



Delft University of Technology

## Innovations in management of the built environment

### IMBE research program

van der Voordt, Theo; de Jonge, Hans; Wamelink, Hans

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# Innovations in the Management of the Built Environment

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

# 1

## Objectives and research area

**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).

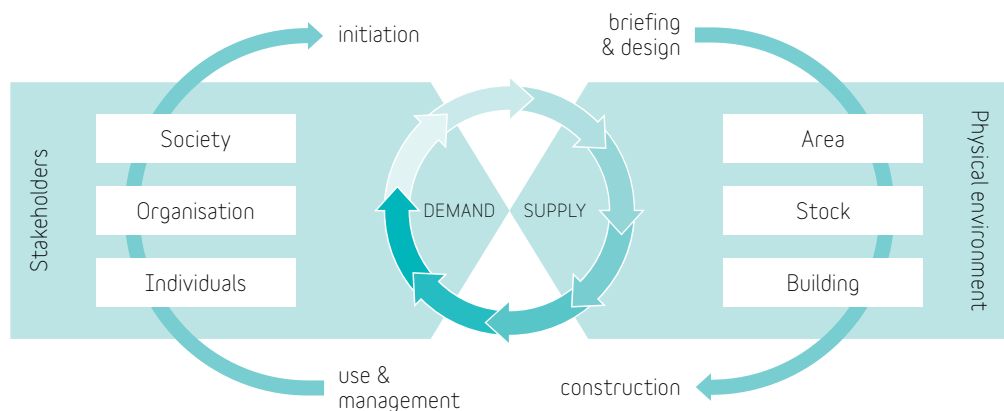
### 1.1 Vision, mission and objectives

**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.

**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.



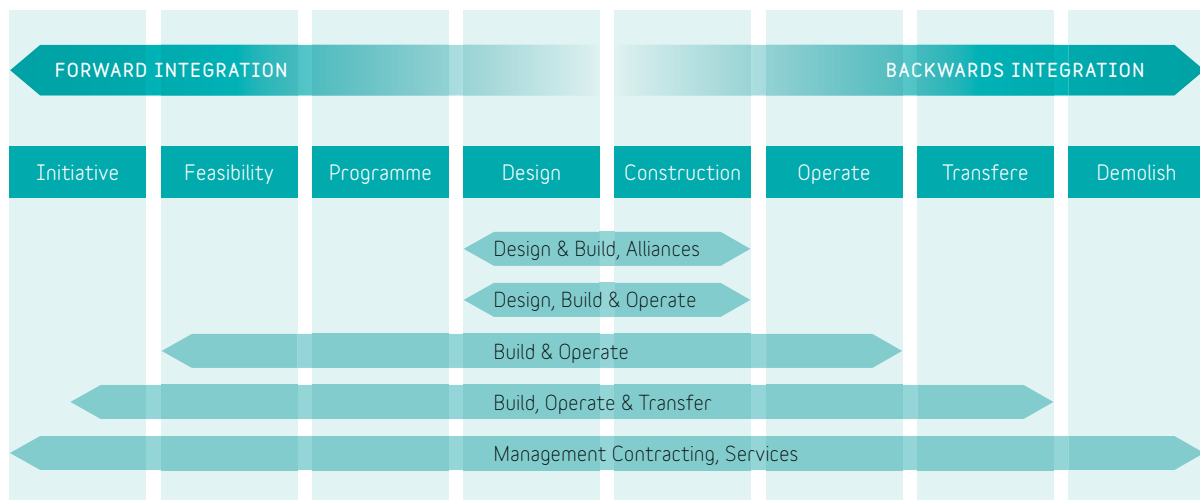
### 1.3 Position

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	
<b>TOTAL RESEARCH STAFF</b>	<b>37</b>	<b>12,2</b>	<b>41</b>	<b>13,0</b>	<b>47</b>	<b>16,4</b>	<b>52</b>	<b>18,7</b>	<b>63</b>	<b>17,4</b>	<b>71</b>	<b>20,0</b>	<b>72</b>	<b>15,5</b>

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	Den Haag 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

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:

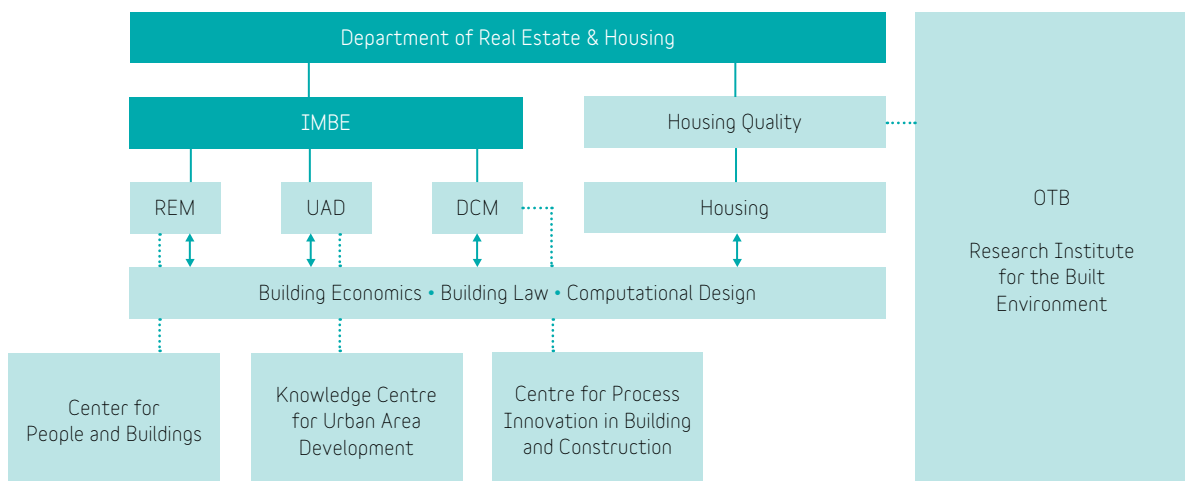
1. The *Center for People & Buildings* (CfPB) was founded with the Governmental Building Agency and ABN AMRO Bank in 2001. Its research focuses on the relationships between people, working processes and places of work.
2. The *Centre for Process Innovation in Building and Construction* (CPI) was founded 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.

### 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

**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.

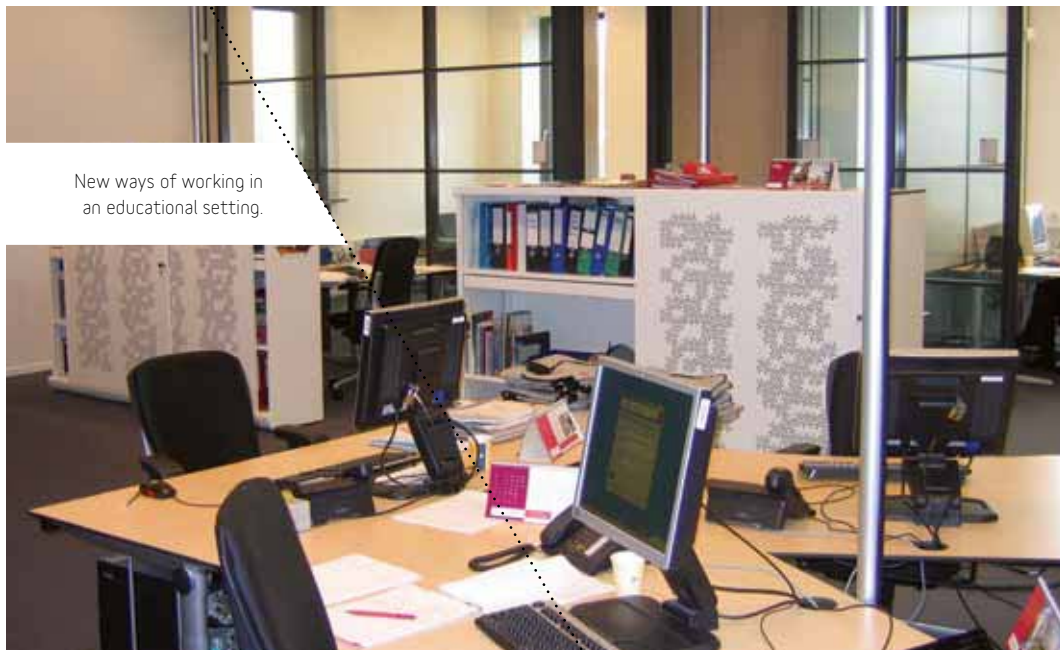


3. The *Knowledge Centre for Urban Area Development* (SKG) was founded in 2006 with the Ministry of Spatial Planning (VROM), TU Delft and other public and private partners. The research focuses on the formation of partnerships between public and private partners and interaction between different knowledge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





### 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



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.

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.

### 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 'fundamentals' 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
- O10 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

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- 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

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- Gehner, E., 2008. *Knowingly taking risk; Investment decision making in real estate development* (published in 2008 by Eburon Academic Publishers, Delft).
- Chen, Y., 2007. *Shanghai 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

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- 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

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- 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.



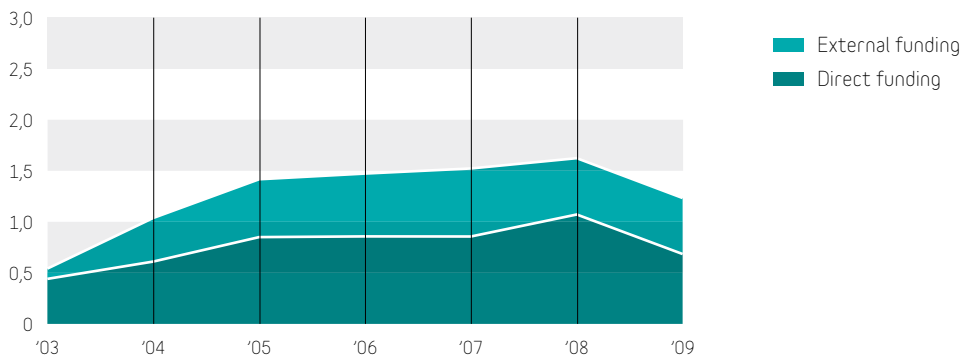
# 6

## 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%
<b>TOTAL FUNDING</b>	<b>543</b>	<b>100%</b>	<b>1,040</b>	<b>100%</b>	<b>1,420</b>	<b>100%</b>	<b>1,476</b>	<b>100%</b>	<b>1,526</b>	<b>100%</b>	<b>1,627</b>	<b>100%</b>	<b>1,236</b>	<b>100%</b>
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%
<b>TOTAL EXPENDITURE</b>	<b>510</b>	<b>100%</b>	<b>800</b>	<b>100%</b>	<b>907</b>	<b>100%</b>	<b>1,044</b>	<b>100%</b>	<b>1,385</b>	<b>100%</b>	<b>1,533</b>	<b>100%</b>	<b>1,121</b>	<b>100%</b>

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	1	4	3	2	4	1	10	3	5	5	1	2	1
Non-refereed articles	4	0	2	1	11	2	8	0	2	1	1	0	8	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	0	36	0	26	0	47	2	36	29	64	21	42	11
Editorships journals/book	1	0	2	0	1	3	2	3	7	1	5	1	6	1
<b>TOTAL PUBLICATIONS</b>	<b>76</b>	<b>1</b>	<b>88</b>	<b>29</b>	<b>96</b>	<b>25</b>	<b>151</b>	<b>31</b>	<b>140</b>	<b>52</b>	<b>138</b>	<b>31</b>	<b>134</b>	<b>27</b>

Table b. PhD-students with employee status

STARTING YEAR	ENROLMENT			SUCCESS RATES													
	GENDER			GRADUATED ≤ 4 YEARS		GRADUATED ≤ 5 YEARS		GRADUATED ≤ 6 YEARS		GRADUATED ≤ 7 YEARS		TOTAL GRADUATED (1-9-'10)		NOT YET FINISHED		DISCONTINUED	
	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%
<b>TOTAL</b>	<b>5</b>	<b>7</b>	<b>12</b>	<b>1</b>	<b>8%</b>	<b>8</b>	<b>67%</b>	<b>8</b>	<b>67%</b>	<b>8</b>	<b>67%</b>	<b>9</b>	<b>75%</b>	<b>3</b>	<b>25%</b>	<b>0</b>	<b>0%</b>



## 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	Den Haag 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	Hoewelaken 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	Den Haag NL



## 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 Duvis), 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.