), the TU Delft campus strategy and real estate portfolio development.

5.3 Key knowledge contributions to practices and policies

The research contributes to the development and testing of new strategies and tools for successful and sustainable management of the built environment, both now and in the future, by amassing a body of knowledge on themes such as:

- The impact of real estate strategies on attaining organisational goals and objectives,
- Managing the campus of the future in connection with the Knowledge City
- Implications of new policies and legislation on cooperation in construction.
- The effects of complex multi-actor decision-making processes on time, quality and costs.

Subjects addressed in our research include the evaluation of new workplace concepts, the legal and societal impact of integrated contracting, collaborative design, sustainable urban redevelopment, the redevelopment of obsolete urban areas, the reduction of failure costs through supply-chain management, past performance measurements by contractors, and the changing role of the architect.

5.4 Evidence of the appreciation of stakeholders

Public and private clients, consultants, developers, contractors, designers and (representatives of) end-users apply research findings and deliverables in practice. Research findings are published in both the professional and scientific media. The knowledge gained from the research projects is implemented in the Faculty of Architecture's BSc and MSc programmes and in its external teaching activities (Master City Developer, TIAS Nimbas Business School, Nyenrode University, Amsterdam School of Real Estate, Fontys School of Applied Sciences, Hogeschool Rotterdam, Den Haag and Utrecht). Several papers and theses written by our MSc and PhD students have received awards from professional institutions and been published as books.

A survey among our stakeholders showed an average appraisal of over 3.5 on a five-point scale. The most positive scores were attained for our responsiveness to enquiries, encouraging innovation, and the understanding of methodology.

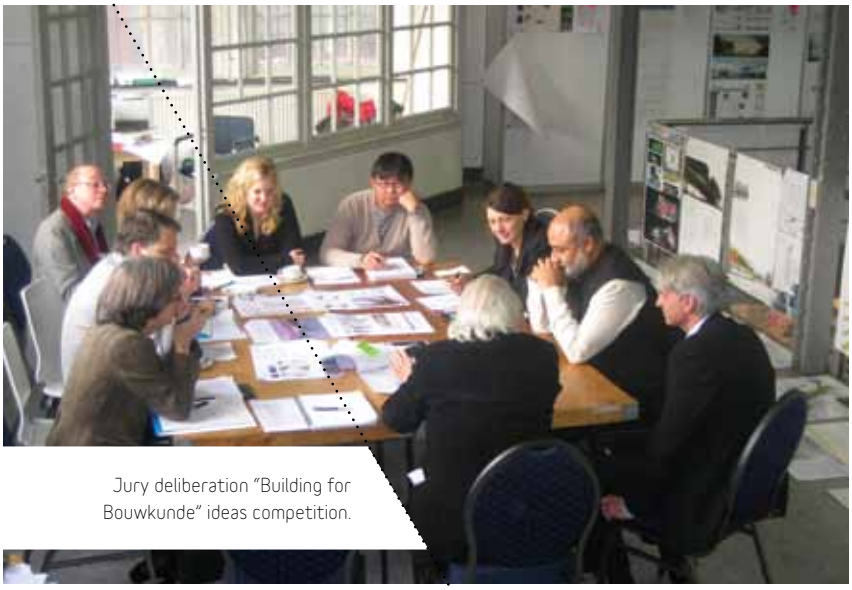
5.5 Dissemination strategies

The IMBE group is determined to strike a good balance between scientific publications and contributions to the professional field. Several of our staff members also work on the editorial staff for Dutch professional journals and newspapers, such as Cobouw, Facility Management Magazine and Real Estate Magazine. Staff members are regularly invited to symposia as key note speakers and operate as facilitators in workshops, as well as being interviewed by journalists for daily newspapers, radio stations or broadcast corporations.

5.6 Evidence of impacts

Because of our research activities, we are often invited to participate in steering committees, discussion groups, think tanks, symposia and so on. Based on the quality and output of our research, many staff members have built up long-term professional partnerships with other academic scholars and professionals. This is also shown in our diverse and dynamic research portfolio.

Transformation of previously vacant office building.



Jury deliberation "Building for Bouwkunde" ideas competition.

Exhibition of the "Building for Bouwkunde" ideas competition.

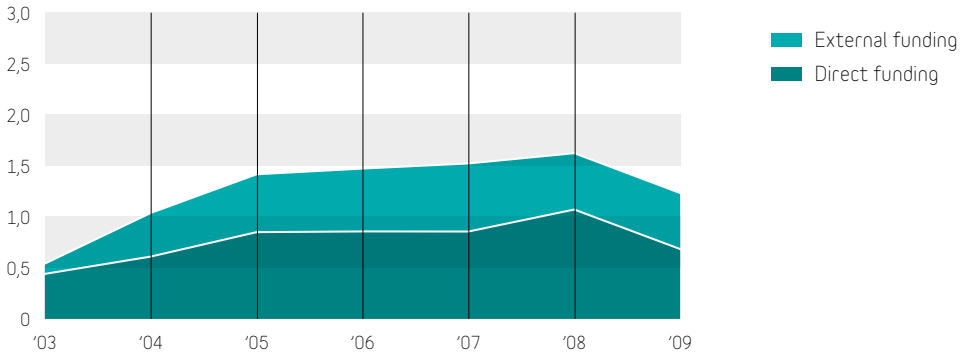
6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	442	81%	612	59%	852	60%	859	58%	858	56%	1,074	66%	686	56%
External funding	101	19%	428	41%	568	40%	617	42%	668	44%	553	34%	550	44%
TOTAL FUNDING	**543**	**100%**	**1,040**	**100%**	**1,420**	**100%**	**1,476**	**100%**	**1,526**	**100%**	**1,627**	**100%**	**1,236**	**100%**

EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	463	91%	718	90%	811	89%	964	92%	1,285	93%	1,418	92%	1,007	90%
Other costs	47	9%	82	10%	96	11%	80	8%	100	7%	115	8%	114	10%
TOTAL EXPENDITURE	**510**	**100%**	**800**	**100%**	**907**	**100%**	**1,044**	**100%**	**1,385**	**100%**	**1,533**	**100%**	**1,121**	**100%**

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	5	0	4	1	3	0	1	1	3	0	5	1	2	1
Non-refereed articles	2	0	1	1	1	0	4	0	1	0	1	0	1	0
Books	4	0	4	6	9	6	8	5	10	1	8	1	11	0
Book chapters	10	0	22	10	9	1	14	1	29	2	14	1	31	9
PhD-theses	0	0	0	0	0	0	1	0	3	0	1	0	0	0
Conference papers	19	0	18	9	38	9	70	10	50	13	40	6	34	5
Professional publications	33	1	39	2	35	6	51	11	37	35	64	20	62	10
Editorships journals/book	1	0	2	0	1	3	2	3	7	1	5	1	6	1
TOTAL PUBLICATIONS	**74**	**1**	**90**	**29**	**96**	**25**	**151**	**31**	**140**	**52**	**138**	**30**	**147**	**26**

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2001	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2002	2	1	3	0	0%	2	67%	2	67%	2	67%	2	67%	1	33%	0	0%
2003	0	2	2	1	50%	2	100%	2	100%	2	100%	2	100%	0	0%	0	0%
2004	1	1	2	0	0%	0	0%	0	0%	0	0%	1	50%	1	50%	0	0%
2005	2	3	5	0	0%	4	80%	4	80%	4	80%	4	80%	1	20%	0	0%
TOTAL	**5**	**7**	**12**	**1**	**8%**	**8**	**67%**	**8**	**67%**	**8**	**67%**	**9**	**75%**	**3**	**25%**	**0**	**0%**

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2006	Organisation and management in Construction	Wamelink	Rome	IT
2008-2009	PROVADA	Arkesteijn, Franzen, Remoy, Zeeuw	Amsterdam	NL
2009	Conference Future Directions in Architectural Management, CIB	Prins	Tainan	TW
2008	Design Firm Leadership Conference, Harvard University	Wamelink	Harvard	US
2008	European Facility Management Conference (EFMC), EURO FM	Pullen, Voordt	Manchester	UK

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2007	2nd Int Conf World of Construction Project Management (WCPM2007)	Co-organisation	Wamelink	Delft	NL
2008	Colloquium Corporations and Cities	Organisation	Jonge, Putte	Brussels	BE
2009	Int Conf Changing Roles, New roles - New Challenges	Organisation	Wamelink, Prins, Geraedts, Hobma	Noordwijk	NL
2009	Conference of Dutch Institute for Construction Law 40 year	Chair	Chao-Duivis	Amsterdam	NL
2009	Working Conference Center for People and Buildings	Organisation	Pullen, Voordt	Delft	NL

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2006/9	METU, Value Management Association Hong Kong, COBRA, IDDS	Scientific cmte	Prins	Hong Kong	CN
2007	Workshop BIM in Construction / Stanford university	Chair module, advisor	Wamelink	Stanford	US
2008/9	International open ideas competition Building for Bouwkunde	Organiser	Volker	Delft	NL
2008/9	Think tank envisioning faculty of the future	Theme coordinator	Arkesteijn, Volker, van de Putte	Delft	NL
2009	Building Brains	Scientific cmte participant	Wamelink, Volker	Delft/Utrecht	NL

Table d. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2005	VOGON PropertyNL Research Award 2005	VOGON	Geraedts, Voordt	Amsterdam	NL
2006	Research Paper Award Int Conf PRoBE	PRoBE	Vries	Delft	NL
2007	Best Young Researcher Award	Building Stock Activation	Remoy	Tokyo	JP
2008	Research Paper Award at 24th ARCOM conference	CIOB	Volker	Cardiff	UK
2009	Changing Planning Cultures Paper Award	4th IFoU Conf	Heurkens	Delft	NL
2010	Royal Award ('Officier in de Orde van Oranje Nassau')	Queen Beatrix	Jong	Lansingerland	NL

Table e. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2004/9	Dutch Association of Cost Engineers (DACE)	Board member	Prins	Nijkerk	NL
2004+9	European Society for Construction Law	Secretary	Chao-Duivis	The Hague	NL
2005	Cornell's International Workplace Studies Program	Visiting professor	Voordt	Ithaca	US
2007	Nyenrode Business Universiteit - Real Estate Valuation	Professor	Hordijk	Breukelen	NL
2009/>	Housing association DUWO	Board member	Heijer	Delft	NL

Table f. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2007/9	PSIBouw (Prog in Process/System innovation in Building/Construction)	Scientific board member	Chao, Wamelink	Gouda	NL
2007/>	Stichting Bouwresearch SBR - programme committee	Board member	Wamelink	Rotterdam	NL
2008/>	Standards committee on the classification of building costs (NEN 2631)	Cmte member	Jong	Delft	NL
2008/>	Post Master Institute for Architecture	Program cmte	Prins	Delft	NL
2009	Platform Vernieuwing in de Bouw	Board member	Jonge	Gouda	NL

Table g. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/>	Building Research & Information	Reviewer	Hobma, Voordt	London	UK
2004	The International Construction Law Review	Member editorial board	Chao-Duivis	London	UK
2007/9	Cities	Reviewer	Chen, Volker, Remoy	London	UK
2009	Facilities	Editorial board	Voordt	Bingley	UK
2009	Architectural Engineering and Design Management	Guest editor	Prins	Loughborough	UK

Table h. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
1999/>	Journal of Corporate Real Estate	Editor/reviewer	Pullen	Bingley	UK
2003/8	Engineering Construction & Architectural Management Journal	Editorial board	Prins	Bingley	UK
2004/>	Tijdschrift voor Bouwrecht	Editorial board	Chao-Duivis, Hobma	The Hague	NL
2009	Urban Planning International	Guest editor	Chen	China	CH

Table i. Role in practice and policy making

YEAR	FIRM/ORGANISATION	ROLE	WHO	WHERE	
1999/>	Brink Groep	CeO	Jonge	Leidschendam	NL
1999/>	Nieuwe Markten van Bouwfonds Ontwikkeling	Director	Zeeuw	Hoevelaken	NL
2007/9	Advisor Evidence Based Reasoning policy CfPB	Member policy board	Volker	Delft	NL
2008/>	DHV	Senior Consultant	Wamelink	Amersfoort	NL
2009	Metropole Price for Area Development	Assessment cmte	Franzen	The Hague	NL

9 Next generation

9.1 Objectives and institutional embedding

The IMBE research group supports the concept of research-based education – that is to say, it implements research findings into the BSc and MSc programmes and, by the same token, seeks to promote links between the work done by students, such as essays graduation theses, and the research programmes of the various departments. MSc students are encouraged to choose a research subject that is linked to IMBE's research programme. MSc students are taught both qualitative and quantitative research methods for design, management and engineering. This education builds on BSc courses in philosophy of science and stimulates to different types of design oriented research.

9.2 Structure of programmes

The PhD research is closely linked to the organisational structure of the IMBE group, including real estate management (PhD projects on Performance by Real Estate, Cause, Cope and Prevent of Structural Vacancy, and Managing the University Campus), design and construction management (PhD projects on Knowingly Taking Risks, Deciding about Design Quality and Managing Collaborative Design) and integrated urban area developments (PhD subjects such as The Inner Historic City, Location Synergy, Shanghai Pudong, and Strategy as a Force). This is also the case for our core areas of Building Economics (Willingness-to-pay, Analysis and Forecasting of the Real Estate Market), Building Law (Integrated Project Deliveries) and Computational Design (Preference Based Design).

9.3 Supervision

Each PhD candidate is supervised by one professor in monthly meetings, and also by a day-to-day supervisor (usually a senior researcher with a PhD) on a weekly or twice-weekly basis. Furthermore, PhD candidates are encouraged to participate in symposia, workshops and international conferences, to learn from other participants and seek feedback on their work. Once a year, PhD candidates are obliged to present their progress in a colloquium. Two external peer reviewers and promoters assess the candidate on the basis of a progress report and their presentation and their responses to the questions raised. The PhD candidates also meet once a month to discuss urgent matters in the organisation and content of their projects.

9.4 Success rates

The number of PhD students fluctuates every year. Most PhD students require a little over four years to finish the dissertation. Only a few discontinue their research before attaining their PhD (see Table 7b). There was a significant increase in the number of PhDs awarded in the period 2005-2010 because of substantial investment originating from the revenues of earlier externally funded research projects.

9.5 Educational resources

Each PhD candidate prepares a personal educational plan. Depending on their individual knowledge and skills, PhD candidates are encouraged to follow courses in research methods, scientific writing in English, presenting research findings, or courses relating to the subject of their research. Our department regularly organises workshops for young researchers on subjects such as how to get started, scientific debating, networking or marketing yourself effectively.

10 Viability

10.1 Viability of the unit to be evaluated, in terms of resource management, available infrastructure and innovative capacity

The viability of our research group has been enhanced by a substantial increase in the number of research staff during the assessment period. In the period 2006-2008, we were able to recruit new professors in the fields of Design and Construction Management (Wamelink), Building Law (Chao Duivis), Integrated Area Development (de Zeeuw) and Building Economics (Keeris, Hordijk, both visiting professors). We were also able to retain some of our most talented young researchers after they finished their PhD research. However, the current decrease in the financial means of the faculty may have a significant negative effect on attracting and retaining highly qualified researchers, particularly younger ones. The retirement of both the professor and associate professor in Building Economics is a serious concern for the viability of one of our core areas. Although the externally financed part-time 'practice' chairs have demonstrated their worth, their future is still uncertain. Our aim is to anchor these chairs within the research programme. However, the current lack of finances and other priorities within the faculty will probably prevent us from achieving this. In order to cope with this problem, a project has been launched to improve external funding and participation in larger, long-term research programmes.

11 SWOT analysis

STRENGTHS

- Our multidisciplinary and integrated approach with strong links between management, design and technology.
- Our broad problem-oriented scope (different stakeholders, different aspects, all phases of the lifecycle).
- A strong record of past performance.
- High societal relevance demonstrated by the positive support from the profession.
- An independent position.
- The strong connections with our knowledge centres and well-established professional and academic networks.

WEAKNESSES

- Low number of papers in renowned scientific journals.
- The need for developing sound handbooks and key publications.
- The need for better external financial support by participation in long-term research programmes (NWO, EU).
- The need for better collaboration in joint international research projects and publications.
- The need for improvement in the integration of our core areas into key research projects.

OPPORTUNITIES

- Increase in external financial support.
- Participation of students in research.
- More synergy through internal collaboration.

THREATS

- The high educational workload.
- Difficulty of attracting and retaining new academic staff.
- Strong competition with consultancy firms and applied science institutions.
- Pressure to extend the number of externally funded research projects in order to maintain our academic freedom and independence, both in terms of publications and research subjects.

12 Strategy

IMBE aims to continue being a highly qualified multidisciplinary research group by continuous reflecting on our research programme and its results, both internally (through discussions, colloquia, critical appraisals etc.) and externally (learning from paper reviews, responses to conference presentations, participation in international workshops and projects etc.). Current areas of activity such as successful real estate strategies, integral analyses of area development and innovations in design and construction management will also be continued. We will also maintain a balance between our broad scope and focus points. Adaptations in the research programme and strategies to change and make further improvements include a number of issues:

- Due to societal needs, there will be greater focus on sustainability in cross-sectional research.
- The merger with the OTB Research Institute will be used to further the exploration of mutual interests and the elaboration of joint projects, in particular in urban area development and quality management.
- On the individual and team levels, appointments are being made to increase the output of scientific papers, with more intensive planning and monitoring of output progress, support from more experienced researchers with a track record of high performance, training in scientific writing and a reduction of time spent on professional papers in favour of scientific papers.
- More effort will be channelled into participation in long-term international research programmes by connecting individual projects into group projects and more intensive co-operation and participation in international academic networks.
- Participation in large-scale long-term programmes and in the Graduate School will be used to attract more PhD students and integrate them into scientific networks, as well as retaining post-docs.

Housing Quality

RESEARCH LEADERS: Prof. Henk Visscher PhD & Vincent Gruis PhD
KEY RESEARCHERS: Prof. Anke van Hal PhD, Vincent Gruis PhD, Evert Hasselaar PhD Laure Itard PhD, Nico Nieboer PhD, Arjen Meijer PhD, Frits Meijer PhD Ad Straub PhD, Prof. Andre Thomsen PhD, Prof. Henk Visscher PhD

1 Objectives and research area

1.1 Vision, mission and objectives

Vision: The quality of the housing stock is of major importance to the occupants' quality of life, to the ecological footprint in urban areas and to economical assets. This quality has to be maintained and improved considerably in coming decades to support the increasing demands of occupants, to reduce the ecological burden and to contribute to CO_2 reductions. These major challenges require innovative, multidisciplinary scientific research, in which technical engineering approaches are combined with social sciences.

Mission: Our aim is to develop knowledge that will be used to support practices in the building, regeneration and maintenance of housing in the decades to come. Societal demands require a functional and environmental transformation of the current housing stock quality. The Housing Quality (HQ) programme uses multidisciplinary approaches to provide new scientific insights through a combination of four perspectives: technical knowledge of the health and sustainability of dwellings; organisational knowledge for the management of housing providers; knowledge of effective policy instruments and enforcement procedures and innovation of building and maintenance processes.

Objectives: The objectives include fundamental contributions to the scientific fields that relate to the improvement of housing quality; contributions to the innovation of the educational curricula; and insights that can be utilised for improving the actual quality of the housing stock. The programme aims to be a frontrunner at national level and to be a key player in specific niches of the international research arena, particularly in the areas of assessment methods for energy efficient housing, building regulations, and strategic management of social landlords.

Figure 1. Four perspectives of Housing Quality

1.2 Societal concerns and issues

Increasing the environmental and socio-economic sustainability of the housing stock constitutes the largest investment challenge within the built environment. Climate change is one of the major global challenges of our time. It has, and will continue to have in the coming decades, a huge impact on how we think about the physical quality of housing in all its dimensions: technique, management, governance and processes. It has recently become clear that the need for a dramatic reduction of CO_2 emissions will, now more than ever, have a major impact on the direction taken with respect to newly built houses as well as existing housing stock. The building stock in the European Union accounts for about 40 percent of total EU energy consumption. Energy saving in the built environment has been rated so highly by the European Union that it has opted for a communal approach. In 2000, the European Committee adopted an action plan in line with this to improve energy efficiency, stating that the use of energy in the Union should be reduced by one percent annually until 2010. This was the precursor to the slogan '20% in 2020'.

Although crucial to society, transformation of the housing stock is not a simple matter. It is hampered by the characteristics of existing building structures as well as a lack of innovative approaches within the construction sector. The cost of failures in the Dutch building industry amounts for more than 10 percent of its turnover. Total investment costs in homes were 46 billion euros in 2007, which means an annual wastage of 4.6 billion euros. In recent years there have been many problems with construction safety and building physics. In many cases, the faults are not due to a lack of technical knowledge but to carelessness in the building process. Furthermore, the possibility to stimulate sustainable housing management and development through central government regulation is limited. Non-profit and commercial housing organisations have become much more independent and are now major actors in determining housing policies, for which they require new strategies, skills and resources. Thus, the need for higher performance with respect to energy and other quality issues in dwellings, in combination with the evidence on poor performance in the building industry, demands strong policy, management and process innovations.

1.3 Position

The academic discipline of Housing studies the way in which society meets the accommodation needs of households. The position of the academic discipline of Housing within the wider field of architecture is to contribute to the realisation of a sustainable housing stock. In doing so, HQ focuses not so much on the aesthetical quality, but on the quality of housing in terms of safety, comfort, health, energy saving, environmental and socioeconomic sustainability as well as the processes that can improve this quality.

1.4 Research area

Within HQ, research questions address the task of improving housing quality. Firstly, in relation to the product: what constitutes sustainable housing stock and how can the sustainability of the existing housing stock be improved? Secondly, in relation to the processes, organisation and governance: how can the actors involved in the housing market contribute to the realisation of sustainable housing, and how can the transformation process of the existing housing stock be improved, for example, by ensuring adequate organisation, cooperation and policy instruments? These questions form the basis of the research being carried out within four themed groups: Sustainable and Healthy Housing (product), Housing Management (organisation), Policy Instruments and Enforcement Procedures (governance) and Innovation of Building and Maintenance Processes (processes) - see Figure 1.

2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	9	6,6	11	7,1	12	7,3	12	7,7	11	5,5	8	5,3	8	5,5
Non-tenured staff	5	2,9	11	3,7	2	3,4	6	4,7	6	7,3	10	10,7	6	7,8
PhD-students			3	2,4	5	3,2	7	5,6	7	4,4	7	4,6	6	4,1
Guests	0		0		0		2		2		4		5	
TOTAL RESEARCH STAFF	**14**	**9,5**	**25**	**13,2**	**19**	**13,9**	**27**	**18,0**	**26**	**17,3**	**29**	**20,6**	**25**	**17,4**

Table b. Research staff with position in practice

WHO	ROLE	FIRM/ORGANISATION	WHERE
Prof. Anke van Hal PhD	Prof. Sustainable Building and Development	Nijenrode Business University	Breukelen NL
Vincent Gruis PhD	Prof. Innovation in Real Estate Management	Research Centre Technology & Innovation Hogeschool Utrecht	Utrecht NL
Laure Itard PhD	Prof. Energy and Built Environment	The Hague University of Applied Sciences	The Hague NL

3 Research environment and embedding

3.1 Embedding

The Housing Quality research programme was established in 2008 and is a joint programme between the Sustainable Housing Quality department of the OTB Research Institute for the Built Environment and the Housing section of the Real Estate and Housing Department of the Faculty of Architecture. This joint research group has been operating for about 15 years in its current set-up. The HQ programme has close links with other chairs within the Faculty of Architecture, such as Green Buildings Innovation in the Department of Building Technology (Prof. Dobbelsteen) and Housing Design in the Department of Architecture (Prof. Van Gameren). Projects are also conducted in cooperation with the Faculty's Innovations in Management of the Built Environment programme (Prof. Hans de Jonge, Prof. Hans Wamelink, Prof. Friso de Zeeuw and Prof. Monika Chao). Several projects are conducted in cooperation with chairs in other faculties, like the Faculty of Industrial Design (Prof. Han Brezet, Prof. David Keyson) and the Faculty of Technology, Policy and Management (Dr. E. van Bueren). The group collaborates with IVAM, which is affiliated to the University of Amsterdam. We have close ties with the Department of Materials Science at Eindhoven University. There are links with the Nyenrode Business University Center for Sustainability (Sustainable Building & Development) and the University of Wageningen (Prof. Louise Vet). There is also an ongoing collaboration with the Radboud University of Nijmegen.

Furthermore, an increasing number of contacts are being laid with several regional universities of applied sciences like Utrecht and The Hague where Dr Vincent Gruis and Dr. Laure Itard are part-time lecturers. Some of the academic staff are affiliated with the Netherlands Graduate School for Housing and Urban Research (Nethur).

3.2 Number and affiliation of guest researchers

The group has hosted a number of guest researchers from foreign universities and research institutes who have collaborated on joint projects at the University, such as Prof. David Mullins (University of Birmingham), Prof. Sasha Tsenkova (University of Calgary), Dr. Linda Sheridan (University of Liverpool) and Dr. Joao Branco Pedro (LNEC – Lisbon). One of our guest researchers, Prof. Thomson, remained with his group after his retirement in 2007. We have also hosted several Dutch and international Master's students who conducted a thesis as part of our research programme.

3.3 International and national positioning

The Housing Quality research group has a long-standing relationship with the Dutch social housing associations. These key players in the management of a large share of the housing stock have based much of their policies on the results of our work. This continues within the collaborative projects such as Housing Quality 2020 and MOVe. Government bodies, such as the Ministry of Housing, Planning and the Environment and various municipalities, form a second group of partners. We also collaborate with national stakeholders-associations, branch organisations and knowledge and research centres and use the knowledge generated by our research. These organisations include ECN (Energy Centrum Nederland) and TNO (The Netherlands Organisation for Applied Scientific Research), the SBR, SenterNovem, the Institute for Construction Law, Aedes, Woonbond, SKW Certification, SVn, NEN, SEV, Cartesius, PeGo, Meer met Minder, as well as consultancy firms and contractors.

Important international platforms relevant to the HQ programme include the International Council for Building Research Studies and Documentation (CIB) and the European Network of Housing Research (ENHR). Almost all of our researchers are coordinators and regular members of one or more working groups within these organisations, and regularly take part in international conferences or working-group activities.

3.4 Actual collaborations with stakeholders

In 2009, we took the initiative to start the *Housing Quality 2020* programme (Knowledge development for energy transition of the housing stock). Based on our ongoing research agenda, we managed to secure the commitment and financial support of fifteen Dutch Housing Associations and Aedes, the Federation of Housing Associations for a four-year research and knowledge dissemination programme. The aim of HQ 2020 is to develop practical knowledge underpinned by fundamental research to support the housing associations in their decision-making processes to implement their energy transition ambitions.

A similar approach lead to the *MOVe* programme. During the 1990s, Dutch housing associations underwent a transformation from task-oriented, government-driven organisations to independent, market-oriented organisations with public objectives. The term 'social entrepreneurship' was introduced to identify the way in which housing associations should operate in their new role positioned between State, market and society. The MOVe programme ('Maatschappelijk Ondernemerschap en Voorraadbeleid van woningcorporaties' - Social Entrepreneurship and Housing Stock Policy of housing associations) has been established to fund scientific research into the development of social entrepreneurship in housing management and to facilitate the transfer of knowledge between science and housing associations through the organisation of master classes for participating housing associations. During the review period, there have been various other collaborative projects with stakeholders. The largest was the *Corpovenista* programme (2004-2008) with housing associations and SBR (organisation for knowledge transfer to the building sector), which was linked to a large national subsidy programme (BSIK - Habiforum - Innovative use of land). Regeneration of urban areas was the central subject of the programme.

3.5 Participation in consortia

Throughout the years, we have participated in a series of EU projects in various programmes. These include: Build-on-RES and EPA-ED in the SAVE/ALTENER programme, Demohouse and Green Solar Cities in the CONCERTO programme, ERABuild in the ERA-network, Hopus in the Urbact II programme, SHELTER in the IEE programme and Beem-Up in the 7th Framework programme. We currently have a number of new applications pending for the IEE and 7th FP programme. The opportunities for participating in EU projects are on the increase. The EU considers the improvement of the quality of the housing stock, with an emphasis on the energetic performance, a priority. Technical innovations having been developed, it is now time for large scale implementation. There is, therefore, a great focus on policy, management and process innovation. At a national level, we have participated in consortia working on programmes funded by national subsidies and have collaborated with market parties on such programmes as mentioned in 3.4. Other projects included Rigoureus (EOS), Building the future (EOS) together with TNO's centre for applied sciences and the ECN Energy research Centre of the Netherlands. More recently, we participated in the Climate Proof Cities programme (FES subsidies) and in NICIS (BSIK subsidies), which involved seven municipalities.

Construction failure in balconies in a building project, Wippolder, Delft.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

HQ concentrates on academic fields that are rapidly developing at an international level. This can be seen by the number of new academic journals and their increased impact in these academic fields. In addition, national and European budgets for scientific research are paying more and more attention to the development of fundamental knowledge on energy and the environment, as well as the processes and policies required for the implementation of new approaches in society. The HQ group is unique within this field in the sense that it has a relatively large group of researchers focusing on one key societal and academic issue. The size and multidisciplinary approach of the group allows us to develop a holistic vision to the question of how to achieve a sustainable housing stock. It also enables us to develop knowledge on specific issues such as available and necessary building legislation, assessment methods for energy efficiency of housing, and methods for strategic asset management in support of a sustainable housing stock.

4.2 Significance of the contribution to the field

The Housing Quality research contributes to the development of the scientific discipline of housing in relation to the societal challenges of sustainable housing transformation and management.
It focuses, in particular, on theories for innovation and organisation. The stimulation and diffusion of innovations that contribute to a sustainable housing stock is crucial to the achievement of the environmental and socio-economic objectives for the performance of the housing stock.

4.3 Coherence

The HQ programme combines the research of three Housing chairs: Housing Quality and Process Innovation (from 2007 Prof. Henk Visscher); Sustainable Housing Transformation (until 2007, Prof. André Thomsen; from 2007, Prof. Anke van Hal) and Housing Management (Associate Prof. Vincent Gruis). We also have close ties to other Housing groups and their research programmes within OTB and the Faculty of Architecture: Housing Systems (Prof. Peter Boelhouwer), and the Urban Renewal chair, created in 2009 for the OTB Neighbourhood Change and Housing research programme. Our multidisciplinary research contains a broad spectrum of sub-issues and uses a range of theories and research methods. This was a deliberate choice, since only this approach addresses the current need for a holistic governance of housing quality in the coming decades. The four themed groups (see Figure 1 in paragraph 1) work closely together and an increasing number of research projects are now interacting within two or more of the themes.

4.4 Quality of the scientific publications

The quantity and quality of the Housing Quality research group has improved considerably in the review period. All research staff publish internationally in peer-reviewed journals. In recent years, an increasing number of articles have been published in journals from the ISI list. Furthermore, the impact scores of these journals have increased. We publish in journals in the fields of housing, building, energy, and policies and regulations. Important journals include: Housing Studies, Urban Studies, Building Research and Information, Energy and Buildings, Building and Environment, Energy Policy, Environment and Planning B: planning and design, Open House International and the International Journal of Law and the Built Environment.

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

- Theory, models and tools for strategic asset management of housing associations.
- Theory, models and tools for performance-based maintenance contracting.
- Modelling and ordering of systems for building regulations and control.
- The application of LCA tools for housing quality policy decisions.
- Modelling of relation between energy efficiency regulations and actual energy use by occupants.

KEY PUBLICATIONS

- Gruis, V.H., Nieboer, N.E.T. & Thomas, A., 2004. Strategic asset management in the social rented sector: approaches of Dutch and English housing associations. *Urban studies,* Vol 41 No. 7. SAGE Publications, Thoasand Oaks, p. 1229-1248.
- Beerepoot, M., 2007. Government regulation as an impetus for innovation: evidence from energy performance regulation in the Dutch residential building sector. *Energy policy,* Vol 2007, No. 35. Elsevier, Amsterdam, p. 4812-4825.

- Guerra Santin, O., Itard, L.C.M. & Visscher, H.J., 2009. The effect of occupancy and building characteristics on energy use for space and water heating in Dutch residential stock. *Energy and buildings,* Vol 41, No. 11. Elsevier, Amsterdam, p. 1223-1232.
- Meijer, F.M. & Visscher, H.J., 2006. Deregulation and privatisation of European building-control systems? *Environment and Planning B: Planning and Design,* Vol 33, No. 4. Pion, London, p. 491-501.
- Meijer, F.M., Itard, L.C.M. & Sunikka, M.M., 2009. Comparing European residential building stocks: performance, renovation and policy opportunities. *Building research and information,* Vol 37, No. 5/6). Routledge, Oxford, p. 533-551.

KEY BOOKS OR CHAPTERS OF BOOKS

- Beerepoot, M., 2004. *Renewable energy in energy performance regulations: a challenge for EU member states in implementing the energy performance of buildings.* DUP Science, Delft.
- Gruis, V.H., Visscher, H.J. & Kleinhans, R.J. (eds.), 2006. *Sustainable neighbourhood transformation Amsterdam.* IOS Press, Amsterdam.
- Meijer, A., 2006. *Improvement of the life cycle assessment methodology for dwellings.* IOS Press, Amsterdam.
- Koopman, M., van Mossel, H.J. & Straub, A. (eds.), 2008. *Performance measurement in the Dutch social rented sector.* IOS Press, Amsterdam.
- Gruis V. & Nieboer N. (eds.), 2004. *Asset management in the social rented sector; policy and practice in Europe and Australia.* Kluwer Academic Publishers, Dordrecht.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

- Nieboer, N.E.T., 2003; *Strategisch beslissen over het woningbezit; voorraadbeleid van Nederlandse woningcorporaties en vastgoedbeleggers.* DUP Science, Delft.
- Visscher, H.J., Meijer, F.M,Beekman, N., Droste, E. & Langman, M.A., 2003. *Certificering op het gebied van bouwregelgeving.* DUP Science, Delft.
- Hasselaar, E. & Rijsbergen, O. van, 2005. *Toetslijst Gezond en Veilig Wonen.* Nederlandse Woonbond, Amsterdam.
- Straub, A., Vijverberg, G.A.M. & Mossel, H.J. van, 2005. *Prestatiegericht samenwerken bij onderhoud. Basisinformatie Bouwkundig Onderhoud.* SBR, Rotterdam.
- Duijm, F., Hady, M., Ginkel, J.T. van & Bolscher, G.H. ten, 2007. *Gezondheid en ventilatie in woningen in Vathorst; onderzoek naar de relatie tussen gezondheidsklachten, binnenmilieu-kwaliteit en woningkenmerken.* GGD Eemland, Amersfoort.

KEY DISSERTATIONS

- Klunder, G., 2005. *Sustainable solutions for Dutch housing. Reducing the environmental impacts of new and existing houses.* DUP Science, Delft.
- Hasselaar, E., 2006. *Health performance of housing, indicators and tools.* IOS Press under the imprint DUP, Amsterdam.
- Beerepoot, M. 2007. *Energy policy instruments and technical change in the residential building sector.* IOS Press, Amsterdam.

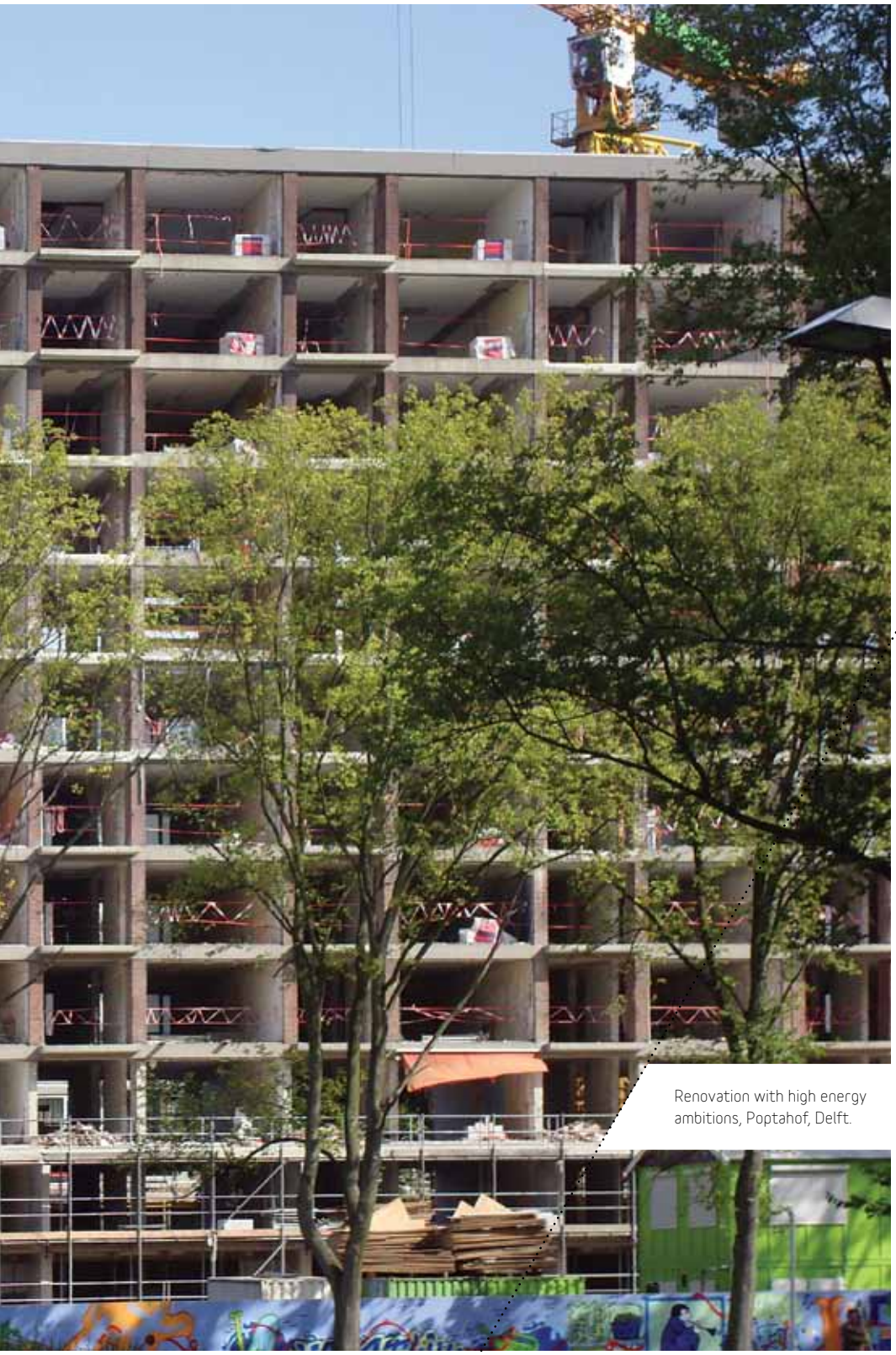
- Mossel, H.J, van, 2008. *The purchasing of maintenance service delivery in the Dutch social housing sector optimising commodity strategies for delivering maintenance service to tenants.* IOS Press, Amsterdam.
- Cum Laude: Heijden, J.J. van der, 2009. *Building regulatory enforcement regimes, Comparative analysis of private sector involvement in the enforcement of public building regulations.* IOS Press, Amsterdam.

KEY EVENTS

- ENHR conference (2007, Rotterdam) - a big bi-annual international conference on Sustainable Urban Areas, 500 participants.
- IBPSA Conference (2005, Montreal) - international conference on Building Performance Simulation.
- Passive House Event (2007, 2008, 2009, Brussels) – the largest symposium and fair exclusively on energy efficient constructing.
- Corpovenista conferences (2004, 2006 and 2008, Rotterdam, Amsterdam and The Hague) - three large national conferences on urban renewal and district development.
- Energy Fair (2007, 2008 and 2009, Den Bosch) - Organisation of a national conference.

KEY EXHIBITIONS

In 2005, Prof. Thomsen organised an exhibition of the entries for the Dutch Refurbishment Award ('Nationale Renovatie Prijs') at the Faculty of Architecture in Delft.



Renovation with high energy ambitions, Poptahof, Delft.

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

Our research is highly valued by the building industry and the housing and management sector. This can be seen in the continuing stream of research projects commissioned by the various stakeholders. These projects result in research reports, books and professional papers. The resulting insights are used for the development of policies and process innovations by the stakeholders. They also serve as input for national and international conferences and seminars. For many years, the group has given courses and master classes for professionals, mainly from housing associations.

5.2 Key results/highlights

1. Criteria for performance-based maintenance contracting
2. Formulation of an assessment guideline for a certification scheme for private building control
3. Harmonisation protocol for LCA databases and calculation methods
4. Assessment method for a healthy indoor climate
5. Development of a decision-making model for heat and cold networks for housing associations

5.3 Key knowledge contributions to practices and policies

Knowledge has been generated within HQ that can be used to improve the design of new dwellings as well as the refurbishment and maintenance of existing dwellings, in particular, in the energy efficiency of housing. This knowledge will be incorporated in design and maintenance regulations, standards, codes and guidelines.

5.4 Evidence of the appreciation of stakeholders

We have accepted many invitations to lecture and present our research results at conferences and seminars for professionals. Henk Visscher, Anke van Hal, Vincent Gruis, Laure Itard, Ad Straub and Evert Hasselaar give these kind of presentations several times a year. We also receive invitations to contribute to professional journals through articles and interviews, as well as regular invitations to attend discussion meetings in support of policy-making within government and among housing providers.

5.5 Dissemination strategies

The Delft University of Technology website is the first platform to announce and present research outcomes. Once research projects are completed, the main results are presented in a press release, which is sent to a long list of press agencies. This leads to many reports being published in journals and newspapers, invitations for interviews and

presentations, and the commissioning of new research. Furthermore, we present our results at national conferences and courses for professionals. Twice a year, we give two four-day courses on Strategic Portfolio Management and on Professional Maintenance of Housing Stocks.

5.6 Evidence of impacts

Our conferences and courses always attract a large number of participants. Professional books and reports are well distributed. Commissioners keep coming back to us with new projects.

5.7 Commissioned research by societal actors

Throughout the years, several dozens of national companies, branch organisations and governmental bodies and housing associations have commissioned us to carry out contract research. For some time now, we have also managed to interest groups of commissioners to form a consortium and participate in projects or programmes that run for several years. This offers us better opportunities to link our scientific research aims to their projects.

Renovation to passive house level, Roosendaal.

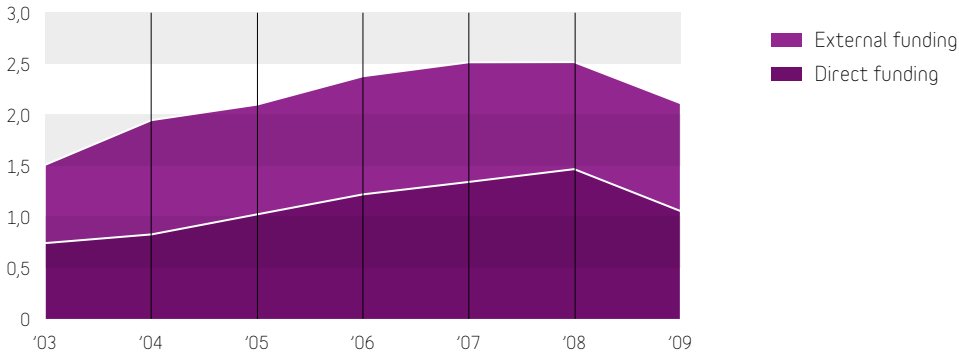
6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	745	49%	830	43%	1,027	49%	1,223	51%	1,345	53%	1,471	58%	1,062	50%
External funding	771	51%	1,122	57%	1,078	51%	1,160	49%	1,175	47%	1,051	42%	1,059	50%
TOTAL FUNDING	**1,516**	**100%**	**1,952**	**100%**	**2,105**	**100%**	**2,383**	**100%**	**2,520**	**100%**	**2,522**	**100%**	**2,121**	**100%**

EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	891	69%	1,006	67%	1,125	68%	1,455	69%	1,522	69%	1,805	68%	1,689	78%
Other costs	397	31%	498	33%	522	32%	659	31%	694	31%	854	32%	478	22%
TOTAL EXPENDITURE	**1,288**	**100%**	**1,504**	**100%**	**1,647**	**100%**	**2,114**	**100%**	**2,216**	**100%**	**2,659**	**100%**	**2,167**	**100%**

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	10		13		10		16		16		13		19	
Non-refereed articles	1		2		6		3		3		1		2	
Books	4		4		0		6		7		6		1	
Book chapters	1		6		4		6		7		14		8	
PhD-theses	1		0		2		2		1		1		2	
Conference papers	25		32		38		56		44		50		44	
Professional publications	65		62		58		65		89		71		65	
Editorships journals/book	3		12		3		8		13		10		4	
TOTAL PUBLICATIONS	**110**		**131**		**121**		**162**		**180**		**167**		**147**	

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	2	1	3	0	0%	0	0%	2	67%	2	67%	2	67%	1	33%	0	0%
2001	0	1	1	0	0%	0	0%	0	0%	1	100%	1	100%	0	0%	0	0%
2002	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2003	0	1	1	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%
2004	2	1	3	0	0%	0	0%	0	0%	0	0%	1	33%	2	67%	0	0%
2005	2	1	3	0	0%	0	0%	0	0%	0	0%	1	33%	1	33%	1	33%
TOTAL	**6**	**5**	**11**	**0**	**0%**	**0**	**0%**	**2**	**18%**	**3**	**27%**	**5**	**45%**	**5**	**45%**	**1**	**9%**

Table c. PhD-students with scholarship or external funding

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	1	0	1	0	0%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2001	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2002	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2003	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2004	1	0	1	0	0%	0	0%	1	100%	1	100%	1	100%	0	0%	0	0%
2005	1	0	1	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%
TOTAL	**3**	**0**	**3**	**0**	**0%**	**1**	**33%**	**2**	**67%**	**2**	**67%**	**2**	**67%**	**1**	**33%**	**0**	**0%**

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2008	Visions for social housing: international perspectives (Conference The Smith Institute)	Gruis	London	UK
2009	The Future of Housing: Rethinking the UK housing system for the 21 st century (BSHF consultation)		Windsor	UK
2009	SASBE2009 (Smart and Sustainable Built Environments), CIB	Hal	Delft	NL
2009	Finnish Real Estate Federation, Annual Housing Day	Thomsen	Helsinki	FI
2007	World Congress, CIB	Visscher	Cape Town	ZA

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2003/9	Annual conference of European Network for Housing Research	Workshop leader	Nieboer	Europe	EU
2007	Bi-annual international ENHR conference, Sustainable Urban Areas	Organisation	Visscher	Rotterdam	NL
2005	International IBPSA Conference Building Performance Simulation	Organisation	Itard	Montreál	CA
2007/9	International Passive House events and conference in Brussels	Organisation	Mlecnik	Brussels	BE
2009	Management and Innovation Sustainable Built Environment, MISBE 2011	Organisation	Hal	Delft	NL

Table c. Involvement in scientific or professional event

YEAR	EVENT	ROLE	WHO	WHERE	
2007	15 jaar Bouwbesluit (15 years Building code), Min VROM	Keynote, panel	Visscher	The Hague	NL
2008	Annual conference Federation of Amsterdam Housing Associations	Speaker	Gruis	Amsterdam	NL
2008	Corpovenista symposium	Co-organisation	Visscher	Delft	NL
2007	MOVe symposium "Professionals in het veld"	Organisation	Overmeeren	Delft	NL
2008/9	Dutch national building award (Nederlandse Bouwprijs)	Jury member	Hal	Utrecht	NL

Table d. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2009	Elected in top 100 most influential Dutch Sustainability Leaders	Trouw newspaper	Hal	Amsterdam	NL
2009	Elected in top 10 most influential Dutch Sustainable Building Leaders	Building Business	Hal	Maarssen	NL
2009	2nd prize Architecture and Philosophy Competition	Istanbul Culture Uni	Medir	Istanbul	TR
2008	Winner SEV (Housing Experiments Steering Group) essay competition	SEV	Gruis	Rotterdam	NL
2006	Honourable mention for article in Property Management	Emerald	Nieboer	Bingley	UK

Table e. Honorary positions

YEAR	INSTITUTE	POSITION	WHO	WHERE	
2006	Forum voor Volkshuisvesting	Honoury member	Thomsen	Delft	NL
2006	Aedes (Federation of Dutch Housing Associations)	Honorary Trophy	Thomsen	Hilversum	NL
2008	PEGO, national energy efficiency regulations board (NL Agency)	Board member	Hal	The Hague	NL
2007	Advisory board Delft Energy Initiative (TU Delft)	Board member	Hal	Delft	NL
2009	Dutch Green Building Council	Board member	Hal	Rotterdam	NL

Table f. Election to academies or academic professional associations

YEAR	INSTITUTE	ROLE	WHO	WHERE	
2003/>	Netherlands Graduate School of Urban and Regional Research, NETHUR	Senior member	Gruis	Utrecht	NL
2007	Nyenrode Business University, Sustainable Housing & Development	Professor	Hal	Breukelen	NL
2006/>	UNEP/SETAC Life Cycle Initiative: Indoor Exposure Assessment & LCA	Member working group	Meijer	Brussels	BE
2003/8	Int Building Performance Simulation Association Netherlands/Flanders	Board member	Itard	Eindhoven	NL

Table g. Evaluator of research programme

YEAR	PROGRAMME	ROLE	WHO	WHERE	
2006	Belgian Federal Science Policy (BELSPO)	Evaluator	Thomsen	Brussels	BE
2008	Belgian Federal Science Policy (BELSPO)	Evaluator	Itard	Brussels	BE

Table h. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2003/>	Building Research and Information	Reviewer	Itard	Abingdon	UK
2005/>	Housing Studies	Reviewer	Gruis	Glasgow	UK
2005/>	Open House International	(Guest) editor	Visscher, Hasselaar	Tyne & Wear	UK
2005/>	Urban Studies	Reviewer	Gruis	Glasgow	UK
2009/>	International Journal of Law and the Built Environment	Reviewer	Visscher	Bingley	UK

Table i. Editorship professional journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2009	Real Estate Research Quarterly	Referee	Gruis	Amsterdam	NL
2003/>	Puur Bouwen (Pure Building), Aenas	Editor-in-Chief	Hal	Boxtel	NL
2003/>	Tijdschrift voor de Volkshuisvesting	Editor	Flier	The Hague	NL
2003/>	Puur Wonen (Pure Living), Aenas	Editor-in-Chief	Hal	Boxtel	NL
2005/>	TVVL-magazine	Editor	Itard	Leusden	NL

Table j. Role in practice and policy making

YEAR	FIRM/ORGANISATION	ROLE	WHO	WHERE	
2003	Ministry of Housing, Spatial Planning and the Environment (Min VROM)	Consultant	Hal	The Hague	NL
2003/9	Woonbron housing association, Board of Supervisors	Board member	Thomsen	Rotterdam	NL
2008	SWW Housing Association	Policy advisor	Overmeeren	Woerden	NL
2009	Advisory committee Indoor Environment Label (2008-2010) ISSO	Member	Meijer	Rotterdam	NL
2003	Expert panel Certification Bouwbesluittoets, Min VROM	Member	Visscher	The Hague	NL

9 Next generation

9.1 Objectives and institutional embedding

In the period 2003 - 2009, the composition of our staff underwent a transformation: what began as a group of nearly all tenured senior staff is now two thirds non-tenured, the majority of which are PhD students.

9.2 Structure of programmes

Before a PhD can be appointed, the supervisors draw up a provisional research plan that has to be approved by a scientific committee. After the PhD candidate has worked on this for three months, a developed research plan is presented. An evaluation follows after the first year. If the supervisors have enough confidence in a successful PhD project, the candidate will be appointed for another three years. Yearly evaluations are held thereafter.

9.3 Supervision

PhDs always have at least one promoter and one daily supervisor/mentor, sometimes more. Policies for the supervision and mentoring of PhDs have been formulated at institute level and in greater detail at research group level. All senior staff have followed a course for supervising and mentoring, which is now subject to peer-review sessions several times a year.

9.4 Success rates

Traditionally, our PhDs worked part-time and completed their work in about 6 years. In 2004, we began offering full-time PhD positions. In the first few years, some of the students failed and ended their projects prematurely. However, success rates have improved considerably since and in the last few years most PhDs finished within four to four-and-a-half years.

9.5 Educational resources

The objective is to have at least two PhDs per year completing a dissertation and also to recruit two new PhDs. Candidates for our groups are members of graduate schools like NETHUR and SENSE. They follow an education plan to develop the skills and tools necessary for carrying out PhD research. From 2010 onwards, they will be members of the Delft Graduate School. The education programme lasts two years, during which period 20% of their time may be used to follow courses that support the development of research skills.

10 Viability

10.1 Resource management

Financial management starts with drawing up three-year budget plans for each research group. Half-way through the year, the budget for the next year is established. This budget includes contributions from direct funding, staff costs (including new posts) and additional costs. This budget also shows the amount of contract research and/or subsidies to be earned. Senior staff are responsible for the acquisition of these subsidies. Our group has always enjoyed a high earning capacity and most years has yielded positive results. Sometimes it is difficult to find new staff with the right background for our job vacancies. Over the past few years, we have also been recruiting personnel from countries outside the Netherlands, including: Finland, Mexico, Ireland, Portugal, Turkey and Spain.

10.2 Available infrastructure

A large part of the HQ group works at the OTB Research Institute for the Built Environment, which provides excellent infrastructure to carry out research in terms of workplaces, supporting staff, opportunities for participating in international networks etc. With over one hundred scientific staff and a large group of PhD students, it provides a highly stimulating working environment. Researchers at the Faculty of Architecture can also make use of this infrastructure and environment. Furthermore, they ensure a concrete link between the HQ programme and the Faculty's other educational and research programmes.

10.3 Innovative capacity

Improving Housing Quality through policy, management, processes or technical innovations is important at all times. Societal circumstances, however, change and influence the priorities and requirements for quality topics. At the end of the last decade, environment and sustainability entered our research domain. Around 2007, CO_2 and energy issues emerged to become important driving factors in our programme as we strive to link new research insights directly to new areas of research. Most recently, innovations in building and maintenance processes and the influence of the end users of dwellings, the occupants, have become more important to our projects. The two new PhD projects started each year provide us with the opportunity to innovate the programme and address issues that are gaining importance.

Integation of photovoltaic panels in balconies.

11 SWOT-analysis

STRENGTHS

The multidisciplinary approach (technical and social sciences) for improving the quality of the housing stock, with a strong emphasis on energy efficiency and sustainability, makes the HQ programme unique. The group is well known for its expertise and is often invited to join consortia. We manage to combine practice-orientated research very well with the development of scientific output in highly ranked journals. Furthermore, the group has proven to be stable in its focus and organisation within an environment that has undergone a great deal of change and restructuring. Further testament to this is the group's steady production of two dissertations per year.

WEAKNESSES

We have a clear focus when it comes to managing housing quality from various perspectives. For our research, on the other hand, we have to employ a broad range of scientific theories and methods. Having enough in-house knowledge of the relevant scientific disciplines remains a challenge. This can also prove problematic when it comes to obtaining funding from the Netherlands Organisation for Scientific Research (NWO), which focuses mostly on theoretical monodisciplinary research. There are too few financial resources available for large-scale measurements in the collection of research data.

OPPORTUNITIES

Our field of research corresponds very well with the research agendas of national and EU funding programmes. These programmes tend to place a stronger emphasis on implementing technical innovations through policy, management and process innovations. The collaboration between OTB and the Faculty of Architecture and the links to universities of applied sciences through some of the senior members of our group provide greater opportunities for cooperation. They also offer new options for sharing and disseminating knowledge and for collecting research data.

THREATS

The University's financial situation and that of the Faculty of Architecture pose a threat to our share of basic funding. Architectural design is the dominating discipline in the Faculty and attracts the most students. In financially stricken times, the Faculty's other disciplines are at most risk. HQ has a significant earning capacity but we aim to keep a balance of at least 40% basic funding. If this sum were to decrease, we would have to reduce the size of the group, which will have consequences for our multidisciplinary research programme. Furthermore, the competition in our field is growing. More and more universities and universities of applied sciences are setting up new chairs and research groups in this field.

12 Strategy

In January 2009, we started the Housing Quality research programme 2009-2014 as a joint endeavour between OTB and the Faculty of Architecture to continue our collaborative research. We have a well-defined research area, a balanced staff of seniors and PhDs and, at the moment, a healthy financial situation. If the university continues to reward scientific performances as they did during the previous period, we will have a very good chance of achieving our ambitions. These are: to continue to hire at least two PhDs a year; to further improve on the quantitative and qualitative production of articles in peer- reviewed journals; and to improve our visibility in the international scientific arena. This will require substantial resources from national and EU subsidy programmes and contract research but this is a challenge we are confident we can handle. However, if the University's direct funding were to be reduced, we would have to decrease the size of the group, reduce our research area and downscale our ambitions.

Governance of Geoinformation and Land Development

RESEARCH LEADER: Prof. Willem Korthals Altes PhD
KEY RESEARCHERS: Daniëlle Groetelaers PhD, Prof. Jitske de Jong PhD, Prof. Willem Korthals Altes PhD, Bastiaan van Loenen PhD, Prof. Hendrik Ploeger PhD, Herman de Wolff

1 Objectives and research area

1.1 Vision, mission and objectives

Vision: Governance issues in relation to land development and geoinformation have a big role to play in fostering sustainability, inclusiveness and territorial cohesion.

Mission: Our Mission is to improve the knowledge available for effective land management.

Objectives: Governance of Geoinformation and Land Development programme combines strong societal relevance with an engineering approach. It aims to contribute to both practice and academic debates on geoinformation studies, land tenure and property rights and land development.

1.2 Societal concerns and issues

1. The interaction between government and markets in the built environment is of growing societal relevance, due to the introduction of market-based instruments and the retreat of governments.
2. Land tenure and property rights play a role in national land law, comparative research on European land law and systems of land administration, and improvements in land registration in developing countries.
3. To understand spatial patterns and processes, the right geoinformation should be available and easily accessible to different categories of users.

1.3 Position

The group aims at a comparative, multidisciplinary research approach. Three disciplines play a relative large role within this multidisciplinary approach:

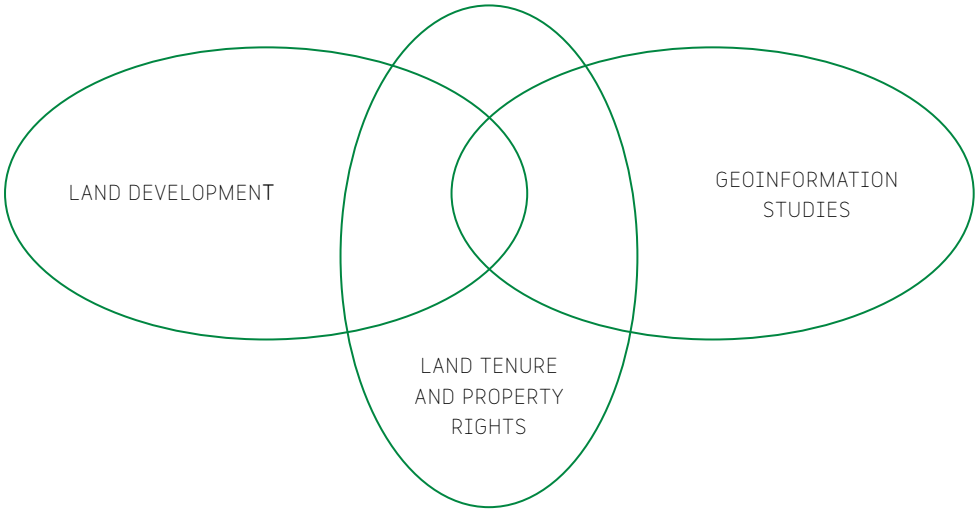
1. Land surveying: Land surveying is about the interaction between property rights, legal instruments, valuation and geoinformation. This field contributes to a clear engineering approach in the sense of 'designing' instruments, even though these are mostly legal and institutional instead of technological. There is also a great need for comprehensive research from an institutional perspective to understand the way these instruments work (or fail to work) in different or changing contexts, including the impact of information technology.
2. Planning: Planning is in itself a multidisciplinary scientific discipline. Within this field, one important aspect the group will address is the interaction of land-development decision-making and planning and another is how different planning agencies can work together for optimum impact on the built and natural environment.
3. Law: The Land tenure and property rights research theme has a strong legal bias, and legal considerations also help to condition the scientific relevance of the other two themes covered by the group (Land development and Geoinformation studies).

1.4 Research area

The Governance of Geoinformation and Land Development programme studies three themes in depth (Figure 1):

- Land development, which is about the interaction between planning and property markets.
- Land tenure and property rights, which focuses on the legal relations between people and land, the transparency of the way these legal relations are implemented by land administration authorities, and the balance of public and private interests.
- Geoinformation studies, which deal with the institutional arrangements whereby geographical or spatial information is provided for. These activities may lead to the creation of a coherent spatial data infrastructure (SDI).
- Europeanization is a common characteristic of all three areas studied by the group.

Figure 1. Research themes



2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	3	1,3	5	2,6	6	3,5	8	4,2	7	3,9	7	3,9	7	3,5
Non-tenured staff	3	0,9	3	0,3	4	0,6	5	2,2	6	3,2	5	2,0	5	1,2
PhD-students	4	2,4	6	3,2	6	4,0	7	3,8	6	3,9	7	4,2	4	2,0
Guests														
TOTAL RESEARCH STAFF	10	4,5	14	6,0	16	8,1	20	10,2	19	11,0	19	10,1	16	6,7

3 Research environment and embedding

3.1 Embedding

The group is positioned in the OTB Research Institute for the Built Environment (OTB), a dedicated research environment, and infrastructure for both direct and externally funded research. The group has been part of the Delft Research Centre for Sustainable Urban Areas, which has resulted in joint projects with other programmes within this centre. Presently the activities of this centre are contributed to the Delft Research Initiative for the Environment. The group has also a relation to the faculty of Technology, Policy and Management. The chairs and educational activities, i.e. in the domain Land: Use and Development, of this group are for a large extent embedded in this faculty.

3.2 Number and affiliation of guest researchers

The group has hosted several guests, such as, Professor Thomas Kalbro (Royal Institute of Technology, Stockholm), Dr. Sang-Bong Im (Rural Research Institute, Korea), Dr Sence Turk (Istanbul Technical University) and Professor Harlan Onsrud (University of Maine).

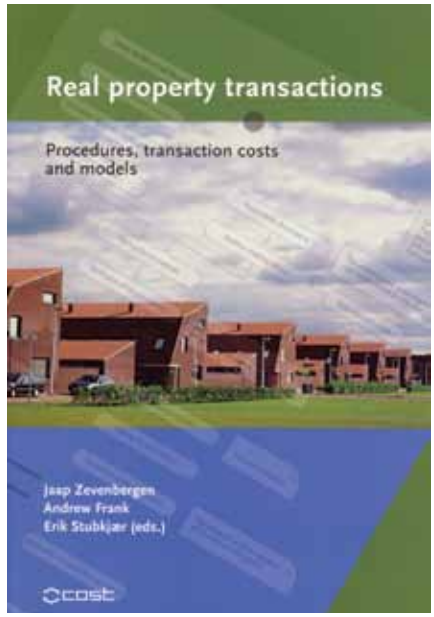
3.3 International and national positioning

The field of planning, law and property rights has developed over the last years. Exemplary is the establishment of the International Academic Association on Planning, Law and Property Rights (PLPR), in which several members of the research group participate. This association has been developed out of an existing Track at the Association of European Schools of Planning (AESOP). Furthermore the group is active in the European Network of Housing Research (ENHR), the International Federation of Surveyors (FIG), the Urban Data Management Society (UDMS) and the Global Spatial Data Infrastructure Association (GSDI).

3.4 Actual collaborations with stakeholders

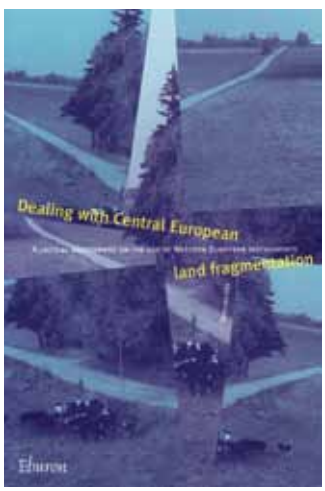
Our participation in boards, committees and other relevant bodies ensured dissemination of our research results in these networks. At the national level, we point to the many positions of Jaap Besemer, such as, Chair of ITC Foundation, Vice Chair of Netherlands Geodetic Commission of the KNAW, Vice Chair of the supervisory board of Geofort, and member of the 'Waarderingskamer' the entity that supervises the appraisal and registration of property for taxation purposes. Danielle Groetelaers is editor of Vastgoedrecht, a professional journal in property law. Jitske de Jong is member of the Mining Council, an official advisory body of the Ministry of Economic Affairs, and is member of the board of the 'Centraal Fonds Volkshuisvesting', the authority that supervises housing associations. Bas Kok has been president of the GSDI, chair of the GSDI Legal and Economic Working Group, and has been active in the European Umbrella Organization for Geoinformation. Willem Korthals Altes, has been scientific director of the Habiforum programme for Innovative Land Use, and is managing director of the OTB, member of the board of NETHUR and member of the council of advice of the Dutch association of land agents. Hendrik Ploeger is professor at the VU University Amsterdam, and is affiliated to various, both Dutch and International, legal science publications. Tuna Tasan-Kok is editor and review editor of the Journal of Housing and Built Environment.

Herman de Wolff is member of the Council of Advice of the Institute for Building Law. Jaap Zevenbergen is professor at ITC and treasurer of the (Dutch) Association of Law and Administration in developing and transition countries.



3.5 Participation in consortia

The group has had a significant stake in two significant Dutch knowledge innovation programmes, the Habiforum programme on Innovative Land Use, and Space for Geoinformation (see also paragraph 4.5: Key results/highlights), and has contributed to a third programme, PSIBouw. Contract research has been commissioned by national, provincial and local authorities, private organizations, and international organisations and programmes, such as, the Worldbank, UN Habitat, URBAN-NET, and COST. For this research the group has co-operated with a wide variety of partners from universities in The Netherlands and abroad, public institutions and private commercial and non-commercial organisations. Notably is the co-operation with Wageningen University, and VU University Amsterdam in order to realize the multi-disciplinary research project Metroland, funded by the Netherlands Organisation for Scientific Research (NWO).



Various publications produced in the framework of the Governance of Geoinformation and Land Development programme.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The group follows a comparative, multidisciplinary research approach. Delft University of Technology's mission of 'user inspired basic research' asks for a multidisciplinary research approach, since practical requirements are not confined to any single scientific discipline. As indicated above, three disciplines play a large role in our research programme:

1. Land surveying
2. Planning and
3. Law

The research group facilitates the exchange of knowledge and expertise and co-operation between researchers that are bridging these disciplines. The quest for fundamental understanding demands a level of abstraction that rises above that of specific concrete applications. A comparative approach is one of the ways of achieving this. The international orientation of the group is shown by publications in international journals and our role in conferences and workshops.

4.2 Significance of the contribution to the field

The relevance can also be underlined by the themes NWO has selected. The theme 'Verbinden van duurzame steden' (Connecting sustainable cities) indicates that integrated area development is part of their research agenda.

4.3 Coherence

The research programme for the period 2009-2014 addresses three research themes.

Land development, which is about the interaction between planning and property markets, and the possible conflict between the private interests of landowners and common societal goals.
The present focus is on three interrelated subjects:

1. New legislation governing land development (New land development legislation: better practice?).
2. The authorities as land developers (Governments as land developers and private enterprise as project developers: does it work? Can provinces be land developers? Financially sound?).
3. The European Single Market and land development (What is the impact of the Single European Market on the governance of land development? In what way does Europeanization frame the constellation of actors, and what new modes of operation are emerging? Developing new 'Europe-proof' land development instruments).

Land tenure and property rights that focuses on the legal relations between people and land, especially in the field of the multiple use of space, the transparency and reliability of systems of land administration, and the balance of public and private interests. This relates to:

1. The demand for easy, reliable access to information from the national land administrations in a context of European integration (the development of a Eurotitle, pan-European registration of rights and restrictions in land).
2. Fundamental rights in relation to land development (such as the fundamental rights to property, the protection of one's home, and procedural safeguards enshrined in the European Convention on Human Rights and the Charter of Fundamental Rights of the EU).
3. The complexities of modern land use (the legal architecture of the built environment, 4D registration system of property rights in time and space).

Geoinformation studies dealing with institutional arrangements whereby geographical or spatial information is provided for in the public sector by private companies and by private persons. With proper coordination, these activities lead to the creation of a coherent spatial data infrastructure (SDI). Access to geoinformation, the use and re-use of it, is central in this theme. Questions relate to the efficiency of access, the mode of provision (public sector or market? New business models required?), aspects in relation to the market for geoinformation (New demands? New data and data providers, new threats?), and the question whether there is still a justification for a specific emphasis of geoinformation apart form other type of information (Is spatial special?).

4.4 Quality of the scientific publications

During the assessment period, the group has published 21 papers in ISI-Journals, i.e.

- Building Research and Information
- Cities
- Computers
- Environment and Urban Systems
- European Planning Studies
- Environment and Planning A
- Environment and Planning B: Planning and Design
- Geoforum, International Journal of Geographical Information Science
- Land Use Policy
- Tijdschrift voor Economische en Sociale Geografie
- Urban Studies and World Development

Another 26 papers are published in the following refereed journals:

- Cartography and Geographic Information Science
- European Journal of Spatial Development
- European Review of Private Law
- Geomatica
- International Journal of Spatial Data Infrastructure Research
- International Planning Studies
- Journal of Comparative Law
- Journal of Housing and the Built Environment
- Journal of Location Based Services
- Journal of Service Science & Management
- Nordic Journal of Surveying and Real Estate Research
- Notarius International
- Planning Practice & Research
- Planning Theory & Practice
- Structural Survey
- Town Planning Review.

Another 44 articles with sufficient length are published in other 'peerlist' journals, i.e.

- Bouwrecht
- Geo-Info
- Nederlands Juristenblad
- Nederlands Tijdschrift voor Burgerlijk Recht
- Property Research Quarterly
- Tijdschrift voor Bouwrecht
- Vitale stad
- Weekblad voor Privaatrecht, Notariaat en Registratie.

Part of these 44 publications are categorised as professional publications, others, especially legal science journals, as non-refereed scientific articles (Table 7.a).

There are so 91 articles published in the three groups of journals mentioned above.

4.5 Results and outputs

KEY RESULTS/HIGHLIGHTS

- The group has acquired funds from the Dutch Science Foundation (NWO) for two projects, i.e. research on Instruments for Internalising Landscape Values in Metropolitan Landscapes, which has resulted in a PhD of Van Rij and a variety or articles and papers, and a research on Location Privacy, which resulted in several publications in books, journals and proceedings.
- The participation of the group in two BSIK -programmes (1) the Habiforum programme on innovative land use and (2) the programme Space for Geoinformation. Professor Korthals Altes has been member of the scientific steering committee (2003-2009) and scientific director (2006-2009) of the first programme, Professor De Jong was member of the scientific committee of the second programme. This has resulted in many projects and publications.
  (BSIK is a Dutch acronym for 'Order concerning Subsidies for Investment in Knowledge Infrastructure'; this is a government scheme set up in 2004 to stimulate innovation throughout the Netherlands.).
- In 2009, the group organised (with GSDI association, EC, Geonovum and BSIK Space for Geoinformation) the 11th GSDI (Global Spatial Data Infrastructure) conference with 1500 participants. Highlights are the publication of a peer reviewed book edited by the group, the organisation of two Master classes for almost 100 students and a pre-conference workshop.
- Publication of monographs and papers in Dutch Legal science, such as, F.H.J. Mijnssen, P. de Haan, C. van Dam & H.D. Ploeger (2006) Mr. C. Asser's handleiding tot de beoefening van het Nederlands burgerlijk recht, goederenrecht, algemeen goederenrecht (Kluwer, Deventer) and J. de Jong & H.D. Ploeger (2008) Erfpacht en opstal (Kluwer, Deventer), and several papers in journals as Bouwrecht and Weekblad voor Privaatrecht, Notariaat en Registratie.
- Co-operation with most of the other programmes in the OTB, both for contract and direct funded research, as a result of the transfer of the group (in 2003) from the department of surveying in the Faculty of Civil Engineering and Geosciences towards OTB.

KEY PUBLICATIONS

- Korthals Altes, W.K., 2009. 'Taxing land for urban containment: reflections on a Dutch debate.' Land Use Policy, Vol 26, No. 2. Elsevier, Amsterdam, p. 233-241.
- Loenen, B. van, 2009. 'Developing geographic information infrastructures: the role of access policies' International Journal of Geographical Information Science, Vol 23, No. 2. Taylor & Francis, London, p. 195-212.
- Veen, M. van der, & Korthals Altes, W.K., 2009. 'Strategic urban projects in Amsterdam and New York: incomplete contracts and good faith in different legal systems'. Urban Studies, Vol 46, No. 4. Sage, London, p. 947-965.
- Korthals Altes, W.K., 2006. 'Stagnation in housing production: another success in the Dutch 'planner's paradise'?' Environment and Planning B: Planning & Design, Vol 33, No. 1. Pion, London, p. 97-114.
- Kok, B.C., & Loenen, B. van, 2005. 'How to assess the success of national spatial data infrastructures.' Computers environment and urban systems, Vol 29, No. 6. Elsevier, Amsterdam, p. 699-717.

KEY BOOKS OR CHAPTERS OF BOOKS

- Loenen, B. van, Besemer, J.W.J. & Zevenbergen, J.A. (eds.), 2009. *SDI convergence: research, emerging trends and critical assessment*. NCG-KNAW Netherlands Geodetic Commission, Delft.
- Ache, P, Andersen, H.T., Maolutas, T., Raco, M. & Tasan-Kok, M.T. (eds. 2008) *Cities between competitiveness and cohesion. Discourses, realities and implementation*. Springer, Germany.
- Crompvoets, J., Rajabifard, A., Loenen, B. van & Delgado, T.C. (eds. 2008) *A multi-view framework to assess SDIs*. RGI Wageningen, University of Melbourne, Melbourne.
- Janssen-Jansen, L., Spaans, M. & Veen, M. van der (eds. 2008) *New instruments in spatial planning. An international perspective on non-financial compensation*. IOS Press, Amsterdam.
- Zevenbergen, J.A., Frank, A. & Stubkjaer, E. (eds. 2007) *Real Property Transactions - Procedures, transaction costs and models*. IOS Press, Amsterdam.

KEY DISSERTATIONS

- Veen, M. van der, 2009. *Contracting for better places: a relational analysis of development agreements in urban development projects*. TUD Technische Universiteit Delft. IOS Press, Amsterdam.
- Rij, H.E. van, 2008. *Improving institutions for green landscapes in metropolitan areas*. IOS Press, Amsterdam.
- Loenen, B. van, 2006. *Developing geographic information infrastructures; the role of information policies*. DUP science, Delft.
- Groetelaers, D.A., 2004. *Instrumentarium locatieontwikkeling, Sturingsmogelijkheden voor gemeenten in een veranderde marktsituatie* [Legal provisions to facilitate land development: Local authorities' management opportunities in a changing market situation]. DUP Science, Delft.
- Dijk, T. van, 2003. *Dealing with Central European land fragmentation: A cricital assessment on the use of Western European instruments*. Eburon, Delft.

5 Societal relevance and quality

Sustainable land management is part of Agenda 21, agreed on at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro (1992). Specific knowledge is needed about the relationship between private property and public goals such as sustainable land management, inclusiveness and territorial cohesion.

The interaction between government and markets is of growing societal relevance, due to the introduction of market-based instruments and the cuts in government funding. Legal instruments are changing to cope with these changes in land development processes, and local authorities are reconsidering their roles in this field.

Research on land tenure and property rights may be applied at different levels: nationally (e.g. leading to improvements in the use of Dutch instruments of land law), at a European level (e.g. comparative research on European land law and systems of land administration against the background of the development of a common mortgage market) or in a global context (e.g. improvements in land registration in developing countries). The challenges of the increasing complexity of our society can often only be met by increased understanding of spatial patterns and processes.

To this end, the right geoinformation should be available and easily accessible to different categories of users. This is in line with the recently published Digital Agenda for Europe (EC, 2010) that promotes a re-use of public-sector information. Examples of re-use are real-estate markets, environmental protection, disaster preparedness and location-based services like navigation.

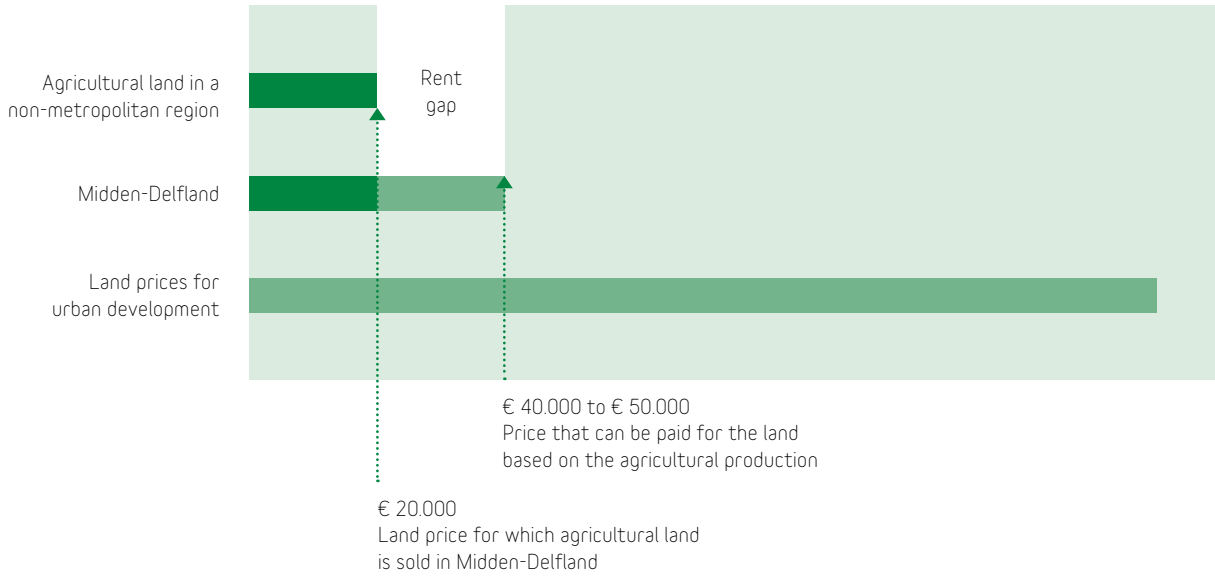
Research insights got, next to BSc and MSc courses the group is involved in, their way through educational programmes for practitioners, such as, civil servants of national government agencies that have followed extensive courses on Land development, and engineers from Arcadis, who followed a course, consisted of 40 full afternoons organised by the group.

The group has also been active in contracts geared towards both increased understanding and the transfer of insights from the research community towards societal practice, which is shown by the following selection.

1. Research on land development practice for a better foundation for improvement of land development instruments (i.e. the new Spatial planning law), for both the Ministry of Spatial Planning, as for associations of the parties that work with these instruments, i.e. the Association of Dutch Municipalities (VNG), the Co-operating Provinces (IPO), and development companies (NEPROM).
2. Contributions to the evaluation of land development, e.g. for Municipal Audit organisations in Amsterdam and Enschede in relation to financial management and strategies, the province of Utrecht in relation to regulation and de-regulation, and, together with the Faculty of Architecture, for a development company and the Ministries of Spatial Planning and Agriculture, to evaluate the results of red-for-green practices in planning.
3. Research and advise towards the use of non-planning instruments for planning issues, such as leasehold (Municipality of The Hague), a public property development company (Municipality of Delft), instruments for the green area of Midden Delfland after the ending of a specific purpose law (Province of South Holland) and the strategic use of these instruments (Municipality of Almere)

4. Research and advise to providers of governmental geoinformation in relation to new legal provisions and marketing, such as for the Data-ICT Service of Rijkswaterstaat (Directorate General for Public Works and Water Management) and the Cadastre in relation to access of information, to the State Service for Cultural Heritage in relation to geoinformation about listed buildings, and for the Ministry of Internal Affairs about policy and practice in other countries.
5. Research and advise on land registration and information, i.e., in the Caribbean (Aruba, Bahamas, Netherlands Antilles, and Suriname) Africa (Ethiopia, Uganda) and post-conflict and post-disaster areas (Aceh, Kosovo) for a variety of organisations, such as the Dutch Cadastre, Ministry for Foreign Affairs, Worldbank and UN Habitat.

Figure 2. Approximate land prices per ha in 2006 (Van Rij, 2006)



6 Earning capacity

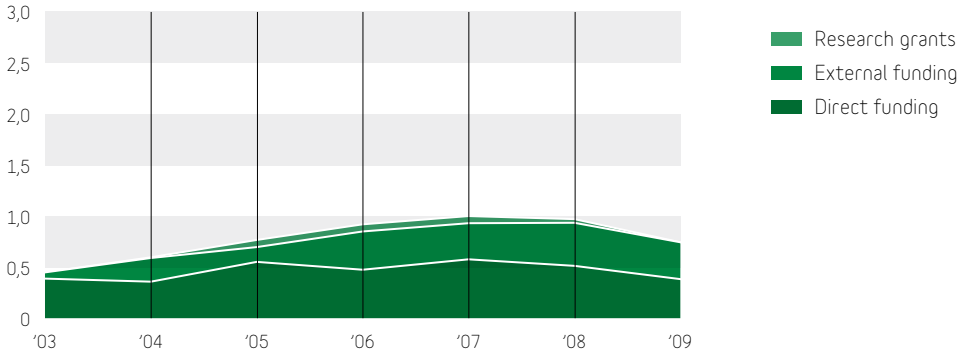
The share of the programme that has been financed by contract research has grown (Table 6.a). The programme has been able to acquire research grants from NWO.

As the result of the reorganization of the department of Geodetic Engineering this group has been transferred to the OTB in 2003. This transfer has resulted in a larger emphasis on acquiring contract research, which has been a success. Contract research is selected based on the ability to strengthen the research programme.

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	388	86%	358	60%	552	72%	475	52%	577	58%	513	53%	383	51%
Research grants	0	0%	7	1%	70	9%	70	8%	70	7%	36	4%	0	0%
External funding	61	14%	232	39%	145	19%	375	41%	354	35%	422	43%	361	49%
TOTAL FUNDING	**449**	**100%**	**597**	**100%**	**767**	**100%**	**920**	**100%**	**1,001**	**100%**	**971**	**100%**	**744**	**100%**
EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	303	67%	413	69%	541	71%	657	71%	713	71%	687	71%	513	69%
Other costs	147	33%	185	31%	226	29%	263	29%	288	29%	284	29%	231	31%
TOTAL EXPENDITURE	**450**	**100%**	**598**	**100%**	**767**	**100%**	**920**	**100%**	**1,001**	**100%**	**971**	**100%**	**744**	**100%**

Chart a. Research funding in M€



7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	3		4		6		10		10		7		7	
Non-refereed articles	4		6		10		1		5		1		2	
Books	0		0		0		2		0		1		0	
Book chapters	8		10		3		3		10		16		12	
PhD-theses	1		3		0		1		1		1		2	
Conference papers	9		17		25		34		25		29		23	
Professional publications	36		32		35		55		50		44		28	
Editorships journals/book	1		4		1		3		6		5		5	
TOTAL PUBLICATIONS	**62**		**76**		**80**		**109**		**107**		**104**		**79**	

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	1	1	1	100%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2001	1	0	1	0	0%	1	100%	1	100%	1	100%	1	100%	0	0%	0	0%
2002	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2003	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2004	2	1	3	1	33%	2	67%	2	67%	2	67%	2	67%	1	33%	0	0%
2005	1	0	1	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%
TOTAL	**4**	**2**	**6**	**2**	**33%**	**4**	**67%**	**4**	**67%**	**4**	**67%**	**4**	**67%**	**2**	**33%**	**0**	**0%**

8 Academic reputation

The academic reputation of the group is visible through a variety of activities and positions. Two researchers have been recently appointed to a part-time chair at other academic institutions, strengthening the links with these bodies. These are the chair of Private law aspects of property including hypothecair and cadastral registration (Ploeger) at VU University Amsterdam and the chair of Land Administration Systems (Zevenbergen) at the ITC (from 01/01/2010 University of Twente). This indicates that the group is acknowledged at other academic institutions.

The academic reputation can also be found in the roles we play in relation to reviewing papers for international conferences and established journals for which we take our share in reviewing papers for the refereed journals in our field. In relation to review processes for conferences, researchers in this programme have been very active in the review of abstracts for conferences by the ENHR (2007), GSDI (2005, 2006 and 2009), FIG (2006) and the Urban Data Management Society (2006 and 2009). In several conferences members of the group have formal role in organising sub groups, themes, among others. The group has also organised several workshops and seminars, such as on socio-economic research on SDI implementation (2008) and on theory-based SDI research: North and South (2009).

The group also has an impact on the field through editorships. Tasan-Kok is editor and book review editor of the Journal of Housing and the Built Environment. Ploeger is a member of the editorial board of the Dutch journal Bouwrecht (Building Law), the editorial board (Private Law section) of Ars Aequi publishers, and the editorial advisory board of the International Journal of Law in the Built Environment. Zevenbergen is regional editor of the Nordic Journal of Surveying and Real Estate Research.

A selection of invited presentations in relation to scientific work:

1. GSDI has requested the group to prepare a book on Spatial data infrastructure and policy development in Europe and the United States (eds. Van Loenen and Kok), which has been handed-out to the participants of the GSDI Conference in Bangelore 2004, where Kok chaired a plenary session on this theme. Kok, as chair of the GSDI Legal and Economic Working Group, has been invited by the United Nations Economic and Social Council to present a paper at the Seventeenth UN Regional Cartographic Conference for Asia and the Pacific (Bangkok, 2006).
2. Based on a journal paper in Land Use Policy, Korthals Altes has been invited for a presentation at the Workshop on land pricing/taxes as an instrument to shape land use patterns in Europe by the European Environmental Agency (Copenhagen, 2009).
3. Welle Donker has held invited presentations on Public Sector Information Access policies and Creative Commons licences for Geoinformation (for which a paper has been accepted for publication by Environment and Planning B: Planning and Design in 2009, published after the assessment period in 2010) for the Open Geospatial Consortium, Tyson's Corner, US-VA (2006), for the Queensland University of Technology (Professor Anne Fitzgerald) in 2008, for the High Level Advisory Committee (Commissie van Wijzen) (as showpiece for results by BSIK Space for Geoinformation) in 2006, and for a workshop of the US National Committee for

CODATA, US National Academy of Sciences held at the OECD Headquarters in Paris (2008) for which the workshop summary has been published by the National Academies Press (Washington DC, 2009).

4. Zevenbergen has been invited as key-note speaker on the Symposium on Land Administration in Post Conflict Areas from FIG, Kosovo Cadastral Agency and UN Habitat in the Palais des Nations, Geneva, 2004 to present (with Van der Molen) the UN Habitat comprehensive evaluation exercise of the Kosovo Cadastre Support Programme. This resulted in a role as editor of the 'Handbook for planning immediate measures from emergency to reconstruction' (UN Habitat, Nairobi, 2004) Later he has worked with UN Habitat in the post-disaster (and post-conflict) area of Aceh, work which contributed to a UN Habitat publication on 'Land and Natural Disasters: Guidance for Practitioners'. He has been invited again for a presentation on Land Administration in post conflict areas with weak land records for a workshop in Geneva (2009). He was in the team that, commissioned by the Worldbank, assessed rural land certification in Ethiopia, which resulted in a paper in the ISI-journal World Development. Follow-up research was and invited presentation at the conference 'Land Governance of the Millennium Development Goals' (Worldbank/ FIG, Washington DC, 2009).
5. In 2008, Van Loenen and Ploeger were invited by the European Land Information Service (EULIS) project to present in Berlin their view on the road towards a European real property market.

9 Next Generation

The group participates in two graduate schools accredited by The Royal Netherlands Academy of Arts and Sciences (KNAW), i.e, the Netherlands Graduate School of Urban and Regional Research (NETHUR) of which Willem Korthals Altes has been member of the board during the whole assessment period, and Ius Commune in which researchers of the theme Land Tenure and Property Rights participate in the programme on Property Law. The OTB provides a two-year part-time postgraduate course in Housing, Urban and Mobility Studies for junior staff. OTB has a specific policy paper on the process and supervising of PhDs, there is a monitoring programme, a PhD-mentor and a PhD Council.

Amsterdam Zuidas Amsterdam
[photo: Municipality of Amsterdam].

10 Viability

The group has a stable position within the OTB. The group has been active in two research projects together with the group working on area development ('Gebiedsontwikkeling') at the Faculty of Architecture. Furthermore there are good relationships with the building law group within RE&H. We are confident that the Transfer of the OTB towards the Faculty of Architecture will open further possibilities for co-operation.

The Governance of Geoinformation and Land Development research programme combines strong societal relevance with an engineering approach. In other words, the group's investigation of practical cases throws light on governance practices in land management systems and gives it a strong foothold in the academic debate on geoinformation studies, land tenure and property rights and land development – the three main themes covered by the group.

The group aims to establish a position as an international leader in the study of the role of local authorities in land development and of the role of Single European Market rules in land development and their impact on urban regeneration practice. Our current and future research on the new Spatial Planning Act in the Netherlands, with a separate chapter on land development, aims to make a significant contribution to understanding of the way legal instruments for land development can be formed.

The Land tenure and Property rights theme group builds on our research on land law and land registration performed in the past, and aims to contribute in a substantive way to the ongoing legal debate on the influence of EU policies and legislation on land law and land registration.

Geoinformation studies have become highly relevant with regard to access policies within the Netherlands and the European Union, and our Geoinformation studies theme group increasingly participates in agenda-setting events. For assessment of SDIs, the group can be considered to be one of the leading institutes worldwide. Building on this basis, we aim to increase our scientific visibility by developing conceptual models and assessment frameworks permitting increased understanding and comparison of developments in and between countries, as part of existing and extended cooperative projects.

11 SWOT-analysis

STRENGTHS

The position within the OTB provides a dedicated research context for use based scientific research. Within OTB there are several research groups with which co-operation works very well as can been seen from joint projects and publications. The group's multidisciplinary approach provides excellent opportunities for this kind of research as societal problems in relation to governance of geoinfomation and land development do not convey themselves to one discipline. The group has published an increasing number of international peer reviewed publications, and has many international contacts. The group has a healthy mix of funding sources, including 2 NWO-financed projects, and good financial assets

WEAKNESSES

The field which the programme addresses is rather wide. This makes it for researchers in the programme often necessary to co-operate with colleagues from outside the programme. Having a multidisciplinary approach has its drawback that the group cannot be at the forefront of the disciplinary debate of all disciplines with we use in our research, and which involves that we must focus on channels and publication outlets that are open to multidisciplinary approaches towards the improvement of the Governance of Geoinformation and Land Development.

OPPORTUNITIES

The combination of OTB and the Faculty of Architecture provide new opportunities for cooperation, sharing and disseminating knowledge and new options for collecting research data. The present crisis on the property market results in a societal awareness for a need for better Governance of Geoinformation and Land Development, and, more specifically for the themes addressed in the research programme of the group.

THREATS

The present financial crisis may have a negative impact on university funds, research grants and contract research commissioned by public authorities, and private parties. This results in a stiff competition for the scarce funds still available. The group has, e.g., experienced that a 14.5 points score (out of 15) has not been enough for FP7 funding.

12 Strategy

The programme was evaluated in late 2003 by an international review committee chaired by Professor Michael Batty. This evaluation, and the previous evaluation (chaired by professor Witteveen in 2000), prompted the group to take several actions in relation to strengthening its international research profile. These actions have been re-invoked by the transfer of the group to the OTB in 2003. Links have been established with other groups within OTB on aspects as the organization of urban restructuring (Urban regeneration group), the relationship between housing and land markets (Housing studies group), regional land development policies (Urban and regional studies group), building codes (Housing quality group) and geoinformation infrastructures (GIS technology group). The international visibility has strongly been improved through more publications in refereed journals and other publications that address an international academic audience, and by more involvement in international academic and research networks.

More operational ambitions are as follows:

- The publication of more influential papers in international peer-reviewed journals
- Combining research with a direct application in a practical context with scientific reflection on the issues involved
- Maintaining a proper balance between retaining our position as a national player in our field and increasing our involvement in international networks
- Making sure that the group produces at least one PhD a year
- Participation in international research networks
- The development of a centre of expertise on Geoinformation Sudies supported by TNO, an organisation that manages the geoinformation regarding the Geological Survey of the Netherlands, the Cadastre, National Government and private parties.
- Building further relationships within the Faculty of Architecture.

Berlage

The Berlage Institute is a post-academic laboratory for design-based research in architecture, urbanism, and other issues related to the built environment. Its postgraduate program and PhD program are open to applications from graduated and experienced architects, urban planners, landscape architects, and other researchers. Complementary to these programs, the Institute also broadens its activities to the professional sector with a series of publications, for which it solicits internal and external collaborators, and a public program of lectures, debates, and symposia.

The Institute provides the intellectual climate and infrastructure to explore the forces that shape the contemporary built environment; subsequently developing, by means of design, alternative models and new insights to devise a transformative impact on the built environment. Essential to the laboratory is the guidance by and exchange with leading and emerging voices and practitioners, and the direct engagement in concrete conditions represented by third-party collaborators—those public authorities, cultural institutions and/or private bodies that are the "holders of the problem" that constitutes the basis of each research study.

This simultaneous commitment to research and reality allows the Institute's researchers to develop a precise understanding of the challenges that necessitate reflection, innovation, and speculation. Through seminars, lectures, publications and exhibitions, researchers directly communicate and debate their polemical architectural and urban propositions with the stakeholders.

The Berlage Institute was established in 1990 to promote excellence in architecture and urbanism. Herman Hertzberger, the Institute's first dean and one of its founding fathers, established its worldwide reputation as a place for discussion, reflection and research on architecture and urbanism.
In 1995, Wiel Arets became the Institute's second dean, introducing the opportunity to perform doctoral research in conjunction with the Delft University of Technology. Alejandro Zaera-Polo was named the third dean in 2002. During his tenure he restructured the Institute's activities to emphasis the connection of research to professional practice. Building on this, the Institute increased its profiled as a research institution. Therefore, in 2007, the Berlage Institute Research Board was established to serve as a new and diverse leadership structure. The Berlage Institute Research Board, presently consisting of Ben van Berkel, Winy Maas, Robert E. Somol, Alejandro Zaera-Polo, and Elia Zenghelis, establishes the profile of the Institute by identifying new research trajectories. Each member of the Research Board is personally involved in one or more component of the program. Under the direction of Vedran Mimica, the program is developed in collaboration with the faculty, Pier Vittorio Aureli, Joachim Declerck, Salomon Frausto, Roemer van Toorn, and Peter Trummer. Leading and emerging voices and practicioners are invited as visiting tutors or as guest lecturers to generate an unparalleled research environment.

International Architecture Biennale Rotterdam (curator: Berlage Institute, 2007):
Edi Rama (Major of Tirana), Ivo Opstelten (Major of Rotterdam), Joachim Declerck (Berlage Instituut).

Berlage Institute

RESEARCH LEADERS: Pier Vittorio Aureli PhD
KEY RESEARCHERS: Pier Vittorio Aureli PhD, Prof. Roemer van Toorn PhD (Umea, Zweden)

1 Objectives and research area

1.1 Vision, mission and objectives

Vision: The rapidly changing field of spatial practice makes it clear that architecture is no longer produced within a closed body of knowledge. That is why the Berlage Institute organises its activities according to a set of defined research trajectories.

Mission: The Institute provides the infrastructure and intellectual environment required to explore the forces that shape the contemporary built environment; this enables it to develop, by means of design, alternative models and acquire the knowledge through which to affect a transformative impact on the built environment.

Objectives: The aim is to generate supra-disciplinary knowledge by relating research ambitions to other disciplines (economy, sociology, etc.), as well as sub-disciplinary knowledge by focusing on specific aspects of architectural production (materiality, organisation, technology, etc.). The Institute's research activities collectively aim to advance new models, visions, and principles to be able to frame the various forces shaping the contemporary built environment.

1.2 Societal concerns and issues

As an independent foundation, the Berlage Institute takes part in Dutch governmental policy on culture, focusing specifically on architecture. Partially funded by the Dutch Ministry of Education, Culture, and Science for this purpose, the Institute also aims to nurture the professional community in the Netherlands by offering a place for cultural debate and international encounter and exchange. In this respect, this post-academic laboratory focuses on research and design issues relevant to the Netherlands more than ever before.

1.3 Position

The Berlage Institute positions its activities in the gap that is being created as a result of the rapidly changing forms of worldwide urbanisation and the lack of models and principles available to structure the physical environment into a socially, culturally, and ecologically sustainable habitat. While the disciplines of architecture and urbanism are increasingly compartmentalised areas of knowledge, the Institute — as a cultural platform — provides a context in which its researchers can establish, test and propagate new forms of synthesising skills that can strengthen the visionary quality of their work. For the current PhD cohort, for example, they are working closely with other schools, such as the Architectural Association School of Architecture in London.

1.4 Research area

The activities of the Berlage Institute are structured according to the following six distinct research trajectories: new living/working conditions, tourism and territory, emerging technologies and techniques, structuring metropolitan formations, cohabitation and conflict, and energy and the built environment.

2 Composition

Table a. Research staff at institutional and programme level

	2003		2004		2005		2006		2007		2008		2009	
	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE	NR	FTE
Tenured staff	3	0,6	3	0,6	3	0,6	3	0,6	3	0,6	3	0,6	3	0,6
Non-tenured staff	0	0,7	0	0,7	0	0,7	0	0,7	0	0,7	0	0,7	0	0,7
PhD-students	5	2,6	5	2,6	5	2,6	5	2,6	5	2,6	5	2,6	14	2,6
Guests	1		1		1		1		1		1		1	
TOTAL RESEARCH STAFF	**9**	**3,8**	**9**	**3,8**	**9**	**3,8**	**9**	**3,8**	**9**	**3,8**	**9**	**3,8**	**18**	**3,8**

3 Research environment and embedding

3.1 Embedding

The Berlage Institute forms, together with the larger and innovative architect's offices in and around Rotterdam, part of what could be described as a 'professional eco-system', where architects both teach and scout for talent, and participants find interesting experience and job opportunities. The Berlage Institute is part of the cultural infrastructure in Rotterdam and contributes significantly to the creative industry in the field of architecture in the Rotterdam/Delft region.

3.2 Number and affiliation of guest researchers

The Berlage Institute is in the unique position of being able to attract world-renowned visiting professors and lecturers such as Peter Eisenman (Louis I. Kahn Visiting Professor of Architecture at Yale), Leon Krier, Denise Scott Brown (VSBA), Mary McLeod (Professor of Architecture at Columbia University), Joan Ockman (Retiree at Columbia University), Annette Gigon (Annette Gigon/Mike Guyer Architekten), Sir Peter Cook (Bartlett/SCI-Arc), Peter Sloterdijk (Staatliche Hochschule für Gestaltung Karlsruhe), and many others. We see it as a real luxury to be able to welcome such prestigious academics and offer the Berlage participants an opportunity to exchange views with them in seminars and interviews.

3.3 National and international positioning

The Berlage Institute is part of, and operates in, an environment of high-performance prestigious institutions in the field of architectural education and design, such as the AA, the Bartlett and LSE (London), Columbia University (New York), and others.

3.4 Actual collaborations with stakeholders

The Berlage Institute pursues active and structural collaboration with the Tsinghua University School of Architecture in Beijing (China), with whom we organise one joint studio per year. Lecturers and teaching staff participate in exchange programmes with colleague institutions such as the AA, Columbia University and TU Delft.

3.5 Participation in consortia

The Berlage Institute collaborates with a group of colleague institutions on a project basis rather than in structural affiliations. Ad-hoc partners include: Erasmus University (HIS) and ETH Zurich/ Studio Basel. The Berlage has a formal affiliation with TU Delft's Faculty of Architecture. The Berlage Institute is one of the expert institutions on the Advisory Committee of the European Prize for Contemporary Architecture Mies van der Rohe Award.

4 Scientific relevance and quality

4.1 Quality and scientific relevance of the research

The Berlage Institute provides the intellectual environment and infrastructure to explore the forces that are shaping the contemporary built environment; this enables it — by means of design — to develop alternative models and acquire insight through which to effect a transformative impact on the built environment. Researchers receive guidance from and exchange ideas with leading and emerging voices and practitioners, and engage directly with the specific conditions put forward by third-party partners — those public authorities, cultural institutions and/or private bodies that are the "holders of the problem" at the heart of each research study. This simultaneous commitment to research and practice allows researchers to develop a precise understanding of the challenges that necessitate reflection, innovation, and speculation. Researchers communicate directly through seminars, lectures, publications and exhibitions, debating their polemical architectural and urban propositions with stakeholders.

As the transformation of the built environment becomes increasingly complex and ambitious, there is a tendency for the professional sectors of architecture to break down into their distinct specialisations. The challenge for architectural research is to engage directly with these transformations while simultaneously developing new forms of architectural knowledge. The Berlage Institute provides a context for its researchers to test and communicate models, insight, and principles that focus on architectural and urban issues in the context of the Netherlands in relation to the global perspective.

4.2 Significance of the contribution to the field

The Berlage Institute participates with the cultural and professional sectors in three ways: project-based exchange with each research trajectory, the development of the public programme as a form of post-professional education, and the publication of its work on the internet and in printed form. The Institute presents the results of its research projects in the form of seminars, workshops, exhibitions and publications. This offers researchers the opportunity to check their plans, visions and convictions with reality directly.

4.3 Coherence

The activities of the Berlage Institute are structured according to the following six distinct research trajectories: new living/working conditions, tourism and territory, emerging technologies and techniques, structuring metropolitan formations, cohabitation and conflict, and energy and the built environment. While developing specific insight into each respective trajectory, the Institute's research activities collectively aim to develop new models, visions and principles to be able to frame the different forces shaping the contemporary built environment.

4.4 Quality of the scientific publications

The architectural and urban research, ideas, and projects pursued at the Berlage Institute are expanded and consolidated for presentation to a global audience through a series of architectural broadcasting initiatives.

Studio at Berlage Institute.

4.5 Results and outputs

KEY PUBLICATIONS

The Institute's flagship publication Hunch inventively expands and complements the architectural and urban research, ideas, and projects being pursued at the Berlage Institute. It is highly topical and aims to provide a bridge between the culture of Dutch architecture and the international discourse on architecture, urbanism, and landscape.

Hunch 12 Bureaucracy
This issue presents twelve contributions by leading and emerging architects, critics, and scholars in which the role of bureaucracy in shaping contemporary architecture is explored. It covers themes varying from government regulations and new models of organisation for professional practice to contrasting forms of urbanism and diverging interpretations of economic value in relation to cultural capital. The authors focus on how to select the determinants that affect the built environment. At the same time, they rethink these processes in order to influence the buildings. Along with these topical contributions — which are supplemented by marginalia in the form of short stories, annotations, terminologies, and inventories — the issue also features four 1,000word texts and a visual essay, which reflect on broader theoretical aspects of the culture of architecture.

Hunch 13 Consensus
This issue covers themes ranging from decision-making strategies, participatory forms of urbanism, and top-down planning methods, to the collaborative process of the architecture studio, the political implications of commissioning star architects, and the realisation of universal planning principles. The contributors focus on how collective thought influences and enriches the development, design, and planning of cities. Along with topical contributions — which are supplemented by marginalia in the form of annotations, inventories, terminologies, and short stories — the issue also presents a series of "peripheralia," consisting of four interviews with renowned architectural theorists and practitioners, and a visual essay and a text reconsidering the role of images in architectural history and theory.

KEY BOOKS OR CHAPTERS OF BOOKS

Brussels—A Manifesto: Towards the Capital of Europe, 2007
This publication - based on a 2004 Berlage Institute research studio developed by an international team of architects and urban designers - takes a vigorous stand in order to explore the link between the representative role of architecture and the future of Brussels and Europe. It is published by NAi Publishers and A+ Editions.

Berlage Reports on Contemporary Urbanism
This series of publications, which will debut in the autumn of 2010, presents selected research activities produced by the Institute's faculty, participants, and affiliates. This research explores urban conditions in order to engage directly with reality; the aim being to advance dialogue and design related to the contemporary built environment. Topics include: resource efficiency as a sustainable

driving force for urban development; the redefinition of the city as a political institution by means of large-scale polemical projects, focusing specifically on the interrelation between architectural form, political theory, and urban history; and the integration of city life, planning policies, aesthetic desires, economic attention, and population growth into the design of the built environment.

KEY OUTPUTS WITH MAJOR IMPACT ON PRACTICES AND POLICIES

Dutch architecture and urban culture has never limited itself to local issues; in fact, its respective innovation has been dependent on its international outlook. In a globalised world, the Dutch context cannot limit itself to national boundaries in relation to cultural, socio-economic, and environmental issues. It is pertinent to collaborate and share knowledge and expertise with colleagues and institutions worldwide. The Berlage Institute is a platform for exchange between other worldwide experiences and established traditions as well as the distribution of Dutch local expertise in urban planning, public housing, and design to gain broader awareness of the built environment. Our most significant impacts on practices and policies are through our platform activities and our graduates.

KEY DISSERTATIONS

- d'Hooghe, A., 2007. 'The Liberal Monument. A Definition of Urban Design as the Manifestation of Romantic Late-Modernism'. TU Delft Architecture, Delft.
- Aureli, P.V., 2005. 'The Possibility of Absolute Architecture'. TU Delft Architecture, Delft.
- Vidler, A., 2005. 'Histories of the Immediate Present: Inventing Architectural Modernism, 1930-1975'. TU Delft Architecture, Delft.

KEY EVENTS

From lectures and round-table discussions to exhibitions and conferences, each year a public programme of events complements the research topics currently being pursued at the Berlage Institute. Each term, a lecture series is presented around a central topic. Recent lecture programmes include:

Fabricators of Ideology and Architectural Education
This multi-part lecture and seminar programme, which began in spring 2009 and will conclude in autumn 2010, brings together the architects who have been the protagonists of architectural ideology and education during the last half century to discuss their influence on contemporary theorists, critics, and practitioners. The aim is to trace a historical trajectory based on the fifty-year teaching experience of Elia Zenghelis. The series includes the participation of many of the protagonists — both practitioners and theorists — that shaped and influenced this historical trajectory. Many of these protagonists are still practising and all have been involved in the search for, or critique of, a paradigm. Most importantly, all are educators. Participants in the programme to date include: Andrea Branzi, architect, Milan; Peter Cook, architect, London; Kenneth Frampton, Ware Professor of Architecture.

Under Construction: Recent Architectural Propositions
The programme brought together architectural practitioners to discuss the ideas, methods, and design intentions that shape their own architectural projects. The overall aim was to present the theoretical and ideological motivations and foundations that guide contemporary emerging architectural practices through the lens of a building currently under construction.

Risky Business: Architecture and Economies of Means
This lecture series focused on the cultural dimension of architecture in relation to its economic organisation. From balancing public policy with private investment interests to rethinking the relationship between architect and client, each lecturer looked at the influence of a world driven by global markets in relation to the construction of the built environment. Lecturers included: Wiel Arets, principal, Wiel Arets Architects; Keller Easterling, Associate Professor of Architecture, Yale University; and Reinhold Martin, Associate Professor of Architecture, Columbia University.

Form and Figures: Exploring the Language of Architecture
This lecture series brought together architects, urbanists, designers, and scholars to present the languages, thoughts, and representations that have successively contributed to the historical and contemporary canon of architecture culture. The series aimed to individuate modes of articulation that implicitly, rather than explicitly, serve as frameworks and reference points for the debate within the discipline of architecture. Lecturers included: Alan Colquhoun, Emeritus Professor of Architecture, Princeton University; Hubert Damisch, Faculty member, École des hautes études en sciences sociales, Paris; Mary McLeod, Professor of Architecture, Columbia University, Vincent de Rijk, model maker; and Hans Werlemann, photographer and filmmaker.

KEY EXHIBITIONS

Bildbauten: Architectural Imagery by Philipp Schaerer 2009
This exhibition of eighteen images that question the validity of architectural photography as a medium to document and as a piece of evidence depicting reality.

History and Future of the European City 2009
The Berlage Institute, together with the Flemish Architecture Institute, presented an exhibition exploring the history, current building projects, and urban challenges of the cities of Mechelen, Plzen, Bordeaux, Kosice and Mons.

Imagining Recovery: Toward a Design Economy 2009
This exhibition was based on an international competition charging designers to imagine innovation recovery through design. Designers were asked to offer their expertise by designing a means of getting from the existing situation to the image of recovery.

5 Societal relevance and quality

5.1 Socio-cultural, technical and/or economic quality

The Berlage Institute publications have been well received and are generally considered to have made a substantial contribution to the international discourse on architectural theory. The authors have acquired important academic positions since and are involved in groundbreaking research.

5.2 Key results/highlights

The dissertations of reps. Pier Vittorio Aureli, Anthony Vidler and Alexander d'Hooghe (to be published by Princeton Architectural Press) can be seen as the keynote results of the first phase Berlage PhD programme (individual thesis). Aureli is now Head of the Berlage PhD Programme 'The City as a Project' and co-promoter to the Berlage Chair Professor, Vidler is Dean of the Cooper Union in New York and d'Hooghe is teaching at the MIT (Cambridge USA).

5.3 Key knowledge contributions to practices and policies

The Berlage Institute educates architectural researchers, enabling designers to develop an investigating and innovative profile, sharpening their profession and strengthening their societal role as public intellectual.

5.4 Evidence of the appreciation of stakeholders

The Berlage Institute plays an active role in a number of cultural networks such as the European Forum for Architectural Policies (EFAP). The General Director of the Berlage Institute is President of this organisation. The Forum originates from an expert meeting on architectural policies held in 1997 in Rotterdam during the Netherlands EU Presidency. The Finnish Presidency, in cooperation with France, took the initiative to propose the launch of a Forum during the Council of Ministers of Culture in November 1999, and the European Forum for Architectural Policies was set up as a network organisation in Paris in 2000. In that constitutive meeting, a Resolution was formulated, the 'Resolution on architectural quality in urban and rural environments in Europe'. The European Council of Ministers adopted this resolution on 12 February 2001 (2001/C73/04).

5.5 Dissemination strategies

The architectural and urban research, ideas, and projects pursued at the Berlage Institute are expanded, consolidated, and complemented for presentation to a global audience through a series of architectural broadcasting initiatives. This content is disseminated as print publications, online interactivity, and public events. The flagship of the Institute's publication series is Hunch. Each issue includes contributions on a selected topic as well as other wide-ranging columns, essays, interviews and design projects. Published at the end of each term, The Berlage Papers is a large-format broadsheet highlighting recent news, activities, announcements, previews and reviews related to the Institute. The Institute's website, www.berlage-institute.nl, is a tool to exhibit the past and present activities of the Institute. The Institute's public programme of lectures, exhibitions and other events is framed around a selected theme that complements the research topics presently being investigated.

5.6 Evidence of impacts

Recent examples are the invitation by commissioner Richard Burdett to contribute to the Architecture Biennale in Venice (2006), the invitation to be curator of the Third International Architecture Biennale Rotterdam (2007), numerous invitations to teach Master Classes, such as recently at the Strelka Institute of Architecture in Moscow, and an exhibition and book launch of the project Rome, the Centre(s) Elsewhere, at the Festa dell' Architettura in Rome (2010).

5.7 Commissioned research by societal actors

A recent example is the project 'Diyarbakir, Accommodating the Displaced', which focused on creating good housing and living conditions for the immigrant streams in Kurdistan and was performed in collaboration with the IHS (Rotterdam) and local partners in Turkey, with financial support from the Netherlands Ministry of Foreign Affairs (Matra Programme). Other projects include the 'Croatian Archipelago' (final results presented to the Netherlands and Croatian Prime Ministers), and research commissions by the City of Lille and furniture-manufacturing company Steel Case.

Seminar by
Prof. Winy Maas (TU Delft).

6 Earning capacity

Table a. Research funding

	2003		2004		2005		2006		2007		2008		2009	
FUNDING	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Direct funding	-	-	-	-	-	-	-	-	-	-	-	-	36	31%
External funding	-	-	-	-	-	-	-	-	-	-	-	-	80	69%
TOTAL FUNDING	-	-	-	-	-	-	-	-	-	-	-	-	116	100%

EXPENDITURE	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%	K€	%
Staff costs	-	-	-	-	-	-	-	-	-	-	-	-	75	76%
Other costs	-	-	-	-	-	-	-	-	-	-	-	-	24	24%
TOTAL EXPENDITURE	-	-	-	-	-	-	-	-	-	-	-	-	99	100%

Master Class by
Prof. Yushi Tsakumoto.

7 Output

Table a. Main categories of research output

	2003		2004		2005		2006		2007		2008		2009	
	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS	STAFF	GUESTS
Refereed articles	0		1		2		2		0		0		0	
Non-refereed articles	0		0		0		0		0		0		0	
Books	0		0		2		3		0		0		2	
Book chapters	4		4		11		8		5		4		3	
PhD-theses	0		0		3		0		1		0		0	
Conference papers	3		3		0		0		1		0		2	
Professional publications	5		4		4		15		3		11		3	
Editorships journals/book	1		0		1		1		0		0		0	
TOTAL PUBLICATIONS	**13**		**12**		**23**		**29**		**10**		**15**		**10**	

Table b. PhD-students with employee status

ENROLMENT				SUCCESS RATES													
STARTING YEAR	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCON-TINUED	
	MALE	FEMALE	TOTAL	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%	NR	%
2000	0	0	0														
2001	1	0	1	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%
2002	2	0	2	1	50%	2	100%	2	100%	2	100%	2	100%	0	0%	0	0%
2003	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2004	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
2005	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-
TOTAL	**3**	**0**	**3**	**1**	**33%**	**2**	**67%**	**2**	**67%**	**2**	**67%**	**2**	**67%**	**1**	**33%**	**0**	**0%**

8 Academic reputation

Table a. Invitations to address major conferences

YEAR	CONFERENCE	WHO	WHERE	
2008	"About Berlage," Open Day, University of Thessaloniki	Mimica	Thessaloniki	GR
2009	Ten Years of Architecture Education at the Dessau Institute of Architecture	Mimica	Dessau	DE
2009	ARCH+20: Architectural Education—The Next Twenty Years	Mimica	Haifa	IL

Table b. Conference organisation activities

YEAR	CONFERENCE	ROLE	WHO	WHERE	
2003	Against Reality: Travel Dialogues - Harvard and Princeton University	Organiser	van Toorn	Cambridge, Princton	US
2008	City of Tomorrow	Organiser	Declerck	Brussels	BE
2008	Critical Judgment: Architectural Criticism and the Politics of City Form	Organiser	Declerck, Frausto	Rome	IT
2008	Recent Research: Berlage Institute - University of Thessaloniki	Lecturer	Mimica	Thessaloniki	GR
2009	City Visions Europe - Bordeaux, Kosice, Mechelen and Pilsen	Co-organisation	Declerck	Europe	EU
2009	The New Urban Question - IFOU Conference	Co-organisation	Rosemann, Docter	Delft	NL

Table c. Involvement in exhibitions

YEAR	EVENT	ROLE	WHO	WHERE	
2004	Contribution to Manifesta 5	Curator	Mimica	San Sebastian	ES
2006	Contribution to 10th Venice Architecture Biennale - Beyond Mapping. Projecting The City	Curators	Mimica, Declerck	Venice	IT
2007	A Vision for Brussels - BOZAR	Curators	Aureli, Declerck	Brussels	BE
2007	4th International Architecture Biennale Rotterdam - curatorial team	Curators	Mimica, Declerck	Rotterdam	NL

Table d. Prizes, awards, competitions

YEAR	PRIZES, AWARDS, COMPETITIONS	ISSUER	WHO	WHERE	
2006	International Iakov Chernikhov Prize	ICIF	Aureli	Moscow	RU

Table e. Editorship academic journal

YEAR	JOURNAL	ROLE	WHO	WHERE	
2007	Hunch	Editor-in-Chief	Frausto	Rotterdam	NL

Table f. Role in practice and policy making

YEAR	FIRM/ORGANISATION	ROLE	WHO	WHERE	
2003/>	European Forum for Architectural Policies EFAP	President	Docter	Brussels	EU
2003/>	Mies van der Rohe Award - European Prize for Contemporary Architecture	Advisor, expert	Docter, Mimica	Barcelona	ES
2005	Palladio Project Foundation	Advisor	Docter	The Hague	NL

9 Next generation

9.1 Objectives and institutional embedding

The Berlage City as a Project PhD programme was initiated during the academic year 2009-2010. The PhDs conduct their research at the Berlage Institute but defend their work at Delft University of Technology (TU Delft). They are supervised by the Faculty of Architecture's Berlage chair. The programme has been conceptualised to understand the city's form as an act that defines a political intentionality, thus establishing a precondition for engagement with the city's complex nature.
A fundamental issue at stake is form in relation to the political. The term "city" is defined not as a mere mass of flows and programmes but as a political form. The terms political and form are assumed to be the fundamental criteria that construct the essence of the city. If the essence of political action is the attempt to project a form of coexistence among individuals, it may be said that architectural form inevitably implies a political vision. Even if there is no political architecture, there is certainly a political way of making and reading architectural form. Far from being just an aesthetic category, physical form represents the political understanding of the city as a constant dialectic process of inclusion and exclusion. This commitment to formal and material responsibility is meant to be a departure from the laissez-faire rhetoric of flexibility and indeterminacy that has paralyzed recent discussion on the city.

9.2 Structure of programmes

The three-year programme, headed by Dr. Pier Vittorio Aureli is organised and structured as a critical forum where participants are asked not only to pursue their individual studies but also to share these studies as part of a collective debate. Candidates are not full-time, but are required to take part in all these events. Participation consists of individual tutorials with the supervisor, monthly seminars with invited guest scholars, a yearly international colloquium, and symposia. These activities are venues for discussion and constitute occasions for candidates to deliver content related to his or her thesis in the form of presentations, papers, and publishable essays.

9.3 Supervision

The institute provides full-time daily supervision for PhD researchers together with a strong collective component in the programme (joint seminars, colloquia etc). The candidates (researchers) meet regularly (at least once a month) in Rotterdam to meet and discuss each other's latest results and progress and to receive tutorials (guidance and feedback) from their second supervisor.

9.4 Success rates

The PhD programme at Berlage was initiated in 2009/2010. It is too early to report on success rates.

9.5 Educational resources

The Berlage Institute has a state-of-the-art printing and binding studio that enables it to produce easy-to-distribute reports and publications. Researchers regularly use the well-equipped library of the Netherlands Architecture Institute (Rotterdam) and the Faculty of Architecture of TU Delft. As guest researchers they have access to all academic facilities TU Delft Architecture has to offer.

10 Viability

10.1 Resource management

The current balance between subsidy (Ministry of Education, Culture and Science) and own income (participation fees and commissions) is approx. 60-40. Participants pay €12,550 per year and invest approx. €50,000 in total in their career following the two-year Berlage programme. In addition, the PhD programme requires another 3-4 years of study.

10.2 Available infrastructure

Located in Rotterdam, a city noted for its modern architecture, the Berlage Institute is housed in the former Spaarbank building designed by the renowned architect J. J. P. Oud and completed in 1954. Participants work in a communal studio space in the building's sky-lit main banking hall.

The Institute operates a specialised library for use by participants, faculty and visiting tutors. It contains a selection of architectural monographs, publications on history and theory, and a broad range of international architectural journals. The library also houses an extensive DVD and video collection of public lectures and final presentations previously held at the Institute. Participants have access to the libraries of the Netherlands Architecture Institute and TU Delft's Faculty of Architecture. The gallery area and studio space are used for the display of guest exhibitions as well as the research and design work conducted by participants, alumni, and faculty. A selection of recent publications, focusing on topics being discussed at the Institute, is featured in the entrance bookshop. The Institute provides a model workshop, adjacent to the studio space, containing facilities for building in wood, plastic, foam, metal and concrete. It is also equipped with a selection of the latest computer-driven fabrication technology for model-making, including a large-bed milling machine.

10.3 Innovative capacity

The institute's innovative capacity stems from guidance by, and exchange with, leading and emerging voices and practitioners, and direct engagement in concrete conditions represented by third-party collaborators — i.e. the public authorities, cultural institutions and/or private bodies who "hold the problem" that constitutes the basis of each research study. This simultaneous commitment to research and reality allows the Institute's researchers to develop a precise understanding of the challenges that necessitate reflection, innovation, and speculation. Through seminars, lectures, publications and exhibitions, researchers directly communicate and debate their polemical architectural and urban propositions with the stakeholders.

11 SWOT-analysis

STRENGTHS

The Berlage Institute has a well-established international reputation as 'postgraduate laboratory of architecture'. It is seen as one of the most important centres of innovative design research and as a meeting place for cutting-edge professionals. The formal affiliation with TU Delft strengthens this position substantially. The smallness of the institute and its relative flexibility to focus its programme on current issues is seen as an important asset. The institute has a strong position as a research & development partner. The circle of highly-renowned visiting professors and lecturers that frequent the institute and the active network/networks of alumni form the most relevant resource.

WEAKNESSES

In applied research, there is sometimes friction between the expectations of the external partner and the academic freedom that the institute retains. Pursuing research opportunities that rise externally may also cause the different components of the programme to sometimes lose a clear common thematic focus. Projects that are clearly too random or too ad-hoc should be resisted in favour of a more coherent research portfolio.

OPPORTUNITIES

As well as sustainability, we observe a general new interest in the social agenda of architecture and urbanism. The institute is capable and eager to address this. There are current opportunities to link up with highly positioned partners on a project basis (e.g. Erasmus University/HIS or the Research Lab by the Ministry of Housing, Spatial Planning and the Environment). Furthermore, we see opportunities emerging from changes in technology and markets on both a broad and narrow scale, from changes in government policy related to your field, and from changes in social patterns, population profiles and life style changes.

THREATS

The competition is larger and better equipped. We are up against usually well-funded academic institutions with generous funding and high-quality resources. The Institute is struggling to catch up with developments in computer-aided design and model-making. The current financial situation is in dire straits due to the recession. We have seen vaporising income from commissions and sponsorship, as well as a drop in applications. Keeping qualified personnel to maintain the existing reputation is also becoming a serious point of concern.

12 Strategy

12.1 Strategic planning; investments and collaboration

Collaboration with TU Delft's Faculty of Architecture and developing joint programmes (such as participation in the new Graduate School and setting up of a PDEng in Architecture) can be a successful strategy to strengthen both, as long as its size and independence can be guaranteed.

12.2 Research topics planned for the near future and their perspectives

Building on the positive experience of recent years, the Berlage Institute structures its laboratory activities according to six research trajectories. The six distinct research trajectories include: new living/working conditions, tourism and territory, emerging technologies and techniques, structural metropolitan formations, cohabitation and conflict, and energy and the built environment.

While developing specific insights for each respective trajectory, the Institute's research activities collectively aim to advance new models, visions, and principles able to frame the different forces shaping the contemporary built environment. Each of these trajectories addresses a precise research subject related to a contemporary spatial development or phenomenon that requires architectural reflection and speculation. The activities under each trajectory consist of research studios, contract research initiatives, a lecture programme, and other related public events, publications, and PhD research. For the duration of the 2009-2012 programme, specialists and external parties related to the phenomenon under study will be closely engaged in establishing the research goals and hypotheses to increase the insights and knowledge in each research trajectory.

12.3 Flexibility and anticipation of expected changes

In 2007, the Berlage Institute Research Board was established to serve as a new and diverse leadership structure. The Berlage Institute Research Board, presently consisting of Ben van Berkel, Winy Maas, Robert E. Somol, Alejandro Zaera-Polo, and Elia Zenghelis, establishes the profile of the Institute by identifying new research trajectories. The structure of the institute and its limited size enables it to anticipate or to move fast if changes occur.

Colophon

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