Notions from practice

Research by design as a stepping stone for the implementation of integral forms of spatial design

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DESIGN ACTIONS FOR SHIFTING CONDITIONS

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NOTIONS FROM PRACTICE.

RESEARCH BY DESIGN AS A STEPPING STONE FOR THE IMPLEMENTATION OF INTEGRAL FORMS OF SPATIAL DESIGN —

Jutta Hinterleitner

Need for new forms of design

In the current era in which climate change combined with the continued growth of our cities poses major challenges, it is becoming increasingly clear that not only as designers, policymakers, administrators, but also as inhabitants and users of the city, we cannot continue as before. In addition to new forms of governance, the transitions we face as a society also emphatically demand other forms of spatial design. If we want to keep our cities and immediate living environment future-proof, safe and healthy, we will have to handle (public) space, mobility, raw materials and water more conscientiously, to name but a few examples. For architects and other design disciplines this means rethinking, designing and materialising differently, but also developing new roles, forms of collaboration and business models.

Practicing in design ateliers

Based on the fact that there is still much to be gained in the field of sustainable and integral design of the urban environment, between 2010 and 2021 BNA Research, the former research department of the Royal Institute of Dutch Architects (BNA) organized design ateliers in which architectural firms and other design agencies, problem holders and knowledge institutions take part. Throughout a design atelier the best possible future for an area was drawn up and discussed on the basis of equivalence (hierarchies did not apply) and in a setting where restrictions imposed by regulations and policies were set aside. This resulted in spatial translations, scenarios and designs, which show how various complex issues can be linked together in a design and which practical and policy-related steps can be taken to realize the outlined scenarios.

By using *research by design* at the front end of a process in which a vision for the future of an area is being created, it acquires strategic meaning. The images produced by the designers can help problem holders discover what ambitions they have for the future of a place or area. Combined with area-based knowledge and knowledge about the larger systems involved, this leads to useful quality frameworks for upcoming construction and development assignments, but above all to establish shared narratives.

The publications that discuss the results of the design ateliers: (1) Highway and City; (2) City of the Future; (3) City x climate. The building as a water machine; (4) Onder weg!.

By elaborating futures that are able to connect the various parties, a discourse coalition[1] can be created, an alliance around a shared story. In this way, high-profile design ateliers have been carried out in recent years, looking into, for example, opportunities for designing for transit oriented development[1] (de Boer, Van den Boomen et al. 2014), the role of the urban ring road as a place for transformation of space and mobility (de Boer, Van den Boomen et al. 2014) or opportunities for integrated urban development in times of major transitions (Berkers, de Boer et al. 2019).

Theoretical intermezzo — the literature behind the design atelier

The instrument 'design atelier' creates a learning network in which designers such as architects, urban planners and landscape architects work together with a broad palette of area stakeholders, governmental institutions and knowledge agencies. This is where what Varkki George (2007)[2] calls 'Second-order design' comes into being: design that creates strategic frameworks instead of final images, and that can adapt to changing circumstances. Gibbons et al. (1994)[3] describe the knowledge that underlies more open planning as 'Mode 2 knowledge': created in a transdisciplinary context, and more widely supported and applicable. Another key concept associated with this method of working is the 'soft space' (Allmendinger and Haughton 2007, Hajer 2017), an informal space for interaction and vision development, where stakeholders can collaborate on substantive rather than hierarchical grounds.

The practice: 'City x Climate — The building as a water machine'

From the autumn of 2019 til the spring of 2020, five interdisciplinary design teams, three municipalities and three housing corporations worked on the design atelier *City x Climate – The building as a water machine* under the leadership of BNA Research and Delft University of Technology (DIMI). The aim was to use design as an instrument to set up a learning network and together gain knowledge about possibilities for closing the water cycle in and around residential buildings.

The changing climate is forcing us to act, but the current visions on climate adaptation mainly focus on the function of public and green space as a buffer for extreme precipitation. But what if there is not enough storage capacity there? Because, for example, we have turned the urban public space into roads and parking lots, or, the groundwater level or soil conditions make infiltration impossible. The often-scarce public space is heavily overloaded. Almost all of the transition challenges the city is facing make a claim on public space and its subsurface: a puzzle that cannot be easily solved. Starting from the idea of reasoning from the building itself, and from the realisation that housing corporations have more than 2.2

[1] Daamen, T. A., and Verheul, W. J. 2014. "Stedelijke ontwikkeling als een emergente adaptieve strategie". *Bestuurswetenschappen*, 68: 3.

[2] George, R.V. 2007. "A Procedural Explanation for Contemporary Urban Design". In *Urban design reader*, edited by Tiesdell, Steve and Carmona, Matthew. Amsterdam; Boston; London: Architectural Press, Routledge.

[3] Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scot, and M. Trow.1994. New Production of Knowledge: Dynamics of Science and Research in Contemporary Societies. SAGE Publications Ltd.

million homes under their care in the Netherlands, the design atelier focussed on the social housing stock. Investigating the building as a link in the water system, in which rainwater is not seen as a threat, but as an opportunity for climate resistance and comfort. The corporations, which were involved as partners in the project, can make a real difference as owners of an extensive real estate portfolio. Each of the five design teams settled at specific locations in the cities of Amsterdam, Rotterdam or Zwolle and used existing, outdated building blocks of the housing corporations as case studies. At all five locations, flooding during extreme rainfall was a problem. What possibilities did they see for making the buildings climate-proof? How could the water storage capacity of the buildings and their immediate surroundings be increased and heat stress reduced? Starting points in all five cases were peak loads of water due to extreme precipitation and heat stress in hot summers. How could a surplus of water be buffered before it could cause nuisance and then be used for dry or hot periods? And how could all this be designed to improve the quality of life of the inhabitants?

During the 5-month program, participants followed master classes at Delft University of Technology, worked on concrete plans with stakeholders in local workshops, and discussed interim results with each other. This led to lively discussions – for example, corporations and municipalities are far from knowing how to practically finance climate adaptation measures – and, to new insights.

The conclusion we can draw from this project is that the social housing stock can make a substantial contribution to climate adaptation, both in terms of coping with extreme precipitation and reducing heat stress. Cleverly using and linking technical and natural possibilities through design can mitigate the consequences of weather extremes. And what is most important in social housing construction: existing homes and neighborhoods can be improved. The design interventions proposed are not limited to the building alone. The larger water system of the street and neighborhood is part of the larger picture – and part of the solution.

This necessitates the involvement of many parties and cooperation between them. Cooperation, that in fact, is the only way to make the built environment truly climate-adaptive.

In addition to the climate adaptation, the design teams also integrated other issues such as local energy generation, reuse of building materials and social interaction into their plans.

Five design visions on climate-adaptive buildings

A phased climate adaptation plan was drawn up for the rowhouses in Tuindorp Oostzaan in Amsterdam North, where the buildings are being future-proofed in the rhythm of the maintenance cycle. The coming decades, private gardens will be transformed into a collective rain garden. On the street side when water levels are high, the street can take the role of a water buffer, closed off by front garden walls

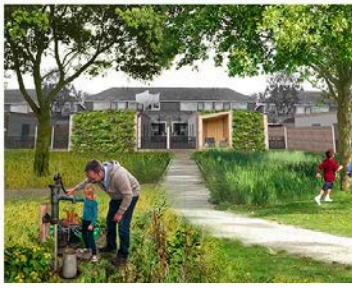
with watertight retaining walls. In exchange for giving up their private garden, the residents gain a pergola on the garden façade, which will provide shade and carry solar panels. At a later stage, the pergolas can be transformed into climate-proof extensions, with a grey water tank underneath.

The team that worked on the apartment building in the Waterlandplein neighborhood in Amsterdam North proposed to make a real water machine out of the four residential buildings and their immediate surroundings on the basis of technical and ecological measures. In feasible steps from small to large, the water problem and heat stress can be solved. The plan shows how the worn down flats can be upgraded with technical interventions and turned into attractive and liveable places. That begins simply, with a sloping roof that allows water to flow into tanks that facilitate the maintenance of greenery on the balconies and facades. With higher levels of ambition, the existing stairwells can be transformed into vertical gardens with galleries added for circulation. This makes it possible to differentiate the apartment types, while the water cycle is becoming more and more balanced.

Also in the low-rise Assendorp district in Zwolle a hybrid technical and ecological system is being proposed: a depth infiltration well collects all the water that falls in the closed building block into the ground for later use. On the way to the well, the precipitation waters the green roofs and fills grey water tanks for domestic use. These green roofs also eliminate heat, just like the summer night ventilation that is being added to the houses during planned maintenance. Here, too, the small private gardens will be transformed into a large, collective rain garden. This requires consent from the tenants, who





need to – above all – be seduced by the attractive result and the fact that the current water nuisance will be solved structurally.

Team Feijenoord worked on two city blocks on either side of a street and sought the solution for the water problem mainly in the sponge effect of vegetation. The petrified public and private outdoor space – the street and the gardens – will be used for the construction of a 'green blanket', which in dry periods will be fed by stored rainwater from underground infiltration crates and water tanks on the roofs. Fruit gardens will be planted to connect, cool and provide food for the residents. The roofs and façades will also be given a green skin, which provides cooling on hot days by evaporating the stored rainwater. In this plan, the green blanket will fulfil all the functions that are currently lacking: the water buffer, evaporative cooling and the meeting place.

In the Alexanderpolder in Rotterdam, where four gallery flats[4] were investigated, the most radical choice was made with a plan that allows water to step-by-step take over the neighborhood. The design team is committed to a large-scale transformation of the polder[5] landscape at more than six meters below sea level, which is subsiding. The measures the team proposes will create a swamp landscape and in the last stage possibly even a water landscape. The buildings become self-sufficient units that not only use the water from the surrounding area but also generate their own energy. Adding collective functions and meeting spaces in and on top of the flats create an attractive and interactive environment. Water is no longer presented as a threat, but as an opportunity for real estate and residents. For each of the test cases, an adaptive solution has been proposed, which can be scaled up as the need increases.

[4] A block with exits on interconnected balconies
[5] A low-lying tract of land that forms an artificial hydrological entity, enclosed by embankments.

The five design locations: Tuindorp Oostzaan (Amsterdam), Waterlandplein neighborhood (Amsterdam), Assendorp (Zwolle), Feijenoord (Rotterdam) and Het Lage Land/Prinsenland (Rotterdam). The top row shows the existing situation, the bottom row impressions from the design study

With regard to the business cases that have yet to be worked out: all parties realise that doing nothing in the long term will cost more than starting to deal with climate adaptation from here on. Both the participating design firms and the stakeholders have acquired a great deal of knowledge about climate adaptation in existing buildings. The housing corporations and municipalities have been presented tools for future implementation.

In addition, the results show that using *research by design* to develop scenarios for major transitions also helps to integrate new ways of thinking, working and collaborating into policies. The Dutch National Strategy on Spatial Planning and the Environment (NOVI 2020) published in 2020, recommends *research by design* as a working method, because it produces high quality visions.
What does this working method mean for the competences of designers? They need knowledge at the level of the larger systems to be able to make integral plans. Not only by organizing design ateliers, the BNA prepared its members for the strategic and connecting role that they can and must increasingly play. But also for architecture and urban design education, knowledge about transitions and systems is a crucial stepping-stone towards successful professional practice. Another obvious route to take is to establish integral studios in which students from different study programs work together on complex issues.
The knowledge and competences that can be achieved in multidisciplinary design ateliers definitely enable designers to make plans for a better and more liveable future of our cities.

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At the time of writing the text contribution, the author was the Research Coordinator of the BNA. Currently, she is affiliated as Research Fellow Management in the Built Environment at the Faculty of Architecture and the Built Environment, TU Delft.

Notes

Design teams involved in *City x Climate*:

Tuindorp Oostzaan: Gerben Strikwerda, Bram van den Heuvel (Strikwerda van den Heuvel architects), Robbert Jongerius, Gijs Rijnbeek (LAND studio)

Waterlandplein neighbourhood: Tom Bergevoet, Maarten van Tuijl, Deniz Atakan, Sebastian Nitu (temp.architecture.urbanism), Erik Tober, Ruben Roelofs, Léon Brouwer, Chantal Posthouwer, Arend de Wilde, Marc Bijvoet (Royal HaskoningDHV).

Het Lage Land / Prinsenland: Nina Aalbers, Isabella Trabucco (Studio ArchitectuurMAKEN), Raquel van Donselaar, Menno van der Heijden (HOSPER landscape architecture and urbanism), Janneke van der Leer (SWECO), Fred Prins (GEP Rainwater).

Feijenoord: Dirk Jan van Wieringhen Borski (BNB Architects), Lieke de Jong (VISTA landscape architecture and urbanism), Gerard Wijland, Leon Valkenburg, Thijs Kool (Tauw).

Assendorp: Heleen Bothof (LUZ Architects), Arjen Oord, Olivier Hoes (Acacia Water), Esmeralda van Tuinen (independent public housing consultant), Michiel Brouwer (independent urban planning consultant), Remco Looman (lecturer/researcher sustainable indoor climate)

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The book 'Stad x klimaat – Het gebouw als watermachine' (in Dutch) can be ordered via www.bna.nl / shop.

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