AN ANNOTATED BIBLIOGRAPHY ON

'RESEARCH BY DESIGN'

(ONTWERPEND ONDERZOEK)

adapted for educational purposes

The crouching man by Anthony Gormley. Photograph by Remiro Quai

AN ANNOTATED BIBLIOGRAPHY ON 'RESEARCH-BY-DESIGN' (*ONTWERPEND ONDERZOEK*)

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- Luthi, P. 2007. Samenvatting van de bijdrage van Peter Luthi, Powerpoint

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PREFACE TO ANNOTATED BIBLIOGRAPHY ON 'RESEARCH-BY-DESIGN' (*ONTWERPEND ONDERZOEK*)

Introduction

In the Netherlands, since the last decades of the 20th century, the notion *'ontwerpend onderzoek'* (mostly translated in English as 'research-by-design'), has been in use regularly among spatial-planning professionals and academia. In the process, the notion gained a positive connotation. Scientists, planners, and politicians seem to appreciate design input as a bridge between (fundamental) research and implementation, while designers such as landscape architects and architects became more aware of the need to credibly legitimate their design.

Deltares, a knowledge agent positioned between fundamental research and practice, wants to explore further the meaning of this notion 'research-by-design'. Deltares, therefore, allocated strategic research funds to depict the possible contributions and constraints of research-by-design to the quality of their day-to-day work. The research project '*Ontwerpend Onderzoek en Ruimtelijke Kwaliteit* (*OORK*) (Research-By-Design and Spatial Quality) forms the overall framework. Research questions that will have to be addressed in this strategic research include, among others:
- What is understood by research-by-design?
- What are the added values of research-by-design? and
- How can research-by-design be best used in practice and (applied) research?

To find answers to these questions, one of the project's research activities is to prepare an annotated bibliography to gain insight in what is understood by 'research-by-design'. One of the other activities is the observation and analysis of design ateliers, such as the *Kustatelier* carried out in 2009. The report at hand is the result of the annotated bibliography[1].

Method

The annotated bibliography started out with the following sources: Wageningen University library, Scopus, Google scholar, and Google general. A combination of academic and non-academic material is used. This had two reasons. Firstly, from an initial survey it became clear that the notion 'research-by-design' is interpreted quite differently in the academic world than in the professional practice of spatial planning and design. Secondly, the results of the *OORK* research ultimately have to reach both worlds.

Initially, the search took as a point of departure the Dutch key words *ontwerpend onderzoek* and the English compound 'research-by-design'. Because this gave relatively few hits, the search was expanded using various combinations of research and design entries. After the search, the literature was rather extensively summarised[2], in the hope that this would spark off a productive discussion between Deltares' researchers and designers. In the light of the question "What is understood by research-by-design"; the summaries and annotations are written with specific attention to how the authors perceive the various relations between research and design. When the authors presented a definition of some sort than this definition is included. Some preliminary observations are presented later in this preface.

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1 An annotated bibliography is an alphabetical list of research sources. It provides a concise summary of each source and some assessment of its value or relevance (Deborah Knott, New College Writing Centre, 2002).
2 The style of writing stayed close to the style used in the original documents.

Categories

The first hits on '*ontwerpend onderzoek*' largely resulted in presentations and reports prepared by Dutch and Belgian practitioners in the field of spatial planning and design and a paper prepared by Charlotte Geldof and Nel Janssens (2007). The search on the English term 'research-by-design' produced academic papers largely prepared by the disciplines, artificial intelligence and learning and educational sciences, with the exception for the articles of Lee-Anne Milburn (landscape architect), Klaasen (urbanist), and Joan Nassauer and Paul Opdam (landscape architect and ecologist).

As mentioned earlier, the use of the compound 'research-by-design' resulted in limited hits and surprisingly few related to spatial planning and design, the search was widened using the terms design and research in disconnected combinations. This produced a larger body of products indeed covering disciplines as spatial planning, architecture, and landscape architecture. In addition, a few books addressing design and research issues, which are in use at Wageningen University in the course Advanced Design Research Methods were also included in the bibliography. These are in particular the books; "Methods, Architectural Research Methods" written by Groat and Wang, "Ways to Study and Research Urban, Architectural and Technical Design" edited by De Jong and Van der Voordt, and "Inquiry by Design" written by Zeisel. Certain documents circulating within Deltares (Bouwmeester et al. 2009 and Heide and Wijnbelt, 1994) among others were also included.

The annotated bibliography is divided in the following categories:
    A. Academic papers prepared by disciplines related to spatial planning, spatial design and landscape architecture;
    B. Academic papers prepared by disciplines related to artificial intelligence;
    C. Academic papers prepared by disciplines related to learning and educational sciences;
    D. Presentations and reports prepared by practitioners of the disciplines of spatial design (mainly landscape architecture).
Within these categories, the bibliography is organised in alphabetic order. Appendix 1 gives a list for further reading.

Some Observations

Regarding the guiding research questions presented earlier, most annotations focus on the 'What is understood by research-by-design'. All annotated articles are either positive about a design approach to research or plead for a more fundamental research approach to design. Several authors point out that in particular a design approach to research (design-based-research) is still in its infancy. This also reflects in the fact that the bibliography does not result in one uniform answer or definition on what it is. Only a few authors address the added value of an research-by-design approach as raised in the second research question.

Although a full literature review is not part of this annotated bibliography, the most conspicuous observations of the bibliography on 'research-by-design' and *'ontwerpend onderzoek'* are summarised below:

Observation 1:
'Research-by-design' as a **research** method is most explicitly used amongst educational scientists concerned with learning processes and curriculum development. These scientists propagate learning in a real-world context in order to extract **evidence-based claims** from it. Research-by-design is then interpreted as **design-experimentation or design-based research.** Illustrative articles in this respect are the articles of Sasha Barab and Kurt Squire (2004) and Daniel Edelson (2002).

Computational scientists concerned with artificial intelligence and creativity, use research-by-design methods too. As these scientists research the human-computer interactions, the **design process and its efficiency** is their core issue.To them the critical question is: "When does a designer do what and what choices does he/she make." John Gero (1990), for example, sees design as an explorative learning process. In order to improve efficiency and quality, he proposes the use of general prototypes to start off the design process. He makes a clear distinction between **routine design, innovative**

design, and creative design. Creative design is non-routine and has the capacity to produce paradigm shifts. Close reading reveals, an emphasis on **research-based design**.

Observation 2:

In the practice of landscape architects, architects and spatial planners, the use of **research-by-design (*ontwerpend onderzoek*)** is process oriented and employed as a technique to articulate problems, to gather local knowledge, or to improve decision making. The design-process often plays a role to smoothen the communication between commissioners, stakeholders, and the designers themselves. The most commonly used instruments are participatory consultative design workshops or charrettes (*ontwerp ateliers*), in which sketching plays an important role.
The results vary from improved insight in the local landscape, the formulation of community needs and wishes, the development of design guidelines (Bouwmeester et al.) or the definition of programme requirements (Luthi, powerpoint, 2007). The booklet, *Ontwerpen op het raakvlak van water en ruimte, Handreiking en voorbeelden* edited by H. Bouwmeester, Jan Elsinga, Madelon Hendrich, Oswald Lagendijk en Hermine de Nederlanden (2009) gives a good overview of the notions of research-by design in the Dutch practice. Others (Anonymous, case 2; Reeth, 2005) apply *ontwerpend onderzoek* as a tool in decision-making processes. Generally, stakeholders then discuss and assess pre-designed spatial alternatives or scenario's.

Research-by-design as a communication tool between the commissioner, user, and the architect/ planner was also an important point of discussion in the debate *Ontwerp als dialoog* (Anonymous, 2003). An important conclusion of this debate was that **the function of the design or design process** always needs to be clarified in advance, because it is the most important dominator for the set-up of the design process. This debate also addressed the issue of the research **validity or credibility** (in the debate they call this integrity) of the notion ***ontwerpend onderzoek*** (that is research focused) or ***onderzoekend ontwerpen*** (that is design focused).

With respect to the validity of a **research-through-design** process, the "Urban Flood Management Dordrecht" project can be recommended. Judith Bax, Saskia Walwijk, Arij van der Stelt and Willem Hermans specifically describe the project's **design and research** steps with intuitive and integrative design outputs, which were verified by scientific research.

Observation 3:
Academia in spatial planning and landscape architecture too address various research and design interactions. They are compelled to do so due to the increasing complexity of our contemporary world and demanding societies who want beautiful designs as well as a sustainable future. Milburn and Brown (2003), for example, argue that the modernist period placed the landscape designer as an omnipotent artist and creator, making decisions on aesthetic, financial, theoretical, and political concerns. The current post-modernist period, however, emphasizes stances as social responsibility, sustainability, environmental integrity, and human health. Consequently, research had to become an important component of responsible planning and design. To achieve this more responsible stance, Milburn and Brown present various models of how educators in landscape architecture see the combinations of research and design.

On the other hand, the search for research qualities in design is the direct result of academic assessments scrutinizing the quality of design schools. In these assessments, the scientific quality is often questioned. Paul Selman, Kevin Thwaites, and Johan Benson address this debate in the special issue of "Landscape Research" Number 23, Volume 2 of 1998.

The bibliography also revealed that certain (academic) designers argue that design(ing) should be respected for its own research paradigm or systems of inquiry similar to those of social and natural sciences. Nigel Cross spent most of his life pleading for such a paradigm revolving around the idea of **design as research.** In his book "Designerly Ways of Knowing" (2007), he states that in addition to the two dominant cultures of thinking 'Sciences' and 'Humanities', there is room for a third one that considers **design as a third 'culture of thinking'**. J. Zeisel (2006) supports a similar idea but calls it **'inquiry-by-design'**. Donald Schön's work too builds on the notion that design is an empirical research activity. He explains his ideas in his influential and classical work "The Reflective Practitioner" (1983).

We should keep in mind though that Schön's work predominantly relates to learning processes and not to research *per se*. Alan Short (2008) links the act of reflection to research in his article "What is architectural design research?" and refers for example to grounded theory methodology as an appropriate mode of scientific reflection within a design process. The work of Steenbergen (1999, 2008) too follows this line of reasoning. Steenbergen, however, emphasizes the design drawing rather than the design process. This stance, d**esign-as-research,** forms one of the most contested and probably most difficult relationships between research and design (Paul Selman, 1998; Kevin Thwaites, 1998; John Benson, 1998; Linda Groat and David Wang, 2002). This is because design is viewed as a creative, subjective, somewhat chaotic process and as such can (or for some should) never meet the criteria of legitimate, verifiable, defendable, and reproducible research.

From the side of scientists, such as the ecologist Paul Opdam, it is argued that fundamental science falls short in transferring knowledge to the society. These scientists see design(ing) as an instrument to increase the utility of science. Opdam and Nassauer claim that **design** provides a common ground for knowledge transfer between scientists and practitioners. They defend the idea that **collaboratively** (designers with scientists) **produced designs** enhance societal acceptance and increase innovation (Nassauer and Opdam, 2008). They present a model in which fundamental research forms the foundation for design guidelines. The step from guideline to final integrative design remains vague.

Observation 4:
As noted before, internationally academicians rarely use the notion 'research-by-design' as a compound. In their efforts to be as specific as possible, they employ different combinations of research and design. From the literature addressed in the bibliography, the following ones can be extracted: design research (Hevner, 2009; Edelson, 2002); design as research; research in design; research into design; research through design; research for design (Short, 2008); research informed design; research based design (Milburn et al. 2003; Gero, Barab); design decision research; design in science; and, research on design. Although close reading often clarifies the meaning of the various combinations, the usage of such a large variety does not help communicating the basic ideas of linking design and research.

Some Dutch and Belgian researchers, however, do use research-by-design as the translation of *ontwerpmatig onderzoek, ontwerpend onderzoek,* and *onderzoekend ontwerpen* (Mansfelt et al. 2003; Klaasen, 2007; Geldof, 2007). Boekhorst (2006) explicitly states that in one design process, all research and design combinations are needed. He, therefore, stresses the use of the compound *ontwerpend onderzoek/onderzoekend ontwerpen* (research-based-design/design-based-research).

In an effort to create some clarity, design and research combinations could be grouped according to their underlying meanings, as follows:
•   Research informs the design process with the ultimate objective to improve the quality of the designed artefact and increase its credibility (**research-informed-design**),
•   Designs (or the process of designing) are used as research instruments with the ultimate objective to generate innovative research (**design-based-research** or **research-through-design**),
•   Research undertaken on design drawings or design processes with the ultimate objective to develop theory or improve on design methods (**research-on-design or design research**)

Each of these types of research–and-design combinations uses specific research methods or techniques to carry out the research and design inter-linkages. To mention a few; interviews, measurements, participatory design workshops, brainstorms, serious gaming, design analysis, and design experiments). There is another group of related to research and design, which has not been addressed very explicitly in this bibliography. This research focuses on the quality of the built artefacts. This type of research uses techniques, such as, post-occupancy evaluation.

Observation 5:
Interesting enough, practitioners in the field of spatial planning and design increasingly use the compound notion **research-by-design.** Their interpretation of this notion is strongly linked to consultative participatory design workshops or ateliers. The booklet "*Ontwerpen op het raakvlak van water en ruimte, Handreiking en voorbeelden" (* Bouwmeester, et al. 2009) is a good example of this approach. Americans, such as Condon, call these types of design workshops 'charrettes'. Charrettes are seen as a method to collect (locally available) data, brainstorm, discuss, visualize, test design

ideas, or create a platform for an overall design concept or plan implementation. In his essay, Boekhorst (2006) refers to a first experiment with *ontwerpend onderzoek/onderzoekend ontwerpen* in 1981, which also used an atelier setting. The atelier participants were the various *Landschapsbouw* staff members. The objective was to bring together design knowledge with fundamental research within the institution.

Observation 6:

Most academia, included in this bibliography, argue that if designing is to be seen as research, the requirements of **research integrity** and **validity** must be addressed. Among professionals, this issue was explicitly brought to the fore by Jannemarie de Jonge in the debate *Ontwerp als Dialoog* (Anonymous, 2003)*.* Notwithstanding the above, this bibliography shows that exactly in this respect 'design and research' as a methodology is still at its infancy. The comprehensive book of Groat and Wang (2002) 'Architectural Research Methods' offers a good starting point in exploring the idea of scientific integrity in design disciplines. As the authors take their starting points from the various paradigms of knowing (post-positivism, constructivism, advocacy, or pragmatic), related research strategies, methods and criteria, the book may act as a bridge in communication between scientists and designers.

Closure

This annotated bibliography revolved around the question: "What is understood by research-by-design?" The results are interesting and challenging. On the one hand, it seems that the notion as a compound is especially in use in the Netherlands (more specifically in Delft and among professionals) and in Belgium (*ontwerpend onderzoeken/ontwerpend onderzoek*). On the other hand, the bibliography shows an internationally renewed interest in the various possible inter-linkages between research and design. In this, research-informed-design and research-through-design but also design-as-research, may form key-interpretations. Designers want to improve the legitimacy and quality of their designs. While through a design approach, scientists see ways to increase the utility of their research. Ultimately, both groups hope to improve the quality of either their design or their research.

The bibliography does not present a universal answer to the question: "How to come to satisfactory collaborative action between scientists and designers?" This is not only because the methodological aspect of in particular research-through-design is still at its infancy, but also because each situation has to be assessed against the required type of research or design product. Sometimes the quality of the design prevails, at other occasions the research aspect dominates, and again in other situations community consultation leads. Each demands its own approach. It is hoped that this elaborate annotated bibliography inspires scientists, professionals, and designers working within and outside Deltares to communicate and experiment with various 'research and design' combinations addressed in this bibliography.

Selected literature

Below a list is provided of authors whom were more than once cited in the annotated articles. Just, the author and year of publication are listed, the full reference can be found in the bibliography itself.

Akin Ö. 1986
Argyis, C. 1974,1979
Bernstein, L. 1983
Benson J.F. 1998
Brink L.A. 1997
Chenoweth R. 1980,1983,1992
Colquhoun, A. 1969,1978
Creswell J. 1994
Cross N. 1984
Dewey J. 1959,1983
Francis M. 1999

Gero, J. 1987,1990,1994, 2006
Jong, T. de. 1992, 1998, 2002
Innes J.E. 1996
Thwaites K. 1996
LaGro 1999
Lawson, B. 1988, 1990
Marsh 1983, 1993
Nassauer, J.I. 1985, 2008
Norberg-Schulz , C. 1980,1991
Rittel H. 1973, 1984
Rowe, P. 1982,1987

Sanoff, H. 1991
Schön D. 1983,1988, 1992
Selman P. 1995
Simon H.A. 1971
Steinitz C. 1995
Stiles R. 1992
Swaffield, S. 2002
Zeisel J. 1981
Zube, 1980, 1998

In addition, the books of Groat, L. and D. Wang. "Architectural Research Methods" (2002) and Creswell, J. "Research Design: Qualtiative and Quantitative Approaches" (2008) provide a framework of possible knowledge claims in which researchers and designers study and work.

PART A

ACADEMIC PAPERS PREPARED BY DISCIPLINES RELATED TO SPATIAL ORDERING AND PLANNING

The crouching man by Anthony Gormley. Photograph by Herman Verheij

PART A:

ACADEMIC PAPERS PREPARED BY DISCIPLINES RELATED TO SPATIAL ORDERING AND PLANNING

Benson, John, F. 1998. On research, scholarship and design in landscape architecture, Landscape Research, 23: 2, 198-204

Condon, Patrick M. 2008. Design Charrettes for Sustainable Communities, Island Press, p. 172

Cross, Nigel. 2007. Designerly Ways of Knowing, Birkhauser, Basel, 138 p.

Geldof, Charlotte en Nel Janssens. 2007. Van ontwerpmatig denken naar onderzoek, in Vos, W. (Eindredactie); Eline Dehullu, E. en R. Dudal, C. Geldof, en K. Vandermarliere (Red.) Achtergrond 03 – Architect/Ontwerper/Onderzoeker? Casus *Mare Meum*: een oefening op zee, VAi, pp. 11-19
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Jong, Taeke M. de Jong and D.J.M. van der Voordt (Editors). 2002. Ways to Study and Research Urban, Architectural and Technical Design, DUP Science, 554 p.

Klaasen, Ina T. 2007. A scientific approach to urban and regional design: research by design, J. Design Research, Vol. 5., No. 4, 2007

Lidy, Christopher James. 2006. A Study of Landscape Architecture Design Methods, Msc Thesis Landscape Architecture, Virginia Polytechnic Institute and State University, Committee Chair Professor Benjamin C. Johnson

Mansfeld, M. van, M. Pleijte, J. de Jonge en H. Smit. 2003. De Regiodialoog als methode voor vernieuwende gebiedsontwikkeling, De casus Noord-Limburg, Blad Bestuurskunde, Jaargang 12, Nummer 6, pp. 262-273

Milburn, Lee-Anne S., Robert D. Brown, and Cecelia Paine. 2001. "… Research on research": research attitudes and behaviours of landscape architecture faculty in North America, *Landscape and Urban Planning*, 57 (2001), pp. 57-67

Milburn, Lee-Anne S. and Robert D. Brown, 2003. The relations between research and design in landscape architecture, *Landscape and Urban Planning*, 64 (2003), pp. 47-66

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Nassauer, Joan Iverson and Opdam, Paul. 2008. Design in science: extending the landscape ecology paradigm, Landscape Ecology (2008) 23:633-644

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Selman, Paul (Editor). 1998. Landscape design as research: an emerging debate, Landscape research, 23: 2, 195-196

Short, Alan C. 2008. What is 'architectural design research'? Building Research & Information, 36:2, 195-199

Steenbergen, Clemens, Henk Mihl, Wouter Reh, and Ferry Aerts, (Editors). 1999. Architectural Design and Composition, THOTH Publishers, Bussum, p. 262

Steenbergen, Clemens M. 2008. Ontwerpen met Landschap. De tekening als vorm van onderzoek, THOTH Publisher, Bussum, p. 429

Steiner, Frederick. 1991. Landscape Planning: A Method Applied to Growth Management Example, Environmental Management Vol. 15, No.4, Springer Verlag, New York, pp 519-529

Thwaites Kevin. 1998. Landscape Design is Research: an exploration, Landscape research, 23: 2, 196-198

Tjallingii, Sybrand en Roos Berendsen (Redactie). 2007. Een Rijke Bron, een nieuwe rol van water in ontwerpen voor de stad, Serie: Studio-Urbanism 02, Techne Press Amsterdam, 204 pp.

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John F. Benson, University of Newcastle

Key words: research, design, misleading concept, HEFCE

Summary

Landscape Research, Volume 23 addresses the results of the workshop on *'Landscape Design is Research: an exploration'* that was hosted by the Leeds Metropolitan University in 1997. This article comes from Landscape Research Volume 23 (1998) in which several authors, such as Paul Selman and Kevin Thwaites express their position regarding landscape architecture, research and design. The articles of Selman (pages195-196) and Thwaites (pages 196-198) are also included in this annotated bibliography.

Benson argues that the notion **'design is research'** is simplistic and misleading, "... because it conflates different traditions, different objectives and different working methods." (page 202). Benson does not mean that design could not be equivalent to research, but states that a careful diagnosis of the issue is required before it is possible to move to an insight. He clearly distinguishes this debate **'design is research'** from "a debate about research on design, or on the design process, or design criticism or other scholarly work built on and around design; such work is entirely eligible for assessment as research or scholarship and should not be in dispute, ..." (page 198).

Benson first explores the policy context and some problems of design under the scrutiny of research assessment. In this section, he quotes the research definitions used by the Higher Education Funding Council for England (HEFCE). He then explores the case that 'design is research' and finally he comments on the implication of research assessment for higher education in landscape architecture in the UK. He notes that the issue is not related to landscape architecture only (page 199). He closes with a section addressing the future of transforming academic cultures and practices. The proliferations of peer-reviewed magazines in the second part of the 1990's are good signs (Journal of Urban Design (1996), Journal of Architectural Conservation (1995), Environments by Design (1996) and Urban Design International (1996).

This article should be read in light of present-day research assessment of educational programmes in landscape architecture. In England this process started as early as in 1986. Because of the undefined relations between research and design, design professions have great difficulties accessing research funds. This, in its turn, hampers proper analysis and development of a landscape (architecture) research tradition and agenda.

HEFCE definition for research for the purpose of the RAE (research assessment exercise) runs as follows:
"original investigation undertaken in order to gain knowledge and understanding. It includes work of direct relevance to the needs of commerce and industry, as well as to the public and voluntary sectors; scholarship; *the invention and generation of ideas, images, performances and artefacts including design, where these lead to new or substantially improved insights;* and the use of existing knowledge in experimental development to produce new or substantially improved materials, devices, products and processes, including design and construction ... Scholarship embraces a spectrum of activities including the development of teaching material; the latter is excluded from the RAE" (emphasis added by Benson).

The author states that the debate "is symptomatic of a paucity of research training and culture in landscape architecture; as Chenoweth (1992) argues, without research, landscape architecture students will continue to do the same sorts of projects, with more or less the same tools (some electronic), with about the same level of ignorance of relevant facts and
theories, while in professional practice each generation will re-invent the wheel with enthusiasm and any changes will be stylistic, not substantive. Research is fundamentally different to design and to

attempt to re-define either to seek convergence is counterproductive." (page 201)

"The HEFCE system recognizes though that design can be **equivalent** to research." (page 201). For RAE to allow 'design(s)' and 'constructed places' to be counted, assessed and valued as equivalent to research, such design must exist in the public domain and must have been subjected to some measure of critical evaluation and acclaim through appropriate peer-review; in the words of HEFCE, it must *'lead to new or substantially improved insights'.* Evidence of merit could include a win or commendation in a competition, a public exhibition or, for a built work, receipt of an award or appraisal in a professional or scholarly journal; in the latter case it is unclear whether it is the built work or the criticism or both which are meritorious. What is clear is that normal, efficient and competent landscape practice will not be counted or rated highly; one must assume that all landscape professionals are doing this all the time ... " (page 202)

The author concludes with recommendations for the landscape architecture educators, profession, and institutions, but in essence, he advises that landscape academia needs to develop its research sensibilities, cultures, traditions and agendas. Shed light to the debate rather than heat the differences.

Relevance
In 1998, Benson finds '*Research is design*' a too simplistic statement. It still requires the development of proper paradigms to stand research assessments as defined by HEFCE definition (... new or substantially improved insights ...) and achieve (inter)national significance.

An interesting quote on page 201 of the article of Benson – says it all – "can we suggest that, as a design discipline, landscape architecture ultimately involves investigation through the work of design itself; that landscape architecture's primary mode of scholarly inquiry is the creation of landscapes – both theoretical constructs and physical constructions – and critical assessment of their meaning?" (McAvin in Benson)

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Condon, Patrick M. 2008. Design Charrettes for Sustainable Communities, Island Press, 172 p.

> **Patrick M. Condon is a professor in the University of British Columbia's School of Architecture and Landscape Architecture and holder of the UBC James Taylor Chair in Landscape and Liveable Environments. Senior researcher for sustainable communities as UBC.**

Key words: city planning, charrette, community development, urban, sustainability, collaborative design, complexity, urban design

Summary
In this book, Condon describes his experiences with design charrettes. His first charrette took place in Vancouver and dates from 1994. He uses two case studies as examples. Condon defines a **design charrette** as:
- A time-limited, multiparty design event organized to generate a collaboratively produced plan for a sustainable community.

The book is composed of seven chapters:
1. Charrette, Theory for People in a Hurry
2. Two Kinds of Charrettes
3. The Design Brief
4. The Nine rules for a Good Charrette
5. The Workshops
6. The Charrette
7. After the Charrette

The two case study presentations are:
1. The East Clayton Sustainable Community Design Charrette
2. The Damascus Area Design Workshop

The author pleads for participatory design in order to plan sustainable futures for urban communities. Condon presents the design charrette as an integrative and synenergy method to achieve more sustainable cities. In opinion of the author, a charrette can absorb a multitude of sometimes even conflicting objectives. A charrette can address physical, quantifiable elements as well as qualifying ones.

According to Condon, a design can never be perfect – an exceptional design comes closest (pg 12) to a perfect answer in a form that transcends the problem, raising it to a higher level through empathy, understanding, and compassion. The objective of the charrette is to produce a design that embodies high levels of empathy, understanding, intuition and compassion of the design team. Professionals, officials, citizens and stakeholders participate. He advocates putting opposing stakeholders in one team. In the charrette, they have no longer the luxury of maintaining their own narrow position from one meeting to the other, but have to discuss and come to some sort of an agreement.

Condon identifies the **design part of the charrette** and the **charrette part of the design**. The products are drawings not plans. He distinguishes **two types** of charrettes;
1. **Visioning** charrettes are speculative explorations of a possible future not directly tied to a government-regulated development or redevelopment proposal, and
2. **Implementation** charrettes are explorations of the ins and outs of implementation of plans and associated regulatory documents. In his opinion, the two types of charrette do require the same kinds of skills and staff support.

The value of **visioning charrettes**: 1. they make words real; 2. they create a common language of solutions; 3. they are a no-risk process; 4. they reveal policy contradictions; 5. they are inexpensive.
The value of **implementation charrettes** are: 1. they get us past the "window of no"; 2. they are powerfully integrative; 3. they are fast and efficient; 4. they are inexpensive.
Condon gives a high priority to the design brief (design programme, set of instructions given to

the design team, numerical requirements and performance targets for the site, goals, product list and design principles). Furthermore, he identifies a site tour, talking, doodling and drawing (by all participants) and the after party as crucial elements of the charrette. A charrette can take 3 to 8 days. Condon pays ample attention to continuity "the charrette is only as good as what happens with it once it is over". In his opinion, all too often charrettes conclude without clear plans on how to transform the design ideas generated in the charrette into actions and policies necessary for implementation.

The Nine Rules for a Good Charrette:
1. Design with everyone
2. Start with a blank sheet
3. Build from the policy base
4. Provide just enough information
5. Talk, doodle, draw
6. Charrettes are jazz, not classical
7. Lead without leading
8. Move in, move out, move across
9. The drawing is a contract

Relevance:
This book is included into this annotated bibliography – not because it addresses the issue of research-by-design, but because it discusses a participatory design approach similar as some reports in Part D of this bibliography. This approach seems to be key in the interpretation of "*ontwerpend onderzoek*" by the Dutch practicing community, see for example the booklet "Ontwerpen op het raakvlak van water en ruimte" (Bouwmeester et al. 2009). However, Condon sees design as the driving activity of the charrette, while Bouwmeester et al. see research-by-design as the driving activity. Condon worked closely with Professor Kelbaugh. The latter is the North American pioneer of the charrette methodology.

The goal of the charrette defines its process. Condon makes a division between visioning and implementation charrettes. He promotes this division to allow for a clear description of the two different processes, even though requiring the same type skills and staff support.

Condon, furthermore, emphasises that a charrette is only as successful as the after process. The design products are drawings (which can function as a contract among participants) and not plans. The link between a visionary drawing and plan requires some sort of action transforming the charrette results into politicise necessary for implementation. Condon works from a (city or town planning) paradigms.

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Cross, Nigel. 2007. Designerly Ways of Knowing, Birkhauser, Basel, 138 p.

Nigel Cross PhD (Professor of Design Studies, Department of Design and Innovation, Faculty of Technology, The Open University, Milton Keynes, UK) is a member of the Board of International Research in Design (BIRD). Other members are Klaus Tomas Edelmann, Michael Erlhoff, Simon Grand, Wolfgang Jonas, Ralf Michel, and Beat Schneider

Summary

Cross worked with an open university and was challenged to teach design at a distance. This book gives an insight in what makes design unique and offers an explicit account of design methods and processes. The book "Designerly Ways of Knowing" is a collection of essays written by Nigel Cross over a period of 20 years. These essays were written with the intent of understanding design as a type of knowledge, a way of thinking, and as a discipline. In other words, design cognition as a particular and essential aspect of human intelligence. Cross takes existing design theories and uses them to start a dialogue. He then observes his own experiments through these frames of theories in an attempt to demystify and add clarity to the structure of design methods and processes.

There are two dominant cultures of thinking and these are the 'sciences' and 'humanities'. The foundation of this book involves considering **design as the third 'culture of thinking'**. While the sciences focus on the natural world and a search for the truth; the humanities focus on the human experiences and a search for justice; whereas, design focuses on the artificial world and a search for what is appropriate. Design is characterized as a **constructivist** way of problem solving where one asks not 'what must be' or 'what should be' but what 'could be'?

Cross identifies the ill-defined nature of design problems as their most important characteristic. This uncertainty requires the designer to **'frame' the problem** in order to provide a focus for the generation of solutions. Due to the complexity of design problems, designers often generate solutions before fully understanding the problem. The co-evaluation of problem setting and solutions generation often happens in a cyclic manner and helps the designer better comprehend the problem.

Cross studied design experts and their behaviours in an attempt to find commonalities in their design processes and three distinct habits emerged;
1. they all subscribe to a systems thinking and a broad first way of assessing a problem,
2. they all frame problems in a distinct way based on personal experiences, and
3. they all solve problems by starting with first principles.
The book makes clear that there are logical problem solving and solution generating design processes that likely provide **a 'bridge' rather than a 'leap'** to ingenious ideas as is often suggested.

Cross explores the following topics:
• The nature and nurture of design ability
• Creative cognition in design
• The natural intelligence of design
• Design discipline versus design science
• Expertise in design

Chapter 7: "Design as a Discipline", first presented at the international conference "Design+Research" at the *Politecnico di Milano,* in Italy in 2000, starts out with a brief review of the historical concerns with establishing a relationship between design and science. Cross notes, a cyclic process starting in the 60's with a renewed concern in the 2000's. He distinguishes three types of relationships:
• Scientific design
• Design science
• Science of design

In Cross's opinion design should be treated as a discipline. This means that design should be described in its epistemology, praxiology, and phenomenology. Design research can then follow the three same categories based on people, process and products:
- Design epistemology: study of designerly ways of knowing
- Design praxiology: study of the practices and processes of design
- Design phenomenology: study of the form and configuration of artefacts

Good (design) research should have the following characteristics (adapted from Bruce Archer):
- Purposive: based on identification of an issue or problem worthy and capable of investigation
- Inquisitive: seeking to acquire new knowledge
- Informed: conducted from an awareness of previous, related research
- Methodical: planned and carried out in a disciplined manner
- Communicable: generating and reporting results which are testable and accessible by others

He warns for the **danger that researchers from other non-design** disciplines will import methods and approaches to the design field that are inappropriate. In this respect, he refers to researchers from psychology or computer sciences, who tend to assume that there is nothing special about design as an activity for investigation. They see it as just another problem solving or information processing activity. Regarding the new generation designer-researchers, another danger is that research adheres to underlying paradigms of which designers are only vaguely aware. Dorst (1997) makes a clear analysis of the paradigms underlying the work of Herbert Simon (positivist) and Donald Schön (constructivist). He then applies this analysis to design activity. This leads him to the view that the different paradigms have complementary strengths and are required for gaining an overview of the whole range of activities in design. Notwithstanding, Cross's long work and experience, he states in his book that an appropriate design paradigm still needs to be build.

Relevance:
Cross introduced design as a new third worldview (in addition to science and humanities). An appropriate paradigm still needs to be developed. Questions such as, How scientific is or should 'design' be if design is a third way of thinking? How necessary is the identification of the normative part of designing?

This distinction can be useful when determining the worldview from which design research can be approached (positivistic, constructivism, advocacy/participatory or pragmatic (Creswell, 2009) or naturalistic (Groat and Wang, 2002). Once we make a clear choice, it will become possible to identify the necessary quality research criteria. Furthermore, designers will then be able to communicate with both humanistic and nature scientists. See also the review of Groat and Wang in this bibliography. An important conclusion is that an accepted designerly way of thinking can help to generate new insights and unique designs.

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Geldof, Charlotte en Nel Janssens, 2007. Van ontwerpmatig denken naar onderzoek, in Vos, W. (Eindredactie); Eline Dehullu, E. en R. Dudal, C. Geldof, en K. Vandermarliere (Red.) Achtergrond 03 – Architect/Ontwerper/Onderzoeker? Casus Mare Meum: een oefening op zee, VAi, pp. 11-19

Nel Janssens, architect-ruimtelijk planner en onderzoeker aan het Departement Architectuur Sint-Lucas Brussel, en Charlotte Geldof, architect- ruimtelijke planner en ontwerper bij FLCextended

Key words: ontwerpmatig onderzoek, begrippenkader, Belgische zee

Summary
Charlotte Geldof en Nel Janssens zetten een theoretische analyse van de term "ontwerpmatig onderzoek" neer en bakenen het begrippenkader af. Zij deden dit ten behoeve van een Debat georganiseerd door het Vlaams Architectuurinstituut (VAi)[3]. Het genoemde artikel maakt onderdeel uit van het derde nummer in de cahierreeks van het VAi. Dit nummer bestaat uit een terugblik op de tentoonstelling *Mare Meum*, die plaats vond in het kader van de Internationale Architectuurbiënnale te Rotterdam (27 mei tot 26 juni 2005) en werd hernomen in de Universiteitsbibliotheek van de Universiteit Gent (6 december 2005 tot 13 januari 2006) en in het Kursaal van Oostende (13 juli tot 27 augustus 2006).

Achtergrond 03 is de neerslag van een denkoefening over het belang en de rol van de ontwerper en van het ontwerpmatig onderzoek voor maatschappelijke en ruimtelijke ontwikkelingen. Het cahier is toegespitst op de visievorming over toepassingen op de Belgische zee: *Mare Meum*. Verschillende ruimtelijke planners, architecten en ontwerpers ontwikkelden in scenario's voor een duurzame ontwikkeling van het Belgische Kustgebied. Met het oog op de stijging van de zeespiegel en ruimtelijke processen ontwikkelden het GAUFRE onderzoeksteam enerzijds en de ontwerpers FLCextended anderzijds, elk voorstellen van exploitatie van de ruimte op zee. Aan de basis daarvan lagen twee verschillende manieren van onderzoek: een fundamenteel wetenschappelijk onderzoek en een artistiek, exploratief onderzoek.

In het artikel 'Van ontwerpmatig denken naar onderzoek' geven de twee auteurs een kritische reflectie op de toenemende 'nationale en internationale' aandacht voor de interactie tussen ontwerp en onderzoek. Zij beargumenteren dat **de invalshoek vanuit het ontwerp** onderbelicht is gebleven. Met hun artikel willen zij, als ontwerpers, een aanzet geven aan de discussie over het samengaan van ontwerp en onderzoek juist vanuit een 'ontwerp' invalshoek. Zij stellen dat het een **hype** is om alle mogelijke combinaties van onderzoek en ontwerp te hanteren, terwijl men tot de kern is nog niet is aangekomen.

Relevantie
Een kritisch artikel waarin Geldof en Janssens stellen dat de verschillende combinaties van ontwerp en onderzoek onvoldoende worden onderbouwd.

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3 Het Vlaams Architectuurinstituut werkt aan een nieuwe cultuur voor architectuur door sensibiliseren en bewustmaking. De reeks Achtergrond biedt inzicht in actuele thema's en maakt ruimte voor uitgewerkte standpunten én overleg tussen diverse specialisten. De reeks is een instrument om het interdisciplinaire karakter van architectuur aan bod te laten komen, maar ook om perspectieven te ontwikkelen voor de toekomst.

De standpunten van deze auteurs en een aantal externe deskundigen werden met elkaar geconfronteerd gedurende een debat, gemodereerd en getranscribeerd door Dirk Bogaert, onderzoeker aan het Maritiem Instituut van de Universiteit Gent en benoemd aan de Arteveldehogeschool als lector voor het beleidsdomein milieu (lees het debat - pdf).

Linda Groat, Professor of Architecture at the University of Michigan's Taub College of Architecture and Urban Planning
David Wang, Associate Professor of Architecture and Coordinator of the Master of Science in Architecture Program at Washington State University's Interdisciplinary Design Institute In Spokane, Washington

Summary
The scope of the book Architectural Research Methods is to provide an introductory guide for anyone wishing to conduct research on an aspect of the built environment with an emphasis on architects. The authors themselves introduce the book as both comprehensive and a starting point. The book is born out of the question: How to do research in architectural design. At many American universities this book is recommended literature.

The book is composed of two parts, the first is an introduction on research in architecture, in which the terminology is introduced and general research outlines are given. The second part contains an elaborate description of seven research strategies and their related research tactics. Every chapter starts with an introduction, continues with the content matter, closes with conclusions, and links to other chapters and sections in the book and ends with recommended readings.

Part 1. The domain of architectural research
Part 1, titled *The domain of architectural research*, is introductory on research methods (chapter 1 to 3); the relationship of research methods and theory in general (chapter 4) and in chapter 5 they elaborate on how they see the relationship between research and design activities.

They introduce decision making in research from three different levels. The first level is the most abstract level. The authors argue that any researcher's choice of a particular research design is necessarily framed by the researcher's own assumptions about the nature of reality and how one can come to apprehend it. They use the term **"system of inquiry"** or "**paradigm**" to convey the notion of a worldview. It is important to define these conceptual frameworks as standards for evaluating research quality as they are substantially dependent on them (page 23).

They introduce a **dichotomous framework**, a **continuum framework of multiple systems** of inquiry, and **tripartite** clusters. The authors find the dichotomous framework that largely builds on two (quantitative and qualitative) paradigms less suitable for architectural research methods. Also the continuum framework of multiple systems, which organises architectural research along a continuum of nine methods (observation, design, review of precedents, manifesto, normative theory, development of prototypes, scholarship, social science research to laboratory research) as presented by Joroff and Morse. The authors reject this continuum framework as the nine methods are organised along the dichotomous framework (from objective to subjective). The authors promote **a mixed approach**. They believe that a variety of research strategies and tactics can be orchestrated in ways consistent with the chosen paradigm (page 31). They propose for architectural research **a tripartite framework** that is a composition of (post)positivism (one truth), interpretive constructivism (several truths) and emancipatory research (many truths), which consequently defines a concurrent variety of **strategies** (or **methods**). These strategies can include: a) qualitative, phenomenological, hermeneutic, and interpretive/ constructive approaches (the authors group them under the name naturalism) in order to research multiple socially constructed realities. b) positivism and post-positivism in order to research issues related to a knowable reality, and c) what they call emancipatory paradigm including critical theory, participatory research and transformative research (addressing issues that highlight dynamics of power, marginalization, historical context).

The stance of this book, however, is that each system of inquiry can provide an appropriate and useful frame of reference for architectural research. Measures of research quality should follow the standards developed by methodologists working within certain paradigmatic conditions (page 34-41). Figure 2.11 gives an overview for positivism and naturalistic. Section 2.3.3 addresses quality standards within the emancipatory system of inquiry that includes historical situatedness; eroding ignorance, transformational impulse.

Standard	Positivism / Postpositivism	Naturalistic
Truth value	*Internal validity* Equivalence of data of inquiry and phenomena they represent	*Credibility* Check data with interviewees; triangulation — multiple data sources of data collection
Applicability	*External validity* Generalizability	*Transferability* Thick description of context to assess similarity
Consistency	*Reliability* Instruments must produce stable results	*Dependability* Trackability of expected instability of data
Neutrality	*Objectivity* Methods explicated; replicable; investigator one-step removed from object of study	*Confirmability* Triangulation of data; practice of reflexivity by investigator

Figure 2.11 Comparative Analysis of quality standards, 1981. By permission of Egon Guba.

The authors see, no matter in which inquiry system a researcher chooses to work, literature review and the explication of the theoretical framework as critical for the quality and rigorousness of architectural research. Chapter 3 gives a guide for proper literature review. Chapter 4 addresses theory in general. **Theory** is defined as "set of interrelated concepts held as an explanation for observable phenomena by recourse or unobserved, more abstract principles" (page 75). They refer to first six of Moore's eight components of a theoretical framework (1. propositions, 2. logical connections, 3. set of conclusions, 4. linkage to empirical reality, 5. assumptions underlying the theory, 6. testability, 7 disciplinary domain, 8. philosophical axioms) (page 76).

Theory is positioned in between philosophy (worldview) and research. On the one hand, it draws from philosophical underpinning for its own sense of legitimacy and coherence. On the other hand, it posits specific explanations about something in nature or the social/cultural worlds and makes its claims amenable to testing and analysis by means of research (page 87), for example through the formulation of a hypothesis.

Chapter 5, *Design in relation to research,* the authors first give a philosophical distinction between design and research using Kant's ideas on art production including figural schemas (art production is indeterminate and cannot be captured by determinate descriptions, yet it is within de domain of reason). The authors predominantly distinguish between **"design as research"** and **"research about the design process"**. Design as research is then defined as a difficult conceptual union of all the mental faculties. It seeks to subsume a reality that is inherently nonpropositional (generative design as a mode of art production) under the domain of a propositional activity (analytic research), which raises logical difficulties. Research about design seeks, by well-defined propositional frameworks, to

understand more deeply the processes involved in the nonpropositional process of design. There is no logical problem with this notion (page 106). However, the authors are adamant that **research about the design process is different from holding that design itself is research.** They see the two as equally worthwhile but different functions.

In section 5.3 – Groat and Wang summarise some possible ways to conceptualise the coexistence between generative design and analytic research. They address: 1. **design as analysis and evaluation** (included programming and postoccupance evaluation), 2. **action research and 'design-decision' research,** 3. **design as a learned skill**, and 4. **design in collaboration.** None of these represent a master strategy that subsumes 'design' under a 'research' umbrella. All of them are gateways for bringing research into the design process (page 108).

The problem with **design as analysis and evaluation** relates to the fact that the research is limited to the introduction and the epilogue. It leaves the design process itself unaddressed. 'Action research' and 'design-decision' address the design process itself. **Action research** examines a concrete situation, particularly the logic of how factors within that situation relate to each other as the process moves toward a specific empirical goal. Reference is made to Kurt Lewin's notion of field theory (theoretical knowledge and practical knowledge must inform each other) as well as to Schön (design activity is a particular instance of reflection-in-action (page 111). Theoretical knowledge can be tested later by research while action research is relevant for the in-context case. **Design-decision research** embeds the researcher into the actual process, which is with action-research not necessarily the case. In the latter researchers and designers are one community. **Design as a learned skill**; the generator/conjecture/analysis model, here, do better design by practice, by a more explicit awareness of the attributes that characterize design, and by reflective assessments of the process. Reference is made to Lawson's model (generator, function, and domain). Design is divided in strategic and tactical considerations. In the process of learning there are some specific pitfalls designers can fall into (category trap, puzzle trap, number trap, icon and image trap. **Design in collaboration** in the contemporary complex society, the design process calls for expertise of a wide variety of disciplines. The authors give a few insights, but state that a consensus still has to emerge. Groat states that collaborative design asks for an architect-as-cultivator (as in opposed to the sole architect-as-technician and architect-as-artist) and one that is sensitive to a larger communal mission of well-being (collaborative and participative). The architect as cultivator aspires 1. the process, 2. interdisciplinary design, 3. socially and cultural sensitive with a mission for the common good. On page 117, figure 5.13 gives the position of the cultivator versus societal consciousness. The section ends with seven examples of design and research connections (design and history research; design and qualitative research; design and experimental research; design and correlation research; design and simulation research; design and logical argumentation; case study and multimethod approaches to research).

Part 2. Research Strategies and Tactics
The second part of the book addresses strategies and related tactics (the second and third decision levels in research). The authors describe seven (or eight if you include combined strategies separately) research and design strategies. The methods all relate to designing architectural/built environment. They describe:

       Interpretive-historical research
       Qualitative research
       Correlation research
       Experimental and quasi-experimental research
       Simulation and modelling research
       Logical argumentation
       Case studies (and combined strategies)

This second part is more complex and illustrates that the straight forward methods as introduced in the first part, are in reality mixed in tactics, and the research is sometimes divided in phases or parallel running approaches.

Relevance
Groat and Wang present various links between design and research. The book emphasises research in architecture (from the building component to the urban centre). Design plays an important role. Examples are largely drawn from architectural practice and academics, however, due to the emphasis on design, the book is also suitable for spatial planning and design. Although, the living part of the environment is not addressed, the methods discussed are appropriate to include also this aspect of spatial planning and design.

The book is written in 2002 and draws from classics in architectural literature largely produced in the eighties and nineties (or even earlier see the literature references). As a result, they regularly refer to for example, to earlier versions Creswell's book: "Research Design: Qualitative and Quantitative Approaches" and thus they could not include his later adjustments related to the large categories of worldviews. The photographs are also somewhat dated. Newer computer programmes and uses overtook the section on computer aided research techniques. Nevertheless, the approaches towards artificial intelligence and CAD are still relevant. However, carefully reading of the book, the book gives a good overview on possible research approaches and choices to be made when linking design to research (including participatory and collaborative research and design).

In particular – the three levels of decision-making in research (1: research worldview, system of inquiry or paradigm, 2: research strategies, and 3: research tactics) and the concurrent research standards, are extremely helpful in defining rigorous research design. Section 2.3.3 addresses quality standards within the emancipatory system of inquiry (in other words, research standards that relate to participatory design, ateliers, and charrettes).

For this literature review, especially Chapter 5 "Design in Relation to Research" is a critical. The authors state that they do not offer a master strategy that subsume 'design' under a 'research' umbrella, but rather offer gateways for bringing research into the design process. In conclusion, the book emphasises methods such as 'research-informed-design', 'research-about-design' and 'designing-processes'. Design as research or design-informing research remains underexposed. Nevertheless, the authors explicitly take the stance that research and design are different realms that can coexists and support each other. Overall, it is a very worthwhile book to study as it provides a good foundation for the research requirements of several combinations of design and research. It provides good insight in criteria, approaches, and language.

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Keywords: spatial planning and design, knowledge sociology, research and design

Summary

The authors of this publication report on the cooperation between researchers and designers in planning practice. This cooperation is viewed as a process of knowledge exchange. The report exists of two parts: the report of an empirical enquiry[4] into this cooperation (chapters 2-6) and the proceedings of a symposium where the results of the enquiry were presented (chapters 7-10).

In Chapter 4 (Knowledge exchange between research and design) the authors remark on the two possible barriers in the exchange of knowledge. One barrier relates to the expectations designers and researchers have about their role in the interdisciplinary process. The other barrier relates to the ways in which design and research results are expressed.

Ontwerpend onderzoek is presented as one of the possible ways to improve the exchange of knowledge among experts and designers. (pp. 64-66). The other way, the authors thought helpful is called socio-spatial construct. In this summary, only *ontwerpend onderzoek* is addressed.

Design-based-research is defined as a way of working that allows for an overlap between research and design. References are made to:
- Keijsers and Verschuuren (1990, p. 372) characterise design-based-research as research focused on the future or as searching for the possible directions in which the spatial system can develop. They claim that the resulting designs need to be tested against the ex-ante developed objectives
- Andersson and Van den Berg (1990, pp. 16-17) state that in the designerly way of research, spatial concepts that are developed at the onset of the process are continuously tested and adjusted. Researcher and designers are stimulated to make their abstract ideas about the spatial situation explicit in maps and drawings.
- Pasveer (Van der Bijl, 1991) refers to Taverne when he states that a design generates knowledge about the possibilities of a location. Through a systematic way of developing design alternatives and testing those alternatives against certain values reliable knowledge about a location can be generated.

Relevance

With the objective to improve knowledge exchange between designers and researchers, the authors bring various definitions *Ontwerpend onderzoek* under the attention. Designing, if carried out in a systematic way can generate knowledge about the spatial possibilities of a location. Another aspect is the testing of designs against objectives, criteria's, or research. Some start out with a design concept and in a continuous process of testing and adjusting the design evolves; others promote a process of testing in a last phase.

Literature References:

4 The enquiry made use of literature study and of extensive interviews with eight designers and six researchers. It proceeded from three questions:
- To what extent are supply and demand of knowledge in spatial planning attuned to each other?
- Is knowledge exchange between researchers and designers hindered by specific obstacles?
- Can methods be devised to improve attunement between supply and demand of knowledge in spatial planning and to clear away communication obstacles? (page 135)

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Klaasen, Ina T. 2007. A scientific approach to urban and regional design: research by design, J. Design Research, Vol. 5., No. 4, 2007

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Key words: research-by-design, utility gap, urban design, typology, spatial organisation principles

Summary
According to Klaasen, the main obstacles in viewing urban design as a science is caused by the idea that creativity is incompatible with science and comprehending each urban design as unique. Klaasen addresses the latter issue by proposing the development of general typologies of spatial organization as a way of doing research. Klaasen calls this type of research: **research-by-design.** The basic idea of typologies is explained by examples ranging from relatively simple (transport model) to complex (urban strip development).

Research-by-design is defined as: "The essence of research by design can be described as follows. Start with a number of basic elements from the object under study and manipulate them in such a way that the resulting theoretical designs are logically plausible, internally-consistent and possessing certain qualities with regard to accommodating (a range of) societal processes: constructions which, in the light of our available form and empirical knowledge, are likely to function stably when implemented. These theoretical designs can be simple and complex, always integrating empirical and formal scientific-based knowledge. I call the simple ones spatial organisation principles. ... Others are, for instance, hierarchy and symbiosis" (p. 476).

Relevance
The relevance of this paper relates to the fact that she addresses urban design up to the level of city development. The transformation of unique and local knowledge to more general principles lifts design as practice up to design as applied science (which the author calls practical science). Consequently, her definition of research-by-design follows the same line of reasoning.

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Lidy, Christopher James. 2006. A Study of Landscape Architecture Design Methods, Msc Thesis Landscape Architecture, Virginia Polytechnic Institute and State University, Committee Chair Professor Benjamin C. Johnson

Christopher James Lidy owns the landscape design company Natural Designs

Key words: landscape architecture, design methods, application cases, literature overview

Introduction

This document is the product of a master thesis. It is one of the few reports that address various landscape architecture design methods and tests them on the design (product) effects. It also presents summaries of relevant literature.

Quote:
If design is the imaginative creation of possible forms (of environment in the case of landscape architecture), which are created to achieve certain purposes and are complete with the instruction for making them, then design is practiced by many people and in many ways (Lynch and Hack, pp. 270-271).

The key question of the thesis is: *What effect do different design methods employed by landscape architects have on the design outcome*?

Summary

Lidy identifies in total 18 different design methods, which he derived from literature research (varied disciplines). These 18 design methods are a combination of the methods distinguished by Lynch and Hack, Row and Rocha.

Lynch and Hack identify twelve design methods:
1) learning probes 2) subconscious suggestion, 3) brainstorming, 4) evaluation criteria, 5) well spaced alternatives, 6) focus on the means, 7) incremental improvement, 8) incremental adaptation, 9) behaviour settings, 10) structure of the problem, 11) optimizing the essential function, 12) disaggregation. Lynch and Hack do not talk about the process or design theory.

Rowe takes a different track and views methods as part of a generic design process. Rowe does not identify methods per se, but rather forms of reasoning. Rowe places his methods in the context of a design process, where and how methods are involved as one design. Landscape architecture usually deals with complex problems. According to Rocha, a systems modelling is necessary. System modelling can be defined as concerned with basic and applied research on simulations and analysis of complex systems, as well as development of applications to understand and control such systems.

Lidy adds Rowe's and Rocha's six approaches to the twelve of Lynch and Hack as follows (he continues with the earlier counting above):
13) system modelling, 14) environmental relation, 15) anthropometric analogies, 16) literal analogies, 17) typologies, and 18) pattern languages.

Lidy groups the 18 methods in four categories;
    1) modelling systems (system modelling, environmental relation, anthropometric analogies, literal analogies);
    2) interrelationships and dependencies (learning probes, subconscious suggestion, brainstorming, evaluation criteria, well spaced alternatives, focus on the means;
    3) incorporation and adaptation (incremental improvement, incremental adaptation, behaviour settings, typologies, pattern languages); and
    4) structure problems (structure of the problem, optimizing the essential function, disaggregation).

Lidy then conducts an interesting design experiment and applies the methods on two types of design applications. One application is of a relatively simple character i.e. addressing the problem of rainwater run off from a parking lot. The other one is more complex in character and concerns the redevelopment of a neighbourhood in Washington D.C. He states that methods influence three elements in design. First, they establish the structure of and connections in a design. Second, they have a direct determination on the design result. Finally, they serve as reference points and road maps from the abstract world of design to the concrete world in which the design is placed.

He also concludes that the use of one method for a simple design problem may change the outcome, but is the designs are fairly complete. The complex designs, however, are incomplete when using one method. One method distorts the design and makes it sometimes irrelevant; therefore, a combination of methods is required when dealing with complex or ill-defined problems.

Relevance
Lidy provides – for a master thesis - a good overview of various design processes in landscape architecture. Complex situations or ill-defined problems, which is certainly the case when dealing with the effects of climate change on hydrological issues and a regional or even national scale. A careful consideration of mixed (design) methods is required to come to sustainable and integrated products.

Lidy focuses on design procedures and less on the link with research. It might be worthwhile to develop a matrix that places Lidy's 18 methods in relation to the various research-design relationships distinguished in this bibliography.

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Key words: design, research, study, architecture, urban design, technical design, science, study-by-design, design study, Delft University of Technology, Faculty of Architecture

Introduction

In the pre-face to the book, the Rector of Delft University of Technology supports the idea that to be able to design for a spatially integrating built environment one unequivocal scientific method is not available (p. 7). A Committee of Methodology and the Faculty of Architecture compiled in the early nineties an overview of essential methods. These methods were divided in eight categories. These eight categories were:

A: Naming and describing
B: Design research and typology
C: Evaluating study
D: Modelling
E: Programming and optimising study
F: Technical study
G: Design Study
H: Study by design

Under the guidance of a second Committee of Methodology, different authors from the Faculty of Architecture, worked on the methodological principles of the above-mentioned categories. The results are described in the book at hand. The basic principles underlying these categories are described as follows:

 "**Design study** is the daily practice of design studios not designing exclusively on the basis of intuition. They tend to document their design decisions, in order to be able to evaluate the design process afterwards because of a sense of responsibility. **Study by design** is the ultimate challenge … it entails that **one must reach beyond the known scientific domain and methods**, at risk of being considered unscientific. However, if that risk is not taken, no ways are to be found into an unknown territory" (page 8).

The book is built around the hypothesis: "a form of scientifically based designing exists, transferable … and not exclusively based on empirical or logical knowledge" and operates from the principles of a fair debate. The book does not offer the final answer but rather several opinions and ways of study.

Summary

In Chapter 1 "Introduction" and Chapter 3 "Criteria for Scientific Study and Design", Taeke de Jong and Theo van der Voordt address the linkages between design and research[5]. The different objectives of the book are presented in Chapter 1. One of the objectives is to facilitate the link between studying and designing: **study by design.** "How are we getting, at the same time, the components as well as the composition as a whole in motion, the objects as well as their context, the means as well as the objective? With this we are not throwing light on one or both, but on their relation. ... If we continue to limp on both thoughts, we are on our way, but not yet at our destination" (page 12). In Chapter 3, the authors define science, research, studies and their concurrent requirements at departure of a design study and after a design or artefact. They refer to the debate around the meaning of 'design study' and study-by-design' as it took place on the Conference "Doctorates in Design + Architecture", organised by the European Association for Architectural Education at Delft University in 1996.
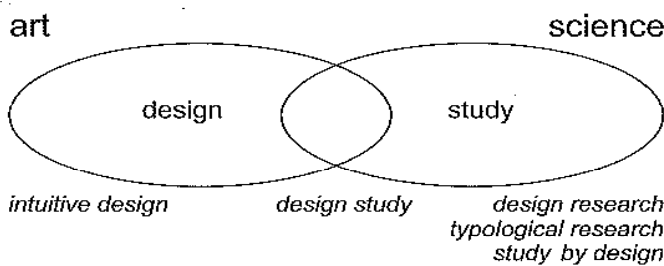
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5 The authors adhere to study rather than to the more American term research. Chapter 2 "Language" provides an explanation. However, for this bibliography the word 'study' carries the same connotation as the word as 'research' in the other annotated documents.

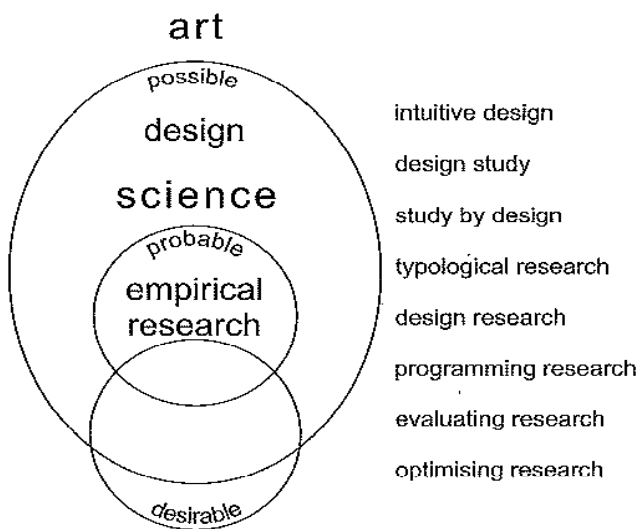|		OBJECT	
		Determined	Variable
CONTEXT	Determined	Design research	Design study
	Variable	Typological research	Study by design

1   Types of design-related study

(Illustration on page 20)

On page 21, **'study-by-design'** is characterised as a 'type of study generating knowledge and understanding by studying the effects of actively and systematically varying both design solutions and their context.

art   science

design   study

intuitive design   design study   design research
typological research
study by design

2   Domains according to Van der Voordt

art
possible
design
science
probable
empirical
research

desirable

intuitive design

design study

study by design

typological research

design research

programming research

evaluating research

optimising research

3   Domains according to De Jong

(Illustration on page 21)

Even though, the various design and research approaches from the eight different categories are important, only "category H. Study by Design" is addressed in this review, in particular, Chapter 50, written by Theo van der Voordt and Taeke de Jong.

Category H, Chapter 50: Types of Study by Design
On page 455, the following definition of study by design is provided:
Study by design – also called research by or through design is defined as the development of knowledge by designing, studying the effects of this design, changing the design itself or its context, and studying the effects of transformation. The authors refer to the TOTE-model from

systems analysis – test-operate-test-exit. Methodologically this is preceded by a pre-design study. There is a distinction made in **'means-orientated study by design' and goal-orientated study by design'**. Another way of classifying is by degree to which **object and context** (in space, time, programme, and boundary conditions) are constant or **variable**. Testing or studying on paper or in reality by studying the effects in a full-scale mock-up or following the realization of the design. When **study by design** is orientated primarily on generating knowledge and insight we can rightfully speak about a study. If optimising a spatial solution is the first aim, then it is a case of product development (page 456). Five types of design are addressed; 1. Prototype design, 2. Experimental design, 3. Design re-construction, 4. Scenario design, 5. Leaving out pre-suppositions.

Relevance
The book "Ways to Study and Research Urban, Architectural and Technical Design" is for the Dutch context a classic 'scholarly' work. The authors state that research-by-design needs to meet the standards of research (Chapter 3, pp. 19-29). Furthermore, there is a clear difference between process orientated and product orientated design research.

In the epilogue, it is mentioned that the book shows how faculty members (sometimes students) do research, and as such, the book should not be seen as a text book on research methodology. This fits well with the criteria for empirical research, presented on page 23, which includes openness to criticism and the ability to criticise in addition to the traditional criteria, reliability, validity, and scientific relevance.

The book is refereed by eight national referees nearly all professors from Delft University, Erasmus University Rotterdam, University of Rotterdam, Eindhoven University of Technology, and the University of Groningen. There were three international referees one from the Leicester School of Architecture, one form the Oslo School of Architecture, and one from the Faculty of Architecture (Ankara).

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Madeleine van Mansfeld, M. Pleijte en J. de Jonge – Alterra Research Centrum voor de Groene Ruimte, Centrum Landschap, *Wageningen University and Research Centrum*; Henk Smit Wageningen Proces Consultancy, *Wageningen University and Research Centrum*

Summary
Stichting Regiodialoog Noord-Limburg developed a process design (*procesontwerp*), named *'Regiodialoog',* to allow for communal and joint actions on regional level of scale. In the article at hand, the authors present and analyse the concepts and the process design from a governance (*bestuurskundig)* point of view.

This process design is based on an approach that addresses the idea of a region simultaneously on various levels of scale (regionally and internationally) and from different content and process points of views.

The multiple character and complexity of spatial issues on a regional level require an approach that combines physical planning (hardware), management (*sturing*) and organisation (org- and software solutions). The authors call the required innovation 'system innovation'[6]. System innovation is not only doing things better but also doing the right thing. This requires 'reframing' and thus normative changes. The system innovation involves interactive and iterative approaches resulting from accumulative insights regarding problem identification and possible solutions.

The authors refer to the knowledge conversions (*kennisspiraal*) of Nonaka and Takeuchi, 1997 (from implicit, explicit, system, to operational knowledge) and **research-by-design** of Wintjes et al, 2000[7]. The **research-by-design process** often uses images (page 3) and follows six phases:
1. identification of ownership, sounding out of possible problems, area analyses, actor-based problem analysis translated in a spatial image; 2. broadening the identified (individual actor) problems to common problem identification which takes place using relational and summarising images; 3. reconnaissance of possible solutions using associative images of multiple solutions, local feedback, communication about products, assessments and input of possible new solutions, new concepts, and signalling new assignments; 4. adjustments of spatial strategies; 5. detailing of promising solutions; 6. implementation of projects.
One of the starting points in the process design of this region-dialogue is the replacement of the principles of **consensus** (*poldering*) with the **coalitions around promising ideas**.

The innovation process of region dialogue is built along three lines of reasoning; 1. generation of new ideas (innovation), 2. democratic ownership, and 3. implementation. The lines are distinguishable but not separated. They are interconnected in a conscious way. The authors note that it is important to have participants who represent various actors including innovators, politicians and the like. The phasing of *'regiodialoog'* is as follows:
- initiation phase;
- working ateliers (charrettes) for knowledge generation and new concepts;
- clustering of results, presentation of strategies;
- market place to which ideas and projects are presented to implementing coalitions and parties.

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6 Systeeminnovaties worden omschreven als organisatieoverstijgende kwalitatieve vernieuwingen die door uiteenlopende deelnemers in het systeem gezamenlijk gerealiseerd worden, die de inbreng van uiteenlopende soorten kennis en vaardigheden vergen, en die de relaties tussen de deelnemers ingrijpend veranderen (NRLO, 1999)
7 In ontwerpend onderzoek genereren de deelnemers in een ontwerpproces oplossingen, wisselen zij kennis uit tussen verschillende planfasen en doorlopen zij een cyclisch proces. Er worden vaak beelden gebruikt.

Lessons learned included, but were not limited to: 1. ateliers were most productive based on implicit knowledge and less so on explicitly presented knowledge (strong directives can actually result in contra productive results); 2. system innovation can have far reaching destructive effects deeply changing existing relationships and power structures; 3. a substantial pre-investment is needed prior to the actual dialogue with the region.

Right from the start, it was the idea to conclude the creative process with concrete, realistic and integral projects. In the evaluation, this trajectory from thinking to doing is noted as crucial for the success of the process. Coordination of the various projects is secured through a programme office and an '*omgevingsschap*' (environmental unit)*.* Thus, in order to acquire a certain durability of the dialogue and innovations, new forms of institutionalisation[8] arose from the process. Durability then includes continuation of the process and linking short-term and long-term objectives.

Relevance
The description of region dialogue includes an interactive design approach, in the respect, that it is iterative. It includes generation of new ideas (innovation), ownership and implementation strategies. However, the research-by-design process is rather loosely defined as using images and visualizations of spatial implications in the various steps of the region dialogue process. The ultimate idea behind the dialogue is to build coalitions around promising ideas.

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8   Institutionalisering opgevat als verduurzamen van handelen (Van Tatenhove, 1993)

Milburn, Lee-Anne S. , Robert D. Brown, and Cecelia Paine. 2001. "… Research on research": research attitudes and behaviours of landscape architecture faculty in North America, *Landscape and Urban Planning***, 57 (2001), pp. 57-67**

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Key words: attitude theory, research, design

Introduction
Milburn, Brown and others published three articles based on a research they carried out among landscape architecture faculty between 2001 and 2003. The above mentioned article and the two following articles published in Landscape and Urban Planning 64 all address the outcome of this research.

Summary
This article 'research on research' examines the attitudes and behaviours of landscape architecture faculty at universities in North America regarding research and design. A questionnaire was mailed to all assistant professors, associate professors and professors listed as faculty in the 1998 Council of Educators in Landscape Architecture (CELA) directory.

They found a positive research attitude but negative research behaviours. If the profession/discipline of landscape architecture is going to continue its evolution into an effective discipline, self-examination and critique of the professions, its members, and entrenched attitudes is necessary (page 65). "Landscape architects need to develop research methods; landscape architects need to learn how to use research; landscape architects need to learn how to do research; …" pg. 66

Relevance
The last sentence of this annotation clearly states that landscape architects have to develop research methods and learn how to do research.

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Summary

This article – part of a series of three published in Landscape and Urban Planning, 57 (2001) and 64 (2003) - addresses the incorporation of research into the landscape architectural design process. The article is the result of in-depth interviews (eight landscape educators) and mail-in survey to all North-American educators. The paper examines how landscape architecture educators integrate research into the process of landscape architectural design. The relations between research and design therefore provide insight into the landscape architecture design process and its communication and teaching. The article provides interesting figures symbolising the various models of design process. In paragraph 3.1.6 the authors compare five models. Table 1 on page 55 compares the models on the following criteria: sources of ideas or concepts; inclusion of a pre-design research phase; inclusion of a post-construction evaluation phase; and a holistic, discrete, or interactive approach to problem solving.

The authors refer to the increasing importance of research-based design as a result of paradigm shifts in the discipline. They claim that the modernist period placed the landscape designer as the omnipotent artist and creator, making decisions primarily on aesthetic, financial, theoretical, and political concerns. Post-modernism placed emphasis on social responsibility, sustainability, environmental responsiveness, environmental integrity, and human health, consequently research became an important component of responsible planning and design processes.

Initial literature review and survey

The authors carried out a literature review of the relations between research and design within landscape architectural design procedures. **The literature suggests that research is collected, analyzed and then incorporated into the design process using five ways**: as criteria against which design concepts are tested and modified (**concept-test and analysis-synthesis models**); as experiences and information which aid in the creation of general principles to assess specific design situations and to evaluate alternatives (**experiential model**); as an intellectual framework for design which is assessed according to criteria established by rigorous research and behavioural studies (**complex intellectual activity model**); and as a subconscious understanding of issues and problems (**associationist model**).

The authors used these five models as a starting point for the set-up of their survey, which existed of nine in depth interviews to test the questionnaire and the questionnaire itself. They extensively legitimate the set-up of their survey. The questionnaire was designed to identify how educators perceived research as being incorporated in the design process. Questions were closed – and included issues such as background and exposure to research and design. They build on the results of Chenoweth and Chidister (1983).

Results

The results of the survey, supported the literature categories as an aggregate, but contradicted the literature's assumption of distinction. The models were considered complementary and congruous. Four of the five (literature-based) models were embraced; however, the responses to the experiential model were mixed. Not one model was embraced by any one of the respondent over the others. Further in-depth analysis of the results suggested that the relationships between research and design were

defined by the timing of research (research stages), type of research (research classes, quality, and comprehension), function of research (research roles), and approach to integration (design model).

Research stages and research classes
Research is incorporated at three stages of the design process:
- before design, they mark two categories of research,
- indirect research (intrinsic research, library research, review of precedents and case studies)
- direct research (site inventory and analysis)
- during design, research seems to have two key roles
- concept generation
- application of the concept on the site
- after design, they distinguish two roles of research;
- evaluation of design
- justification of design.

Research quality
The survey participants largely recognize the inconsistent quality and lack of rigor of landscape architectural research (page 60). Research varies between "data gathering from sources that have done the research already" to "we are a profession based upon anecdotes and not on incremental knowledge" (student participant), research in landscape architecture is a controversial issue – while others plead not to forget that design is the profession's key contribution. On the other hand, available research is often too specific or of inconsistent quality for use in the design process.

Research comprehension
Although literature categories suggest several perspectives, the survey provided a surprising consistency – 'a relationship between acquiring and applying information is required to create a dynamic interaction between theory and practice'. Research is understood subconsciously, consciously, and when applied.

Research roles
The literature models identify research as having two key roles: development of criteria for concept evaluation; and development of general rules for application during design. A post-construction evaluation phases can also involve research. The outcome suggests a much more iterative relation between research and design (fig. 11) involving four stages problem identification, concept generation, concept resolution, and design resolution. Research is then used to generate concepts, assess, rank, judge and modify alternatives and to determine the potential success of the design.

Design Models
The study results (table 5) suggest five models to explain the distinct approaches to the incorporation of **research into design**;
- **artistic model** research is something to be transcended to be truly creative;
- **intuitive model** dominated by emotion and instinctive response; research informs design, but for good design research has to be transformed and involves a dialogue between idea and site (is incidental)
- **adaptive model** responsive to the site, the concept translates the research
- **analytical model** reflects a pragmatic approach to design. Research consciously informs a concept and transposes the research. Adopts basic and applied research, interpreted in the light of site issues and program concerns and interacts with the design problem. Focus on process rather than product
- **systematic model** – the design approach tends to be formulaic – design becomes primarily a problem solving exercise – driven by rules and procedures.

The aforementioned models are different from those in the literature in several ways:
- all models have a pre-design research phase that educates the designer about similar sites and potential solutions
- adaptive, analytical, and systematic approaches consciously use research during design
- all the models use research to assess, prioritize, judge, and modify their design solutions
- similar to the complex intellectual activity model from the literature, all models use an interactive

approach to problem solving – though the design approach may differ.

Discussion and conclusion:
"As shown by the results of this study, the key issue in understanding the relationship between research and design is not an adequate understanding of the design process, but rather the definition and application of research"(p. 64). Evidenced by the positive attitudes of the respondents and the almost seamless incorporation of research results into the design process, the value of research is well accepted. The authors suggest that the introduction of research into design can lead to a more rational, objective process without a loss of creativity or synthesis.

The authors emphasize the need for well-founded research and responsible use of research results – demanding from the landscape architect to "… express images and design ideas in written and verbal form. In order to do this, educators must understand how they themselves move from numeric and semantic to visual data. … the designer to be increasingly dependent on pre-conceived ideas (Hillier et al., 1976) and easily accessible information, without the rigor of scientific inquiry, immediate experience, or objectivity". ... Schön states that landscape architecture educators should teach about what scientists do instead of their results, thereby providing tools and methods for scientific inquiry without restraining creative thought" (page 64). This could result in a simultaneous awareness of what is and what should be.

Relevance:
Millburn et al. present a well-documented study. The term research-by-design is not introduced, even though the authors produce a wide range of possible interactions between research and design (as perceived by educators in landscape architecture) Neither do the authors explicate the idea of 'design as research', although they identify research into design, research as a response to design, and research leading to design.

Furthermore, the various design models still follow a traditional design cycle – inventory, analysis, design, implementation based on a given assignment/program.

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Introduction

This article is part of the three articles published by Milburn – addressing research and design issues among landscape architecture educators. They take the increasing demand for research informed design decision making. They propose that design, teaching, and service can be either topics of research or products of research, but are not, by definition, research. They provide guidelines for assessment of the relationship between **research and design** in the context of scholarship as defined by Boyer's (1990) framework[9].

Summary

The authors refer to the British Research Assessment, who identifies three research categories:
- basic research,
- strategic research (applied research in a subject that has not yet advanced to a stage, where eventual applications can be clearly specified) and,
- applied research.

Milburn et al. state that when using the above quoted categories of research, design could be a topic of research but they exclude design as a research methodology. The authors argue that design is not research even though research and design have much in common, but because their products are not equal. As such, design and traditional research both qualify as contributions to academe, but they require different criteria for assessment.

A design must have the following attributes to be considered a contribution to academe:
- quality;
- thought;
- originality
- significance;
- technical merit;
- evidence of a vision;
- excellent collaboration with practitioners
- have received regional, national or international awards of honors;
- (no fiscal reward)
- written documentation;
- universal accessibility (pages 122-123)

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9   Boyer [Scholarship Reconsidered: Priorities of the Professoriate, The Carnegie Foundation for the Advancement of Teaching, Princeton, NJ. 1990; Building Community: A New Future for Architecture Education and Practice, The Carnegie Foundation for the Advancement of Teaching, Princeton, NJ. 1996] identifies six main criteria that should be considered in the review of scholarship: clear goals; adequate preparation; appropriate methods; significant results; effective communication; and reflective critique (p.119). Recent contributions on scholarship have expanded the definition beyond that of research, including scholarships of 'discover', 'integration', application, and teaching. The 'scholarship of integration' allowed for the recognition of inter- multi- and transdisciplinary work (pp. 120 and 121).

They propose **research into design; research as a response to design; or research leading to or informing design**. They present two tables. One table (Table 2) presents criteria for assessing the quality of research for refereed journal publications, and one (Table 3) for assessing the quality of research, design, teaching, and service for other peer-reviewed publication vehicles, such as books, manuals, juried design competitions, designs, and the like. Both tables are based on the following assessment entries: clear goals, adequate preparation, appropriate methods, significant results, effective communication, and reflective critique) (pages 126 and 127).

The authors relate to Landscape Review (1997 and 1999) and Landscape Research (1998) article series as a venue to refereed studios. They recommend research-method courses and training in sciences. Landscape architects should show more concern with the process and should be less occupied with the products (Eberhard, 1968, p. 38). As academics, it is our responsibility to continue to challenge and explore the relationship between 'knowing' and 'doing' in research, design, teaching and service.

Relevance
The authors claim that *design is not by definition research.* To fulfil that status, design needs to comply with proper research criteria. They place research-and-design in the context of Boyer's (1990) framework for scholarship (see footnote), but extended it with peer review, new or substantially improved insight and universal accessibility.

Pages 126 and 127 provides table 2 (Criteria for assessing the quality of research for refereed journal publications) and 3 (Criteria for assessing the quality of research, design, teaching, and service for other peer-reviewed publication vehicles (books, manuals, juried design competitions, designs, etc) respectively.

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Summary

The authors argue that ecological science has produced knowledge about the relationship between landscape pattern and landscape processes, but has been less effective in transferring this knowledge to society. They argue that design (design pattern) as a product and design as a process (design method) provide common grounds for scientists and practitioners[10]. They therefore propose to extent the pattern-process paradigm of landscape ecology with design. They further conclude that landscape design created collaboratively by scientists and practitioners in many disciplines improves the impact of landscape science in society and enhances the saliency and legitimacy of landscape ecological scientific knowledge. It is then that innovation and societal acceptances can be achieved.

The authors first define problem and aim of their article. Environmental benefits have always been part of the intent of design in landscape architecture and planning, however, the scientific evaluations of landscape change and progress in landscape ecology have not sufficiently incorporated. It is the hypothesis of the authors that **landscape design can effectively link science and society for sustainable landscape change.**

The article then continues with positioning landscape planning as the design practice to change landscapes. It furthermore, places **design** as a common ground for technology transfer: that is where practitioners and scientists conceptualize landscape innovations, where practice can influence scientific questions in landscape ecology, and where scientists can discern relevant directions for developing new knowledge.

The authors conclude, however, that if design becomes a shared part of scientific knowledge creation then the design concepts and products should stand the test of effective societal decision-making. Cash et al (2003) concluded that the effectiveness of scientific information in societal decision-making is related to three characteristics of sciences: saliency (relevant to decision making), legitimacy (fair and unbiased information production that also respects stakeholders' values), and credibility (scientific adequacy). Page 636 provides a schema linking science and landscape change (fig 2.).

Based on the literature review, they identify the following problems with design as a link between practice and science: 1) science disciplines may not be sufficiently integrated; 2) knowledge tools may not be perceived as legitimate or not salient; 3) communication processes between scientists,

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10 Definitions:
Design is any intentional change of landscape pattern for the purpose of sustainably providing ecosystem services while recognizably meeting societal needs and respecting societal values (pg 633).

Landscape is a heterogeneous mosaic of ecosystems that is constantly being adapted by humans to increase its perceived value (pg 634).

Knowledge innovation (Amidon, 1997) is "the creation, evolution, exchange and application of new ideas into marketable goods and services, leading to the success of the enterprise, the vitality of a nation's economy and advancement of society". Dvir and Pasher (2004) defined it as the process of turning knowledge and ideas into value (pg 635). The authors defined innovation as turning knowledge into design for landscape change that protects earth's life-support system for the long term while respecting societal values.

practitioners, and society stakeholders may be inadequate; 4) feedback from practice to science may remain absent.

The authors then present an analysis of the role of design in two case studies in which they focus on the four possible problem areas. They addressed the following questions in their cases:
1) Did design enhance saliency through knowledge integration?
2) Did the design process offer legitimate, salient knowledge tools for decision-making?
3) Did design invoke communication and innovation? and
4) Was the design brought back into science?

The two cases address 'Design of robust ecological corridors' and 'Design of alternative landscape futures to affect agricultural landscape change' subsequently. The first one is located in the Netherlands and the second in America's Mid-West.

In case two the "after the workshop, the landscape architects synthesized many of these design proposals into three different futures for each study watershed" these went through a revision process and were vetted by all members of the science team. These were then translated to replicable design rules. Then GIS-ed and simulated in near photo images (too real could have undermined the trust of the farmers).

The authors conclude with synthesis model for design in landscape ecology. This model includes a phase of landscape process analysis; a phase of integrating this knowledge in general design pattern rules and a phase in which these pattern rules are applied as designs for specific problems to solve a problem and/or to increase or protect the value of the landscape for the future. Fig 3 (pg 642) gives a landscape science model that employs design process as part of research and design pattern as a means of landscape change. They conclude that incorporating design into science can contribute to relieving the tension between credibility of scientific inputs and their saliency and legitimacy.

Relevance:

Important article! It sheds a clear light on a possible link between research and design from both a designers and a scientific perspective. It is, in particular, interesting for knowledge institutions, like Deltares, as they form an institutional bridge between society, technology, science and application. According to this article, design is an excellent tool for building such a bridge. It should be noted that the authors do not talk about research-by-design, but about design as an end-product as well as a method!

Even though, the 'design' link between science and the design as proposed by the authors holds a great promise for interlinking science and well-founded societal decision-making, their design model is still incomplete. The model does distinguish several phases: a landscape process, development of (ecological) design pattern rules, application of the rules, but does not address a truly integrated landscape design approach. For example – an ethical position (norms and values carried by the society (local and scientific) are not addressed. Landscape enhancement (strengthening) is addressed only in the form of increase or protection of bio-diversity, improved connectivity etc. Other, ecosystem services, such as, landscape aesthetics, recreation are not addressed, for example. On the other hand, the presented cases may cover in reality a more integrated design approach. Monitoring and evaluation are mentioned in the article but in real-life are yet not carried out.

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Summary
This article is a result of hands-on experience of two design practitioners with the building industry. Even though their aim is to build greener and more sustainable, the building industry has standardized its process to deliver products that meet relatively narrow concerns of structurally safe and temperature controlled shelter – lacking the inclusion of social and natural processes. Design in this process is reduced to fashion and technological engineering issues. However, the construction industry is becoming more sensitive to the benefits of sustainable building practices. This article suggests that with a workable, basic and replicable model the building industry will embrace environmental issues and will more readily accept an integrated systems design process as standard practice. The model is to demonstrate the costs and benefits too.

The authors propose an integrated design process encompassing cross-disciplinary teamwork enabling the improved integration of building, community, natural and economic systems for sustainable design. An assessment of some recent initiatives in Canada, Finland and the United States illustrates progress and identifies further research and practical needs.

The current practice shows that significant steps occurred before the architect is brought on as a consultant – issues such as zoning, build form, are already determined by civil engineers or administration (figure 1 provides a good overview of the current process, typical actions, problems, and opportunities for improvement). Ecological design options and/or system-wide innovations cannot be considered because of the after-the-fact involvement of design expertise.

In order to improve the quality of the building environment, they propose a **pre-tender** process that is integrative and interdisciplinary. This means that substantial costs will be spend on this pre-process, however, the authors report that these costs will be more than balanced in the actual implementation and design process. Figure 2 shows the relationship between costs versus savings as it develops over time. This pre-development process includes a charrette (largely composed of a design team) to design the construction. It shows that the resulting management efficiency enables a 25% decrease in life cycle costs.

The Bild-IT international development project, which jointly funded by the United States Department of Energy (DOE) and the Finnish government technology agency Tekes, is an industry study to understand better the international building delivery process. Their ultimate objective is to develop software tools that facilitate the entire process – thus a tool that can be understood by all professionals involved in the process. The project concluded that a better insight in the entire design (building and delivery) process was needed. Towards this end, a series of nine workshops involving architects, engineers, contractors and managers, were organised. The consensus of the workshop participants was consistent with earlier findings in the DOE roadmap and included the following:
(1) Early collaboration through charrettes (design teams) is essential to the improvement of commercial buildings,
(2) All key players should be in these teams at the very beginning of the process,
(3) A cultural change is required. No one group can make or force the change themselves, and only a co-ordinated joint effort by industry, academia and government can hope to succeed,

(4) IT, design tools and management techniques can only positively impact the building delivery process if its current status is understood and a future vision is mapped,

(5) Government must provide incentives for change including R&D (research and development) resources to supplement industry and academic R&D efforts,

(6) Owners and developers must be educated, along with others in the process, to understand the importance of weighing first cost within the context of life-cycle cost,

(7) R&D must be conducted to substantiate and validate basic criteria for intelligent owner/developer decisions on concept and design options,

(8) A fundamental need exists for a process professional to facilitate the charrette. Such an individual would have to have a broad interdisciplinary background *and* be
proficient in team leadership,

9) The workshops also firmly established the need for the facility manager to be part of the building delivery process.

They further recommend helping mainstream green building design and construction practice, through the development of well-documented **process-case studies** that demonstrate the process and benefits of sustainable design. The authors recommend to build explicit (process oriented) case studies– in order to prove the costs and benefits of the improved process. Design costs, management costs, building and infrastructure construction costs, operating costs, commissioning costs, environmental and health benefits to the occupants, proper sizing of the physical plant, benefits to natural resources, and impact on the local physical and social environment will be monitored and analysed. The authors provide a list with 15 questions that require substantive answers.

Relevance:
The importance of this paper lies in the parallels between stimulating the building industry to embrace more sustainable building practices as perceived by designers (architects in this case), and the efforts of Deltares to come to more integrated design of large structures and waterscapes. The debate revolves around collaboration among engineers and designers. Although some experiments are carried out to include the "softer" ecological, design, social and management disciplines into the construction process – the effects still have to materialise.

Reed and Gordon propose a new process model in which the early and continuous involvement of the design profession is advocated for success and ecological and social efficiency. In this, a pre- tender process (including a design charrette) is extremely important. The hands-on, real-world practical experience of the two authors gives the proposal its strength.

Furthermore, even though cost-benefit analyses may be difficult in the case of large-scale landscape development and complicated when it comes to assessing economic costs and benefits of quality of life of people and nature – it may be worthwhile for Deltares to develop, monitor, and evaluate a similar case as recommended by Reed and Gordon.

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Key words: architectural design, decision making, case studies, modern architecture, research inquiry

Summary

Rowe describes a systematic framework in which he explains the process of designing in architecture and urban planning. The book offers a framework for a large amount of methods concerning 'design. With the use of schemes and illustrations, he gives an insight in 'design' characteristics and theories in particular in the underlying structure of inquiry common to all designing.

The author addresses topics like; styles of decision-making, the kind of problems designers are confronted with, different perspectives on design, organizing principles of a design, normative positions on defining "proper" design, grounding the meaning of an architectural work, and early and contemporary theoretical positions on problem solving behaviour.

The book is composed of four parts:
- Designers in Action
- Procedural Aspects of Design Thinking
- Normative Positions that Guide Design
- Architectural Positions and Their Realms of Inquiry

Relevance

There is quite some emphasis on architecture and methodology. Although, the book is written in 1987 – it is still regularly referred to and used in several educational institutions.

Literature References

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Summary
This paper is part of the special Issue of Urban Design Research and addresses the process and results of a community development project that provided an opportunity to implement and evaluate an integrative approach to planning and design. The approach is aimed at addressing some of the most vexing procedural and substantive issues in planning and design, including **the integration of planning with design activities, generation and use of situational knowledge, and meaningful and active participation of the public in all phases of the planning and design activity**. "It reflects a worldview that acknowledges the need for a new definition of rationality based on the integration of knowledge, subject domains, and places across space to understand the connectedness among phenomena, a search for causes and solutions locally, collective appreciation by participatory action, and a shared vision of the future which embodies solutions generated within the community by the participants rather than imposed from without or by experts.

The procedures used in the approach aimed at achieving collaborative social interaction and dialogue among participants who represent the breadth of community residents as well as cognitive facilitation to enhance the participants' capabilities to deal with complexity.

A case study description takes a substantial part of the paper (pages 72-86). It concerns an example of community planning in the city of Janesville near Chicago, with a population of 55.000 inhabitants. Sancar describes the setting, selection of participants and their characteristics, the procedures and techniques and the outcomes of the planning and design process. **The process began with structuring the situation, followed by identification of future visions and their evaluation by the community residents, culminating in community designs**. The results and methodological implications are discussed in the conclusions (p. 86).

Relevance
One of the papers calling for a new worldview that includes community residents and participation.

Literature Reference:
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Schön, D.A. 1983. The Reflective Practitioner. Chap. 5, Design as a reflective conversation with the situation. Basic Books, New York, pp. 76-104

Schön, Donald A. 1991. The Reflective Practitioner, How professionals think in action, Ashgate, Hampshire, 374 p. (first edition is from 1984)

> **Donald A. Schön is a leading M.I.T. social scientist and consultant. He is Ford Professor of Urban Studies and Education at the Massachusetts Institute of Technology.**

Key words: reflection-in-action, art, science, professionalism, engineering, architecture, management, psychotherapy, town planning, reframing, problem solving,

Summary
The book "The Reflective Practitioner" forms a classic when it comes to the **design and research** thinking. This book frames the design notion also in non-designer disciplines, such as artificial intelligence, education, and knowledge management. Reprints are prepared on a nearly yearly basis.

Schön examined 5 professions (engineering, architecture, management, psychotherapy, and town planning) in order to find out how professions go about solving problems. He maintains that good professionals know much more than they put into words. They rely on a kind of improvisation learned in practice. This book makes an effort to show how this unarticulated process of **'reflection-in-action'** works and how future professionals might foster this vital creativity.

The book is composed of three separate parts. In the first part, Schön gives a theoretical introduction, in the second part he presents empirical examples of professionals who are 'reflecting in action'. In third and last part, the author explains how reflection-in-action can be of use in daily practice.

Part I – Professional knowledge and reflection-in-action
traditionally, there is a sharp distinction between science and professionalism. This is called the model of *Technical Rationality*. Scientists produce knowledge that is used by professionals. In the process of application, the professional, then, often has to choose between 'rigour or relevance'.

Schön states that each professional has its own knowledge base. As professionals believe they act intuitively, a lot of this knowledge remains implicit. The author argues that if professionals would consciously reflect on their actions, the unconscious use of knowledge in their decision-making will become explicit. As a result, they will be able to improve on their decision-making, while the obtained (new knowledge) could also be made available to others.

Schön distinguishes three critical moments of reflection:
• Knowing-in-action → unconsciously knowing what to do
• Reflection-in-action → reflecting during acting
• Reflection-on-action → reflecting after acting (evaluating)

Part II – Professional contexts for reflection-in-action
The author describes and analyses several cases. Schön explains when **reflection-in-action** is used and when not; if it is happening consciously or not; and how **reflection-in-action** can be used to improve the professional practice.

The first two examples are about teaching, respectively in the field of architecture and psychotherapy. After a detailed description, Schön states that every (professional) case is unique, unstable and uncertain. When a (good) professional starts with a new case, he will always try to reframe this new problem to something that he already knows. Every professional has its unconscious database of experience which helps him to make the right decisions.

With an example of the daily practice of a town planner, the author shows the 'limits to reflection-in-action'. In this case, the town planner's position is between two parties with different interests, namely a developer and the Zoning Board of Appeals. The town planner cannot be really open in this process, because he is not allowed to tell the developer exactly what he knows about the assessment of the

Zoning Board. In this model of 'mystery and mastery' the professional shows his skills without revealing everything he can and knows. This can hamper the process of reflection-in-action.

A third interesting example is about malnourishment in Colombia, where a scientist who is specialized in process modelling tries to solve this severe problem. He decides to use a bottom-up approach. During the process, the scientist constantly reflects on his results and assesses if he reached his objectives and if not on how he can improve. This is a clear example of using scientific information in a professional setting combining the use of reflection-in-action.

Part III – Conclusion
In the conclusion, Schön states that the success of reflection-in-action does not only depend on the professional, but also on the client. He emphasizes the importance of equalizing the relation between professional and client. In the traditional model, the acting of the professional is like a black box or 'mystery-mastery-concept'. Schön expects that a better-informed client accelerates the **reflection-in-action** process, which will ultimately improve the quality of the end product.

Relevance
Taking into account the date of the first print 1983, the book is truly visionary in respect that Schön already in those days promotes a consultative dialogue between professional and client (consultative participation).

As he used cases from different professions, his work influenced various disciplines. Consequently, the work of Schön is referred to in a large variety of papers and books addressing design and research issues. This is amongst others illustrated, in the literature included in this bibliography.

However, how this reflection can become rigorous research still remains vague. A more recent research approach such as 'grounded theory' from Kathy Charmaz (Constructing Grounded Theory, A Practical Guide Through Qualitative Analysis, Sage Publications, Los Angeles, 208 pages), for example, could be an excellent tool to achieve this.

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Most references are from an older date than 1970, a limited selection is presented below.

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Paul Selman, Editor, Landscape Research

Key words: landscape architecture, research, debate, design is research,

Introduction

The paper of Paul Selman is an editorial introduction the special issue of Landscape Research, Volume 23 (1998). The special issue addresses the results of a Landscape Research Group (LRG) workshop on 'Landscape Design is Research: an exploration" that was hosted by the Leeds Metropolitan University in 1997. Kevin Thwaites, as the workshop organiser, prepared as a response on the proceedings of the workshop a commentary, which is also included in the special issue Volume 23 on the pages 196-198 (Thwaites,1998) (see elsewhere in this annotated bibliography). Other authors, such as John Benson, too debate about the **research and design** positions of landscape architecture. The article of Benson (Landscape Research Volume 23 (1998): 98-204) is also included in this annotated bibliography.

Summary

Selman refers to the debate among town planners and refers to Carfax Journal Planning Practice & Research. Already in 1995, Selman remarked that schools of landscape architecture shifted away from their previous orientation to design and practice to scholarly research and publication. He is however critical about landscape architecture's engagement with classical, original scholarship and research publications.

An important observation he makes, relates to the "vocal response ... that landscape design should ... be treated as original research, and that peer assessors ought to develop criteria which give imaginative design solutions the possibility of being equated with refereed journal articles. This argument is problematic, not least because it provides further excuses for landscape architects to avoid receiving proper research training or to discover the benefits of integrating self-critical inquiry with innovative design " (page 196). He further notes that landscape design enjoys a favourable status as a profession, yet is distanced from academically reputable research; whereas landscape research is taking place in geography, psychology and other mainstream disciplines.

Relevance

Selman does not so much addresses the relationship between design and research, but the attitude of landscape designers. He pleads for interdisciplinary collaboration and landscape architects to step their research engagement. Research assessment focus on mono-disciplinary work in mainstream subject areas and less so on inter-disciplinary teamwork and practice oriented achievements.

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Nadin, V. 1997. Widening the gap between the haves and have nots in research funding: the UK research Assessment Exercise, Planning Practices & Research, 12, pp. 93-97.
Thwaites, K. (Ed). 1996. Landscape Design is Research: an exploration. SCHOLA Occasional Paper No 3, Leeds

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Summary

The article is based on the research symposium 'Reflections on Practice: Capturing Innovation and Creativity' RIBA (Royal Institute of British Architects) Research Symposium,19 September 2007, London, UK.

The symposium was well attended and drew more practitioners than the organizers expected. The authors interpreted this renewed interest of architects in understanding more about the relations between research and architectural design, as the result of the distinguished speakers but more so because of the hostile environment engendered by the 2001 UK Research Assessment Exercise (RAE). At least two Russell Group Schools[11] were penalized due to insufficient solid publication records.

The idea of the 'reflective practitioner" credited to Donald Schön, was given new force by the keynote speaker Leon von Schaik's account of his Melbourne Masters Architecture initiative. Subsequent speakers included Piers Gough, Sean Griffiths, Kathryn Findlay, Jane Rendell, Deborah Saunt, Alex de Rijke, and Susan Francis who tackled, from various directions, the principal question emerging on the day: 'What is design research as applied to architecture?' Speakers presented built and unbuilt projects as **'design research'**.

In one notable case, the designer denied any research dimension to his work, anxious that an increased level of consciousness would dismantle inspiration. How what the general academic research community might considers as research, rigorously applied methodology, and unprejudiced analysis, have affected the projects shown? Is it helpful for design to be cast as research? Is there a missing third category, a funding stream for gathering innovative design work to add to those of 'teaching and learning' and 'research'? Might this new stream of funds stimulate more than self-reflection, a much-needed innovative design programme outside conventional practice, but within academic institutions collaborating closely with practice?

The various speakers discussed the various relations between **design and research**[12], such as:

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11 The Russell Group is an association of 20 major research-intensive UK universities and represents the UK equivalent of the US 'ivy league' of top research universities. Schools of
Architecture in the Group include: University of Cambridge, Cardiff University, University of Edinburgh, University of Glasgow, University of Liverpool, University of Manchester,
Newcastle University, University of Nottingham, Queen's University Belfast, University of Sheffield, and University College London.

12 HEFCE's definition of research for the RAE (annex 3), 2008:
 "research" for the purpose of the RAE is to be understood as original investigation undertaken in order to gain knowledge and understanding. It includes the work of direct relevance to the needs of commerce, industry, and to the public and voluntary sectors; scholarship[*]; the invention and generation of ideas, images, performances, artefacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved materials, devices, products and processes, including design and construction. It excludes routine testing and routine analysis of materials, components and processes such as for the maintenance of national standards, as distinct from the development of new analytic techniques. It also excludes the development of teaching materials that do not embody original research'.

Scholarship for the RAE is defined as the creation, development, and maintenance of the intellectual infrastructure of subjects and disciplines in forms such as dictionaries, scholarly editions, catalogues and contributions to major databases.

- **design critique** of current practices,
- **reflection by practitioners**, warning though for the contempt of the academic research community for its self-indulgence, lack of methodology, rigour and peer review. Accounts of own work, employing beautiful and manipulated images received uncomfortable reactions
- **design review as research** can only stand up in cross-comparisons, such as carried out by Brain Lawson (applied research output)
- it was discussed that **research for design**, for example by using historical maps to legitimate design decisions, may not survive peer reviews.
- **research in design** for example investigations into materials could provide good research material.
- **architecture as applied research** requires original investigation undertaken to acquire new knowledge. In contradiction to pure research, architecture as an applied science is principally directed towards a specific practical aim or objective (OECD, 2002, p. 78). Crafted artefacts are legitimate research outputs but strictly in terms of peer review by critics.
- **grounded theory methodology** may provide a rigorous framework for the analysis of interview transcripts
- **data collection** requires careful preplanning at the design stage.

Where **research into design** and **research for design,** according to one of the participants (Frayling) comfortably inhabit the mainstream of respectable audible academic research, **research through design** may form a much needed parallel scheme. Sue Francis remarks that the design of UK's public buildings is frozen by regulations and standards despite new models for healthcare, teaching and learning, the world of work, industry and commerce. The greater profession has no capacity to practice speculative design and thus needs the support of the academic research sector, in particular research-trained designers to deliver it.

Relevance:
The article discusses various relations between research and design. Academic/scholarly research is used as the reference framework. There seems to be consensus about 'research-into-design' and 'research-for-design' as mainstream interrelations, but this does not count yet for research-through-design. To develop the notion of research-through-design further, the RIBA symposium calls specifically for 'research-through-design' to be included in the research protocol of the UK academic research audit to allow for speculative design research. Unfortunately, a clear definition of what 'research-through-design' may be, is still lacking. With some freedom of interpretation, the following definition could be distilled: research-through-design are characterized as speculative design or design experiments free from all kinds of rules and regulations as set for example by the UK public building laws and standards (see the above quoted comment from Sue Francis).

Literature References:
OECD 2002 Frascati Manual — Proposed Standard Practice for Survey as on Research and Experimental Development, OECD Publications Service, Paris

Clemens Steenbergen (Prof. dr. ir. C.M.) is full professor and chair of Landscape Architecture Faculty Bouwkunde University of Delft
Henk Mihl (ir) Bouwkunde, Bouwtechnologie en Bouwconstructies, University of Delft
Wouter Reh (Dr. Ir.) universitair hoofddocent landschapsarchitectuur Faculteit Bouwkunde Chair Group Landscape Architecture.
Ferry Aerts currently Urban Designer at MTD landschapsarchitecten

Summary

This book shows the relevance of doing **design research** and **research-by-design** within the profession of architecture. The study provides examples to gain compositional knowledge by a process of discovery while researching the design. The design is broken up in separate elements to allow for analysis and discussion of its compositional terms. The authors found their inspiration for writing this book in the failures of the Modernistic architecture in which the search for a new global social order disconnected the quality of life is from the quality of its architecture and its buildings.

The authors argue that design is about science and art whereby composition takes a main role within the (architectural) design. In their opinion, all knowledge accumulated during the design process is stored in the composition of a design product. Through seventeen essays of different architects, the authors present a wide range of perspectives on **'design research'** and **'research by design'** and the role composition plays in it.

Three separate sections analyse the application of **design research** and **research-by- design**. Each section is composed of several chapters written by different authors, mostly from Delft University of Technology. The three sections address different a perspective:
- Architectural Perspectives, provides insight in the role of compositional knowledge played in the history of spatial design;
- Architectonic Perspectives, illustrates the way to acquire compositional knowledge from analysing plans; and
- Experimental Perspectives, shows how systematic compositional knowledge can be interrogated, critiqued, and transformed into experimental models and new design proposals.

Research-by-design is introduced on pages 23-25. The realm of research-by-design is within situations whereby either the object, context of study or both were open. This is in line with the thoughts of Taeke et al. in Ways to Study. Dirk Frieling in particular, addresses in the chapter Deltametropolis under the third section "Experimental Perspectives" (pp. 216-235), **the role of research-by-design**. He explores the role in a real-case situation. Several groups of students prepared their final design studios within the frame of the case (which would later became Deltametropolis). Staff carried out research in the form of action research. An interesting aspect was the institutionalisation of the various results. According to Frieling, accommodating conditions were the rather relax atmosphere in which the various design studios and the research were carried out, allowing for improvisation. In retrospect, a larger multidisciplinary input would have been beneficial.

Although **research-by-design is not strictly defined,** Frieling describes under which conditions the process was carried out. He starts out with the statement "architectural design is to conceive environments that do not yet exist and even may be yet unknown. Doing this, it will reveal the hidden order in seemingly haphazard patterns in rural and urban landscapes. It invents solutions for problems nobody is yet aware of. It will open up new opportunities by creating new conditions" (page 217). To find out what may come, one can follow several ways;
• The way of the humanities, the way of art. This is the alpha way.
• The way of natural sciences based on rules and analyzing evolution of systems. This is the beta way.

- The way of social sciences based on man-made rules and open to human influence. This is the gamma way.
- The way of designers and engineers based on selection of options for an emerging present attracted by the future coming forth from natural systems or the creative mind. This is the delta way.

The complexity of the regional assignment, the relations with clients, and a great uncertainty in space and time, requires a strategic approach to planning and design with a focus on the design process. A research-by-design seems an appropriate instrument to explore potentials and experiment with possible solutions, the design studios proved a good vehicle.

Relevance
In particular, Frieling pays ample attention to the theoretical starting points for a *research-by-design* approach. He supports a rather loose set-up allowing for experimentation.

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Bernstein, B. 1997. Advertising Outdoors; watch this space, London
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Steenbergen, Clemens M. 2008. Ontwerpen met Landschap. De tekening als vorm van onderzoek, THOTH Publishers, Bussum, p. 429[13],[14]

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Key words; ontwerpend onderzoek (research-by-design), tekening (drawing), landschapsarchitectonisch ontwerp (landscape architectonic design), ontwerponderzoek (design research), compositie (composition)

Introduction

Drawing is core to this book – with as key aspect the continuous exchange between *thinking* and *doing*. The drawing is the means for verification, testing, and implementation. Drawings are made with different objectives. A construction drawing makes a design visible, measurable, and implementable. Drawings can also play a role in imagination, exploration and communication. In the latter case, Steenbergen sees the drawing then as an instrument for architectonic research. Every drawing is an answer to a question, but in itself also generates questions. The systematic ordering of drawings is then seen as a research.

The author arranged the drawings according to their (research) function:
- plan analysis (*plananalyse*)
- typology (*typologie*)
- design experiment (*ontwerpexperiment*)
- experimental design (*proefontwerp*)

The drawings used in the book are extracted from the landscape architectonic work undertaken at the chair group landscape architecture (University of Delft).

Steenbergen refers in the introductory chapter *Ontwerponderzoek en ontwerpend onderzoek* to the works of Taeke de Jong. On page 20 – he quotes De Jong as follows:
In case the context and object are determined (ontwerp-onderzoek ex-post) we can use a classical empirical research model. In all three other forms, the drawings themselves are the research foundation.
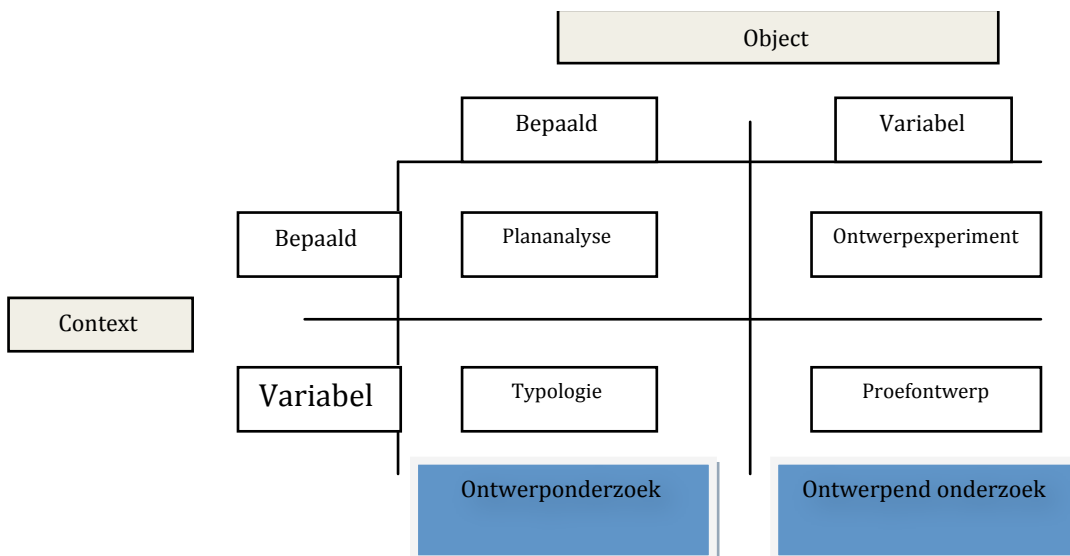
Adapted from page 20

13   There is an English version of the book available. In this bibliography, the Dutch version is used.
14   Steenbergen was assisted by the PhD students, Sabine Meeks and Steffen Nijhuis.

In the chapter *Ontwerpexperiment,* design experiments are discussed as if they were carried out in a kind of laboratory context (context is fixed). Design interventions are tested on their compositional effects. The chapter *Proefontwerp* focuses on the development of an integral spatial design (context and object are variable). Steenbergen claims that in this process the magical black box is opened through the development of systematical design experiments.

Relevance
The emphasis is on the design drawing and the design process, but still very much so from the perspective of the designer as the expert. The drawing and design process are approached from a somewhat reductionist attitude. Nevertheless the book is relevant because it make a serious effort to define the notion of research-by-design and design- research.

Literature References
The references focus through the nature of the book to master students thesis work and the various publications of Steenbergen and his colleagues and mostly too.

Jong T.M. de and D.J.M. Van der Voordt (Editors). 2002. Ways to Study Urban, Architectural and Technical Design, DUP Science, Delft University Press, Delft
Steenbergen, Clemens, Henk Mihl, Wouter Reh, and Ferry Aerts, (Editors). 1999. Architectural Design and Composition, THOTH Publishers, Bussum Faculty of Architecture TU Delft, p. 262

Frederick Steiner, Department of Planning, College of Architecture and Environmental Design, Arizona State University, Tempe, Arizona (1991) Currently (2010) Steiner is Dean at the University of Texas.

Summary

The article is the first in a series of three. In this article Steiner proposes an 11-step method for landscape planning processes, including community participation. Steiner illustrates the method through an example of growth management planning for Teller County and the city of Woodland Park, Colorado. Design plays an important role in this method and it has a human ecological bias. Steiner depicts the introduced method as a middle ground approach to physical planning somewhere between purely organic and truly rational one.

Steiner developed landscape ecological design approach as a reaction to the debate around the normative, rationalist planning approach, but also to the fully organic *laissez-fair* approach. As a reaction on the rational, problem solving approach, Lewis Mumford proposed an organic approach to planning. "Organic planning does not begin with a preconceived goal: it moves from need to need, from opportunity to opportunity, in a series of adaptations that themselves become increasingly coherent and purposeful, so that they generate a complex, final design" (Mumford, 1961, page 302 and page 519 of Steiner's article). Meanwhile, Mumford remained an advocate of the spatial and physical aspects of planning. Mumford's organic approach presaged the concept of contingency planning. Steiner refers here to Kast and Rosenzweig "The contingency view seeks to understand the interrelationships within and among subsystems as well as between the organization and its environment and to define patterns of relations or configurations of variables. It emphasizes the multiversity nature of organizations and attempts to understand how organizations operate under varying conditions and specific circumstances (1974) page 519. In his 11 step method, Steiner links aspects of both the organic and contingency notions as well as the more rational physical aspects. The method is based on the philosophy that in order to create or protect sustainable landscapes an integrated approach is necessary.
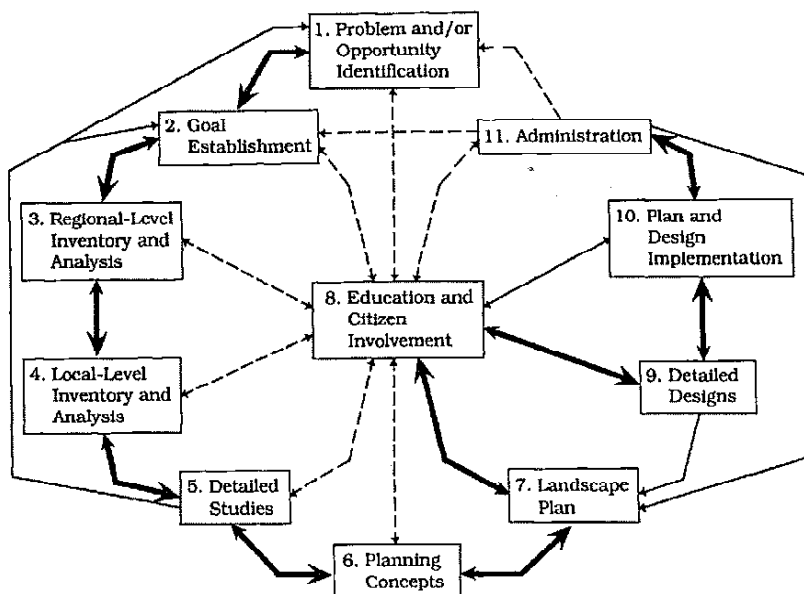

Figure 1 (page 521) gives an illustration of the 11-steps planning process. Step 8, education and citizen involvement are clearly the focal point in the method.

The 11 steps are:
1. problem and/or opportunity identification
2. goal establishment
3. regional level inventory and analysis
4. local-level inventory and analysis
5. detailed studies
6. planning concepts
8. education and citizen involvement
7. landscape plan
9. detailed designs
10. plan and design implementation
11. administration

Figure 1: gives an illustration of the 11-steps planning process. Step 8 is the focal point in the method. Figure 2 gives an illustration of the planning process on growth management by Teller County and Woodland Park planners. Document (1), preliminary (2), survey/research/collect (3), forecast/projection (4), evaluation/alternatives (5), growth management strategy (6), selection of planner/course of action (7), review (8).

The author describes each step but also provides commentary – on history, theory and actual implementation. In his conclusions, Steiner advocates a standard method as an organizational framework for landscape planners. A relatively standard method would also present the opportunity to compare and analyse case studies. At the same note – he refers to the use of planning methods in analogy to jazz composition: not a fixed score but a palette that invites improvisation (page 528).

Relevance
The method developed by Steiner starts with a participatory problem and opportunity identification and continues involving the same community at appropriate moments during the full design and implementation process. He views the method as a living, organic process that takes advantages of opportunities that arise. Throughout the process, research and design, education and consultation activities interact addressing different scale levels and stakeholders. The interactions are expressed in designs and reports.

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Riet, W.F. van J. Cooks. 1990. An ecological planning model, Environmental Management 14(3) pages 339/348
Zube, E.H. 1980. Environmental Evaluation. Brooks/Cole, Monterey, Callifornia

Kevin Thwaites, Leeds Metropolitan University, 1988-2002 Senior Lecturer: Leeds Metropolitan University, Landscape Architecture Department and since 2003 Lecturer and Director of Learning and Teaching, Department of Landscape, University of Sheffield

Introduction

Kevin Thwaites prepared a commentary on the proceedings of a workshop hosted by the Leeds Metropolitan University in 1997. The purpose of the workshop was to explore whether landscape design could be considered as research and how 'designed' outputs and consultancy activities could be framed in terms of RAE (Research Assessment Exercise) recognizable research. Other authors, such as John Benson and Paul Selman also contributed to this special issue of Landscape Research and debate about **research and design** position of landscape architecture. The articles of Benson (Landscape Research Volume 23 (1998): 198-204) and Paul Selman (Landscape Research Volume 23 (1998): 195-196) are also included in this annotated bibliography.

Summary

Thwaites concludes that most research output in landscape architecture is derived from related disciplines accustomed to the research traditions and not from landscape design. According to Thwaites, the question **is landscape design research** or not, remained largely unanswered. And if it is not, does it matter if research attributable to landscape architecture can be acquired without 'designing'? The main issue is, if design is acknowledged as intellectually equivalent to traditional forms of research, then the intellectual credibility of landscape design rests as much on moving away from the view that landscape architecture is a site-based problem solving activity, as to a more enlightened attitude and a wider intellectual development.

For the time being the Research Assessment Research in landscape architecture thus needs to progress on two fronts:
- through exploiting opportunities derived from consultancy, an approach which argues for strengthening ties between education and practice; and
- through the intellectual development of the discipline. Within already crammed curricula, this may argue for a redefinition of the traditional relationship between education and practice to achieve a more equitable balance between serving the needs of practice and the longer-term imperative for wider intellectual growth. It remains for future discussions to explore how the potential for tension here might be resolved (page 198).

Relevance
Practical, problem-solving landscape design is not automatically equivalent to research. Landscape architecture discipline needs to develop; first, a critical approach to problem definition; second, an evaluatory framework or at least a level of theoretical coherence; third, more, peer review mechanisms.

Tjallingii, Sybrand en Roos Berendsen (Redactie). 2007. Een Rijke Bron, een nieuwe rol van water in ontwerpen voor de stad, Serie: Studio-Urbanism 02, Techne Press Amsterdam, 204 pp.

Dr. Sybrand Tjallingii, Associated Professor at Technical University Delft, Faculty Architecture, Department of Urbanism (Environmental Design)
Roos Berendsen Ing., Urban Designer, The Hague

Summary
The book bundles a series of master thesis studies carried out by students at the master's education Urban Design at Technical University of Delft. The overarching research question was: Are there ways to prevent water-based calamities as a result of climate change (doom scenarios) with the beauty of water in our human environment? This question is approached in two ways;
• Can we use designer's inspiration in our search for sustainable water management?
• Can the quest for sustainable water solutions form a source of inspiration for urban designers?

Water structures that deal with water management issues are combined in prototypes (*gidsmodellen*). These prototypes are giving basic principles for various possibilities for sound water management. The student theses integrate the prototypes under various conditions;
• designing at boundaries of urban and rural areas, and
• designing in existing urban contexts.
An (water) expert reviews each student project. For example, the master thesis of Janneke Dries, "*Pluk de vruchten van de groene rivier, groene rivier als drager van stedelijke ontwikkelingen in het Rivierengebied*" is reviewed by Frans Klijn (WL Delft Hydraulics).

In the last section of the book "Ontwerpend Onderzoek in de universitaire praktijk", three referees of the Technical University Delft, (Han Meyer, Chair Group Theory and Methodology of Urban Design; Edward Hulsbergen, Chair Group Spatial Planning; and Frans van de Ven, Chair Group Urban Water Management), provided an overall reflection.

Relevance
Research-by-design formed the point of departure in addressing the research questions "Can we use designer's inspiration in our search for sustainable water management?" and "Can the quest for sustainable water solutions form a source of inspiration for urban designers?"

The review of Frans Klijn reveals that the design inspiration is not tested on actual water flows or on the efficiency of the solutions found - not in form and not in quantity. The analysis of the integrated design on their effectiveness in water management (does it solve the stated problems?) and the conscious testing of the various water flow(stream) models would have made the design exercise research-by-design.

In Section 3, 'Ontwerpend Onderzoek in de universitaire praktijk' this issue of forth and back testing of the design and re-designing as a quality of research-by-design is a starting point of an overall critique. Edward Hulsbergen, in particular, from the chair Group *Ruimtelijke Planning* (Spatial Planning) argues that the thinking about research-by-design (*ontwerpend onderzoek*) showed little progress since the publication of the book "Ways to Study" from Taeke de Jong and Van der Voordt (see elsewhere in this bibliography). He comments especially, on the limited results in linking 'research' methodologically-technically explicitly to 'design'. In line, Frans van der Ven noted on the difficulties of linking technique to (urban) design because of the respectively deductive and inductive ways of thinking. He pleads for a continued dialogue and sees collaborative design as a important way to do so.

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Klaasen, I.T. 2004. Knowledge/based Design. Developing Urban and Regional Design into a Science, Design Science Planning Series, Delft University Press, Delft

Zeisel, J. 2006. Inquiry[15] by design: Environmental/behavior/neuroscience in Architecture, Interior, Landscape and Planning (First edition is from 1981)

> **J. Zeisel has a doctorate in Sociology (Columbia University) and taught at Yale University, Montreal's McGill University, and Harvard Architecture School.**

Key words: built environment, behaviour, neuroscience, inquiry-by-design

Summary
This 2006 update of Zeisel's classic book (1981) folds the new field of neuroscience for design into the field of environmental-behaviour methods and approaches. In the theoretical section, the author presents how the physical environment affects life and behaviour of people. In this book, the author explores the link between research, neuroscience, and design. He uses the relationship between human behaviour and built environment as a starting point. The author defines and analyses the processes in design and research and compares the two. He promotes collaboration as it yields greater design creativity and research effectiveness.

The book is divided in two parts: Part One: "Research and Design" and Part Two: Research Methods. Part One addresses in particular research methodology, design and research approaches, research design, and settings. Part Two, presents a series of predominantly environmental behavioural research techniques, such as; observing physical traces, observing behaviour, interviewing, structured questionnaires, archival methods, and plan annotation. Examples illustrate each technique.

Zeisel distinguishes on page 22, five design characteristics:
• Three elementary activities (imaging, presenting, and testing),
• Two types of info (info used to create, info used to test the design),
• A shifting vision on the final product,
• Towards a domain of acceptable responses, and
• The product develops through linked cycles.

The author approaches research from four different perspectives, diagnostic, descriptive, theoretical and action research. Zeisel describes how design and research develops along similar creative processes, which he sees as the fundamental basis for collaboration between designers and scientist. The author argues that collaboration is adamant if researchers and designers want to deal with the current social reality. Zeisel analyses the benefits of this collaboration and provides illustrative case studies. For designers this collaboration can be helpful in two ways, 1. to control the behavioural effects of the design and 2. to deal with the designers-user or clients gap.

Relevance
Zeisel calls 'research-by-design', 'inquiry-by-design' that makes him one of the few authors annotated in this document, who actually uses the compound notion research-by-design. The difference between research[16] and inquiry[17] is the lesser or more systematic approach to the search (see footnote). However, there is a substantial emphasis on behavioural science and related research methods and techniques.

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15 "Inquiry is the creation of knowledge or understanding: it is the reaching out of a human being beyond himself to a perception of what he may be or could be, or what the world would be or ought to be." quote of C. West Churchman on page 19.

16 Systematic investigation to establish facts or collect information on a subject (The Collins Dictionary and Thesaurus)

17 To make a search, or investigation (see also enquire; to seek by questioning; ask (The Collins Dictionary and Thesaurus)

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PART B

ACADEMIC PAPERS PREPARED BY DISCIPLINES RELATED TO ARTIFICIAL INTELLIGENCE

PART B:

ACADEMIC PAPERS PREPARED BY DISCIPLINES RELATED TO ARTIFICIAL INTELLIGENCE

Carroll, John M. and Thomas, P. Moran. 1991. 'Introduction to this special issue on design rationale', Human-Computer Interaction, Taylor and Francis, London, Volume 6:3. pp. 197-200

Gero, John S. 1990. Design Prototypes: A Knowledge Representation Schema for Design, AI (artificial intelligence) Magazine, Volume 11, Number 4 (1990) (copy write AAAI)

Hevner, Alan R., March, Salvatore, T., Park, Jinsoo., Ram, Sudha. 2009. Design Science in Information Systems Research.

John M. Carroll, IBM T.J. Watson Research Center
Thomas P. Moran, Xerox Palo Alto Research Center

Summary
The article starts with a reflection on the changes between design research of the 1960's and the 70-80's. "Design research has traditionally been concerned with systematizing the design process – its tools, techniques, methods, and management – for artifacts and their specifications. This research has changed dramatically over the past 25 years. The design methods of the 1960s sought to provide general representations and formal decompositions and clustering techniques but failed in the end to be applicable to real problems (see Jones, 1970). In the 1970s and 1980s, there was a growing recognition that design is not just the solving of difficult problems but a kind of problem solving with distinctive properties: problem stages do not exist as such (or completely overlap …), there are never singularly correct solutions, the range of potentially relevant considerations is nearly always unbounded, side effects and interactions deflect even the most considered design moves, and so forth (see Cross, 1984)" page 197.

This led to what Rittel called "second-generation" design methods that assume distributed expertise, the need for discovery, and the centrality of argument, and multiple perspectives in all design work. Design process and design rationale are critical elements in this second-generation design research in human-computer interaction. The authors look at the design process from the perspective of computer and information systems that are designed specifically with the use and users in mind.

An explicit rationale is an important element in research because it:
- supports reasoning processes in design,
- facilitates communication among the various players in the design process (designers, implementer, maintainer, users etc), and
- helps with the accumulation and development of design knowledge across design projects and products.

The seminal issue-based information system (IBIS) methodology developed by Rittel tries to capture the issues that arise in the course of design deliberation. The idea is to make decisions more understandable and open to reflection and reconsideration.

Current research (that is in the 1990s) pushes in different directions of which this special issue presents a sample. Most of the current research is concerned with representation and codification of the design rationale in both form and content. Some emphasize the capture of the rationale as a by-product, others stress that the rationale needs to be constructed. Some are concerned with a wide variety of considerations, others with a narrower, but more rigorous scientific base, while others again relate to the design practice. In the special issue for which this article is an introduction, is composed of the following papers:

- MacLean, Young, Bellotti and Moran describe Q(uestions), O(ptions), and C(riteria) for representing design rationale. IBIS notation captures as its happens, QOC representation must by constructed as an act of reflection on the state of the design process.
- Lee and Lai present D(ecision) R(epresentation) L(anguage) and show how it represents the various aspects of knowledge surrounding rationale in design
- Carroll and Rosson embed psychological theory into evolutionary development of systems.
- Lewis, Rieman, and Bell challenge the notion that design rationale should be conceptualized as abstract issues, criteria, or principles. They propose a focus on representative concrete problems that the system is intended to address. These problems are used to guide exploration of the design space and evaluation of alternative designs.
- Conklin and Yakemovic show that the rationale caught and managed several design errors.

- Fischer, Lemke, McCall, and Morch built a suite of exploratory design tools in which design rationale plays a central role.

The authors finish with the conclusion that there is only a beginning of an era human-computer interaction research. Very little, for example, has been done in studying and assessing the use of design rationale in real larger design projects addressing complex design problems and with real designers.

Relevance:
The article addresses design research from the perspective of human decision-making and the making of designerly choices. The article gives an interesting starting point in how computers can help to create a better understanding of the rationale in a design process. This understanding will allow for interlinking scientific research into a design process, and the testing of design decisions.

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Rittel , H. and M. Webber. 1973. Dilemmas in a general theory of planning. Policy Science, Vol. 4, pp.155-169

John Gero is Professor of Design Science, Director of the Design Computing Unit, and Director of the Key Centre of Design Quality at the University of Sydney. He is also adjunct professor at Carnegie/Mellon University.

Summary

This article of Gero describes models of design as a process. His reference revolves around interior design. It introduces and describes a knowledge representation schema for design, called design prototypes. This schema supports the initiation and continuation of the act of designing. Design prototypes[18] are shown to provide a suitable framework to distinguish routine, innovative, and creative design[19]. He claims that prototype schema provide a framework that separates knowledge from computational processes.

Gero sees designers as change agents in society. "Their goal is to improve the human condition in all its aspects through physical change. Although design for many continues to remain a mysterious activity, it has been recognized as an important activity for more than 4000 years" (page 27). To shed light on this 'mysterious activity', the author identifies several goals for design research; a better understanding of design, the development of tools to human designers, and the potential automation of some design tasks.

In order to reach the goals of design research, the author first explores the character of research versus design. He sees science as an attempt to explain and understand the existing world around us. Design exists because the world does not suit us. Design is to make the world fit our needs. Design descriptions, thus, relate to the future and expectations of the functions of designed artefacts. He notes that originally (1960) most research programmes linking research and design, were founded on systems view using concepts of operations research. Gero introduces artificial intelligence as a way of information processing. He sees designing as a process of exploration of what variables might be appropriate. These variables include goals variable and decision variables. Part of the exploration activity involves learning about emerging features as a design proceeds. Furthermore, he states that designing occurs within two contexts: the context within which the designer operates and the context produced by the developing design itself. Gero concludes that a design activity can be characterized as a goal-oriented, constrained, decision-making, explorative, and learning activity that operates within a context that depends on the designer's perception of it.

Gero then presents several design models. Those are models illustrating the process of transformation, comparison, reformulation, sets of expected and actual behaviour, functions and design description, synthesis and analysis in an iterative way. He distinguishes two fundamental research issues. One relates to representation frameworks for **design knowledge** required for the transformation process and one that relates to appropriate **transformation process for design**. In this paper, Gero addresses the first research issue.

Gero introduces the idea of a conceptual schema of design prototypes. He does this by asking the question "How is it that designers can begin designing with incomplete information and before all the relevant information is available?" page 29. Indeed, because design is an explorative process, what is relevant manifests itself as the design proceeds and varies with the decisions taken. Gero suggests that designers schematize their design experiences into generalized concepts on many levels of abstraction. He further states that no schema fits direct into a new situation that has sufficient expressive power.

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18 Prototypes are the first on which others are modelled. Archetypes are first singular examples, and stereotypes are copies without change

That is why, there is a distinction between **routine design**; within a well-defined state space of potential designs. All values directly instantiable form existing design prototypes. **Innovative design** is non-routine design. Here, designers manipulate the available range of values for variables. This results in a design with a familiar structure but novel appearance. **Creative design** is non-routine. The designer uses new variables producing new types that extend or move the state space of potential designs. In the extreme case, a new and disjoint space is produced. Creative design has the capacity to produce a paradigm shift (prototype generation).
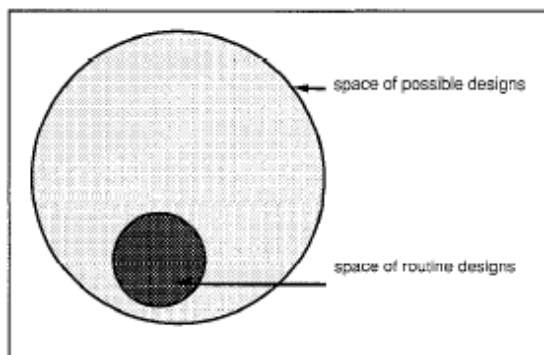

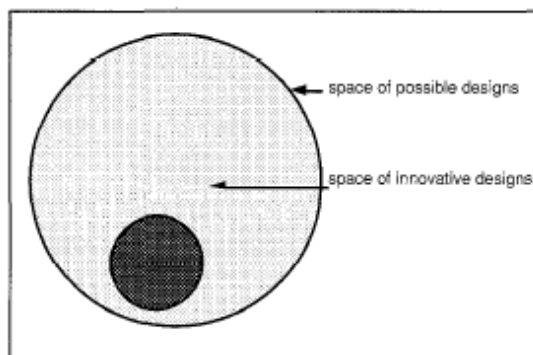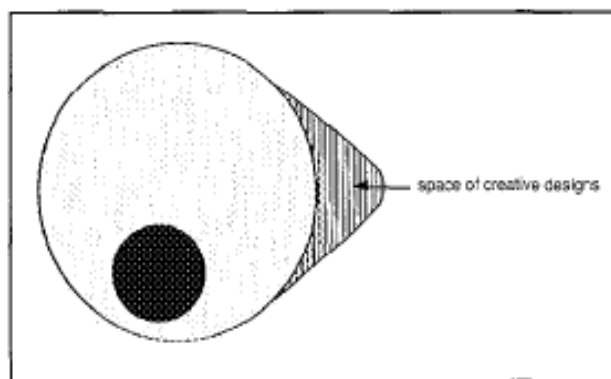Illustration 5 State Space of Routine Designs
(page 34)

Illustration 6 State Space of Innovative Designs
(page 34)

Illustrations 7 State Space of Creative Designs
(Page 35)

A **design prototype** is a conceptual schema for representing a class of a generalized heterogeneous grouping of elements derived from alike design cases that provides the basis from the start and continuation of a design. Design prototypes provide this basis by bringing all the requisite knowledge appropriate to the design situation together in one schema. A prototype brings together the three groups (function, structure, and behaviour) and the relations between them, which includes processes for selecting and obtaining values for variables (pp.30-31). He further explains the structure of design prototypes (relational knowledge, qualitative knowledge with a subset of qualitative reasoning, computational knowledge build on quantitative, constraints, context knowledge varying from exogenous variables and the designer (his choices etc). Gero states that given a little situational information, the designer fleshes-out a set of various concepts. A concept is selected through processes of evaluation and assessment. Computation of these processes can help the designer to produce routine and non-routine designs.

Relevance
Gero links research and design, using computational reasoning. He starts out with a synthesis model (that is a prototype) and then continues with clarifying where and when designers make decisions. A prototype is in principle a conceptual design founded on the designers experience

placed within a situational context. This concept is then tested and evaluated against various context related variables. The concept evolves into a final design. This design can be routine, innovative, or a creative design.

From the perspective of the design process, Gero starts out with synthesis and then follows with analysis, evaluation, reformulation and ends with the design description. The article contains clear illustrations.

Gero explains his train of thoughts using a simple design example i.e. placing a window. On the one hand, more complex design processes may be too complicated to be caught into schema and prototypes, on the other hand, just because of their complexity these processes may benefit from his thinking (that is starting with a synthesis).

This article is written more than 20 years ago. Meanwhile, artificial intelligence has taken a great flight. However, Gero is a widely cited author when it comes to creative design supported by computational processes.

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Alan R. Hevner, Information Systems and Decision Sciences, College of Business Administration, University of South Florida; Salvatore T. March, Owen Graduate School of Management, Vanderbilt University; Jinsoo Park, College of Business Administration, Korea University; Sudha Ram, Management Information Systems Department, Eller College of Business and Public Administration, University of Arizona.

Summary

Two paradigms characterize much of the research in the Information Systems discipline:
1) **Behavioural-science paradigm** has its roots in natural science research methods. "It seeks to develop and justify theories (i.e. principles and laws) that explain or predict organizational and human phenomena surrounding the analysis, design, implementation, management, and use of information systems. Such theories inform researchers and practitioners of the interactions among people, technology, organisations that …"
2) **"Design-science paradigm** has its roots in engineering and the sciences of the artificial (Simon, 1996). It is fundamentally a problem-solving paradigm. It seeks to create innovations that define the ideas, practices, technical capabilities, and products through which the analyses, design, implementation, and use of information systems can be effectively and efficiently accomplished". The artefacts are not exempted from natural laws and behavioural theories "on the contrary their creation relies on existing "kernel theories" that are applied, tested, modified, and extended through the experience, creativity, intuition, and problem solving capabilities of the researcher" (p. 2).

It is the objective of this paper to describe the performance of design-science research in Information Systems via a concise conceptual framework and clear guidelines for understanding, executing, and evaluation research.

The authors define IT artefacts as constructs (vocabulary and symbols), models (abstraction and representations), and instantiations (implemented and prototype systems). These are concrete prescriptions. Evaluations of the prescriptive theories must respect the utility provided for the class of problems addressed. Research/evaluations of the artefacts need to address quantitative as well as empirical and qualitative methods.

Framework for IS research

The framework of IS research is based on the interdependencies between business strategy, information technology strategy, organizational infrastructure, and information systems infrastructure (Figure 1 - Henderson and Venkatraman, 1993). The authors claim that a true appreciation for design science as an IS research paradigm, the dichotomy of design as a process (verb) and a product or artefact (noun), needs to be faced. "This Platonic view of design supports a problem-solving paradigm that continuously shifts perspective between design processes and design artifacts for the same complex problem. The design process is a sequence of expert activities that produces an innovative product (i.e. the design artefact). The evaluation of the artifact then provides feedback information and a better understanding in order to improve both the quality of the product and the design process. This build-and-evaluate loop is typically iterated a number of times before the final artifact is generated (Markus et al. 2002). During this creative process, the design-science researcher must be cognizant of evolving both the design process and the designed artefact as part of the research" (page 6).

The authors present a conceptual framework for research combining the two scientific paradigms discussed earlier (Figure 2 on page 9). Interesting aspects are the definition of problem space, perceived needs, need perceived by the researcher, research relevance (framing). They acknowledge the importance of prior research and stress the importance of research rigor (appropriately applying

existing foundations and methodologies). They further make the difference between routine design (application of existing knowledge using "best practices") and innovative design (addressing unsolved problems in unique or innovative way or in a more efficient way).

Guidelines for design-science in information systems research
The authors present and discuss seven guidelines in design-science research are presented;
Guideline 1: Design as an artefact (innovative, purposeful for a specified problem domain),
Guideline 2: Problem relevance (it must yield utility),
Guideline 3: Design evaluation (utility, quality, and efficacy must be rigorously demonstrated),
Guideline 4: Research contribution (clear and verifiable contributions),
Guideline 5: Research rigor (rigorous methods in construction and evaluations),
Guideline 6: Design as a search process (utilizing available means to reach desired ends while satisfying laws in the problem environment), and
Guideline 7: Communication of research (both to technology oriented as well as management-oriented audience).
On pages 12 up to 25, the authors elaborately discuss these seven guidelines.

Application of the design-science research guidelines
To illustrate the application of the design-science guidelines to IS research, the guidelines are illuminated using three articles from different IS journals;
- Gavish and Gerdes (1998) develop techniques for implementing anonymity in Group Decision Support Systems (GDDS) environments,
- Aalst and Kuma (2003) propose a design for an eXangeable Routing Language (XRL) to support electronic commerce workflows among trading partners, and
- Markus, Majchrak, and Gasser (2002) propose a design theory for the development of information systems built to support emergent knowledge processes.

The article ends with **discussion and conclusions** addressing the following challenges:
In the recent debates on how to conduct IS research, there is ample attention for the philosophical stances, e.g. positivism versus interpretivism, underlying design science. The authors argue that both paradigms are needed to ensure the relevance and effectiveness of IS research. While moving forward, the authors see the following exciting challenges ahead;
- inadequate theoretical base,
- insufficient set of constructs, models, methods, and tools exist to accurately represent the business/technology environment,
- existing knowledge base insufficient for design purposes and designers must rely on intuition, experience, and trial-and-error methods,
- design-science is perishable (rapid advances in technologies can invalidate design-science research), and
- rigorous evaluation methods are extremely difficult to apply in design-science research – generalizations are difficult.

Relevance
Although not touching on spatial planning and design, the debate addressed is also relevant for the stances to be taken in research and design in integrated regional development, spatial planning and landscape architecture, for example. The authors discuss two paradigms characterizing the information-systems discipline: behavioural science and design science. The authors explain that information systems draw knowledge from technology, people, and organisations. They argue, therefore, that both paradigms are required in *design-science* research. In the article, the authors present a concise conceptual framework and guidelines for understanding, executing, and evaluating the research.

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PART C

ACADEMIC PAPERS PREPARED BY DISCIPLINES RELATED TO LEARNING AND EDUCATIONAL SCIENCES

PART C:

ACADEMIC PAPERS PREPARED BY DISCIPLINES RELATED TO LEARNING AND EDUCATIONAL SCIENCES

Barab, Sasha and Kurt Squire. 2004. 'Design-Based Research: Putting a Stake in the Ground', *Journal of the Learning Sciences*, 13 (1) 1-14

Edelson, Daniel C. 2002. Commentary: Design Research: What We Learn When We Engage in Design, *Journal of Learning Sciences,* 11(1), 105-121

**Sasha Barab (Indiana University, Bloomington) and Kurt Squire (University of Wisconsin,
Madison) Publisher of Journal of Learning Sciences is**

Summary

The emerging field of the learning sciences is one that is interdisciplinary, drawing on multiple
theoretical perspectives and research paradigms to build understandings of the nature and conditions
of learning, cognitions, and development. **The broad goal is developing evidence-based claims
derived from both laboratory-based and naturalistic investigations that result in knowledge
about how people learn**. Learning, cognition, knowing, and context are co-constituted and cannot be
treated as isolated entities or process.

The commitment to examining learning in naturalistic contexts, many of which are designed and
systematically changed by the researcher, necessitates the development of a methodological toolkit
for deriving **evidence-based claims** from these contexts. One such methodology is that of **design
experimentation or design-based research**, frequently traced back to the work of Ann Brown
(1992) and Alan Collins (1992). The authors refer to Cobb, diSessa, Lehrer, and Schauble (2003) as
follows: "Prototypically, design experiments entail both "engineering" particular forms of learning and
systematically studying those forms … within the context … This designed context is subject to test and
revision, and the successive iterations that result play a role similar to that of systematic variation in
experiment" (page 2).

The authors argue that **design-based research** includes:
- a series of approaches;
- the intention of producing new theories, artefacts and practices that account for learning and
  teaching in naturalistic settings;
- they result in the production of theories and teaching;
- are interventionist (involving some sort of design);
- take place in naturalistic contexts;
- are iterative.

There are many questions left before design-based research is going to be deemed credible and
trustworthy to others. Some questions are: What are the core foci of design-based research and
what delineates it from other forms of research? What counts as reasonable and useful warrants
for advancing assertions investigated through this type of research? What are the boundaries of a
naturalistic context? How do we control researcher bias in selecting evidence, in reporting observations,
and in developing trustworthy claims? How do we understand the contextuality of research claims
generated *in situ* and use them to inform broader practice?

In this article, the authors begin with the process of responding to these questions. They address in
more detail the character of design-based research[20]. **They argue that design-based research fits
more in pragmatic knowledge claim than in the positivist science or ethnographical traditions
of inquiry.** Theories in the pragmatic knowledge claim relate to their ability to do (applied) work in the
world. They refer here to Dewey, 1938. They introduce the concept of consequential validity, but state
that design researchers need to be clearer about the claims they make from design experiments and
the limitations of their findings. They then explore the idea of advancing credible assertions touching on
issues, such as trustworthiness, credibility, usefulness and contexts. Next, they define the naturalistic
context.

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[20] Table 1 gives an overview of design-based research methods regarding location, complexity, focus, procedures, social
interaction, characterizing findings, and role of participants (page 4). Table 2 characterizes design-based research in
terms of the designed artefact and resultant theory focusing on research study, local impact and theoretical work.

In their parting thoughts, they claim that **design-based research** as a term has grown in popularity and significance. However, **they confine that the design-based research is still at its infancy in terms of having agreements on what it constitutes**, why it is important, and in the methods for carrying it out. At the time of writing this article the Journal commits itself for the coming two years to explore this field further (that is 2004-2006).

Relevance:
The importance of this article lies in the exploration of the characteristics of design-based research and its credibility. The authors develop a train of thoughts and while doing so introduce the articles of Collins, Joseph and Bielaczyc (2004) (in the same special issue on design-based research).

The article includes two interesting tables; 1) on comparing psychological experimentation and design-based research methods (page 4) and 2) characterizing design-based research in terms of the designed artefact and the resultant theory (page 7).

The article contains interesting parallels with the research and design approaches in spatial planning and landscape architecture. The notion of design-based research posed by Barab et al. could be of help in furthering the credibility of design as a research method in spatial planning and design. It can help also to develop a common language between spatial designers and scientists.

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Edelson (School of Education and Social Policy, Computer Science Department, Northwestern University)

Summary

Educational researchers are increasingly using design as a means of advancing their understanding. Historically design has served as a way to implement theories for testing. The emerging design paradigm treats design as a strategy for developing and refining theories.

The author links **design to research that influences practice for direct impact as well as for advancing understanding.** This new wave of research, characterized by iterative design and formative research in complex real world settings has been called **design experiments, design research, and development research.**

Cobb (2001) described the convential role of design as a strategy for theory testing, as a four-step sequence:
- the development of a theory,
- the derivation of principles for design from the theory,
- the translation of the principles into concrete designs, and
- the assessment of the designs to test whether they work as anticipated (page 106).

Cobb questions if this process is realized in practice. Furthermore, the author adds, it assumes a fully developed theory that maps directly into design.

Numerous examples of recent literature poses that:
- Designs plays a critical role in the development of theories. The design-researcher begins with a set of hypotheses and principles that they use to guide a design process. Importantly, these hypotheses and principles are not detailed enough to determine every design decision, neither are they followed slavishly, if accumulated evidence, specific circumstances, informed intuition lead the designer to believe they do not apply.
- Design-researcher proceeds through iterative cycles of design and implementation, using each implementation to collect data to inform subsequent design, and
- Design-research is a parallel and retrospect process of reflection upon the design and its outcomes. The design-researcher elaborates or discards initial hypothesis and principles, refines, adds – gradually knitting together a coherent theory (page 106).

The author argues that an important characteristic of **design research is that it eliminates the boundary between design and research**. "In the traditional theory-testing paradigm, design and research are distinct processes that happen sequentially. Design takes place first as the implementation of theory, followed by the evaluation-oriented research. The design process is not regarded as an opportunity for learning. In contrast, design research explicitly exploits the design process as an opportunity to advance the researchers understanding of teaching, learning, and educational systems" (page 107). His focus is on what kinds of lessons can we learn from the design processes in design research? He argues that both descriptive as prescriptive lessons can be learned through design research.

What we learn when we engage in design;
- design is a sequence of decisions to balance goals and constraints, and
- decisions related to 1) the design process; 2) needs and opportunities, 3) form of resulting design.

Schön points out that in **challenging** or **innovative design** (in contrast to routine design) – these decisions can be complex, interdependent, requiring extensive investigation, experimentation, and iterative refinement. The designers inevitably acquire substantial new understanding as they learn by making decisions and observing the consequences.

Edelson refers to three collections of decisions that determine the outcome: the design procedure, the problem analysis, and the design solution. At several points, the author argues that **design research** has an additional goal in that the new understanding needs to lead to the development of **useful, generalizable theories**. He distinguishes three types of theories; **domain theories, design frameworks, and design methodologies (parallel to the indicated sets of decision-making)**. Domain theories are the generalization of some portion of problem analysis – they are descriptive. Design framework is a generalized design solution they are prescriptive (Van den Akker called this substantive design principles). Design methodology is a general prescriptive design procedure. Van den Akker called this procedural design principles.

Most interesting is the part in which the author addresses the transition **from design to design research**. The lessons from design must apply beyond the specific context in which they were learned, and they must serve an audience beyond designers themselves. He gives four features that distinguish design research from design:
1. **Research driven.** For a design research program to yield useful results, it must be informed by prior research and guided by research goals. The work must be connected both to research findings (available theories and empirical experience) and research perspectives. This means that the researcher designer must deliberate when diverging from available research and aware of when he/she is resorting to intuition.
2. **Systematic documentation** of the design process is required to allow for retrospective analysis. Systematic documentation can be used to produce design cases.
3. **Formative evaluation.** In design research, design, evaluation, and revision can enable the designer-researchers to identify problems or gaps in their understanding of the design context and to elaborate their analyses to account for them. It helps to expose issues that need to be addressed.
4. **Generalization.** Look beyond the current design generalizations to other contexts. Retrospective analysis, reconcile partial theories from prior research, analyses of available design cases, and issues raised in their formative evaluation help the process of generalization.

In addition, the author addresses the issue of uncertainty. He sees, as one of the typical characteristics of design research in comparison with applied sciences (statistics) in educational sciences is uncertainty. The **objective of design research** is the generation of new and useful theories that have the utility of resolving important problems, making novelty and usefulness criteria to judge quality. The source of strength lies in explanatory power and in the grounding in specific experiences. A design theory should be internally consistent and account for the issues raised during the design and evaluation process.

Why engage in design-research?
• Productive perspective for theory development;1) practical demands require a theory fully specified; 2) the practical process reveals inconsistencies because the theory will provide conflicting guidance; 3) goal directed nature provides a focus for theory development (resources, goals and constraints help to guide).
• Usefulness of its results (through both its prescriptive (design frameworks and design methodologies) and the descriptive character (domain theories).
• Directly involves researchers in improvement of education – free from market considerations they can explore truly innovative design.

Relevance:
The author builds his article on several learning researchers as well as on Simon (1971) and Schön (1990). Battista and Clements (2000) claim that "the first step toward becoming scientific, curriculum developers need to explicate their theoretical standpoints, judgments, purposes, and procedures, so that the development process is recorded, shared, and opened up to critical

reflection and discussion" (page 116). In this, Edelman also regularly refers to Cobb (2001).

Usefulness of Edelman's article lies in the exploration of the link between theory, design and research. Although, there seems to be a somewhat repetitive, cyclic reasoning, Edelman's thoughts can help to reflect on the notion of design-research in spatial planning and design.

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Ontwerpen
op het raakvlak van
water en ruimte

Handreiking en voorbeelden

PART D:

PRESENTATIONS AND REPORTS PREPARED BY THE PROFESSIONAL PRACTICE OF SPATIAL DESIGN

As explained in the preface, for various reasons, it was considered important to include articles, papers, or otherwise documented materials from the professional community. Currently, 2009-2011, there is a growing amount of design offices in landscape architecture (like West 8, Bosch Slabbers, DS, HNS), architecture, and spatial planning that use the notion research-by-design (*ontwerpend onderzoek)* in their reports, brochures etc. In this annotation, reports that resulted from the scan on Google, are included. Some other documents are included because, they were known at Deltares or Wageningen University.

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Key words: ontwerpend onderzoek, modellen, concepten

Samenvatting

Het betreft hier een document waarin een locatiestudie van een crematorium ten zuidwesten van Aalst (België) wordt besproken. Het rapport bestaat uit 9 hoofdstukken (inclusief bijlagen). Hoofdstukken 2-7 betreffen planningsstappen om tot een locatiekeuze van een crematorium te komen. Stap 6 wordt ontwerpend onderzoek genoemd.

In stap 1 – analyse verwevingsprofiel van de functie. Er wordt een uitgebreide analyse aangeboden van de functie crematorium in zijn verschillende componenten (ruimtelijk, gebouwen, buiten-functies). Er wordt vooral ook gekeken naar verwevingkenmerken (korrel, impact en on/omkeerbaarheid, constant en periodiek gebruik, introvert versus extravert, on/toegankelijkheid) en naar locatiekenmerken (sterk en zwak verkeersgenererend; aanpasbaarheid aan het landschap, aanpasbaarheid fysisch systeem).

Stap 2 – verwevingskenmerken studiegebied - Vervolgens wordt kort de ligging van Aalts op een regionale schaal geanalyseerd waarna het studiegebied zelf wordt bestudeerd. Er wordt gekeken naar een verweefbaarheidsprofiel op macro-niveau (belastingsniveau, afwisselend ruimtegebruik, ruimtelijke dynamiek, mono/multifunctionaliteit, doordringbaarheid). Vervolgens worden beide analyses (functies en omgeving) in de zin van verwevingsmogelijkheden door middel van een matrix aan elkaar verknoopt. Ruimtelijk spreiden, concentreren en een tussenvorm worden afgezet tegen de functionele relaties verbinden en scheiden.

Stap 3 – planologische en juridische context

Het concept van verweefbaarheid wordt volgens stedenbouwkundig op microniveau geanalyseerd.

Stap 4 – probleemstelling en potenties voor verweving worden in **doelstellingen** vertaald en geprojecteerd op de locatie waardoor er een ontwerpprincipe ontstaat (bijvoorbeeld aansluiten bij bestaande bebouwing of aansluiten bij bestaande verharde/publieke ruimte)

Stap 5 – *ontwerpend onderzoek* – "In het ontwerpend onderzoek worden vanuit stap 4 de meest interessante ontwerphypothesen gebundeld in één of meerdere modellen/concepten, geprojecteerd binnen het studiegebied. Van elk van deze modellen wordt aangegeven welke meerwaarde wordt bereikt vanuit verweving en welke de eventuele problemen of beperkende factoren zijn die deze verweving in de weg staan. Elk van de modellen gaan op andere wijze om met verweving en scheiding (pagina 70).

Stap 6 – conclusies De verwevingsmodellen worden getoetst en geëvalueerd op macro- en microniveau en aan de juridische/planologische context. Deze fase levert onderzoeksvragen op, bijvoorbeeld dat op microniveau toch mogelijkheden voor complexe verwevingsvormen als symbiose mogelijk zijn. Deze mogelijkheden liggen buiten de oorspronkelijke randvoorwaarden voor verweving.

In Hoofdstuk 8 worden de resultaten en de methode geëvalueerd. Als een positieve aanvulling op de generieke methodiek m.b.t. locatiekeuzes voor crematoria wordt gezien, het uiteenrafelen van "de functie in relevante ruimtelijke componenten" (pagina 86).

Relevance:

De modellen/concepten worden getest aan hun meerwaarde, problemen en beperkingen. Deze gedachtegang past in een concept-test methode. Er wordt in de studie verwezen naar een generieke methodiek, welke in deze presentatie niet wordt uitgelegd. Ook is er geen literatuurverwijzing.

Key words: onderzoekend ontwerpen, ontwerpend onderhandelen, ontwerpend onderzoek, faseringen, ownership, integriteit

Setting

Stamtafel StadShuis: discussiepartners; Pieter Jannink (MUST), Jan Doms (NIROV), Donald van Dansik (ONE Architects), Frits Vermeijs (gemeente Haarlemmermeer), Jannemarie de Jonge (Alterra), Bastiaan Staffhorst (RPB en UvA), Wigger Verschoor (RPB en UvA), Jeroen Saris (De Stad bv) en Tamara Metze (UvA en De Stad bv)

Het stuk is een impressie van een uitwisseling aan meningen, ideeën en kennis van de deelnemers. De Jonge en Jannink hebben een lezing gehouden.

Aan de orde komen:
- Opdrachtformulering
- Condities voor een betere opdrachtformulering
- Soort ontwerp: verleiden of onderzoekend ontwerpen
- Condities voor bepalen van soort ontwerp
- Waardering van ontwerp: evaluatie

Opdrachtformulering

- Vaak eerst een zoekproces naar vraag en beste vorm van ontwerp dat daarbij past.
- Twee vragen waarom participatief en waarom ontwerpers? Participatief onder andere om erachter te komen welke belangen er spelen; draagvlak; beste plan; inbreng van kennis; kennis bij elkaar brengen; verrassende oplossingen
- Ontwerpen in essentie, dat je veranderingen wil bewerkstelligen, dat het moet gaan om betekenisvolle veranderingen
- Als de opdrachtgever precies weet wat hij wil (politiek gezien) dan geen ontwerper nodig is in deze fase
- Gesprek tussen opdrachtgever en ontwerpers laat zien wat er mogelijk is

Politieke cyclus
Korte termijn (opdrachtgever/politici) versus lange termijn

Politieke verantwoordelijkheid en sturing
Politicus heeft vaak wel een vraag maar weet niet welk soort ontwerp nodig is. Keuze van ontwerpers geeft ook inkleuring van de vraag (je weet hoe ze werken). Soms worden ontwerpers ingezet om processen los te trekken of een vlucht naar voren te geven.

Projectmatige benadering
Projectmatige benadering strookt niet meer met de procesmatige aanpak.

Condities voor beter opdrachtformulering

Een *voorfase* om het ontwerp in politiek-bestuurlijke context in te bedden (proefatelier of excursie) helpt bij opdrachtformulering.

Procesarchitectuur als taak voor opdrachtgever en ontwerper
Opdrachtgever en ontwerper moeten beiden nadenken over de procesarchitectuur van het ontwerpproces. Ontwerp moet consequenties hebben (richting uitvoerbaarheid). Vereis "De manier waarop een ontwerper wordt ingebed in het proces vin ik heel belangrijk. De rol van ontwerper is zeker niet meer centraal, maar moet ingebed zijn in een veelbreder scala van beroepsgroepen en

belangenpartijen. Die kundigheid zul je je als ontwerper eigen moeten maken, je bezig houden met het onderscheid naar de fasen van het werk. De aanvullende dimensie van de rol van ontwerper noemt hij "ruimtelijk regisseur" (pagina 3).

Integriteit van opdrachtgever en ontwerpers
Het onderzoekend ontwerp, of **ontwerpend onderzoek** vereist dat de opdrachtgever nadenkt over de gevolgen van een ontwerpproces en daar achter gaat staan. Opdrachtgever verliest een deel van de regie en wordt een van de kennisdragers (De Jong, pagina 3). Opdrachtgever en ontwerper moeten de kwaliteit van het resultaat centraal laten staan.

Soort ontwerp: verleiden of onderzoekend ontwerpen
De extremen tussen de soorten van ontwerpen lijken zich te bewegen tussen groots en meeslepend als het programma van eisen al bekend is, of een vehikel waarmee coalities gesmeed worden en belangen en kennis bij elkaar worden gebracht.

Andere rol van ontwerp
Is er een andere rol van ontwerp, die van creëren van diversiteit, verandering, *reframing* van processen door leren op een dieper niveau dan is **ontwerpend onderzoek** nodig. Jannink "Zoals wij ontwerpers acteren heb je in ieder proces een andere rol, is het heel erg aftasten wat je positie daarin is en wat je daaraan kan bijdragen. … nadrukkelijk de taak om de dialoog tussen opdrachtgevers en belanghebbende op gang te krijgen, om begrip te kweken tussen die partijen, en daar meerwaarde te creëren. Dat is … de rol van het ontwerp. Het is een middel. Soms gaat het over de uitvoering , maar vaak is het een praat - een onderhandelings - of een begeleidingsstuk. Allemaal heel legitieme functies die het ontwerp kan hebben (pagina 4).

Andere manier van ontwerpen
De Jonge spreekt over **ontwerpend onderzoek en ontwerpend onderhandelen**. Zorg voor een verrassende mix – anders vind je alleen de traditie waarbij hooguit een groepje experts betrokken wordt. Van Dansik "Je kunt niet top down en ook niet bottom-up werken. Je moet eerst met een paar mensen, die van wanten weten in een hokje gaan bedenken wat de agenda's zijn … selecteren wat je wel en wat je niet gaat doen". De Jonge vraagt zich af of dit niet te beperkend is – topmensen uit de vertrouwde wereld – dan levert dat oplossingen die niet meer zijn dan wat jij kan. **Je moet goed weten wanneer welk soort ontwerp wordt ingezet.**

Consensus en variatie
Niet alleen rol en de manier van ontwerpen verschillen maar ook de producten. In **ontwerpend onderzoek zijn** de coalities en een variatie aan mogelijkheden het belangrijkste doel. Bij die mogelijkheden kun je partners and ontwerpers zoeken, daar hoeft geen consensus over te zijn. Via een draagvlakmodel ontstaan er eigenlijk altijd compromissen. Ontwerpend onderzoek kan ook oplossingen aandragen die pas later te pas komen doordat zich gedurende het proces een visie heeft ontwikkelend die in eerste instantie vooral in de hoofden van de mensen zit.

Condities voor bepalen van soort ontwerp
Het onderscheiden van fasen in het proces is belangrijk. Per fase, moet je bepalen welk soort ontwerp (verleidelijk of onderzoekend) nodig is. De Jonge koppelt "het ontwerpend onderzoek aan onderhandelend ontwerpen, en een verleidelijk beeld kan pas gemaakt worden als de interactie zijn vruchten heeft afgeworpen" (pagina 5). Het is maar de vraag of in alle fasen dezelfde ontwerper moet optreden. In dit proces moet je naar het *momentum* zoeken of aangrijpen. Ook het schaalniveau (mate van complexiteit) en de projectfase hangen met elkaar samen. Elk soort ontwerp moet een (mede) eigenaar hebben! Dit is cruciaal voor succes uitvoering.

Waardering van ontwerp: evaluatie
Evaluatie van **onderzoekend en onderhandelend ontwerp** is moeilijk te meten. Van Dansik stelt voor dat als mensen hun individuele doelstellingen overstijgen dit een maat van succes van het proces is. Ontwerpproces moet in een veilige ruimte plaats vinden, alleen dan kan er diepgaand geleerd worden.

Relevance:
Uit deze ronde tafel discussie, komen een aantal eigenschappen van ontwerpend onderzoek naar voren. Ontwerpend onderzoek richt zich op het genereren van alternatieven, op leren, en visievorming. Het is daarom belangrijk om eerst de vraag naar het soort ontwerp vast te leggen; de processtappen vastleggen waarin ook de verschillende soorten ontwerpen die nodig zijn worden gedefinieerd, *ownership* van het ontwerp vast te leggen voordat het idee van ontwerpend onderzoek wordt ingezet. Communicatie tussen belanghebbende en opdrachtgever zijn van groot belang, inclusief het vastleggen van verantwoordelijkheden tijdens het ontwerpproces maar vooral ook daarna. De Jonge adviseert een stevige voorinvestering om deze vragen te beantwoorden en de verantwoordelijkheden vast te leggen.

De discussanten geven aan het belang aan van een ontwerpend voortraject plaats te laten vinden om tot een grove uiteenzetting van het proces en doelen te komen. Let op dat er voldoende ruimte blijft voor vernieuwing (dus niet altijd de topmensen uit de vertrouwde wereld) Interessante discussie tussen onderzoekers, praktijk, en opdrachtgevers!

Bax, Judith, Saskia van Walwijk, Arij van der Stelt en Willem Hermans. 2008. Ontwerpend Onderzoek naar hoogwaterbestendige ontwikkeling buitendijkse stad, Gemeente Dordrecht, Definitief concept 31 oktober 2008, www.ufmdordrecht.nl

UFM consortium[21]; leden Ellen Kelder (gemeente Dordrecht) Chris Zevenbergen (Dura Vermeer Business Development) Sebastiaan van Herk (projectcoordinator namens gemeente Dordrecht) s.vanherk@ufmdordrecht.nl

Deel van het project Urban Flood Management Dordrecht (ufmwp401). Partnersteden zijn London en Hamburg.

Key words: learning by doing, ontwerpend onderzoek, scenario's, interdisciplinary action

Inleiding

In het voorwoord van dit boekje, stelt Annemieke Nijhof – Directeur-Generaal Water – Ministerie van Verkeer en Waterstaat, dat de UFM aanpak van het **ontwerpend onderzoek** niet allen nuttig is bij waterveiligheidsvraagstukken, maar ook ingezet kan worden bij het zoeken naar integrale oplossingen voor wateroverlast, waterkwaliteit en andere opgaven. Interactie tussen verschillende disciplines is essentieel. Dit levert nieuwe ideeën en inzichten, niet alleen in oplossingsrichtingen maar ook bij de deelnemende instituten en personen. Verder kan het bijdragen aan beleidsontwikkelingen op verschillende schaalniveaus.

De samenwerking tussen de consortium partners van het UFM onderzoeksproject was rondom het ontwerpproces georganiseerd en heeft geleid tot actief leren, van elkaar, en in communicatie over en weer met derden: *learning by doing*

Het onderzoeksproject was onderverdeeld in verschillende werkpakketten. Dit document is het verslag van de werkzaamheden van **werkpakket 4. "Ontwerpend Onderzoek".** De centrale onderzoeksvraag van dit pakket was: "Hoe kunnen de buitendijkse stadsdelen van Dordrecht hoogwaterbestendig ontworpen worden?" Door middel van ontwerpend onderzoek wordt de expertise vanuit de andere werkpakketen (techniek, schade, overstromingsgedrag, en veiligheid) ingezet bij het beantwoorden van de onderzoeksvraag.

Het rapport van werkpakket 4 is als volgt opgebouwd:
• Inleiding,
• Hoogwater en de buitendijkse stad,
• Casus Stadswerven,
• UFM in een breder perspectief, en een
• Slotbeschouwing

Samenvatting

Natuurlijke processen en menselijk handelen hebben vorm, hoogtemaat en inrichting van de stad Dordrecht bepaald. Ook in het **ontwerpend onderzoek** van het UFM project staat de confrontatie tussen rivier en stad, water en land elk met eigen karakteristieken, centraal. Het spel tussen waterstanden, stedenbouw en architectuur, heeft de toekomstvisies voor Dordrecht vormgegeven. Deze uitgangspunten werden toegepast op een *casus* (de locatie Stadswerven-Dordrecht). Waterstanden en de acceptatie daarvan als ontwerpvariabele, drie stedenbouwkundige modellen, toetsing aan techniek, schade, overstromingsgedrag en veiligheid functioneerde als de knoppen waaraan gedraaid kan worden. Niet genoemd als ontwerpvariabele, maar zoals uit het rapport blijkt, is ook ruimtelijke kwaliteit als ontwerpcriterium opgenomen. Ruimtelijke kwaliteit wordt uitgedrukt in het beleefbaar zijn van de dynamiek van het water.

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21 Consortium partners waren Gemeente Dordrecht; Rijkswaterstaat; Progrez thuis bij mensen; UNESCO-IHE; Provincie Zuid-Holland; Ministerie voor Verkeer en Waterstaat; Deltares; Dura Vermeer; Hollandse Delta

Hoogwater en de buitendijkse stad

Er is onderzoek onder andere in de andere werkpakketten, gedaan naar natuurlijke water- en geomorfologische processen, naar het verleden via een historische terugblik met behulp van een chronologische kaarstudie, en er is een blik vooruit geworpen met betrekking tot de voorspelde klimaatsverandering. Er is gekozen om met het KNMI middenscenario te werken. Men doet dit eerst op een bovenstedelijk en regionaal, schaalniveau.
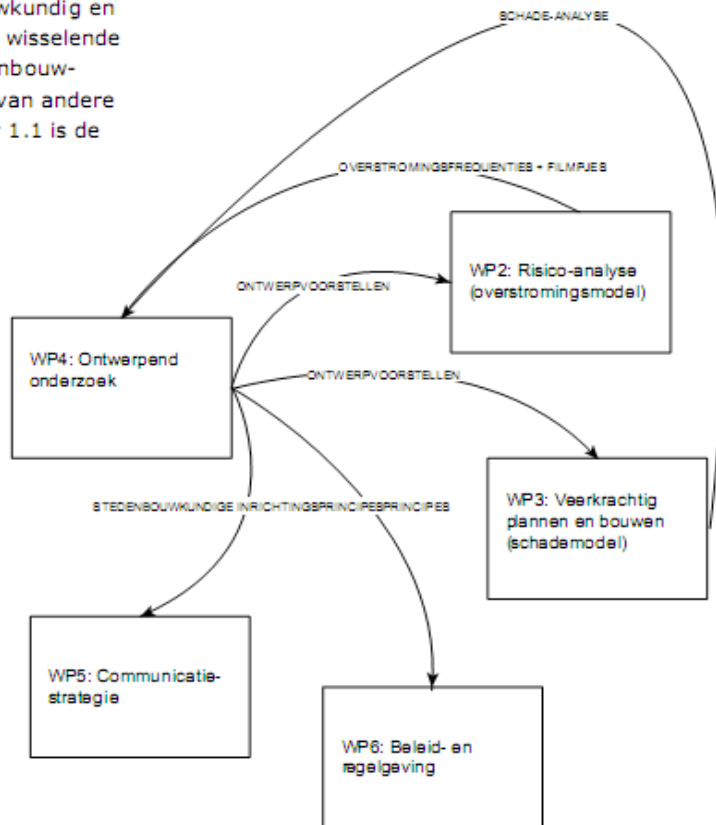
Illustratie 1.1 Schema met de relatie van Werkpakket 4 (WP$) met de andere werkpakketten (pagina 12)

Casus Stadswerven

Daarna zoomt men in op de Stad Dordrecht en vooral op de buitendijkse gebieden (met name het havengebied, de eilanden, de Biesbosch, en de Staart (het eigenlijke casus gebied)). Waterhoogtes worden berekend en de kansen op overstromingen in het verleden en volgens het midden scenario werden gekwantificeerd. Het karakter van de bedreigingen worden expliciet gemaakt.

Op basis van deze vooronderzoeken worden uitgangspunten geformuleerd. De volgende uitgangspunten worden benoemd: 1. dijken en hooggelegen routes als "*life-lines*" moeten altijd aanwezig zijn (Masterclass *European* Dordrecht (2006)); 2. buitendijksgebied moet hoogwaterbestendig zijn (kans en risico moeten in balans zijn); 3. voldoende flexibiliteit om in te spelen op veranderingen, bijvoorbeeld in het klimaatsscenario; 4. een combinatie ruimtelijk beeld en hoogwaterbestendigheid; 5. de tijdshorizon wordt vastgelegd; 6. er mag geen interne waterschade (in woning, winkel, kantoor) bij eventueel hoogwater ontstaan; 7. er moet een vrije zone in verband met aanvaarbeveiliging zijn; en 8. de gebiedsafbakening.

Dan wordt er een schaalsprong naar het casus gebied gemaakt. Kaartbeelden (met name luchtfoto's) worden gebruikt om de locatie te bestuderen. Een drietal modellen met betrekking tot veilig wonen dienen als vertrekpunt. 1. op een terp; 2. met een vloedfront; en 3. watertreden. Elk model wordt onderbouwd vanuit de locatie en/of referentiestudie en uitgewerkt op wat de schrijvers noemen drie lagen (1. land en water; 2. *life-line* netwerk; en 3. bewerking maaiveld oftewel het stedelijk weefsel). Ook worden alternatieven uitgewerkt door wel of geen rekening te houden met water in het gebied. Elk model wordt nader geïllustreerd met een principe doorsnede. In een volgende stap worden de drie modellen gecombineerd, door ze als het ware toe te passen op passende deelgebieden in het casus gebied.

De modellen worden getoetst en gevoed door schadeanalyse; overstromingsanalyse; opstellen van communicatiestrategieën (in verband met uitvoering) en vormgeving van het beleid- en regelgevingkader voor buitendijkse gebieden. Ook de criteria flexibiliteit en adapatie komen aan de orde. Dordrecht kan de komende 100 jaar met een gemiddeld 40 cm hogere grondwaterstanden uit de voeten. Het blijkt dat als de waterstanden met meters omhoog komen dan voldoet het nieuwe *floodmanagement* plan niet meer.

UFM in breder perspectief
Vanuit de studie op stadsdeel niveau wordt nu gekeken hoe de specifieke kennis generiek gemaakt kan worden of te wel: "Hoe kan de Dordtse kennis gebruikt worden voor andere plekken?" Iedere plek en stad vereist maatwerk en de terp, vloedfront, watertreden worden getoetst aan lokale mogelijkheden. Uitgezoomd leverde dit een kansenkaart op voor andere Drechtsteden.

Slotbeschouwing
De eindconclusie is dat buitendijkswonen kan. Als resultaat van de discussies met de verschillende experts, is ruimtelijke (ontwerp) opgave voor Dordrecht in relatie tot de waterveiligheid verduidelijkt. Ruimtelijke kwaliteit kwam tijdens het ontwerpend onderzoek als een belangrijke toetssteen naar boven. Ook ruimtelijk moet het wonen in een Deltastad zichtbaar gemaakt worden.

Conclusies
In de conclusies, zetten de schrijvers de uitgangspunten af tegen de resultaten. Deze evaluatie leidt tot een aantal aanbevelingen; 1) het uitvoeren van principes om de gedachten te testen in de werkelijke omgeving; 2) nader onderzoek naar historische haven in het lage gebied is nodig; 3) ideeën- en haalbaarheidsstudies naar dijkversterkingen en de primaire waterkering in de Dordtse binnenstad; 4) een uitwerking van de kansenkaart Drechtsteden; 5) een verdere ontwikkeling van stedelijke hoogwaterstrategie op regionale schaal geïntegreerd met binnendijksgebied.

Relevantie:
Dit project document is belangrijk omdat het illustreert hoe onderzoek en ontwerp elkaar ondersteunen. Enerzijds heeft vooronderzoek ertoe geleid dat de modellen studies en het ontwerp voldeden aan de uitgangspunten. Anderzijds, zijn de verschillende modellen/ontwerpen voor het casestudie gebied kwantitatief getoetst op hun hoogwaterbestendigheid!

Er is op cyclisch en op verschillende schaalniveaus gewerkt. Een eerste algemene studie is verbijzonderd in het casestudiegebied in Dordrecht. Vervolgens is het bijzondere van de casestudie weer veralgemeniseerd naar de regio.

Het UFM project lijkt vooral door experts te zijn uitgevoerd (ruimtelijke vormgevers en landschapsarchitecten lijken er niet bij betrokken te zijn geweest). Het ontwerpproces lijkt opgedeeld in duidelijke stappen. Hoe elke stap is uitgevoerd is niet duidelijk (bijvoorbeeld zijn er participatieve ontwerp ateliers geweest of zijn de ontwerpers zelfstandig aan de gang gegaan). De aanpak van dit project is vergelijkbaar met wat met de Engelse term *research-through*-design wordt aangeduid. Het ontwerpproces vertoont ook gelijkenis met het *concept-test* model.

Literature references:

In dit onderzoek is – veelal indirect – gebruik gemaakt van kennis van de partners uit het UFM-consortium, maar ook de praktijkervaringen van mensen uit het veld, zoals beheerders en havendienst (p. 63). Wel zijn er verschillende bronnen geraadpleegd zoals, bijvoorbeeld, Deltacommissie (2008), Samenwerking aan water. Een land dat leeft bouwt aan zijn toekomst.

Boekhorst, Jan te. 2006. Landschapsarchitectuur en Onderzoek, Een korte geschiedenis van de landschapsarchitectuur binnen de DLO, ESG Alterra, Wageningen, 66 pg.

> **Jan te Boekhorst is a retired landscape architect and researcher. He worked within various governmental institutions. His last employer was with Alterra, ESG, Wageningen WUR.**

Introduction

Jan te Boekhorst wrote this essay in a private capacity at his departure from Alterra in 2006. The essay gives an overview of about 20 years (1975-1991) of *landschapsbouw* (landscape construction) as a governmental responsibility. *Landschapsbouw* (a typical Dutch intervention) included research, landscape architecture, spatial planning and design for predominantly the development of the rural areas in the Netherlands. In a separate section, the author addresses especially the relationship between research and landscape architecture. The author saw the initiation, the high, and the loss of *Landschapsbouw* programme as a coherent and independent field of research.

The essay includes summaries of four important key (internal) papers: A. *Omgaan met Landschap vriendenboek Pieter Tideman (*1983); B. Groesbeek, *ontwerpend Onderzoeken – onderzoekend Ontwerpen* (1981); C. *De landschapsarchitect in het Staring Centrum, Een vreemde eend, een koekoeksjong of een zwaluw die nog geen zomer maakt? Of beter 1 landschapsarchitect in de hand dan 10 in de lucht?* (1991); D. IMPULS *Landschapsarchitectuur, Een studie naar de mogelijkheden voor samenwerking tussen het onderwijs en het onderzoek in de landschapsarchitectuur in de Kenniseenheid Groene Ruimte* (2001).

Research by Design

Landschapsbouw was the name for a new interdisciplinary research group. It included the planning and design (giving form) to regional landscapes. The research group was housed over the years under various institutions:

- De Dorschkamp 1975-1989
- Staring Centrum 1989-2000
- Alterra from 2000.

With the introduction of this new research group, the paradigm of applied art (design) was introduced in a predominantly agricultural and forestry research environment. This generated intense discussions about the character of the research within *Landschapsbouw*. Landscape architects discussed about their role and function: Should the emphasis lie on landscape science or landscape design?. They saw the *Midden-Brabant* study of the mid-70's study as the phantom of measuring and calculating and how it not should be! Apart from the logistics of quality assessments, the *landschapsbouw* research group was deeply convinced that design had its own intrinsic values.

To bridge the debate the notion of research-by-design' (*ontwerpend onderzoek/onderzoekend ontwerpen*) was introduced in the late 1970's. On page 19, Boekhorst writes:
"De bedenkers van de termen toendertijd (ca. 1980) gingen uit van de opvatting dat onderzoek en ontwerp elkaar op een specifieke en verschillende manier nodig hebben bij het maken van ruimtelijke plannen. Onderzoek kan alleen een rol vervullen in de planvorming als het is afgeleid van ontwerpvragen (ontwerpend onderzoeken), en ontwerpkwaliteit wordt vergroot door goede vragen te stellen aan de onderzoekers (onderzoekend ontwerpen). En deze onderzoeks benadering begon met de formulering van een concept, een richtinggevend idee voor de planvorming[22]

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[22]   The researchers within Landschapsbouw believed that in the process of spatial planning and design, research and design need each other in a specific and unique way. Research in spatial design gains utility if it is based on design questions (design-driven- research), and the design quality can be enhanced by asking the researchers the right questions (research-driven-design). It is nearly impossible to translate this Dutch combination in proper English without creating new meanings. Design-driven-research/research-driven-design may come closest (ed.).

Tideman, the first Head of *Landschapsbouw,* had always believed in an holistic approach and had been able to develop an interdisciplinary team. In 1981, the whole research group *Landschapsbouw* experimented in an atelier-like environment with the initial ideas about *ontwerpend onderzoek/ onderzoekend ontwerpen* in a pilot case "Groesbeek".

In the later periods of the Staring Centre and Alterra, Boekhorst and his colleagues continued to persuade the management about the importance of a design approach in research and in the process brought fort the idea of design as a research instrument. This design approach included design contributions in problem, programme, and design phases (PPP).

During the Alterra period, the delta approach was engendered. Delta, is then seen as the integration of alpha, beta, and gamma science paradigms. To the discontent of Boekhorst, landscape design is brought under the alpha group. He sees design as an integrative delta activity. The design component, however, looses terrain and the unit *landschapsbouw* slowly dissolves.

Relevance
The relevance of this essay lies in the fact that Jan te Boekhorst writes about the initiation of the notion *ontwerpend onderzoek/onderzoekend ontwerpen* in the Netherlands*. He also provides a first definition:
In the context of spatial planning and design, research can only gain utility in the planning process if it answers design questions, while design quality increases when the design activity generates the right research questions. A spatial concept forms the start of such an integrated design process. Researchers from different expertise work jointly with designers in one team on a certain spatial issue. The first experiment (Groesbeek) was kick-started with an integrative design atelier.

***Ontwerpend onderzoek/onderzoekend ontwerpen* (Design-driven-research/research-driven-design) according to Jan te Boekhorst (verbal information) should be treated in unity and not in separation. This indicates attention for the full interative cycle of a design process.**
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Bouwmeester, H., Jan Elsinga, Madelon Hendrich, Oswald Lagendijk, Hermine der Nederlanden (Redactieteam). 2009. Ontwerpen op het raakvlak van water en ruimte, Handreiking en voorbeelden, Actieprogramma Ruimte en Cultuur, Ministerie van VROM in samenwerking met de ministeries van Landbouw, Natuurbeheer en Voedselkwaliteit (LNV), Onderwijs, Cultuur en Wetenschap (OCW) en Verkeer en Waterstaat (VenW), Den Haag, 76 p.

English version – Designing on the interface between water and spatial planning, Guide and Examples (March 2009)

Key words: cases, cross-boundary water cases, spatial planning, participatory design workshops, research-by-design (ontwerpend onderzoek), research through designing, landscape, research and design

Summary
The booklet shares the experience with designing with water over the period 2006-2009. It is composed of two parts; Part I is a guide presented in the form of essays and Part II gives design workshop examples.

Part I gives the purpose (Tineke Huizinga, State Secretary *Verkeer en Waterstaat*) and preparation (Peter Glas from de Dommel Water Board). Then a method of jointly designing (Erik Luiten) including the numeration of quality standards (Jannemarie de Jonge) is presented. The overall objectives include sustainability (Adriaan Geuze) and part 1 closes with an essay of Dirk Sijmons on the outline of the required follow-up activities. Sijmons stresses the importance of the specification of the role and selection of workshop participants, designers, facilitators, and in the after-math a charismatic leader or ambassador.

Part II is composed of the seven pilot design-studios. The description of the studios addresses content and process, lessons learned, and achieved results. In this summary, the pilot project "Guide for spatial quality of the river IJssel – A safe river in harmony with its surroundings" is used as an illustration (pages 35-39). The executing office was Bosch Slabbers Landscape Architects and the client was the Provincial Government of Overijssel (who also acted on behalf of the Provincial Government of Gelderland). The lessons learned in this specific case are summarised as follows:
•   Explicate environmental qualities
•   At the beginning agree on the end product
•   Select participants carefully (sufficient time, money, space, and capacity)
•   A design approach helps moving between level of scales
•   National (provincial) guidelines do not automatically affect other levels of scales

The workshop result was expressed in strategic design principles for spatial quality for the river the IJssel (Guide for Spatial Quality of the River IJssel).

Other pilot design studios include:
Groene Woud and Essche Stroom – Cultural history gives inspiration
Executing office: Grontmij
Commissioner: Waterschap de Dommel

Rotterdam Plantage South – Water for desirable neighhourhoods
Executing office: RIGO and West 8
Commissioner: Municipality Rotterdam

Haarlemmermeer Westflank – Housing and water in the polder
Executing office: Strootman Landschapsarchitecten
Commissioner: Province Noord-Holland

Amsterdam Southeast lob – Over the boundary between city and countryside
Executing office: TU Delft and NL Architects
Commissioner: Municipality DRO Amsterdam

Walcheren Waterfronts – Handling uncertainties flexibly
Executing office: Arcadis
Commissioner: Municipalities Veere and Vlissingen

Bodegraven-Woerden Window – To be kept open with water
Executing office: Bureau Alle Hosper
Commissioner: Steering Committee Green Hart

For the purpose of this bibliography, the lessons learned in the various pilot cases are combined under the headers logistics and organization, knowledge base, and process, as follows:
Logistics and Organisation
• Problem ownership lies with the local parties,
• Select participants carefully (*sufficient time*, money, and capacity),
• Communication and participation from various disciplines leads to reflection and quality,
• National (provincial) guidelines do not automatically affect other levels of scales,
• Cultural history works as a binding factor for experts as well as inhabitants, and
• Involve inhabitants in the designing.

Knowledge base
• Knowledge of the working of abiotic (biotic) systems is critical,
• Insight in water systems and their spatial consequences is important for good design (include educational sessions if necessary),
• The 'water' assignment is not new – there are lessons to learn from the past, and
• Extract local knowledge from inhabitants.

Process
• Cyclic step-by-step (design) process is needed to make appropriate choices,
• Combine designing with calculating for feasible plans,
• Extreme models, scenario's, alternatives, sectoral entry points generate discussion,
• Allow for wild ideas (outside policy frameworks),
• Higher levels of scale expose spatial quality and sustainable water systems,
• A design approach helps moving between level of scales,
• Illustrate effects on direct living environment in detail,
• Explicate environmental and spatial qualities, and
• At the beginning - agree on the end product and establish a joined ambition.

Relevance:
In the speech of Tineke Huizinga (State Secretary for Transport, Public Works and Water Management) at the launch of the "*Canon of Nederlands Water*" 16 December 2009, the issue of research and design is addressed. Huizinga states that projects on the interface between spatial development and water crossing administrative boundaries gives *designing* and *research through designing* a high priority. Designers are expected to deliver more than a spatial plan; the plan should also serve as a guideline, or source of inspiration, and for administrative and legal definition. The design *process* is crucial. *Designing and 'research-through-designing'* make it possible to broaden the issues and to identify unique, comprehensive solutions that are effective on multiple fronts (page 9).

She does not explicate what the *research results* are or what '*research-through- designing*, other than through the examples, should entail. Important is that she speaks of the verb *designing* with an emphasis on the *process* rather than the noun design.

The examples are all design- and landscape-based, participatory workshops. The role of the designers was not always made clear, except in the case Plantage Zuid in Rotterdam. Contractors were RIGO and West 8 and the client the Municipality of Rotterdam. Here, the interaction between drawing and calculating was made explicit (pg. 49 English version and 51 Dutch version). A social cost-benefit analysis was used as a design tool. This tool was used to check by hindsight but also an as instrument for optimizing the design during the design process. This example case illustrates well what the interaction between *research-through-design* or *research-based-design* could be.

Luthi, Peter. 2007. Samenvatting van de bijdrage van Peter Luthi, Powerpoint Themabijeenkomst van de NVvE, Tiel, 15-10-2007,

Key words: ontwerpend onderzoek (research-by-design), evaluatie onderzoek (evaluation research)

Peter Luthi is architect in het bureau Luthi & Niclaes Bureau voor Architectuur, Onderzoek en Procesregie, gevestigd in Rotterdam sinds 1978. In de afgelopen jaren is door Luthi & Niclaes een werkwijze ontwikkeld waarbij een directe koppeling wordt gemaakt tussen evaluatieonderzoek bv naar het functioneren van gebouwen en het ontwikkelen van bouwkundige voorstellen en oplossingen. Naast architectuurwerkzaamheden worden, **door middel van ontwerpend onderzoek**, kwalitatieve Programma's van Eisen ontwikkeld vooral voor het bouwen in de Zorgsector.

Er lijken 4 stappen te zijn in deze werkwijze:
1) ontwikkelen van een Programma van Eisen door middel van observaties en analyses in de bestaande situatie en het gelijktijdig ontwikkelen van bouwkundige oplossingen
- Invloed van de fysieke omgeving op de mens (*space, place, occasion* bepaalt de kwaliteit van de fysieke omgeving (=*scene*)
- Knelpunten in de fysieke omgeving en ontwikkelen van oplossingen
- Schaalvoorzieningen (bed, nabijheid bed, kamer en nabijheid kamer)
- Voorfase basiskwaliteiten op basis van onder andere een Onderzoek naar Ouderen in Ziekenhuizen en de visie WZH (van instituut naar woonachtig)
2) het komen tot een Programma van Eisen door middel van **ontwerpend onderzoek** gestuurd door de visie van de opdrachtgever
- Elementenstudie (leefstijl 6 bewoners per bungalow)
- Kleurperceptie (literatuur)
- Privacy en sociaal contact; geborgenheid en deelname, keuzevrijheid (schetsmatig zoeken naar plekken)
3) vastleggen van basiskwaliteiten zoals ruimtelijk oriëntatie en zelfredzaamheid, op verschillende schaalgebieden (bijvoorbeeld in badkamer, bij bed etc.)
4) inspraak belanghebbende door middel van het 'dubbelpaginaprincipe'. Dit principe laat geconcentreerd over 2 pagina's de overwegingen en mogelijke oplossing ten aanzien van de basiskwaliteiten zien en nodigt hiermee iedereen uit om hierover mee te denken (visualisatie – om discussie te genereren (statement 1: basiskwaliteiten dienen een toetsingkader te zijn in het gehele ontwerp- en bouwproces; statement 2: meedenken over omgevingskwaliteit is "zaak" van iedereen))

Relevance
Ontwerpend onderzoek in deze benadering wordt vooral ingezet om tot een programma van eisen te komen. De visie van de cliënt, de fysieke omstandigheden, literatuur onderzoek, en consultatie van bewoners waarbij ook wordt geschetst. De onderzoeksresultaten worden ingezet door de architecten in het ontwerp.

Reeth, Johan, Ontwerpteam Johan Reeth. 2005. Ontwerpend Onderzoek Koninklijke Baan, PRAKtijk Workshop 22.03.05

> **Johan van Reeth is engineer architect and urbanist. Hij is mededirecteur van het Bureau voor Urbanisme (buur) in België**

Key words: ontwerpend onderzoek, consultation, design alternatives

Dit document betreft een *powerpoint* waaruit de zoektocht naar een nieuwe infrastructurele verbinding langs de Belgische kust wordt uiteengezet. Er is een analyse naar functies gemaakt – verbinden en ontsluiting. Voor het deelgebied De Haan, België, worden 5 uitgangspunten (knippen, verbinden, parkeren, tunnel, en ontsluitend) geformuleerd. Deze worden ook in een kaart gevisualiseerd. Beelden worden getoond om een impressie van de locatie te geven. Het gehele proces wordt **ontwerpend onderzoek** genoemd.

Relevance
Het document geeft vooral een opsomming van stappen die zijn gezet om tot het ontwerp voor de nieuwe verbinding te komen. De *powerpoint* geeft geen inzicht in het proces in de zin van keuzemomenten. Wel wordt er onderzoek gepresenteerd naar ruimtelijke landschaps'lezing' (landschapsanalyse), toegankelijkheid, en verzandingprocessen. De resultaten lijken vooral uit het ontwerpteam van Johan van Reeth voorgekomen te zijn en niet met de bevolking of experts te zijn getoetst. Ook komen er geen nieuwe onderzoeksvragen voort uit de zoektocht naar locaties of uit de gepresenteerde varianten voor de ontwikkeling in De Haan. Het ontwerpteam Reeth geeft inzicht in een ontwerpproces en noemt dit ontwerpend onderzoek.

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APPENDIX 1

FURTHER READING

APPENDIX 1

FURTHER READING

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