

LOCAL VALUES
in a
NETWORKED
DESIGN WORLD

ADDED VALUE OF COMPUTER AIDED
ARCHITECTURAL DESIGN

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Vista Versa

Critical Considerations on the Evolvement of Designerly Attitudes, Instruments and Networks in Design Driven Studies

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KEYNOTE PAPER

Introduction

We are all involved in design.

Besides being the (sub)conscious *recipients* of all sorts of design driven activities, we are professionally concerned with *products* of design and *acts* of designing, either as practitioners or as academics, in some cases as both...

As someone who was trained as a designer, drifted into design teaching and presently attempts to combine composition research with design practice, I feel there is a need to bridge the cultural gap between design and design research. I intend to put forward the case for more *designerly* approaches in the study of design.

In this context I would like to discuss perspectives for design *driven* studies by considering the following *ensemble* of aspects:

- the matter of shifting *attitudes* to design in a scientific context;
- the necessity of expanding the scope of *instruments* of design in relation to methods and insights.
- the furthering of opportunities for *networks* aimed at bringing out and communicating findings concerning different aspects of design.

It is on the topic of *interaction*, between the targeted creativity of *designing* on the one hand and the open minded search for relevant knowledge, insights and applications on the other, that I would like to dwell.

Furthermore, I hope to provoke some thoughts – and hopefully responses – concerning the roles of computer based applications in such studies. What kinds of impulses *have* computer technologies offered, *should* they perhaps have offered and indeed *might* they still be able to offer in this field? I would like to by take a critical look *back* and try to turn things around, towards a possible view *forward*...

Attitudes to Design and Research

The area of Design is extensive and varied.

An ‘in-between’ realm: broad and multi disciplinary; traditional as well as innovative; stretching into the domains of the Technical Sciences on the one hand and those of the Arts on the other. A conglomerate of domains with overlapping and constantly shifting boundaries, in many ways still ‘unmapped territory’. As such there is much to be explored and discovered...

What do we know about design? How does one go about it? What do we need to know or master in order to create design solutions worthy of merit?

Some basic definitions of ‘design’¹:

- to work out the structure or form of something by making a sketch or plans;
- to plan and make something artistically and skilfully;
- to invent / to intend;
- a plan or preliminary drawing / project / a purpose;
- the arrangement, elements or features of an artistic or decorative work;
- a finished artistic or decorative creation;
- the ‘*art*’ of designing.

Clearly design is to be considered both as the plan or object (noun) and as an action or process (verb). Together something approaching a frame of mind: a sometimes wonderful, often annoying, ultimately satisfying or frustrating, captivating yet elusive intellectual and creative phenomenon, which in research, education and practice is alternately canonised, mystified, misunderstood or ridiculed.

The Dutch word for designing – “ontwerpen” – is thought to be a mutated translation of the Latin word *projectare*: the idea of the designer ‘projecting’ new developments². Clearly, designing is an act of *conceiving* futures. An important part of this work is testing the ideas and demonstrating that these are *conceivable*. This is important for the designer him/herself, but also for all kinds of other ‘actors’ involved in the design and realisation processes.

Designers are inclined to look forward towards ‘what might be’, they seldom look back in order to understand what has come to be and why. They apply their knowledge in a pragmatic way, but they are also inclined to ‘bend the rules’ for aesthetic effect whenever they consider it necessary. Such ‘poetic licence’ may be at the root of persistent objections to architectural design and affiliated research activity from conventionally inclined academics. However, it is precisely this *tension* between logical and aesthetic considerations that makes architectural compositions so *complex* - and therefore so challenging...

Designing is not a ‘scientific’ activity: it is an *iterative* development process³ which is

both *rational* and *creative*, drawing from a wide range of knowledge and experience, concerning technical, practical *and* cultural aspects.

An *architectural* design (which I would like to consider not only as the creation of buildings, but also of urban environments, constructions and planning processes) remains a mental ‘construction’ up to the moment that it is realised and begins to function within surroundings which become altered by its introduction. In the unpredictable and iterative design process, various options are developed and ‘tested’; a process which is rational as well as intuitive.

Designers base their conceptions on experience and knowledge but are often able to take ‘shortcuts’ and ‘bypasses’, using an *intuition* which is fed by knowledge and experience. As such a design product is clearly not the same as research output. A designer is primarily involved in a creative process aimed at reaching a solution which is – at least in principle – ‘buildable’, whereas a researcher is involved with the evolvment of *knowledge*.

Our judgements involving issues of design are often guided by ‘feelings’ which are difficult to rationalise. For designers - and particularly for people *learning* and *teaching* design - this is a problem. There is a need to *understand* what the relevant *options* are, what the effects of design *decisions* will be and how people, confronted with the results of the designer’s toils, will *experience* his or her creations - often ‘day in day out’...

For this reason academics have an obligation to *disentangle* the maze of compositional issues which are *fundamental* to our understanding of how built environments ‘come across’.

If we wish to *extend* the range of design oriented research, then other methods have to be found - or developed - which do justice to the kind creative *variation* which is a characteristic of (architectural) design composition.

Whilst we should recognise the intrinsic *differences* between practice and learning, it is relevant to look for connections between the disciplines. I suggest we do this through the active *integration* of the sorts of experiences which may be gained through designing – and indeed through *teaching* design – into *research* initiatives, whilst simultaneously attempting to bring somewhat more method and rigour into the – notoriously woolly – domain of design based discourse.

Designerly Enquiry

New opportunities for innovative – and imaginative – design research may be offered by integrating active forms of *designerly enquiry* into research⁴. In this context the term ‘designerly’ is consciously used to indicate *the kinds of* approaches used in designing, but also – potentially – for the benefit of gaining insight, experience, knowledge.

Design based studies can follow different routes towards various goals. The two most characteristic of these:

- the purposeful *creation* of functional objects and spaces (by the designers);
- the objective *understanding* of the underlying generation processes and workings of such artefacts (by the scholars).

These two trajectories appear to move in opposite directions and are therefore often presented as wholly different, even *conflicting* forms of intellectual endeavour.

However, this enduring dogma, whereby designing and design research are considered as 'separate worlds', is not only conservative (protecting the established 'habitats' of *praxis* and *academia* by keeping each other at a safe distance), but form an obstacle to the cultural, intellectual and methodical development of both design based knowledge and knowledge based design.

It is generally only possible to learn from design processes *afterwards*, whereby the end product can seem like a natural, unavoidable outcome. However, it is the kinds of judgements made *during* a design process from which we may learn what is behind the concretised spatial object we perceive (and appreciate). The problem is there are few designers who conscientiously document the development of their plans and for most academics it is difficult to grope what goes on within a seemingly chaotic process leading up to the eventual end product. An alternative is to set up more or less 'controlled' design exercises with the ambition to *learn* rather than to *build* ⁵. Such studies may be carried out by involving design practitioners or students. The disadvantage of students may be their lack of experience, but this is often compensated generously by their open-mindedness and inquisitiveness, as well as their willingness to share discoveries and insights. There is a lot to be said for a more active 'laboratory' approach to the educational environment, whereby designerly activity is made instrumental in order to gain insights into issues of composition and perception, as well as the ways in which design tasks are *approached*.

The Delft Form & Media Studies group has developed a variety of design driven workshops, such as the TUD Variations ⁶. Such exercises tend to be most effective if a clear 'game' situation is devised beforehand, with previously defined tasks and constraints. On the basis of experiences with such design workshops, eight *types* of design driven composition research have been identified, from more or less familiar forms of design research to more speculative approaches, involving design(erly) activity as an integral part of the research method ⁷.

An important requirement for an architectural *research* project - as opposed to a design process - is that it must be methodically *transparent*, as well as *systematic* in the way insights are gathered and subsequently communicated. The characteristically wide range of design endeavours should not be denied but should somehow be 'tamed' for the benefit of research.

Most contemporary architectural research tends to be *descriptive*, often focusing on the oeuvres of individual architects or groups and their underlying ideological motivations. However, design research might involve *applying* design knowledge and experience in order to get behind the kinds of *considerations* and *choices* which determine the end product, in order to understand how such an object or environment is *conceived* and *perceived*. This involves the characteristic *interplay* of various compositional aspects. Introducing certain *constraints* narrows down the field of study, without necessarily leading to reductionism or simplification. This approach to the study of design involves identifying themes, defining meanings, establishing relationships and unravelling design composition attributes.

Instruments and Networks of Design

What kinds of ‘instruments’ do designers use in order fulfil their tasks?

One could argue that the true instruments of design are the building materials from which the end product is to be constructed. It is unquestionably true that architectural design has a great deal to do with creating the conditions by which the idea can be *concretised* and as such designing might be viewed as a kind of *virtual building process*. But it is not only with building that the designer is concerned, issues include setting the scene for future patterns of use, for human interaction and experience. Atmosphere, dramatic effect and emotional well-being are addressed. Aspects of the concept are continually being evolved, tested and refined in relation to each other. This calls for ways to capture and communicate the figments of the *imagination* through active *imaging*, using specialised design *media*.

Traditionally, the architectural designer has always been considered the one who was not only knowledgeable about the craft of building, but also skilful in its notation and communication, possessing the ability to *draw*... Apart from drawing up plans, elevations and sections Designers have, through the ages, become more and more proficient in their mastery of different design media. In order to give shape to their thoughts, there is a constant flow of drawings, models, schemes, diagrams and sketches which (in combination) can conjure up a vision of the *effects* of the concept.

Such designerly enquiry generally involves a great deal of *redrawing*: it is very rare indeed for a designer to get things ‘right’ straight away. Different components are studied as constituting parts and as it were assembled, taken apart again, altered and reassembled in *mental experiments*. As such the search for the ‘correct’ design composition often follows *loops*, whereby the concept is mentally decomposed and recomposed, in order to reach a *synthesis* of form, space, material and detail.

Media innovations, even relatively modest ones, can enhance the designer’s working methods and stimulate new approaches. Two historic examples of this phenomenon have been the introduction of *squared paper* (which is said to have stimulated the outings of intellectuals like Thomas Jefferson into (neo)classicist architecture) and *transparent paper* (which allowed modern architects to redraw (aspects of) different design options – one over the other).

Clearly, the influx of computers into the world of design has had a major impact. Even though design thinking as such does not seem to have fundamentally changed, the *instrumentation* of the designer has been expanded considerably and this is still an ongoing development.

An important difference with ‘familiar’ media is that computer based applications are essentially *choice based*; rather than physically generative. This has certain advantages, but at the same time it means that the designer is dependent on the qualities – and limitations – of preconceived *products and data*. Such products are continually being improved. This does not always make it easy to become fully proficient – and indeed *comfortable* – with the design tool, or *instrument*.

I feel that one of the most enduring misconceptions is that of ‘the computer’ as a *medium*. The power of the present spectrum of computer aided applications is that the designer can choose for *different kinds* of media (software applications), which can

increasingly be *linked* and used in different *combinations*. As such, individual designers and researchers can create their own conglomerates of instruments, based on individual preferences and skills.

In this way computers should really be considered as *networked* devices, characterised by communication within and without their system boundaries. A situation which is on the one hand efficient, but at the same time makes the user vulnerable for unwanted intrusions and technical complications – particularly through interaction with ‘external’ networks.

Despite the fact that interconnection appears to have become the norm, the media applications mentioned still have to share the same basic *interface* – essentially a flat screen, an adapted typewriter keyboard and a targeting device, generally a ‘mouse’. In the eyes of some experts this means that computer driven media will never be able to acquire the qualities of truly specialised instruments, comparable to, for instance, musical instruments.

Can computer driven media shake off the aura of multi-functional, non specific *gizmo*? One way would be create specialised, stand alone tools. The case for such a development has been put forward, but does not seem to have truly ‘caught on’, even though there appears to be a growing tendency towards using one computer for (relatively dirty) *communication* tasks and having one reserved for the ‘important’ work.



Figure 1: Umgebände variations – five buildings from the Oberlausitz plus one Bohemian wood-frame house (Czech republic)



Figure 2: Elementary decomposition and structuring studies on the basis of a characteristic Umgebände farmhouse building

Networked Enquiry—the Umgebinde Variations

In recent years emphasis has been placed on the interactive *communication* capacities of computers, resulting in inflated claims that we are – at last – living in a unified, ‘networked’ world’.

The fact that the currently mass communication networks tend to use digitally broken down information through ‘wired’ connection systems is not a merit in itself and one could even argue that the true network potentials of computers have been seriously neglected in recent years.

Besides, networks are nothing new...

In the field of designing and building human environments, there have always been platforms for exchanging knowledge, experience and insight.

The disciplines of building are to large extent ‘empirical’, as far as that they tend to follow paths of ‘trial and error’. If a certain approach works, or is considered pleasing, this information will get passed on. As such developments in the architectural profession are for a large part *precedent based*. Examples which are considered successful will be ‘followed’ by others, though usually not literally *imitated*. There is a deep-rooted tendency towards creating designs which are (at least to a certain extent) ‘original’. Techniques and styles tend to be adopted, but at the same time *transformed*. Reasons may be the environmental situation and cultural context, societal and economic factors and individual preferences and – last but not least – the designer’s *ambitions*.

An interesting example of the way networks can come together and lead to new solutions is what I would like to consider as the *Umgebinde Case*.

In the late medieval period two types of building conventions – the Slavic ‘block hut’ type and the Germanic ‘wood frame’ type – met in the relatively sheltered and self-contained borderland of the Oberlausitz (where eastern Germany, the Czech republic and Poland come together) ⁸. The interesting thing is that these two ‘networks’ did not repel each other but led to a fusion, resulting in a unique building type, which gradually developed into a clearly recognisable *local* style.

Because of the relatively simple basic set-up of these houses (accommodating farming and weaving enterprises as well as serving as dwellings), the subtle *variations* become very apparent.

Without wishing to present the relatively well preserved, but isolated, Umgebinde format as a ‘model’ for design thinking, I would like to consider it as a worthwhile, concise *case*, in the sense that it highlights the interaction between identifiable *patterns* of composition on the one hand and forms of project specific *articulation* on the other.

Designing has to do with the interplay between *Convention* and *Invention*.

Inventions may be brought on by technological advancements, but are frequently *transformations* of existing approaches. Once such inventions are *recognised* they become the ‘latest convention’ and the cycle is repeated.

But there is *another* kind of invention, less apparent from a distance, but nonetheless crucial to designerly thinking. This is the kind of invention on the level of the composition at hand: the kind of development of options, choice-making and fine tuning which takes place on different levels of the design, often simultaneously, and shapes the many-faceted overall end-form.

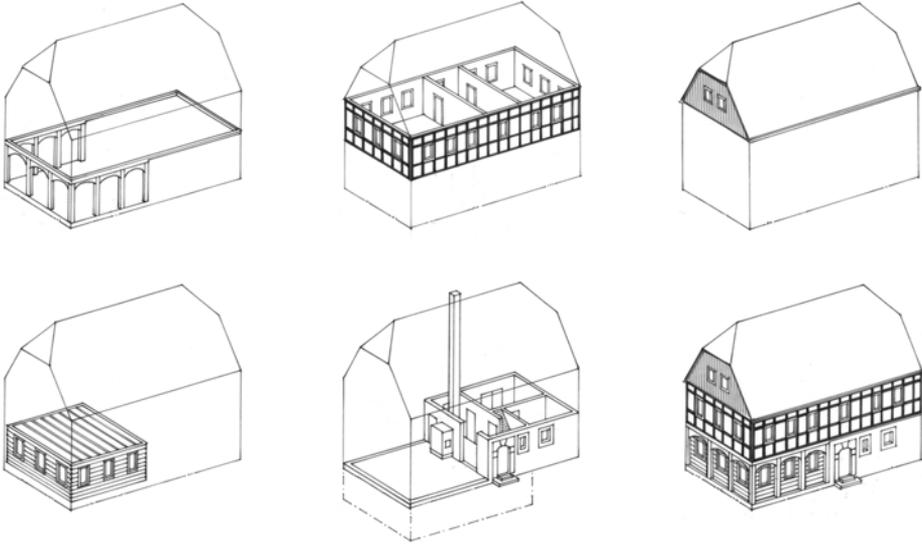


Figure 3: Overview of essential Umgebände characteristics considered as typological domains for compositional variation.



Figure 4: Overview with some characteristic formal combinations on the basis of the typological Umgebände aspects. (All illustrations by the author)

An indication of interrelated levels of design invention with their possible relative 'scales':

- Context (1 : 1000 / 1 : 500);
- Form (1 : 200 / 1 : 100);
- Structure (< >)
- Arrangement (1 : 50 / 1:20)
- Material (< >)
- Detail (1 : 10 / 1 : 5)
- Information (1 : 1 / Legend)

Printed texts, drawings, photographs, and recently the availability of information via databases, have accelerated the dispersal of design artefacts and approaches. Architectural fashions are spread and manipulated by the Media. This has arguably led to 'globalisation' in the world of design. However, there is a marked tendency to focus on a relatively small (top?) segment of the branch: the 'travelling circus' of internationally recognised Idols, flattered by an in-crowd of hangers-on, followed critically by professionals and adored by students. The design discourse has become largely *image-driven* and frequently lacking in thematic structure and content.

At the same time it is my experience as a designer that in many ways the practice of designing and building is still a very much a 'local' affair, even though the products used have become more and more globally available and the possibilities for interdisciplinary communication and collaboration have increased.

Recent experiences with designing and building have strengthened my belief that – from a research point of view – it is time to once again get properly involved *in* design, rather than with the kind of trendy superficiality and shallow 'theorising' which seems to have become the norm.

We need to address the thematic conceptions and characteristic networks *within* design, by attempting to unravel the 'Intertwining Continuum'⁹ of design compositions in a *designerly* way...

Digital Pasts, Presents and Futures...

Lastly, some considerations about the possible roles of the computer in design driven studies. First of all a 'look back'...

My generation was brought up with the notion of the computer as a kind of 'brave new world': a bright light on the horizon, greatly promising, but at the same time mildly threatening. We were assured that our future was going to become altogether different, though no one seemed to know exactly what this would involve.

The expected benefits and blessings of 'computerisation' were (and often still are) proclaimed and spread with an almost *religious* fervour. This aura of boundless, fascinated optimism surrounding "The Computer" meant that critically inclined individuals like myself have tended to approach the phenomenon with a combination of *interest* and *scepticism*; maintaining a certain level of reserved distance.

To prepare us for the Wonderful World of Computation in secondary school we received well intended education in 'modern' maths, actually learning to calculate with the binary

system and subsequently moving on to elementary ‘flow’ diagrams, something approaching very simple programming. After that it became relatively quiet for a number of years. In the academic world of the seventies computers were mostly hidden from view and it was the pocket calculator which was the first affordable ‘intelligent’ consumer article. The uppermost in word-processing was still the electrical IBM typewriter, with changeable letter balls. Deep into the eighties computers remained for the most part enormous contraptions, as I learned while working on the development of new ministry complex after my studies: interconnected mainframe devices whirring away in special air-conditioned environments, overlooked by a specialised caste of loving operators. Digitised communication networks were still primitive and cumbersome to use.

Essentially the computers of that era were used as *calculators* and *sorting machines*, capable of sifting through large quantities of coded data. This was what people tended to expect from them. One of the most interesting perspectives (predicted amongst others by scientists and artists) was that of the computer as a *generator* of options, capable of sifting though data for the benefit of creative choice-making.

Even then working with computers entailed being regularly confronted with ‘unpleasant surprises’.

In the course of his evolution, the species of Homo Digitalis has constantly had to prove his adaptability to new levels of *irritation*...

I am convinced that the true impact of the digital ‘revolution’ became apparent with the introduction of desktop *word-processing*: the opportunities of changeable, printable text. Initially this remained the domain of secretaries and ‘typists’ – but only for a while.

The change had come and the computer began to become part of the ‘furniture’ and gradually an indispensable ‘tool’ for just about every layer of the working community. This development was accelerated further by the steady improvement of the stand alone computer’s *capacity* and particularly its more ‘user friendly’ *interface*, as championed by Apple with its lovable Macintosh. A trend grudgingly followed by the other ‘market leaders’ in the field.

The changeover has been radical and amazingly swift. In less than twenty years we have gone from a situation where there was hardly a computer to be seen in the office to one where there are few households to be found without at *least* one. In addition computers have discreetly become part of just about all of our daily appliances.

But where do we stand now?

Most computers still seem to be used primarily as word-processors.

For younger generations, who grow up with them, their appeal is often primarily in the form of ‘games’; the computer as a virtual *weapon*.

The World Wide Web has increasingly become the domain of ‘infotainment’, of sometimes dubious quality, offering access to (commercial) catalogues and the ability to download ‘bits and pieces’ for one’s computer.

The information ‘superhighway’ has become a means for the transportation of hastily conceived messages back and forth, and is showing signs of congestion.

In design, computer aided *drafting* has become the dominant form of notation, from the initial design phase onwards. As CAD is still largely a ‘self-learning’ affair the

opportunities of structuring information (by using components and layers) are still underdeveloped.

Although the ambitions of fully *immersive* virtual reality have been toned down somewhat, computer aided *modelling* has gained prominence. The introduction of texture maps facilitated the generation of dynamic ‘film’ sequences, often of limited image quality and restless (non)scenographic motion.

Increasingly the 3d model is no longer the end product, as images are developed further using image processing software and presented in ‘serial vision’ rather than from a Ferrari/F16 perspective.

This *mixing* of computer based Media, coupled with presentation software and the availability of beamers and digital cameras, has led to a new presentation aesthetic, whereby not only computer generated forms are used, but also all kinds of output created *by hand*.

In addition, the 3d possibilities of the computer have given rise to new representations of *data*, such as ‘spatial’ schemes and diagrams.

The idea that ‘thanks to the computer’ all kinds of forms, which were hitherto not considered economically feasible, could now be *realised* led to a new wave of architectural expression, whereby the challenge seemed to be to make things which could *only* be made with the computer. This fad of ‘Blob’ architecture, around the turn of the Millennium, seldom led to forms of lasting appeal. In the computer the designer might have been able to play freely with a kind of digital ‘silly putty’, but the realised projects tended to be technically and materially unconvincing, costly contraptions, painfully highlighting the limitations to such approaches.

So, what should be our aims?

It seems time to ‘spring clean’ the conceptions and ambitions concerning the ‘added value’ of computation for the future.

As a personal contribution towards a potential ‘agenda’ I would like to put forward the following ideas for *enhanced* value:

- The screen interface has serious limitations and should ideally be replaced by new, less ‘flat’ modes of representation. The design disciplines should take a lead in defining what might be *expected* from new devices – and why.
- As this interface development may be expected to take some time, it is worthwhile to strive towards the active generation of *physical* types of output: objects which can be viewed and handled freely. These do not necessarily have to be full size, scale models have proved to be important instruments of design and research.
- No matter how much we try, the quest for total ‘reality’ will in most cases lead to a kind of disappointing ‘surrogate reality’. In many instances realism is not even desired in designerly enquiry. Levels of schematisation should be sought, which can be reached quickly and spontaneously, yet are capable of conveying *symbolic* information.

- Although there has been a marked tendency towards the generation of three-dimensional objects, nearly all navigation systems are still depressingly *flat* and orientation is generally a problem. It would be worthwhile to start thinking on the lines of information *space*, transparent virtual environments, where the visitor would be able to ‘move around’ whilst knowing his/her ‘whereabouts’.

But most importantly, I would like to suggest ‘re-animating’ the computer as an *ordering* and *structuring* device, particularly for the benefit of designerly explorations. In this way it would be possible to introduce more *objectivity* into studies into design decision-making, searching for and recognising *patterns* in *variety*.

The aim should not be to specify binding systems, but to be *systematic*; not to prescribe methods, but to be *methodical*; not to lay down specific images, but to be *imaginative*...

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