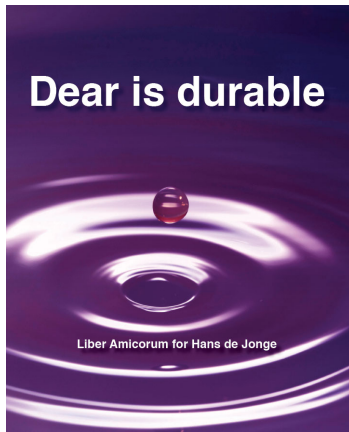


Campus management



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Cover of Alexandra den Heijer's dissertation "Managing the university campus" (2011), featuring university buildings and people's activities on campus and in the (knowledge) city.

Managing university campuses – in theory and practice

Alexandra den Heijer

Social relevance: supporting universities in their transition of being real estate owners

Ever since Real Estate Management (REM) became a chair in Delft, the campus has been an interesting object of study, with the TU Delft campus as the ultimate laboratory. The very first “BMVB” curriculum in 1991-1992 already contained a real estate management course with an assignment for students to explore the strategy, use, quality and finances of their own TU Delft campus. But not just students focused on their own workplace from the start, so did researchers. Obviously, it was tempting to test early theories on a built environment that the research team knew so well. At the same time, TU Delft board members and policy makers were more than happy that their own academic staff could support them in exploring strategies for their campus of the future. At that time - around 1995 - universities were going through an important transition: from being user of their buildings to becoming the owners of a huge portfolio of buildings and land. The researchers knew that TU Delft was not the only university that needed support in the process of becoming a real estate owner and corporate real estate manager.



The irony of this subject is that we have always put our knowledge to the test on our own TU Delft campus, also when our own faculty building went up in flames.

Scientific relevance: case studies to test evolving REM theory

From the very beginning REM researchers needed case studies to test their evolving theories on corporate and public real estate management: to test hypotheses and to feed evidence-based concepts. Considering the key partners of the BMVB department in the early nineties – the Government Building Agency (“Rijksgebouwendienst” at that time) and multinational companies

like Philips and ABN Amro – the focus of cases has always been on a combination of (semi-)public and corporate real estate. Incorporating societal and institutional goals in real estate strategies – exceeding business economics and financial goals – always was an important foundation of the REM group, which determined the research agenda and the preferred research partners. The user-oriented, strategic approach of corporate and public real estate management was interesting for many clients from practice, including institutions for higher education.

Conveniently, the need for case studies in REM theory and Dutch universities needing advice and support in REM practice has led to the start of a successful collaboration between REM researchers and (corporate) real estate managers at universities from the mid-nineties that is still active today.

1995-2000: exploring the research field with TU Delft and University of Amsterdam (UvA)

Not only TU Delft but also University of Amsterdam was an early research partner on this subject in the period 1994-2000. With their questions from practice they approached professor Hans de Jonge to support them in their campus management processes. Their questions varied from providing criteria for their portfolio strategies (TU Delft Langetermijn Huisvestingsplan 1995-2010; UvA Masterplan in 1997) to helping them develop rental models, to make the campus users – and deans – more aware of the costs of their facilities (“Huurder-Verhuurder-Model” for TU Delft in 1996). This intensive collaboration also led to pilot cases of innovative academic workplaces (at TU Delft, Civil Engineering in 1999) and studies on new types of laboratories. All the publications that were written in this period were co-productions of authors from theory and practice – see table for examples.

Key publications

The table presents the key publications mentioned before in chronological order:

Year	Authors , Titles or subjects
1995	De Jonge, Sanson, Den Heijer & Poppelier (TU Delft: REM and FMVG), TU Delft campus strategy 1995-2010 (1995), in Dutch Huurder-verhuurder-model (HVM 1996) – report + tool
1997	Hans de Jonge with University of Amsterdam (UvA) UvA long-term campus strategy (1997) , in Dutch
1999	Van der Voordt, University Real Estate: learning and work environment. Assessment of two pilots with new workplace concepts. In Dutch.
1999	Aalders, Fabery de Jonge and Van der Voordt New concepts for university laboratories. In Dutch.
2000	Van der Voordt and De Puy, Evaluation of an academic workplace pilot at the Faculty of Civil Engineering TU Delft. In Dutch.
2000	De Jonge, Den Heijer and De Puy, Analysis of university accommodation plans. In Dutch.
2002	Den Heijer, University campus management (3 reports) - part A: Uncertainty and flexibility, part B: costs and benefits, part C: customer satisfaction. In Dutch
2002	Den Heijer and Van der Schaaf, Benchmarking: a challenge for CRE managers. In Dutch.
2004	Den Heijer and De Vries, Benchmarking of university real estate: management information to support real estate decisions. In Dutch.
2005	Den Heijer , Managing university real estate portfolios, generating management information for performance based portfolio strategies and real estate decisions. ERES conference paper
2005	Den Heijer and De Vries, Analysis of university buildings: benchmark findings from 12 recently built projects. In Dutch.
2007	Den Heijer, University campuses in the Netherlands: an analysis of 14 universities. In Dutch.
2007	Den Heijer, Analysis of university buildings: benchmark findings from 26 recently built projects. In Dutch.
2007	De Vries, dissertation - Performance through real estate. Research into the impact of real estate interventions on the performance of Universities of Applied Sciences. PhD thesis In Dutch. Eburon Academic Publishers
2008	De Vries, Van der Voordt and De Jonge, Impact of real estate interventions on organisational performance. Journal of Corporate Real Estate 10(3), 208-223.
2008-2009	Den Heijer and Cruyen, Ten articles for Facility Management Magazine (FMM) about the process after the fire and creating BK city
2009	Den Heijer, Dalmeijer, Van der Leij, Cruyen, The making of BK city – Bouwkunde één jaar na de brand (200-page book), in Dutch
2009	Den Heijer, The Making of BK City, the ultimate laboratory for a faculty of achitecture” in The Architecture Annual 2008/2009, article, Rotterdam, 010 Publishers, released June, 2009, p. 20-25.

- 2009 Arkesteijn, Den Heijer, Vande Putte, Volker, "Envisioning the faculty of the future" in Building for Bouwkunde, open to ideas, Delft: TU Delft, May 2009.
- 2010 Gorgievski, Van der Voordt, Van Herpen and Van Akkeren, After the fire. New ways of working in an academic setting. Facilities, 28(3/4), 206-224.
- 2010 Den Heijer, Teeuw, Aalbers, "Towards a sustainable campus; Visions for the future of higher education", ERSCP-EMSU 2010 Knowledge collaboration & learning for sustainable innovation – papers, poster and research report for Agentschap NL (and Dutch universities)
- 2011 Den Heijer, dissertation: Managing the University Campus – Information to support real estate decisions. PhD thesis. Eburon Academic Publishers
- 2011 Den Heijer, De Vries, De Jonge, "Developing knowledge cities" in Van Geenhuizen, Marina and Peter Nijkamp, Creative knowledge cities, Edward Elgar, February 2012.
- 2012 Den Heijer and De Jonge, Adding value – linking decisions and performance. Theories, frameworks and tools applied to the university campus. Book chapter in Jensen, Van der Voordt and Coenen (eds), The Added Value of Facilities Management: Concepts, Findings and Perspectives.
- 2012 Den Heijer and Curvelo Magdaniel, The university campus as a knowledge city: exploring models and strategic choices. International Journal of Knowledge-Based Development, 3(3), 283-304.
- 2013 Valks, Designing and Testing a Strategy Game. MSc. Thesis TU Delft.
- 2014 Den Heijer and Tzovlas, The European Campus - Heritage and Challenges.
- 2015 Arkesteijn, Valks, Binnekamp, Barendse, De Jonge, Designing a Preference-based Accommodation Strategy: a pilot study at Delft University of Technology. Journal of Corporate Real Estate 17 (2)
- 2015 Bentinck, Pleidooi voor de academische plek "Houd rekening met hoe mensen zijn." TH&MA: tijdschrift voor hoger onderwijs & management, 22(5), 6-9.
- 2016 Beckers, dissertation: A learning space odyssey: exploring the alignment of learning space in universities of applied sciences with the developments in higher education learning and teaching. PhD thesis University of Twente.
- 2016 Curvelo Magdaniel, dissertation: Technology campuses and cities, a study on the relation between innovation and the built environment at the urban area level. PhD Thesis TU Delft.
- 2016 Valks, Arkesteijn, Den Heijer, Vande Putte, Smart campus tools: a study on measuring real use of campus facilities (research project for FM departments of 14 Dutch universities)
- 2016 Den Heijer, Arkesteijn, De Jong, Campus NL: past, present and future of the Dutch campus (research project for 14 Dutch universities + VSNU)

Based on the experience and research findings of these early years the first REM theories emerged: "adding value with corporate/public real estate to institutional goals". It became clear that strategic, financial, functional and technical aspects needed to be merged in every campus decision.

1999-2016: Supporting decision making of all 14 Dutch campus managers

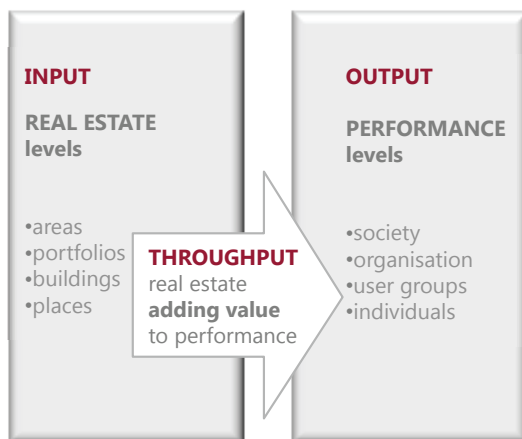
Around the year 2000 the chairman of the association of Dutch campus managers (HOI) – Frans Dekker (UvA) – asked Hans de Jonge's REM research group to conduct the first collective research project on Dutch university campus management. All fourteen publically financed Dutch universities joined forces and set the collective research agenda. At that time the universities had been owners of their campuses – both land and buildings – for five years, since 1995. The question was whether campus managers could learn from each other in the complicated process of managing their campuses. Between 2000 and 2007 numerous research projects were commissioned by the association of Dutch campus managers, leading to the PhD thesis "Managing the University Campus" (Den Heijer, 2011). In each of these research projects the objective has been to provide campus managers with information and tools to support decision-making on the campus, and as such to enable, adding value to the performance of the organisation. Adding value is considered an activity or the sum of activities that (attempt to) influence the effect of real estate on performance: to prevent a negative effect or to realize a positive effect. That effect can be defined as "Added value" and can be measured as a delta (Δ) in its performance, measured by comparing key performance indicators (KPIs) before and after the real estate intervention. This presumed impact of real estate on performance is the basis of real estate management.

In her PhD research project Den Heijer elaborated the DAS Frame which was developed by the REM group (de Jonge et al. 2009, see contribution on CRE alignment) and linked the four management tasks to steps in the campus management process: step 1: assessing the current campus (problem statement), step 2: exploring changing demand (trends / university of the future), step 3: generating future models (for the campus of the future) and step 4: defining projects to transform (investment plans, portfolio strategies).

In each of the management tasks or steps, there are four stakeholder perspectives to consider. Managing corporate real estate (CREM) has gradually changed from monitoring the technical condition of buildings and reducing costs to effectively supporting primary processes and adding value to institutional goals. The information and tools developed in research should enable decision makers to consider many different perspectives: from m2, users and euros to strategic goals.

Campus management theory: four perspectives and performance criteria to consider

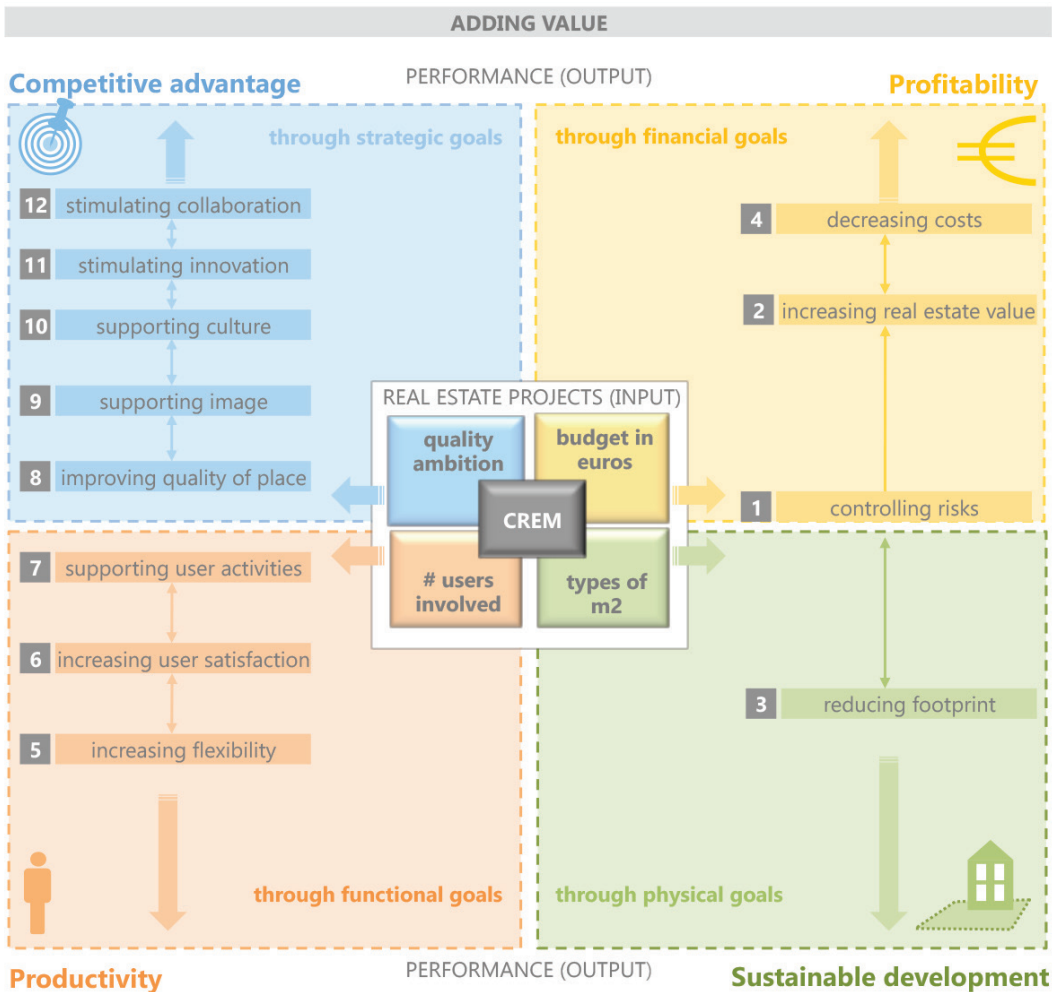
Campus research demonstrated that every decision can be related to at least one of the performance criteria of universities (or organisations in general): productivity, profitability, competitive advantage and sustainable development. This was based on the assessment of fourteen campus plans and forty campus projects in the period 2005-2010, by collecting physical, functional, financial and strategic data. This included floor area, function types, investment costs and the aspired goals. The latter was most difficult to measure. However, a list with 'twelve ways of adding value' was available to determine the reasons for a campus project. The relation between the physical, functional, financial and strategic campus data (input), the four performance criteria (output) and the twelve ways of adding value (throughput) is illustrated in the figure on the right. Examples of "adding value" are stimulating innovation, reducing the footprint and increasing flexibility. These ambitions can be recognised in campus strategies like changing the academic workplace or sharing laboratories. Campus managers consider this conceptual framework useful for their decision-making process, which is demonstrated in some of their recent strategic plans or was explicitly stated in interviews or discussions.



The foundation of real estate management (REM) theory: "real estate adding value to performance"

Research goal: Information and tools to support campus management

From the very first campus research project that Hans de Jonge acquired in 1995, the goal was to generate knowledge to support a larger group of universities. From 1999 all Dutch universities were actively involved in REM research and questions were formulated on aligning university and campus planning, the use of scenarios, applied forms of flexibility, notions about costs and benefits and creating cost-consciousness about campus matters within the university. Additionally, campus maps and data of floor area in relation to number of students and staff numbers were collected, to give universities an overview of all campuses and a basic comparison of space use. The report, Analysis of University Campus Strategies (De Jonge, Den Heijer and De Puy, 2000) appeared to be a very useful study for all universities, because despite different contexts, it was clear how much they could learn from each other.



Corporate Real Estate Management (CREM) theory – “12 ways of adding value” - derived from campus management research (Den Heijer 2011)

The enthusiasm about the lessons learned just from comparing the campus strategies on a few issues led to the next, more comprehensive project on campus management, in which many of the issues in the first project were elaborated and compared with campus management at universities abroad and public real estate management at the Dutch Government Building Agency. The results were published in three different reports, in a series called Campus Management (Den Heijer, 2002). The first focused on trends and developments that universities were facing at the time and the scenarios for the changing context of Dutch universities. The second report focused on costs and benefits, introducing the

need for comparative analysis of campus data for all fourteen Dutch universities. The third report focused on customer satisfaction, identifying different groups of users within the university.

From 2004: Benchmarking the campus as a research theme

After the publication of these reports and the positive response from the universities, this research theme turned into two PhD projects (for Den Heijer and for DeVries who

studied institutions for higher professional education: “hogescholen”). At that time the emphasis on benchmarking increased. Benchmarking on two variables (space use or building costs per square meter) did not provided enough information for campus management. In fact, such a benchmark could be misinterpreted, when only focusing on the lowest building costs and square meters and not the possible consequences for user satisfaction or university goals to support. This resulted in the report *Benchmarking the university campus* (Den Heijer & De Vries, 2004) where theories on benchmarking and practice at other organisations were studied. A questionnaire filled out by all Dutch universities demonstrated that definitions needed to be accentuated and that information about users, satisfaction and goals to support was lacking. In *Benchmarking university campus projects* (Den Heijer and de Vries, 2005; Den Heijer, 2007) data was collected on new buildings, registering building costs in relation to project types, supported goals and numbers of users to accommodate in order to provide universities with references. Both reports resulted in a

database of 39 buildings, described by ‘why’ (goals), ‘for whom’ (users), ‘what’ (m2), and ‘for how much’ (euros). In *Benchmarking the Dutch university campus* (Den Heijer, 2007) data was collected on the level of the whole campus for each university, in a similar format to the campus projects, describing university and campus management goals, resources spent, students and staff members to accommodate and floor area on many different issues: types of space, land property, building age, technical condition etc.

In 2008 the fire of the faculty building

When the draft dissertation “Managing the university campus” was about to be sent to the promoters, a fire destroyed the Architecture faculty building. The immediate assignment was to put the theories and lessons for the campus of the future to the test. Despite the loss of the iconic Berlageweg building and the research material of many, this dramatic event and the BK city project was a milestone in BK history. The multidisciplinary teamwork and determination to create a better faculty building than before, resulted in “renewed old building” BK city that has been an inspiration for many other universities ever since. Publications about this process delayed the dissertation with a few years, but added many valuable lessons to the content. At the same time De Jonge, Arkesteijn, Vande Putte and Volker guided the design competition “Building for Bouwkunde” (2008-2009) with more campus lessons.



Berlageweg building after the fire in May 2008

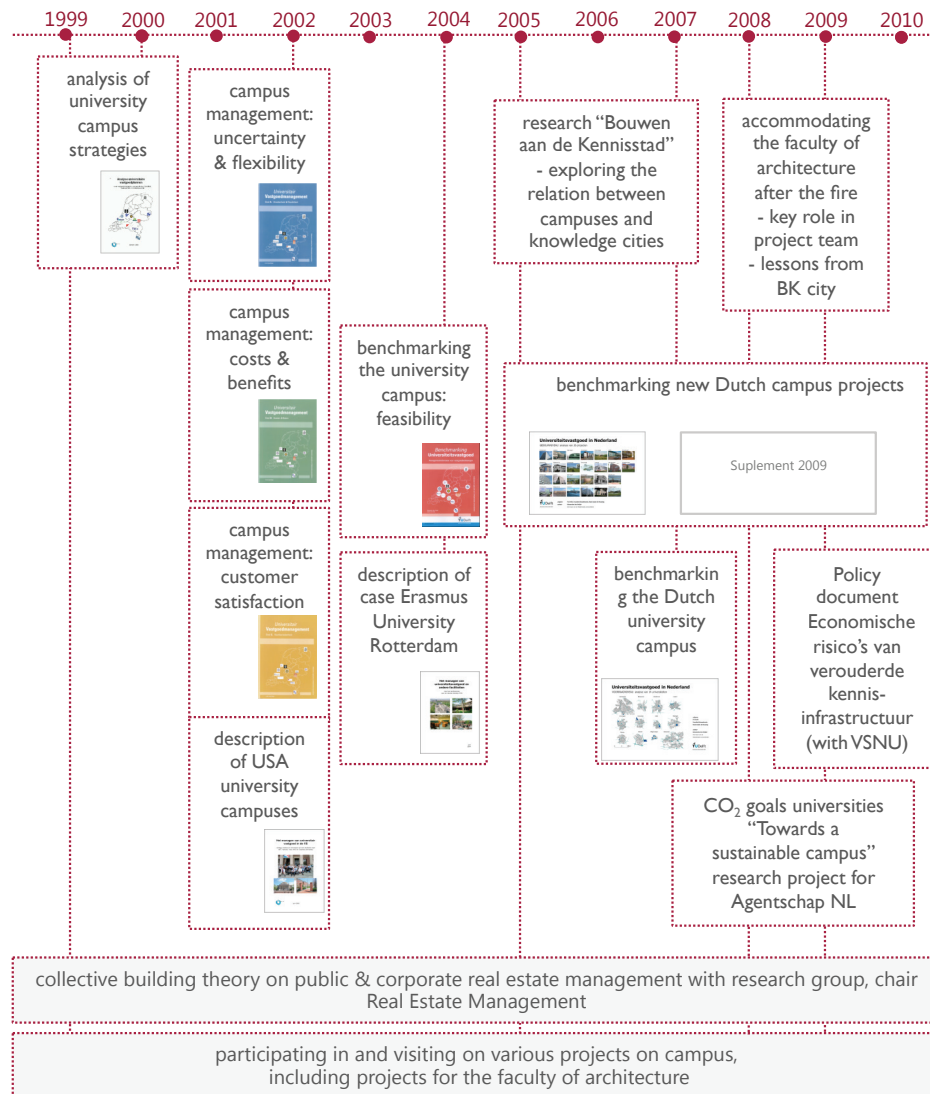


New Architecture building BK city as a test case for the campus of the future

2011: the publication of the dissertation “Managing the university campus”

In 2011 these studies and lessons from practice resulted in the dissertation Managing the University Campus (Den Heijer, 2011). This book has been an academic bestseller: in the last five years more than 1500 copies have been distributed to more than 40 countries. Consequently not only the number of visits to BK city increased rapidly, but

also the number of request to give lectures abroad. The success demonstrated that the campus management theories were practical enough to support designers and decision makers on campus.



Overview of campus studies by Den Heijer in the period 2000-2010, which were merged in her dissertation “Managing the university campus” (Den Heijer 2011)

Ongoing research

Since then, new research projects were started and a campus research team was formed. The projects are all related to university campuses, but with other clients and subject areas.

Theme from 2006: The campus and the (knowledge) city

Since 2006 campus research has been expanding to knowledge cities, leading to seminars and publications. The municipality of Delft has often been involved or connected to research projects, like the study that led to the publication “Positioning Delft in the context of the knowledge economy, project TIC Delft” which was also a spin-off of MSc student Flavia Curvelo Magdaniel’s graduate thesis. Five years later – in 2016 – her PhD thesis “Technology campuses and cities” (Curvelo Magdaniel, 2016) examines the development of technology campuses with the aim to gain and provide understanding about the role of the built environment in stimulating innovation. By developing more knowledge on the subject, it can lead to more efficient and effective use of the resources required to develop these built environments. The research includes an exploratory study of 39 technology campuses and two explanatory case studies of HCTE in the Brainport-Eindhoven region and the MIT campus in the Boston-Cambridge Area.

Theme from 2013: exploring the European campus

In the European Campus project, campus-level data is collected for European universities, similar to the benchmark previously done for Dutch universities (Den Heijer and Tzovlas, 2014). The data regard the state of the campus in all 28 EU member states, (number of) students and employees, funding, locations, iconic buildings and (number and state of) m2 floor area. Part of this European campus research is the development of a decision-support tool: “a campus stress test”. This stress test contains a set of key performance indicators (KPIs) to assess current European campuses and new campus plans (examples of indicators: space utilization in users/m2, ecological footprint, inter-university collaboration, total costs of ownership in euros/m2, % shared university-city functions, effective use of European heritage buildings), using European best practices as references and benchmarks.

Theme from 2014: Preference-based Accommodation Strategy

In the Preference-based Accommodation Strategy design project, a design method for real estate portfolios has been developed and tested at TU Delft (Arkesteijn et al and Arkesteijn, PhD work in progress 2015). The pilot study for the university’s large lecture halls was necessary because the current supply of lecture halls did not meet present-day requirements with regard to facilities and capacity while occupancy and utilization rates of lecture halls suggest that an increase in efficiency is possible. The pilot study for food facilities set out to solve the problems of students and staff who claim that there is insufficient capacity and quality in the food facilities. In both cases stakeholders were able to perform the PAS procedure, by using a mathematical model of the PAS procedure. The PAS is generic in nature and can be used for a wide range of real estate portfolios.



Members of the Campus team with other colleagues of the MBE department

Theme from 2011: a university as a place to be

The research project 'A University as a place to be' by Salomé Bentinck explores physical factors that make university buildings and campuses attractive in the eyes of employees and students. The research focuses in particular on physical conditions like spatial programme, design and facility policy that support the occurrence of chance encounters, place attachment and identity. This topic is all the more important since physical presence as such is not in any case necessary as there are so many ways to communicate via ICT. This research is conducted by using data, collected at a number of departments of two Amsterdam Higher Education Institutions, before and after relocation. The role of physical characteristics of the building and environment, relevant for users and contributing to social interaction, are examined.

Theme from 1999: the changing academic workplace

In an earlier project in the late nineties, a study was conducted into the appraisal of new workplaces as well, at the Faculty of Civil Engineering (Van der Voordt, 1999; Van der Voordt and De Puy, 2000). By a reduction of individual room spaces, extra space was created for meeting and collaboration and to exhibit research findings and other products of the research group. This was one of the first experiments with new ways of working at the Delft University of Technology. At that time, activity-based working concepts were one step too far. Later on, many faculties adopted new ways of working accommodated by a variety of shared activity-based workplaces, including the Faculty of Architecture (Gorgievski et al., 2010; Van Akkeren et al., 2010). More recently, Geert Dewulf and Theo van der Voordt supervised Ronald Beckers, who wrote a PhD study on the impact of new ways of learning and teaching on accommodating Universities of Applied Sciences (Beckers, 2016). This thesis discusses both management approaches to align real estate strategies to organisational strategies and the design, experience and use of study places.

From 1999: new concepts for laboratories

Due to various trends in academic research – a growth in international and interdisciplinary collaboration, sharing of very expensive research facilities, replacement of lab research by computer modelling – in the late nineties another study was conducted into university laboratories (Aalders et al., 1999). This study resulted in an overview of trends in academic research and spatial implications, a typology of labs ranked from low till maximum sharing of spaces and facilities, a presentation of best practices, and a questionnaire to assess the experience and use of (university) labs. This study has also been used as input to a special version of the Work Environment Diagnosis Tool (WODI), WODI labs. This questionnaire has been

developed in 2014 by the Center for People and Buildings to assess employee satisfaction with lab environments.

From 2008: exploring the sustainable campus

In 2008 Agentschap NL asked TU Delft to explore scenarios and strategies for a more sustainable campus. That same year Dutch higher education institutions signed an agreement to reduce the carbon footprint with 30% in the year 2020. Together with energy officers, sustainability professionals and academic colleagues from the chair Smart Architecture (Environmental Technology) and Sustainable Housing Transformations the REM group led this research project that resulted in two papers, a (Dutch) report and an online tool. Since then, this theme has increasingly been integrated in campus management practice and has drawn international attention. Since 2013 the Sustainable campuses in Saudi Arabia research project focuses on campus management in Saudi Arabia (Alghamdi, work in progress). The research covers the recent campus development of many universities in the country, with a strong focus on sustainability. This PhD research project concentrates on the environmental sustainability in university campuses in Saudi Arabia. The main aims are to (a) learn more about environmental sustainability in the first phase of college buildings and university campuses, (b) develop sustainable planning principles as a guidance to aid improvement of these facilities and (c) ultimately help make new college buildings, to a large extent, future-proof.

From 2015: reassessed the Dutch campus–Campus NL describes past, present and future

The latest research projects mark a shift back towards the association of Dutch campus managers. In the Campus NL research project the information generated in previous research is updated (Den Heijer et al., work in progress). On a campus-level, data is collected for each university and compared with the data from 2007. On a project-level, data is

collected on recent projects and added to the existing project database. Trends and developments are studied that can impact the campus.

From 2015: Smart Campus Tools - making better use of the campus

In the Smart tools on campus research project data is collected for each university on the tools that they have to improve the occupancy and frequency rates of their campuses (Valks et al, 2016 forthcoming). Examples of these tools are real-time monitoring of the occupancy (number of occupants, frequency of being occupied) of classrooms based on Wi-Fi connections and real-time monitoring of the availability of computers on campus, to help students find a study place. Additionally, interviews at a number of other organisations are conducted to see what can be learned from examples outside of the university context.

Concluding remarks

Over the past twenty years, the department of Management and the Built Environment has made a significant contribution to building a body of knowledge on the management of the campuses of universities. The research has contributed to existing theories on real estate management and built new theory. At the same time, the objective of research has always been to provide tools and information for use in practice. As such, researching campus management has been at the core of the department's research on corporate real estate management, exceeding financial and business economics goals and incorporating societal and institutional goals in the decision-making process.

The first phase of the campus research, up to the publication of dissertation "Managing the University Campus", can be characterized as building standards for campus management: by describing the position of campus management (in real

estate management theory), its purpose (adding value), the management process of adding value (matching supply and demand, now and in the future) and the available tools per step of the management process (campus and project benchmarks, scenarios, etc.). The current and future research projects are aimed both at further research based on these standards – applied to the European campus and Campus NL - and further research into more specific aspects of campus management. This can be related to a specific type of real estate (learning spaces, technology campuses or the academic workplace), to a specific stakeholder perspective (sustainability) or to the development of more tools for specific parts of the management process (smart tools on campus or new methods for decision-making). Knowledge and tools will be developed in close collaboration with and for universities.

Twenty years after Hans de Jonge acquired the first research project on this subject, the academics and the professionals in this field have collectively gone through a learning process. The campus has been a living lab for researchers and campus managers. The increasingly larger research team – with links to design, technology, economics and psychology – hopes to continue this fruitful and inspiring partnership to further professionalise campus management and contribute to inspiring, functional and resource-efficient campuses.

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References

Many publications that are mentioned are available online and can be found on Den Heijer's blog (page PUBLICATIONS), which also contains more background information about campus research project:
<http://managingtheuniversitycampus.wordpress.com>



Aerial photo of the TU Delft campus – a combination of academic heritage, iconic buildings from the 1960s and recent additions, which represents the average university portfolio that needs to be managed