Research design in design research

Birger Sevaldson 1999

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Abstract

In this essay my intention is to render the contours of a research design useful to my research on design with digital tools. The background for this focus on research design in the area of design research is twofold: on one hand there is a lot of confusion about what design research is about, and how design research could be carried through. The picture of the different positions is confusing. Still it is possible to suggest two main directions within design research in Europe, one with emphasis on meeting academic standards and one more related to the design professions as practical activities. In this essay I will suggest one way of integrate these two positions and exemplify this through my own research on digital aided techniques

Status in design research

In design research we can find a series of different approaches and ways of understanding design research and research in general. One major reason for this lack of consensus can be found in the problem of relating research to design practice and vice versa. One branch of design research tries to live up to what is conceived as "hard nosed" and conservative research standards. The opposite position tends to equalise any design activity, which has an element of investigation. Within this sector of design research there is a lack of precision regarding the standards of documentation. Our task as design researchers must be to combine proper research standards with practice based investigations. This is a big, and sometimes overwhelming task, but never the less, design research will not gain acceptance both from practitioners and from the academic realm, if not both sides are addressed and integrated. If only answering to conservative academic standards, in worst case the investigation fails to target the most central questions in design, seen from a theoretical perspective or as a profession. On the other hand, if design research is defined as equal with "experimental" [1] design activities, design research will only be established as an internal activity with no possibility to develop a dialogue with other sciences or the academia in general.

The wish of being accepted by the scientific community is common for all professions about to develop research activities. This leads to what polemically could be called a fear of not being scientific, which again results in projects that are formally sound, but which tends to be less visual, less appealing and less intriguing than what they potentially could be. In addition this fear leads to a restrictive attitude to what is researchable and what is considered to be not. Since design research is in its initial stage it is hard to know what is researchable and what is not. First proper methods have to be adapted from other areas of research. Then new methods have to be designed from scratch. As design research is in it's early stage , many projects are focused on the border zones of design, overlapping neighbouring academic fields and professions with a well defined research tradition. The design researcher can easily be caught by historical research, psychology, marked related research or technological based research. This raise the question if such research as well could have be accomplished by others than designers. The design researcher encounters a situation, where one has to live up to several "alien" research-standards. Simultaneously the design researcher faces the difficult unsolved questions and diversities within design research.

1 Experimental in the sense of trying out something new, not in the sense of setting up a scientific

Design research is in many cases remarkably free of visual content. [2] Where there is a visual material, often there is a lack of integration between visual practice and text. Although some projects are based on the analyses of visual material, one seldom finds a seamless integration between accumulating knowledge through practical work and the knowledge production conducted through theoretical based research, systematic observation, analyses and documentation.

From hard-nosed natural sciences we can find examples of how visual material is totally integrated in the research process. Scientific visualisation is developing at high speed into a ever more important tool for all natural sciences [3], which again results in an increasing significance of the *visual evidence.* Equally important is the filtering and interpretation of such visual material. All kinds of graphical techniques are applied to clarify and qualify the reading and interpretation of complex data. This graphical treatment is absolutely crucial to derive the significant phenomena from the structures and patterns in the data. To comprehend the phenomena a theoretical argumentation is necessary. The data as such in its numerical representation is not readable before it is visualised. One can say that the graphical treatment of the data fields produces the empiri for visual evidence. In such cases, visual impression, theoretical models, interpretation and aesthetically concerns are seamless integrated within the production of knowledge. In contrast to this, many projects in design research avoids visual aesthetics. Good look is thought to be less serious and hence, non-scientific.
All these concerns lead to the search for a simple and easy to understand research design for research on design topics, which allows to focus on the core of design, and which integrates the visual aspects seamless in to the research process. The suggested model for such a research design is partly inspired from research in practical/technical areas, research on technology and development of techniques.
For this essay a conclusive definition of this kind of research could be:
The development and investigation of design methods, strategies and techniques -AND the following production as evaluation of these techniques.

New design techniques

One primary item in design research is research on how design work is performed through out the design process: design methodology.
Design methodology seems to have reached a defensive state. The history of design research has to a large degree focused on the investigation of how the creative mind works. According to this approach, creativity enhancing techniques have been developed. None of these methods give a complete receipt to radically improve creativity, though many of them do have a proven effect. Only one of the techniques, brainstorming, is widely spread and accepted, though in its simplified version. The mental aspects of creative processes still appear to be fuzzy and hard to understand. They seem to have qualities which are difficult to systematise, and which vary from person to person and over time. In addition they vary because of cultural variations.

This unstable nature of creative processes makes research on design methodologies difficult. On the other hand, if these mental techniques are unstable and potentially changeable, this opens up for the possibility to alter them, simply by what we do and how we do it. This means to move focus from the investigation of the creative mind and the mental processes, towards research on development of creative techniques. The problems are externalised and focus

[2] Review of "Design Studies"
3 This development is of course initiated by computer technology.

moved to the core of the design profession. [4] The empirical base for such research would be the development and testing of techniques and registration of results. Externalisation would be tested through the observance of any designer applying such techniques. The generic validity of these techniques would not be tested by producing identical results, but through the fact that they would (or would not) produce similar effects on different design processes conducted by different designers.

Such a development of new design strategies could also answer to the increasing complexity of the tasks we face as designers. Good design solutions must relate to the embedded complexity that any design job implies. Diagrams help to understand complex situations. Different entities and the relations between those entities are mapped and described in a clarifying and simplified manner. Such diagrams mostly describe relations between entities and eventually the importance of these relations in a quantitative way. But if we really want to go further in our understanding of complex systems we need to describe relations in a qualitative way as well. We should be able to describe border conditions between entities in a graphical manner. The computer with its ability to handle huge numerical data appears to be the perfect tool for such visual complex system analyses.

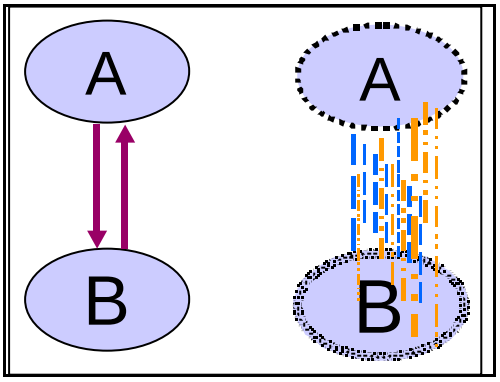

Fig.1 Normal bubble diagrams tell little about the qualities in relations. Through additional graphical treatment and coding it is possible to add information to such diagrams.

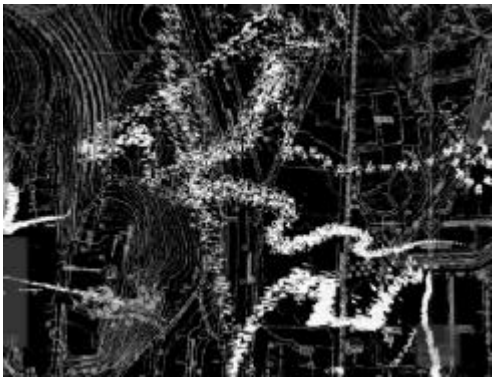

Fig.2 The particle animation in SL3 is to be seen as a diagram where border conditions between different activities are potentially articulated.

The traditional early stages of most design processes are often based in the appliance of a tool: the pencil. Early sketching techniques are used to "think" visually and in an intuitive way. This graphical underlay is dependent on an interpretation otherwise it would be without meaning. Often a team work design process can increase production speed in such early sketching stages because the sketches are reinterpreted in various different ways, others than intended by the drawer. The drawing "inspires" to new solutions. The inaccuracy and openness is the potential of a hand made graphical sketch. Still, a pen drawing is limited when it comes to complexity. Most often it has no colour depth, meaning it is only in grey shades at its best. By adding colour the sketch would be able to carry multiple levels of information. Seen as structure the hand sketch tends to be structural homogenous, since its main structural component is the line.

The existing information is interpreted directly through visual perception. But we can also alter the sketch to animate divers re-interpretations. Well known is the trick to observe a sketch

[4] It seems that psychology has damaged the creative mind more than anything by its myth production. Many artists are caught in a Freudian way of thinking, a way of thinking which is highly introvert and anti co-operative.

through a mirror or upside down. The computer equipped with graphical manipulation software can add a lot to this. Just a simple trick like the negative of an image is very efficient in adding to new readings of a graphical material. Blurring is very well suited to identify the overall structural features, which often are confused by layers of detail. By increasing contrasts we can easier read the most important "force fields".

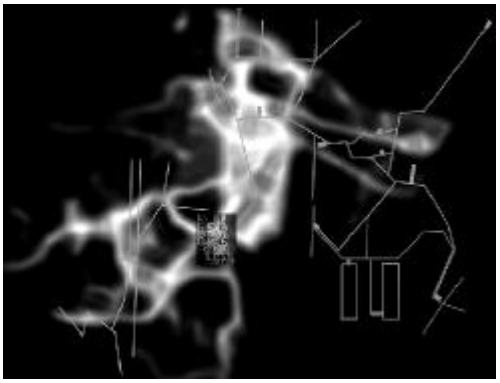

Fig.3 Particle fields are here treated with both blurring and sharpening filters to visualise the main structure and connections in the field

The way we design is not determined or programmed in our genes. Altering our ways of designing is possible. We need to do that if we want to take full advantage from the powerful graphical tools computer technology offers.

From this we can conclude that it is hard to break new ground through the development of new software according to old design methods. (The dream of the intuitive software) A better strategy would be to develop methods adapted to the existing computer technology and from that reach a radically new design methodology. In practical terms this means to use existing software in redefined ways, in addition to custom programmed software. Any graphical software potentially can be used, from custom made design tools to scientific visualisation tools or medical software. By redefining the use of these software's, by looking for structural qualities that could inspire systems structure and relations and generic principles, we release the tools from its determined context.

Integrated design research.

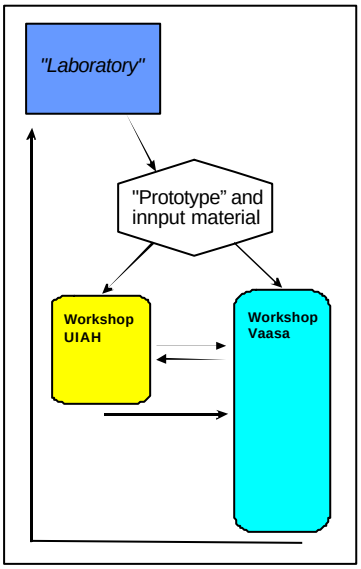

Fig.4 Diagram of proposed research design.

Seamless integration between practical activities (research by doing) and writing, is possible in design research. Especially in research on techniques and methods the combination of accumulating knowledge through practical work and theoretical analyses seems to be productive. When the design researcher also is practitioner (opposed to only observer and analyst) new ideas and methods are easier developed. This is a way of researching which also should be familiar to the designer's mind, since he is used to develop ideas, solutions and concepts through sketching and practical work. This way of researching is also comparable with engineering research and development, where theoretical knowledge, technical know-how and physical prototyping is integrated.
For design research a similar way of thinking is possible. The designers know how and tacid knowledge should somehow be taken advantage off in design research. The research must be of a generic value, which makes it possible to feed it back to the designers practice. A suggestion for a research design, which fulfils these criteria, is designed around five distinct units: A laboratory for the development of new techniques, a prototype which clearly isolates and describes selected techniques, and a test-ground where the prototype is used to test it for generic validity, a feedback system to

collect data from the test-ground which feed back into the laboratory and finally documentation and analyses of the results.

In the case presented here, the laboratory is given through the collaboration within OCEAN [5] and its long-term research project Synthetic Landscape. Ocean is an international group with "nodes" in London, Helsinki, Cologne, Oslo, Ljubliana and Boston. OCEAN describes it self in the following way:

Since formed in 1995, OCEAN and its affiliated structure, OCEAN net, have emerged as a new architectural initiative. The organisational structure is best described as inclusive, collaborative, synergetic, multi-disciplinary, decentralised and geographically dispersed.

The OCEAN net's operative coherence emanates from connectedness and participation, a transgressive process of interaction and communication between nodes, always unfolding, always in transition. The modus operandi is orchestrated by an unbound heuristic and experimental logic.

Collaboration within the OCEAN net takes place in various ways, including project work, research, workshops, public conferences and symposia, exhibitions, and publications.
The theoretical commitment is the search for new and differential modes in spatial thinking and the making of space, towards fluid and topographical spatial organisations and material effects. On an urban scale the research focuses on adaptive and differential directives that enable a dynamic and largely self-organised urbanism of emergent properties and mobile influxes to occur.[6]

Another smaller laboratory setting is the VORB[7] workshop series at the Oslo School of Architecture. VORB stands *for "Virtuele Objekter, Rom og Bevegelser"* (Virtual Objects, Spaces and Movements) VORB is a series of workshops at AHO which started three years ago. The first workshop was an unfocused and general investigation, where the students where told to design a freely defined object or space in a 3D software. [8] The only restriction was that this object or space should be non-figurative, and that the use of traditional drawing tools was prohibited. The intention was to do an initial scan of the virtual space and it's possibilities and potential. No concepts or distinct techniques where developed at that stage. The succeeding VORB workshops developed from the generic initial approach towards more distinct and defined concepts, and at the same time from the abstract to the concrete, from space via architecture to product. The project description from VORB3 illustrates this development towards more specific modelling techniques:

The students where obliged to find a graphical material which would serve as a starting point for the project. The graphics were analysed and the students, divided into four

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[5] OCEAN is a international group of designers and architects with nodes in Boston, Cologne, Helsinki, Ljubliana, London and Oslo. The collaboration between the nodes varies strongly and is especially intens between Colgne, Helsinki and Oslo. The author is a member of OCEAN Oslo. OCEANwebsite: www.ocean-net.org

[6] http://www.ocean-net.org/info-ocean.htm

[7] http://www.ifid.aho.no/bs/3d/vorb/

[8] Jorgensen describes the use of unfocused methods in situations where one enters new research areas. The method is meant to avoid prejudices to influence the first investigations. p.82
Danny L. Jorgensen Participant Observation Sage 1989

groups, used the graphics to inform 3D spatial models. Parallel model processes where

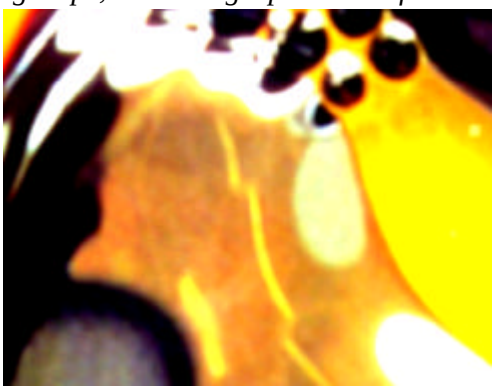

Fig.5 Graphical seed information

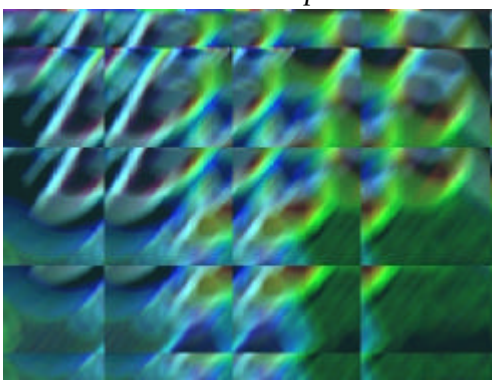

Fig.6 Graphical seed after several rounds with transformation through graphical filtering.

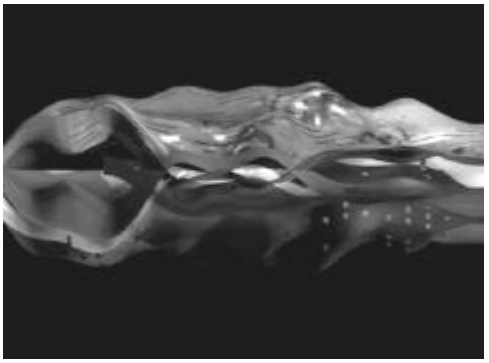

Fig.7 3D spatial model derived from the graphics in Fig 5 and 6.

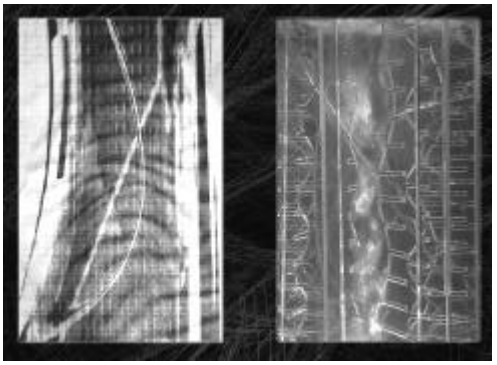

Fig.8 On the left graphical seed. On the right: physical Perspex and water model derived from graphical seed.

conducted in both digital and physical form. [9]

Synthetic Landscape as a laboratory. (A case)

[9] http://ifid-nts.aho.no/bs/3D/vorb/vorb3/

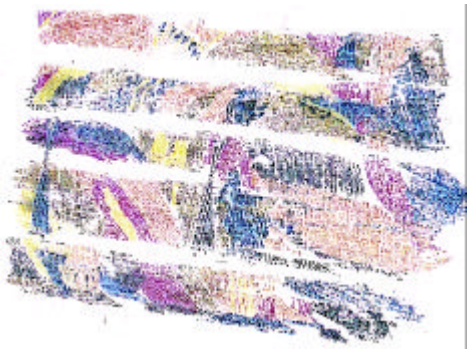

Fig.9 Hand drawn seed or colour graft (Johan Bettum

Synthetic Landscape is a conceptual research project, partly financed through the Norwegian Research Council.[10] The project is still under development into its fourth stage. Intermediate stages have been presented at exhibitions at the Hennie Onstad Center, Norway (phase two) and at the AA School of Architecture in London (Phase one and three)[11].
Through the long-term work with SL several concepts have been developed. In this essay only one of the concepts and a narrow segment of that concept will be presented.

Theoretical background

Dynamic generative diagrams

If we understand the hand sketch as a graphical seed to a design process, where shape, structures and relations between elements are more important than the semantics, it is a short step to replace the traditional hand sketch with any other graphics. The seed could still be hand drawn but in a completely different way, as in the *colour graft*[12] for synthetic landscape. In this case the sketch was cautiously designed to initiate certain structural qualities inspired from different other sources. The seed could also be any "found" and or manipulated graphics that has certain structural and formal qualities as shown in the projects of the VORB3 Workshop. These graphical sources for information of both form and program we call generative diagrams. In contrast to descriptive diagrams, which help us to understand structural principles of existing systems and situation, generative diagrams inform us about possible structural and formal principles on a generic level. Many architects and writers have been occupied with the notion of the diagram in this sense [13]. Central in this line of thinking is Gilles Deleuze and Felix Guattari's notion of the "abstract machine":

An abstract machine in itself is not physical or corporeal, any more than it is semiotic; it is diagrammatic… …The diagrammatic or abstract machine does not function to represent, even something real, but rather constructs a real that is yet to come, a new type of reality.[14]

The work presented in this essay has to be seen against this context.

Since the traditional way of initial sketching seems to have it's limitations, this opens up for other methods, methods that might be easier to implement to computer technology or which even would benefit through the use of this technology. Graphical information, with no coded

[10] Synthetic Landscape was founded and administrated by JohanBettum, member of OCEAN Oslo and doctoral student at the Oslo School of Architecture
[11] http://www.ocean-net.org/exhib/urbs-pr.htm
[12] The technique and notion of the colour graft was initiated by JeffreyKipnis as an alternative or addition to Cartesian space. The a priori spatial organisation of space through the Cartesian co-ordinate system has an initial influence on spatial thinking and hence on spatial design. The colour graft is meant to produce a richer and more varied initial spatialcondition .
[13] Here to be mentioned Ben vanBerkel, Stan Allen, Manuel De Landa, Peter Eisenmann and Sanford Quinter. A collection of essays with the mentioned authors and additional ones is to be found in ANY magazine 23 1998.
[14] Cilles Deleuze and Felix Guattari: "A thousand Plateaus"

meaning is one example of the use of seed material with which to initiate digital processing in the design process. The computer is an essential aid when such graphic information is to be developed and analysed into systemic principles and inter-relations between subsets of information. Later in the design process, the information can be coded and instrumentalised to deal with material and other systemic variables.
In an early stage of this kind of systemic design, any pre-existing conception would violate the need to operate on a generic level. Therefor the systems first have to be developed on a generic and diagrammatic level. Only at a later stage the generic systems are coded.
Another problem is presented in how to develop a technique, which will produce complex systems, render the various relations between the entities in such systems and to maintain their complex qualities throughout the design process.
Both problems are possible to address successfully through and with the aid of computer graphics and the concept of generative diagrams.

All our designs, whether it is on an urban scale, building scale or product scale are likely to be used in unexpected ways or contexts and will have unpredictable futures. In this respect, time becomes an ever more necessary element in the comprehension of the urban fabric. We wish to know the future, since urban dynamics generates uncertainty through its potent production of future possibilities. Through scenario techniques we can tell well grounded stories about our possible futures, prepare both mentally and practically, and implant adaptability to our designs. Though scenarios can not be taken as true predictions, we can say that they are potentially true on a structural level.
Scenarios introduce the dimension of time into the design process. Generative diagrams with a time dimension (animation) can be seen in relation to scenarios as indicators of possible futures. These types of diagrams we call dynamic generative diagrams.
Several architects (Greg Lynn, Marcus Novac, Stephen Perella) are breaking barriers in terms of the creative potential of the computer media combined with the notion of generative diagrammatic thinking and time as an object of design. Especially Greg Lynn has contributed with crucial new ideas and techniques. [15]

Reconfiguring schemata

Another effect of the graphical techniques applied to abstracted data sets is the production of unexpected solutions.
In many creative techniques the idea of breaking established conventions and rules, in order to reach new insight, is a well-known strategy. There are numerous ways of achieving what we could call the breaking and reconfiguring of schemata. [16] All of these techniques are designed

[15] See Greg Lynn: "Folds, Bodies & Blobs collected essays" Books-By-Architects 1998
[16] The notion of schemata is used by Piaget as an explanaratory model of the process of understanding the environment. This model was related to design thinking by Mark Gelernter :
"In both acquiring new knowledge or developing new skills, the mind works from a repetoir of mental schemata- programs of conception or action - which in the past have enabled individuals to negotiate problems successfully. Whenever the individual faces a new situation, a new piece of information or a physical problem, he or she first tries to solve it with one of the schemata in this existing repetoir. Should one prove to be successful, the problem is said by Piaget to be *assimilated* by the schema. On the other hand, if no existing schema will make sense of the new information or enable the individual to negotiate the physical problem, then the individual begins to search through the repetoir for a schema closest to the action or understanding he or she desires. By testing an existing schema against the problem, adjusting the schema in light of its success or failure and then testing again, he or she eventually might develop a new schema which will cope successfully with the new problem. A schema which has been evolved to cope with a new problem is said by Piaget to be *accommodated* to the problem. Once developed, a new schema is put back into the repertoire for possible future use, and in

to loosen up "mind control" when dealing with design problems. In the research exercises in OCEAN we applied a simple technique. By applying a "mechanical" procedure in the process one ensures that no prejudices bias the production through “unconscious” selection. Without any regard to preferences or foreseen solutions all possible structural solutions are reviewed. Only when all possible structural solutions have been investigated they are evaluated according to user needs, technical problems, aesthetically concerns and so on. The technique is devised in order to force the designer to engage with alternative solutions to those preferred by his or her established design schemata. Other techniques like brainstorming are employed to loosen up or delegate mental control. This technique has proven to efficiently produce new and unforeseen solutions.

Graphic computers can be used in a similar way. In fact as generators of unexpected effects in visual material, and/or in the production and visualisation of complex information, the use of graphical computers is superior to any traditional method. Though similar effects can be produced analogously with physical models, the computer offers a high degree of flexibility, which allows for quick altering of the input material, the set-up and the parameters.

The output from the computer can be understood and interpreted in many different ways. On a generic and principal level it could be used to derive visual phenomena or structural systems which again could be used to inspire and inform specific designs. It could also be used as a form generator or form template for specific design problems, or it could be used as underlay for organisational systems layout. Also as a rendering of programmatic distribution, principles and systems scenarios the technique seems to have a vast potential. In all those cases the technique emphasises the important and crucial role of the human as interpretator and selector.

Building complex situations.

As the computer is designed to process huge amounts of numerical data it is well suited to monitor complex systems in a mathematical sense. Though as designers, it is not the digital core of the computer we are interested in but its graphical representation system, its analogue shell. In this sense the computer is not a digital tool but an analogue one, as we desire its graphics and representational power. In fact it is questionable if the “digital revolution”, is not an analogue one as the breakthrough of technology is based on the analogue user interface and the accompanying visually based applications which makes the computer useable for a broad range of purposes. So in order to be useable for designers, mostly with a poor understanding of mathematics (that includes my self) the information has to be represented in a graphical form.
Scientific visualisation is used to present, clarify, communicate and deliver evidence. Visualisation in a design process has a similar but also different role. In a design process we are in a larger degree free to interpret and code the data in any suitable way. The designers means for control include interpretation, selection and monitoring of parameters, but also aesthetically concerns in rendering the data is of importance. In addition the choice of the seed conditions or input material (graft) is of crucial importance to the ensuing results and are a means to instrumentalise generic design intentions.

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this way an individual´s understanding and skill grows ever moreextensive“Reconciling Lectures and Studios”
Mark Gelernter: “Reconciling Lectures and Studios”

The prototype

The prototype in this case is produced as a generative dynamic diagram for the generation of spatial structures in Synthetic Landscape stage 2. A initial graphical information seed (Colour Graft) was treated through several stages in a completely abstract manner, to translate, release and investigate the spatial potential of the initial graphical information. The different colour channels where isolated and used to map colour intensity to 3D surfaces through displacement of the 3D surfaces according to colour intensity [17]. The separated surfaces where brought back together (superimposed) and intersection lines where generated to extrude the minimum common data. Time cursors where applied to the intersection lines and animated along these lines to add the dimension of time. Finally a selection of the cursors where equipped with forces and particle generators, to render possible interaction fields between the cursors over time. This process is a cyclic exercise in letting the data set grow and expand to wards unexpected results and through extraction of representative minimum data, reduce the data fields to comprehensible scale. Repeated reductions of the data sets are important in the process of re-utilising them or codify them on a later stage.

Fig.11 The process from colour graft to prototype starts with the mapping of colour intensities to 3D surfaces (left). Intersection lines and cursors are added (middle) and the relation between the cursors rendered as particles. (top)

The final result of this process was several animation sequences, Some investigating and graphically rendering specific phenomena, others producing complex dynamic particle fields for use as dynamic generative diagrams. [18]

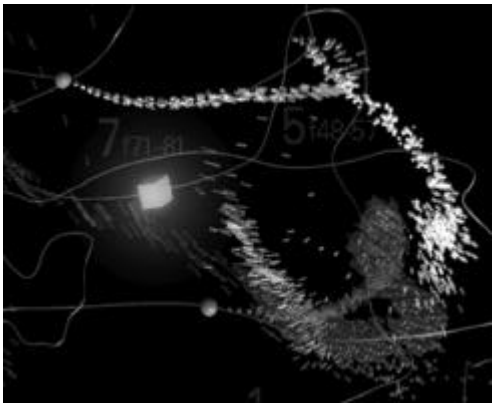
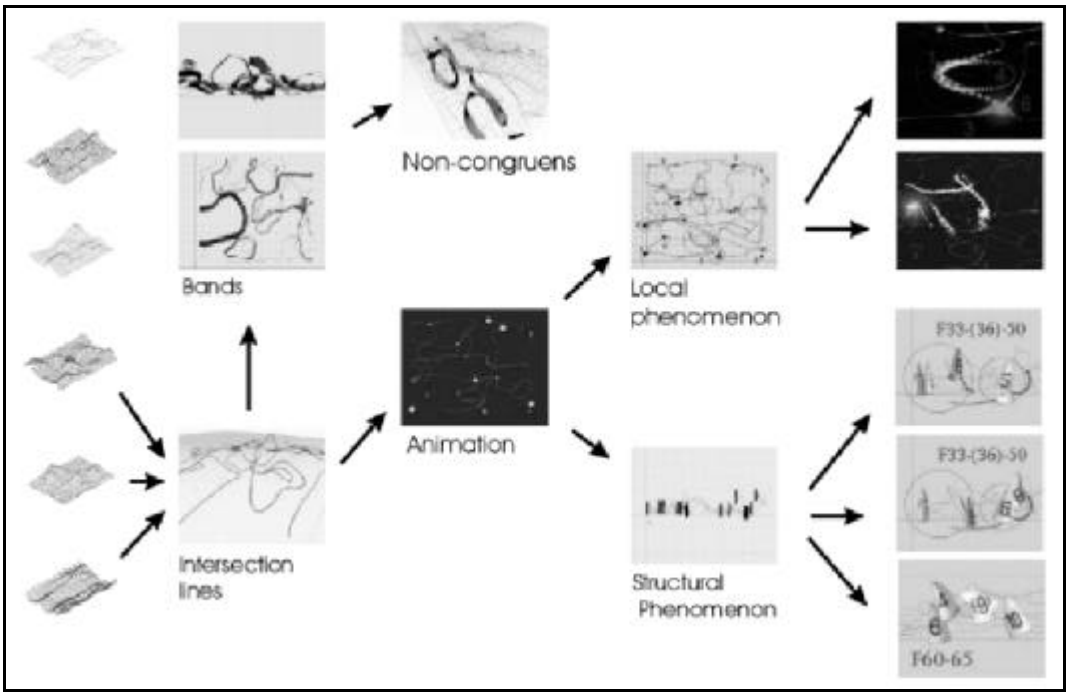


Fig.10 Particle field with two emitters and one attractor force cursor.

[17] Displacement mapping is a similar process as Bump mapping. In this case the Mapped textures where translated into 3D geometries.

[18] Virtual Phenomena Video OCEAN 1998

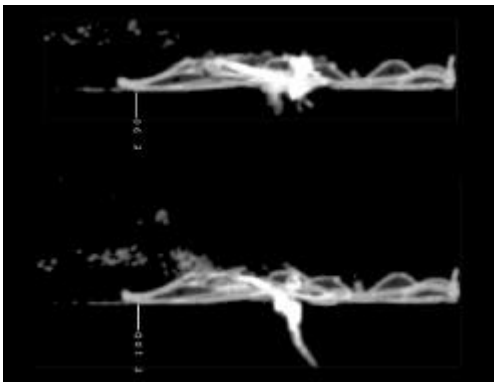


The Test Ground

To test the thesis according to the mentioned research design one needs a wider context than the laboratory its self. Student classes and workshops are well suited for this purpose.
A parallel workshop at the University of Art and design in Helsinki and at the Vaasa Institute of Technology was chosen as an interesting arena to test the value and usability of the prototype.
At the workshops the students where presented to a selection of frames from the particle field animation sequences in top, right and front view from each selected frame [19]. The frames where selected with an even distribution of every 20 th frame. This selection was necessary because of the huge amount of information a complete printout of every frame would represent. This material was delivered both in digital form and as prints. In addition the video was available

The students where encouraged to analyse the animation in diverse ways. First step was an analysis on a generic level to derive spatial and organisational principles. Brain storming techniques where used to generate concepts to comprehend significant time / space events (Virtual Phenomena). Several of these phenomena where chosen by the different groups for further analysis. The criterion for this selection was the proposed potential off the phenomena to be developed into generative diagrams. Some phenomena where analysed as principal force- direction- and density diagrams. Others where used as colour under-lays (colour grafts). Our design intentions where interweaving of entities and forces and carefully design the relations and interactions between entities and forces. Also we intended to design systems that where able to adapt to unforeseen future contact with other complex systems. This adaptable complex design with an implied multiple system mechanics is achieved by imposing minimum one system on another, generic diagram on program, colour graft on topology. The adaptable systems answer to complexity in the way the structure and topology are investigated for co-relations and quasi-congruencies, interactions and continuities. Colour grafting can be applied in many stages and on different areas of the design process. In the workshops such different situations where experimentally investigated. Colour grafts where imposed to

[19] Frames as frames in animation or singular images in a movie.



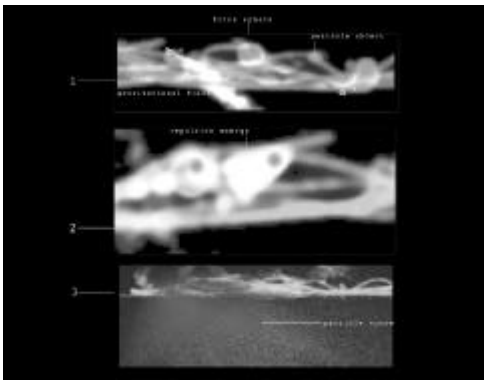


Fig.12 and 13 A side view of the particle streams after graphical filtering, blurring and colour transformation (left.) Structural analyses of the blurred images to the right.

diagrammatic program, social space, topology, form and structure. The entire colour grafts where derived from the source material (video) through various steps of transformation. Transformation processes where driven both by manual drawing and by digital manipulation. Manual drawing was in most cases closely integrated with analytical interpretation, while digital transformation turned out to appear as the non-analytical approach to transformation. Individual interpretation, redefinition and redesign through selection are important elements in the transformation process.

From the analyses and transformation of the source material the students built abstract structures as physical models. Consciously avoiding the term "model" (as this is associated with a semantically representation) but calling them "abstract structures", we wanted to emphasise the fact that this was a intermediate step towards architecture. The idea was to avoid a direct translation into architecture, which could result in banal schematic solutions. Instead this process was meant to ensure the extraction of the essence and the principal features of the implied material. The abstract structures served in some cases both as structural and generative diagrams.

In the next stage the students had to invent a user profile for a pavilion sited on specific sites. The user profiles where meant to deliver a detailed system of user activities and needs. In this stage we introduced in other words two new systems, topology and user profile. The user profiles where analysed and generated diagrammatically through colour grafting and the use of generative diagrams with the source material as deliverer.

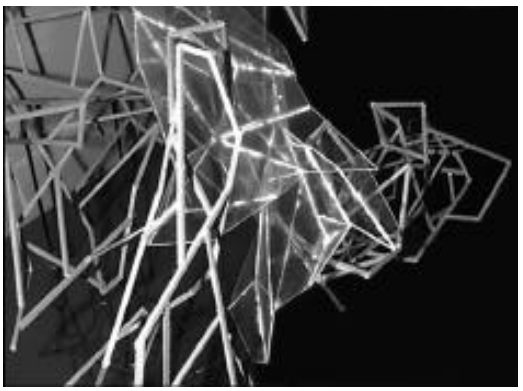


Fig.14 Structural model derived from graphical underlay (Fig.13)

The user profiles together with topology, abstract structure and generative diagrams used in different ways produced the spatial and structural programs for the pavilions. Different techniques where used as planning templates. Different independent views from the structural models could be used to inform plan and sections. Sampling of geometries was another technique used by some groups.

Workshop as research tool

When we planned the workshop, looking for a theme, we thought of finding the most interesting and difficult areas of our own work to investigate further. We had just finished another stage of the research project "Synthetic Landscape". This stage had left more questions unanswered than solved. One of the major problems was how to implement and use the diagrammatic and abstract material produced through the process. This was a crucial point where we thought the workshop could help to develop both practical techniques and theoretical considerations.

One of the most interesting objects for further investigations was the video "Virtual Phenomena". The steps from dynamic generative diagram towards architecture seemed to present a wide range of possible practices, but how to proceed was very unclear. To investigate these possibilities seemed to involve considerable effort. To investigate as many possible ways we thought of the workshop as a kind of test field where practical solutions could be developed and tested.

The workshops where first thought of and planned in quasi experimental sense. As it turned out it was hard to full fill the intentions totally. Protocolling and registration of events was hard to execute in the high intensity atmosphere of the workshops.
In Vaasa the students where prompted to keep a simple diary. A single question was to be answered repeatedly every morning. The idea was to collect information about the design process in a very open ended way. The single question interview was meant to operate in a similar way as a fishing net.[20] We did not know in advantage what to look for in the process which would be of value. Therefor we thought this technique to have a potential to succeed. The information collected in the diary turned out to be of low value to the project. The questions seemed to be to generic to animate the students to describe important points and steps in the process. They described mostly obvious events in a very generic way. A better result could properly have been achieved if a more intensive interview technique had been applied. Because of the mentioned workload it was important to do the additional labour, (registration, protocoling and interviewing) as small as possible. As the main intention of the workshop was to develop design strategies both in a practical and theoretical, and not to observe student behaviour or do research in the psychology, pedagogics or creative activities, it was judged less important to do a thorough research design in the traditional sense. The emphasis was on the practical development of the design strategies and the theoretical implications on the field of design.

The open ended approach was kept through the study as it was from the beginning very unclear what the results where going to be. In fact we where worried about our own prejudices to be to influential and bias the results. Biased results where obvious in two groups where some of the students where former OCEAN workshop participants or temporarily joining OCEAN projects. In the other groups the bias was less visible though they too where under great influence of the tutors. The concern about biasing the results was in the end considered to be less important than the need for intensive tutoring and periodical detailed guidance of the students by the tutors. As the nature of the research in the workshops became clearer the concern for biases was reduced. The workshops where not compared to

[20] The techniques used in the workshop where informed and freely inspired by participant observation methodology described by Jorgensen He describes a questionnaire technique used as a fishing net. p.20
Danny L. Jorgensen :*Participant Observation Sage 1989*

laboratory settings where experiments have to be isolated from irrelevant influences. The research was a practical investigation on methodology. Practical solutions to advanced design problems, introduced by the tutors where developed by the students. In this sense the tutors where as much participants in the workshop research as the students. The role of the students could be compared with the role of research assistants.

The results from the workshops depended on post-investigation and analyses of the collected material.

Results

The results from the workshops are still not fully analysed, Still the feedback to the "Synthetic Landscape" research project has been considerable and increased the understanding of techniques. The workshops gave important hands-on experience and reinforced the believe in the value of this research. Especially the workshops gave important input on how to codify different channels of activities and forces, like user activities and needs and spatial concerns. Also important input on how to relate these activities and to integrate them in an articulated way was produced.

The concepts from the workshops are presently developed further in "Synthetic Landscape 4". A new prototype is to be applied on the urban scale.