
T[H]INKER
Creating Knowledge through Design & Conceptual Innovation
DESIGN AS INQUIRY
A MANUAL
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PUBLISHED: 2014

Education and Culture DG
Lifelong Learning Programme

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AUTHORS: RICHTER, ALLERT, REISAS

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ABOUT THIS MANUAL

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Concepts such as design thinking, knowledge creation, or open-ended problem-solving have become popular in recent years as they hold promise to generate innovation and prepare ourselves for the challenges we are facing at the beginning of the 21st Century. What these approaches have in common is that they build on a creative and transformational under-standing of learning and inquiry. They mark a shift from a *belief mode*, focused on the plausibility and justification of ideas towards a *design mode*, oriented towards the utility and promissingness of ideas (cf. Bereiter, 2010).

While a lot has been written about these new forms of learning and inquiry there is no commonly agreed upon model on its methodological and epistemological foundations. Additionally there are only limited resources available for students and teachers on how to make use of these approaches in education.

Against this background this manual introduces Design as Inquiry as a common conceptual denominator and provides practical guidance for teachers and students. Yet, rather than providing a full-fledged methodology, the manual comprises a set of evolving ideas. The presentation therefore is intentionally fragmentary and unfinished, aiming to stimulate the readers' curiosity, reflection and response. In this sense, this manual provides a snapshot of its authors' ideas at the time of writing, but we are eager to learn about your questions and ideas regarding the matters tackled and are willing to discuss them with you.

Bereiter, C. (2010). Where the Learning and Pedagogical Sciences Need Philosophers. In Encyclopaedia of Philosophy of Education, M. Peters, P. Ghiraldelli, B. Žarni , A. Gibbons (eds.). Retrieved 5 October, 2012 from http://www.ffst.hr/ENCYCLOPAEDIA/doku.php?id=where_the_learning_and_pedagogical_sciences_need_philosophers.

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DESIGN AS INQUIRY

Established expectations towards science as well as higher education have been severely challenged in the last decades. In particular, science and higher education are becoming more and more expected not only to provide explanations about the world as it is, but also to respond to concrete social, economic, or ecological needs and to foster innovation. At the same time designers, engineers, and many other practicing knowledge workers not just apply pre-existing knowledge, but also add to the body of knowledge by exploring and making use of new possibilities, pushing the limits of what is known. Just as designers and engineers, scientists and knowledge workers across disciplines are becoming actively engaged in the creation of the realities they aim to understand. Be it the learning scientist who develops new educational technologies, the sociologist asked to propose new means to prevent social segregation or the information scientist enrolled to ease access to the health system.

We believe that in response to these challenges it is not sufficient to carry out more applied research and evaluation studies or to add creativity techniques and entrepreneurial skills to the curriculum, but we have to reconsider our understanding of the process of inquiry as well as the objects of our studies.

Design as Inquiry is an approach that aims to combine designerly ways of thinking and acting with a knowledge creation perspective on learning. It conceptualizes design as a process of open-ended inquiry in which we deepen our understanding of a design space by creating innovative products, services or interventions. Rather than seeing the designed product as the primary outcome it is conceptualized as a working hypothesis that might provide insights into what works for whom and under which conditions.
When talking about design we are referring to what Bruce Archer (1979) has called Design with a big D, *‚the field of human experience, skill, understanding and imagination that is concerned with the conception and realization of new things and events and particularly with man's appreciation and adaption of his surroundings in the light of his material and spiritual needs'*. Design in this sense is not limited to some glossy products but relates to all the things and events that are devised by human kind. It's not only our cars and mobile phones that are designed, but also our homes, towns, university courses, healthcare system, and even the laboratories, questionnaires and models for research.

Design as Inquiry is not supposed to replace but add to those research approaches currently used in the sciences and the humanities. Its specific domain is what Herbert Simon (1969) has called the *Sciences of the Artificial*. Rather than solely focusing on what is, *Design as Inquiry* aims to research into what might be, into systems and states that do not exist yet. The questions and problems *Design as Inquiry* starts from are consequently antroprocentric and any intervention or new product we could think of will essentially alter the situation we find ourselves in. Be it the pupils' behavior in the classroom, the spreading of diseases in a rural area, the transfer of goods on a global scale or the exploitation of natural resources. Once we have devised new means to cope with respective problems the situation has already been transformed as we have changed our own scope of action.
Yet as mentioned before, *Design as Inquiry* is not a full-fledged methodology but a set of evolving ideas. This handbook is supposed to be a toolbox that might be useful to organize one's ideas or to plan and carry out an inquiry process.

Archer, B. (1979). The Three R's. Design Studies, 1(1), 19- 21.
Simon, H.A. (1969). The Sciences of the Artificial. Cambridge: MIT Press.

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MORE THAN A METHOD

While we side with those who are calling for the use of well-articulated and sound methods in research as well as in teaching, we do not think that we can break down complex processes such as inquiry or education into simple recipes. Every model, every method has to be interpreted in light of the situation at hand. While we felt it useful to depict core activities relevant to *Design as Inquiry* in form of a process model, it is only a scaffold that might provide for orientation but does not prescribe the actions to be taken. Both design and research, like any other human activity, are essentially messy processes in which we have to adapt to ever-changing circumstances.
Rather than focusing on recipes we think it is equally important to articulate the underlying propositions. In a nutshell *Design as Inquiry* assumes the following issues to be relevant to promote design as a credible approach to inquiry:

(1) Emphasizing synthesis over analysis and promoting solution-focused strategies. Inquiry into evolving systems has to go beyond the analysis of the existent. To figure out what might be requires action.

(2) Acknowledging the irreducible complexity of design problems & the limits of one's own knowledge. Every design product, every intervention is unavoidably confronted with the overall complexity of the world even though our knowledge of this world is always limited and imperfect.

(3) Building on the works of others. Design and inquiry do not take place in a vacuum. New ideas are seldomly arise from scratch, more often they build on, modify or recombine something that already exists.

(4) Organizing design as an iterative process with the design artifact as a working hypothesis. Neither design nor inquiry are one-shot activities, most often they are lengthy and tedious processes that require to learn from and make sense of one's own mistakes.

(5) Raising awareness for the fact that design decisions inevitably entail normative commitments, which the designer takes responsibility of. Due to its antroprocentric nature design requires an ethical stance. It confronts the designer with the question on how we want or should live.

(6) Putting emphasis on the creation and manipulation of material and/or symbolic artifacts for exploration, ideation, probing and evaluation. Thinking is not just something that takes place in our heads but it spreads across the tools are artifacts we are using, be it the pen and paper, the computer or a couple of LEGO bricks.

(7) Explication and questioning one's own models and hypotheses. Models and hypotheses provide just another set of tools we use to structure and make sense of the world around us. Rather than taking them for granted it is important to scrutinize the underlying premises.

(8) Fostering exploration, innovation, and risk taking, provoking problematizing moves, forcing failure and breakdowns. Things that do not work as expected provide an essential opportunity for learning as they might help us to question our own assumptions.

(9) Searching for feedback and critique throughout the process. Feedback and critique provide an important source of inspiration but also an essential corrective in all stages of the design and inquiry process.

(10) Acknowledging the transformative qualities of design. Design is essentially aimed at altering our own scope of action. It is probably the only way to respond to the local and global challenges we are facing.

With its focus on the artificial world, the things, processes and systems created and shaped by human kind, design a inquiry entails theoretical, ethical and practical implications. Whether we use it as a framework for research or education, we have to be aware that it is more than a method but a certain perspective on the world.

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HOW TO USE THIS MANUAL

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When writing this manual we wanted to create a modular toolbox offering multiple entry points to the idea of Design as Inquiry. As a consequence the manual is structured into four main sections, each of them providing a set of texts approaching Design as Inquiry from a different perspective.

Foundations - introduces some of the theoretical concepts and models Design as Inquiry is build on. This section includes definitions of core concepts such as design and inquiry, compares Design as Inquiry with other modes of inquiry, and discusses some of the theoretical and conceptual challenges this approach is faced with.

Principles & Process provides a set of orienting scaffolds and recommendations for the practitioner. This section introduces basic principles of Design as Inquiry, outlines core activities in form of a process model and comprises a set of methods to be of use at various stages of the inquiry process.

Case Studies & Design Challenges - includes a set of case studies aiming for a more vivid description on how Design as Inquiry can be actualized in different contexts and settings. The case studies also give an idea on the type of questions/issues students or researcher might work on.

Teaching and learning materials - finally provides a collection of important teaching and learning materials, which you can use to adapt and plan your next design challenge or settings.

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EPISTEMOLOGICAL AND METHODOLOGICAL FOUNDATION

THE PRODUCT(S) OF DESIGN

DESIGN AS A PROCESS

(SCIENTIFIC) INQUIRY

DESIGN AS INQUIRY

MODES OF INQUIRY

MATERIALITIES IN INQUIRY

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THE PRODUCT(S) OF DESIGN

Photo by Christoph Richter

At first sight design appears to be about the conception and realization of the various types of things that populate our homes, offices, and cities. Be it the chair I sit on, the monitor in front of me, the keyboard I am using or the building I work in, all these things have been intentionally created and form the visible output of what we might call design. Yet, as argued by authors such as Burckhardt (1980) there is also an invisible side to those things we usually associate with design. The chair, the computer and the building are not just isolated objects but they are interwoven into a complex fabric of social, technical, and organizational infrastructures and networks. Moving our attention from the isolated object towards their role within these infrastructures it become obvious, that the chair is not just a means to sit somewhere, but that it allows or hinders me to work together with others, that it allows me to spent several hours a day at my desk, and that it says something about my role within the organisation. Similarly, the computer is not just a big calculator but gives access to a plethora of services across the globe, connecting me with other people, their ideas, providing a powerful cognitive prothesis for my own mind. Also the building is not just a concrete structure of rooms and floors but it is deeply engrained in the organization it hosts. The seminar rooms, lecture halls and laboratories are not just exchangable rooms but are shaped and also reproduce the ideals, norms and practices within the institution labeled university. If we accept this invisible side of design, and we suggest to do so, the boundaries of the design product become blurred and we have to face the fact that even such „natural" things as the night or the countryside are the product of complex and long lasting interventions and in this sense an outcome of design. For example, the night is not just the period of darkness between sunset and sunrise as defined in the dictionary, but it is shaped by business hours, night rates, time-tables, habits and even street and traffic lights. Similary a thing such as the countryside, has to be created and even if only by protecting it from exploitation or other forms of usage (cf. Burckhardt, 1990). As can be seen from these examples, the relation between the tangible outputs of design and their actual uptake and utilization within the fabric of social, technical, and organizational structures is quite intriguing. Depending on the perspective we take, we can look at these products as intentionally created entities or as

Burckhardt, L. (1980). Design istunsichtbar. Retrieved October 15th 2012 from http://www.lucius-burckhardt.org/Texte/Lucius_Burckhardt.html#Design

Löwgren, J. (1995). Appyling Design Methdology to Software Development. DIS 95, Ann Arbor, MI, USA, ACM press, pp. 87-95.

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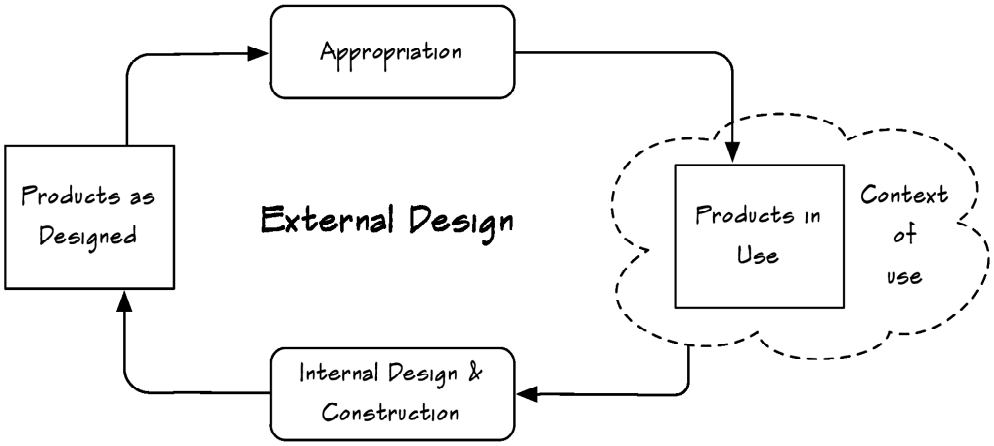
things that are put to actual use in a certain context.
The distinction between the products as designed and the products in use mirrors in what Löwgren (1995) has called „internal design and construction“ and „external design“. While „internal design and construction“ essentially aims to transform a given requirements specification into a solution that satisfies the requirements and constraints, „external design“ aims at an understanding of the needs that give rise to certain requirements as well as the actual uptake of a product in the context of use. External design in this sense goes beyond the product as designed but is also concerned with its actual use. In a similar vein Carroll (2004) hence argued that design is completed in use through a process of appropriation.
This distinction is of great importance for the conceptualization of Design as Inquiry as it is the external design that allows us to investigate which products, services, and interventions work for whom and under which circumstances. Internal design and construction are integral to the process yet they are only one stage in the overall inquiry cycle.

Design – no matter whether it creates new products, services or interventions – provides new options for action. Design as Inquiry thus is interested in transformed practices mediated by artifacts.



An Integrated Perspective on Design

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DESIGN AS A PROCESS

Photo by Christoph Richter

Besides looking at the products of design we can also approach design as a process or activity. In his seminal work *‚the Sciences of the Artificial'* Simon (1982, p. 129) has defined design as the process by which we *‚[devise] courses of action aimed at changing existing situations into preferred ones*'. This definition provides a good starting point as it emphasizes the intentional and future oriented nature of design aimed to introduce change to a real world situation. Yet, the definition as such says little about the process of design and might easily be mixed up with other kinds of problem solving. Simon himself conceptualized design as a complex form of information processing, a perspective we believe its too limited given the complex nature of design(-ed) products as sketched above. In contrast, we suggest to understand design as an inherently social activity embedded and meditated by the situation it arises from and aims to change (cf. Löwgren & Stolterman, 2004). Design is also not only an intellectual process, but a process embedded in and shaped by the material world. When drafting a sketch, playing out an idea or developing a prototype we are in constant conversation with the materials we are using (cf. Schön & Bennett, 1996).

Even though design as an activity has been approached from various perspectives, the following characteristics have recurrently been associated with design as a process:

Design is creative and generative in that it produces new, often unexpected forms and introduces change to the situations it responds to (e.g. Winograd, 1996; Jonas, 2004).

Design is conscious and reflective in that is an intentional and goal directed activity, even though concrete effects can hardly be predicted and are often up to processes far beyond the designer's control (e.g. Winograd, 1996; Löwgren & Stolterman, 2004)
Design is anticipatory in that it aims to envisage possible futures and to create new and viable options of action. Design not only responds to what is but also raises the question of what might or could be (e.g. Jonas, 2004).

Design is focused on the ‚ultimate particular' (Stolterman, 2008), in that it aims to respond to a unique situation and aims to develop a solution with specific functions and characteristics, which might not work or even be relevant somewhere elso or at another

Jonas, W. (2004). Designforschung als Argument, DGTF, Hamburg, 30. und 31. Januar 2004.
Löwgren, J. &Stolterman, E. (2004). Thoughtful interaction design: A design perspective on information technology. New York: MIT Press.
Schön, D., Bennett, J. (1996). Reflective Conversation with Materials. In: T. Winograd (ed.). Bringing Design to Software (pp.). New York: ACM Press.
Simon, H.A. (1982). The Sciences of the Artificial. 2nd ed. - Cambridge: MIT Press.
Stolterman, E. (2008). The nature of design practice and implications for interaction design research. International Journal of Design, 2(1), 55-65.
Winograd. T. (1996). Bringing Design to Software. Boston: Addison-Wesley.

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point in time.

Design is integrative in that it is confronted with the entire complexity of the situation it responds to. While the designer's focus might be limited to certain aspects of the situation or the product, no aspect of the situation can be bracketed onces to product has been put into use (e.g. Jonas, 2004).

Design is a conversation, both with the stakeholders involved as well as the materials used. The ideas relevant to design not just exist in the designer's mind but are developed and tested in conversation with others, be it peers, clients, customers, sketches or prototypes (e.g. Schön & Bennett, 1996; Cross, 1999).

Design arises from a position of not-knowing and uncertainty in the sense, that both the situation he is confronted with as well as the change he wants to bring about are essentially uncertain and only take shape in the process of design itself (e.g Zamenopoulos & Alexiou, 2007).
Simon's original definition and our take on it have been deliberately broad. Simon (1982) emphasized that design as process is not a unique feature of the traditional design and engineering discplines but also essential to fields such diverse as economics, education, law and medicine. Terms like organizational development, instructional design or medical technology also stress the desingerly components of these disciplines, yet it might be argued that the proposed definition is too broad as it would apply to any kind of human activity. While we assent with authors such as Papanek (1984) that essentially everyone can act as a designer, not every activity is a design activity. Reading a book, cleaning the house, playing football, having a discussion about last night's movie, or carrying out scientific experiment are all worthwhile activities but they are not design activities in the first place as they (usually) do not cause *‚an inconsistency that emerges between beliefs about the past, current, and future states of the world, and the expressed desires or needs regarding the states of the world'*. (Zamenopoulos & Alexiou, 2007). Or to put it differently, as long as we know what to do, as long as we have plans at our disposal or can produce them easily, there will be no need to device new courses of action in order to change existing situations into preferred ones. Design should also not been mixed up with blind action or mere trial-and-error as it is an intentional process in that we might fail if we cannot change existing situations into preferred ones, as noted by Friedman (2003).

Cross, N. (1999). Design Research: A Disciplined Conversation. Design Issues, 15(2), 5-10.
Friedman, K. (2003). Theory construction in design research: criteria, approaches, and methods. Design Studies, 24(6), 507-522.
Papanek, V. (1984). Design for the Real World: Human Ecology and Social Change. 2nd ed. - Chicago: Academy Chicago Publishers.
Zamenopoulos, T. &Alexiou, K. (2007). Towards an anticipatory view of design. Design Studies, 28(4),411-436.

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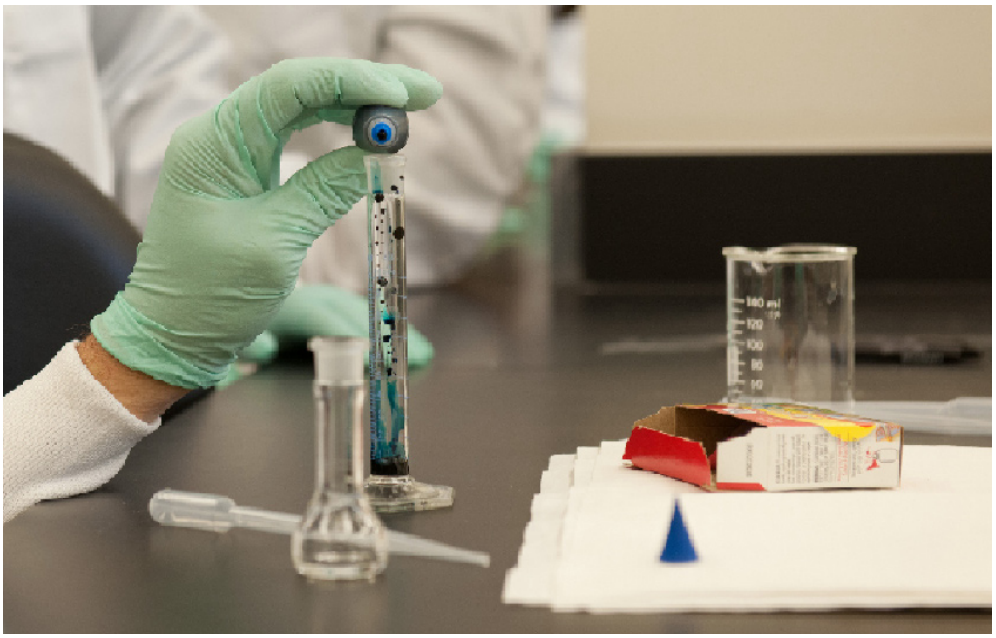
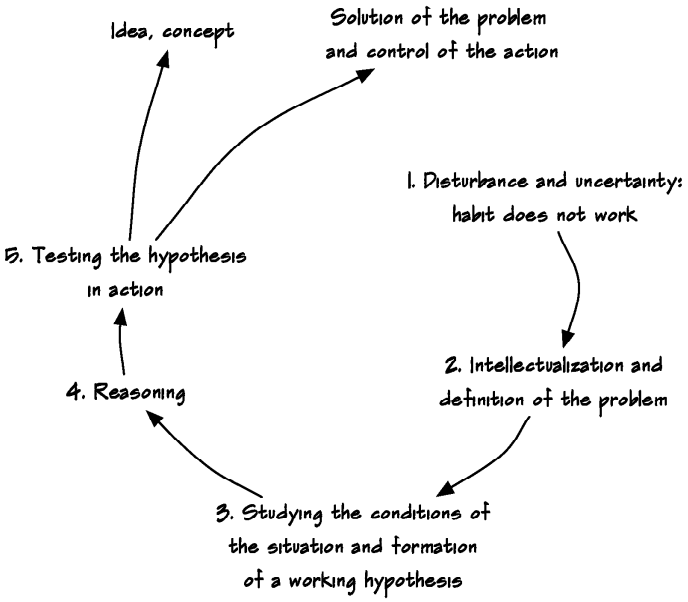
(SCIENTIFIC) INQUIRY



Source: RDECOM, URL: http://www.flickr.com/photos/rdecom/7071596657/ [16.10.2012]

In its most general sense inquiry can be understood as a search for knowledge, an investigation, a question (Chambers Dictionary, 1993). In this sense, inquiry is a quite common process and similar to the concept of learning it might even be seen as an essential constituent of human life. Searching for the first secretary-general of the United Nations in wikipedia, experimenting with a new receipe for cheesecake, learning how to mow the lawn, coming up with a medical diagnosis or figuring out who robbed the bank, can all be understood as processes of inquiry. If carried out in a systematic fashion, processes of inquiry are also



Dewey's Model of Reflective Thought and Action (Miettinen, 2000, p. 65)

Inquiry (2003). In C.M. Schwarz (ed.). The Chambers Dictionary. Chambers.
Dewey, J. (1938).

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labeled as research. While processes of inquiry and research are sometimes treated as primarily cognitive endeavors, authors such as Dewey (1938) emphasized that inquiry is in essence a transformatory activity. More precisely, inquiry sets in when we are confronted with a situation where our *‚habits do not function, a problem, uncertainty and a crisis emerges and calls for reflective thought and investigation into the conditions of the situation'* (Miettinen, 2000, p. 65).

Even though the process of inquiry, as depicted by Dewey, closely resembles what is commonly understood as *‚the scientific method'*, in that it entails the formulation of a question (or problem) based on an observation, the development of a hypotheses, the determination of the logical consequences of the hypothesis as well as its test and finally the analysis of the outcomes of this test, usually a distinction is made between science and other forms of inquiry. For example, Graziano and Raulin (1997) write in their textbook titled „Research Methods – A Process of Inquiry":

‚Research is a systematic search for information, a process of inquiry. It can be carried out in libraries, laboratories, schoolrooms, hospitals, factories, in the pages of the Bible, on street corners, or in the wild watching a herd of elephants. Indeed research can be carried out anywhere, on any phenomena in nature, and by many different people. Scientists, rabbis, and head chefs can all carry out systematic inquiry in their own domains. Although all research is a systematic process of inquiry not all research is scientific. A religious scholar's research is a serious, systematic process of inquiry, but it is not, and it is not meant to be scientific. What distinguishes scientific research from other research is the emphasis in science on using both empirical and rational processes.' (p. 28)

The question that arises when introducing a distinction between scientific inquiry and other forms of inquiry is what are the qualities that can be used to distinguish one from the other. This question is relevant in the context of this manual, because one of our main claims is that design is not just a process of inquiry but a scientific one. While this manual is not the place to provide an original answer to the so called demarcation problem, we think its important to explicate the distinctive assumptions we deem relevant to discern science from other forms of inquiry. First of all we agree with Cross (1999) that a distinction needs to be drawn between works of practice and works of research. While works of practice and respective forms of inquiry are largely focused on the situation at hand, works of (scientific) research go beyond the current situation in that they aim to derive results that might be of use for future situations. Respective knowledge claims hence have to be re-usable in other context, at least in principle. Apart from this we suggest to adopt the minimal epistemological model suggested by Schurz (2011) as it stresses the epistemic and methodological commonalities between the natural sciences, the social sciences, and large parts of the humanities. According to Schurz (2011) all the empirical sciences share the following five assumptions:

Minimal realism: they assume a reality that exists independently of a knowing subject, even though it is neither required that all properties of reality can be observed nor that the boundaries of what can be known can be specified a priori.

Fallibilism and skepticism: all scientific knowledge is more or less fallible and hence tentative. All scientific statements therefore have to be open to critique.

Objectivity and intersubjectivity: the truth of a statement has to be independent of the beliefs and values of the knowing subject and in the light of the data available, at least in principle, convincing for others.

Minimal empiricism: the universe of discourse must, in principle, be open to experience or observation. Yet it is not required that all concepts and statements in the sciences can be empirically defined, but that that there are consequences of these statements that can be tested.

Logic in a broader sense: precise logical

Logic: The Theory of Inquiry. New York: Holt, Rinehart & Winston.
Graziano, A.M., Raulin M.L. (1997). Research Methods – A Process of Inquiry. 3rd ed. – New York: Longman.
Miettinen, R. (2000). The concept of experiential learning and John
Dewey' s theory of reflectivethought and action. International Journal of Lifelong Education, 19(1), 54-72.
Cross, N. (1999). Design Research: A Disciplined Conversation. Design Issues, 15(2), 5-10.

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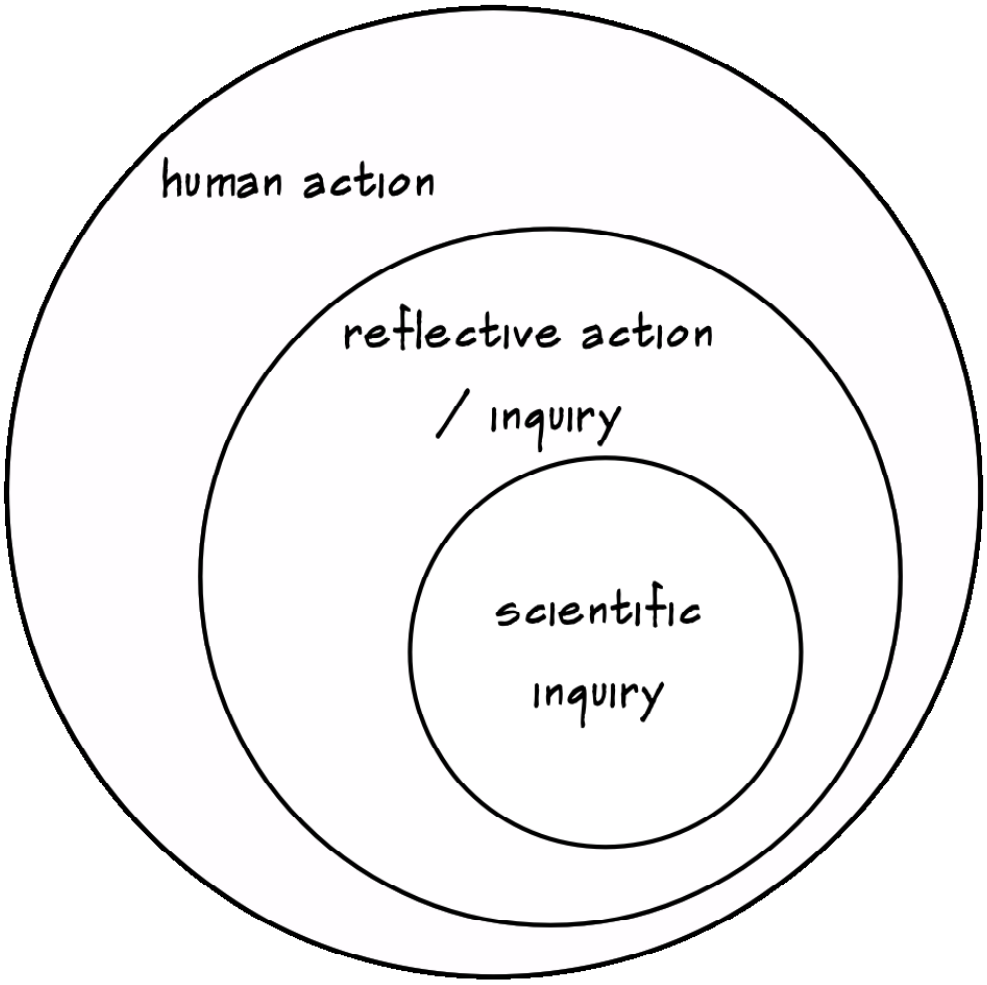
methods provide the most effective way to introduce concepts, specify statements and form arguments, even though these methods are not restricted to deductive logic.

These assumptions effectively rule out processes of inquiry as unscientific that deny the existence of a real world, are not willing or able to question its own assumptions and put them to an empirical test, while still giving enough room to also include the empirical branches of the social sciences and the humanities. For a more extensive treatment of the demarcation problem the reader is referred to Schurz (2011).



Scientific Inquiry as Action.

Schurz, G. (2011). Einführung in die Wissenschaftstheorie. 3. Aufl. Darmstadt: WBG.

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DESIGN AS INQUIRY

Photo by Heidrun Allert

Trying to understand the notion of *Design as Inquiry* it is important to get to terms with the epistemtic processes that underpin design. Or to use Simon's wording, the core question becomes: What do we actually do when we aim at changing existing situations into preferred ones? This question has caused a lot of discussion in the philosophy and theory of design and even beyond. At the very heart of this discussion there are two fundamental positions, the one sees design as a process of rational problem solving while the other emphasizes the creative and situated nature of the design process (cf. Dorst, 1997; Visser, 2006). In a nutshell, the problem-solving model of design, which can be traced back to authors such as Jones (1970), Simon (1982) or Bunge (1983), assumes that design problems are solved by chosing from alternatives. Starting from a specification of the actual situation, the main task of the designer therefore is to select and integrate the means most suitable to bring about the preferred situation. Design in this perspective strongly depends on the theoretical and empirical knowledge the designer uses in order to identify and evaluate the alternatives available. Yet, as pointed out by many authors this perspective entails a severe limitation. The problem-solving model assumes that analysis of the status quo and the body of knowledge already entails what is to be achieved, i.e. the preferred situation. Furthermore, this position assumes that designerly interventions are essentially controllable and its outcomes predictable. While this might hold for the creation of a closed system, such as a mechanical clock, it fails as soon as our focus shifts towards open systems such as embedded information systems, man-machine systems, or organisations. As a consequence authors such as Rittel (1972), Schön (1983), Gedenryd (1998) or Shamiyeh (2010), to name a few, have outlined models of design that emphasize the creative and situated nature of design instead. What these models have in common is that neither the problem nor the possible solutions are given but actually are created in the process of design. Design from this perspective cannot be understood as a choice among existing alternatives but actually as one that produces new alternatives that have not been available before. Design therefore inevitably also entails the question of „what desired future do we want to create?“ (Shamiyeh, 2010). Following this position, design then is a process of inquiry as it is essentially supposed to

Bunge, M. (2003). Philosophical inputs and outputs of technology. In: R.C. Scharff, V. Dusek (eds.). Philosophy of Technology: The Technological Condition: An Anthology (pp. 172-181). Malden, MA: Blackwell Publishing.
Dorst, K. (1997) Describing Design: A Comparison of Paradigms. Delft University of Technology: Delft, The Netherlands.
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figure out what these desired futures could be and how we could make them come about. Hence, design basically starts from a position of not knowing and aims to deepen the understanding of the current situation by the attempt to transform it (cf. Schön, 1983).

It seems that the idea of design as a process of inquiry is appealing to many practitioners and has also been taken up in various textbooks on design, even though under different labels (e.g. Lawson, 2006; Löwgren & Stolterman, 2004). Yet, arguing that design is inquiry does not imply that design is or can also be a process of scientific inquiry. In fact, proponents of an inquiry oriented perspective on design such as Rittel (1972) and Schön (1983) developed their ideas in contrast to prevailing models of scientific rationality, while their models in turn have been critizised as too fuzzy and not rigorous enough to life up to scientific standards. We belief that most of the respective arguments are flawed as they are implicitly or explicitly referring to a quite narrow understanding of scientific inquiry, which (a) is guided by idealistic perceptions of experimental research in the natural sciences and (b) expels value statements from scientific discourse. Drawing on the wider conception of scientific inquiry introduced above, we therefore argue that there are design-based forms of inquiry on par with those used in the natural and social sciences as well as the empirical strands of the humanities. The argument falls into two parts. On the one hand we have show that design-based forms of inquiry are not just aimed to produce singular products or services but also reliable forms of knowledge that are relevant beyond the situation from which they arose. On the other hand the assumptions entailed in the minimal epistemological model suggested by Schurz (2011) must also apply for design-based forms of reasoning.
As mentioned above, design essentially can be understood as a process that is aimed to answer questions of what is desirable as well as about the means to change existing situations into preferred ones. Design is therefore concerned with two main types of knowledge claims, normative statements about desired ends and descriptive statements about means-end relations. While both types of claims are open to rationale justification it is only the latter that can be assessed empirically. Hence, what design-based research essentially deals with from a scientific point is the development and testing of means-end relations of the following form '*if you want to achieve Y in situation Z, then perform action X*' (vanAken, 2004). Such statements have often been labeled as technological rules and are supposed to form re-usable knowledge claims. Consequently we might say that design processes that aim not only at some specific product or service but also explicitly put forward or test technological rules fulfill a core requirements of scientific inquiry. But what about the other assumptions constitutive for scientific inquiry? Let us have a look at criteria one by one:

- The assumption of a reality that exists independently of a knowing subject appears to be accepted by most engineers (deVries, 2005), but probably also by most people involved in any form of design. A reason for this might be that designers and engineers not just observe but also aim to manipulate the world and hence experience that the world is resistant and not always obeys to their ideas (cf. Miettinen, 2006).

- Similarly, design-based researchers also appear to accept that their knowledge claims, the technological rules, often only heuristic character and might be replaced as soon as there a new means available or new side-effects to exsitent means become known.

- Criteria, such as objectivity and intersubjectivity, are equally important for design-based research. Whether something works as intended or not should not depend on the beliefs and values of the persons involved. Similar to evaluation research, the explication and justification of the underlying norms and values have to be treated separately.

- As design aims to devise product and services, the universe of discourse is es-

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Miettinen, R. (2006). Epistemology of transformative material activity: John Dewey's pragmatism and cultural-historical activity theory. International Journal of Lifelong Education, 36(4), 389-408.
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deVries, M. (2005). Teaching about Technology – An Introduction to the Philosophy of Technology for Non-Philosophers. Doordrecht: Springer.

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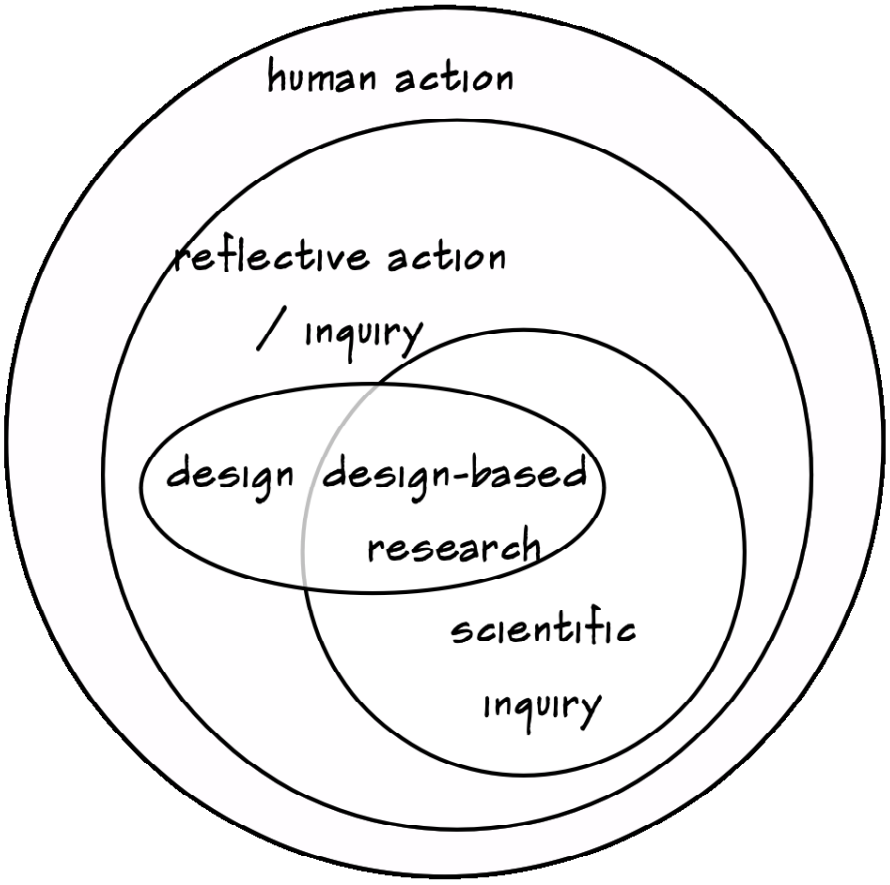
sentially an empirical one. Empirical tests of technological rules are essential to design-based research.

- Finally, it has been argued that despite its creative nature also design adheres to the principles of logic, even though it entails moves not covered by deductive logic.

- Hence, in principle there seems nothing that renders design-based research unscientific as long as we assume that normative and descriptive statements could be treated separately. This result is in line with Findeli et al. (2008, p. 68) who state:

„Methodology of design research is a subset of the methodology of [scientific] research in general, and as such its statements, specifications, validation criteria, etc. should be consistent and congruent with the general principles of the latter, as accepted and discussed by the international scientific research community."



Design as Inquiry

Findeli, A., Brouillet, D., Martin, S., Moineau, C., Tarrago, R. (2008). Research Through Design and Transdisciplinarity: A Tentative Contribution to the Methodology of Design Research. Proceedings of Focused, Swiss Design Network Symposium 2008, Mount Gurten, Berne, Switzerland, pp. 67-91.

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MODES OF INQUIRY

Photo by Christoph Richter

How does design-based research relate to other forms of scientific inquiry?

While authors such as Bunge (2003) have tried to conceptualize design and technological development as a form of applied research, this perspective seems to be limiting. It neglects both the creative and anticipatory nature of design as well as the fact that we might devise and make use of new techniques and technologies that are not build on some existing theory. The invention of the airfoil as a predecessor of the science of aerodynamics and the steam engine as a step towards the science of thermodynamics provide some remarkable examples for practical invention as a driver for theoretical development in the natural sciences (e.g. Glass, 1996). Similar cases can be found in the humanities, where new research questions and even sub-disciplines emerge in response to new inventions.

We therefore follow authors as Archer (1981), Cross (1982), Romme (2003), deVries (2005) who position design (and engineering) as a mode of inquiry distinct from those in the natural sciences on the one and the humanities on the other hand. What makes these modes of inquiry different, are not so much their epistemological assumptions but their objects of study. In a nutshell, while the natural sciences are focusing on the natural world, animate or inanimate, the humanities are looking at the human experience within the world and the way this experience is mediated by culture. The domain of design-based research in contrast is the artificial or man-made world. Due to the different objects of study, the modes of inquiry also differ regarding their primary knowledge claims and dominant types of reasoning. While the natural sciences aim to discover universal patterns and are largely nomothetical, the humanities are seeking to describe and explain particularities and are dominantly idiographic. Design-based research are in between those extremes, in that they

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deVries, M. (2005). Teaching about Technology – An Introduction to the Philosophy of Technology for Non-Philosophers. Doordrecht: Springer.

Glass, R.L. (1996). The Relationship Between Theory and Practice in Software Engineering. Communications of the ACM, 39(11), 11-13.

Romme, A.G.L. (2003). Making a Difference: Organization as Design. Organization Science, 14(5), 558-573.

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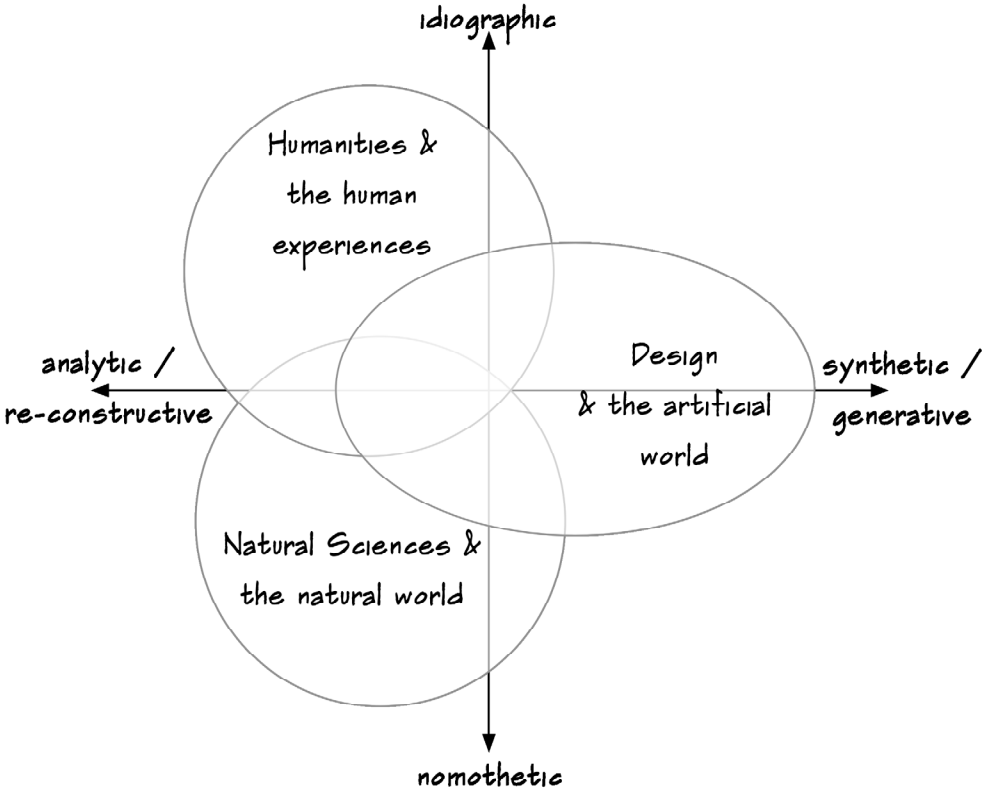
stive for technological rules „that transcend individual design problems, but on the other hand they should not get too far removed from practical situations“ (deVries, 2005, p. 39). Yet, while both the natural sciences and the humanities are primarily analytic or re-constructive in nature as they aim to explain the existing, design-based research is interested in systems and phenomena that do not exist and hence is synthetic or generative.



Three Modes of Inquiry

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MATERIALITIES IN INQUIRY

Photo by Heidrun Allert

‚From a practice-oriented perspective creativity is neither a property of a person, process, product, nor environment, but constitutes 'a mode of interaction with the world' (Beardon, Ehn & Malmborg, 2002, p. 503). More precisely, creative practices can be understood as those modes of interaction in which individuals or collectives aim to cope productively with an otherwise indeterminate situation, i.e. a situation that is inherently disturbed, confused, ambiguous or unsettled (cf. Miettinen, 2006)' (Richter et al., 2014). This means that creative practice is a form of inquiry as we intervene and thus co-create and transform the situation we aim to understand. To productively cope with an indeterminate situation we frame it and come up with an initial and primilinary local theory. In intervening we engage with the socio-materiality of the local practice producing an artifact (conceptual and material) to probe into and find out about the sitation. Artifact and practices are constitutively entangled (Orlikowski, 2007), which means that the artifact does not contain it's meaning in itself but that qualities and practices are emergent. Socio-technical systems are evolutionary.

Materializing a hypothesis means to draw decisions and ask ourselves whether and how options make a difference – in doing so we articulate a theory and hypothesis. In *Design as Inquiry* we understand the artifact as a materialized assumption, i.e. a hypothesis allowing to probe into and explore the situation at hand. In design Darke (1979) proposes that understanding of a problem is gained by testing conjectured solutions. The problem is not given and the solution is neither defined by an inductive process of collecting requirements, nor deduced from theory. Design is not just applying some scientific findings. Cross states ‚(...) that problems and solutions in design are closely interwoven – that ‚the solution' is not always a straightforward answer to ‚the problem'. (...) the need to use sketches, drawings, and models of all kinds as a way of exploring problem and solution together' (Cross, 1995).

Following this argument, creativity is a mode of inquiry in everyday activities, in design as well as in research. The relevance of materiality and artefacts in epistemic practices is stressed in different approaches. One of them is the theory of *distributed cognition* taken up in

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- the concept of *manipulative abduction* (Magnani, 2009): Artefacts are external mediators which allow for an interplay between external and internal (individual brain activity) representations of meaning. Magnani focuses on creativity and hypotetical reasoning in research;

- the concept of *cognitive niches* (Bardone, 2011): human beings build niches and manipulate their environments to come up with situations which better afford our cognition;

- the concept of *cognitive technology* (Pea, 1987). Cognitive Technology is any medium that helps transcend the limitations of the mind in thinking, learning, and problem-solving activities. ‚I take as axiomatic that intelligence is not a quality of the mind alone, but a product of the relation between mental structures and the tools of the intellect provided by the culture' (Pea, 1987)

Other approaches are those of epistemic processes as socio-material practices (e.g. Schatzki, 2012), focussing on the situatedness of knowledge and the entanglement of epistemic practices and artefacts. An idea is not externalized from the mind into the external world, but a solution is a conversation with the situation itself. Design is conceptualized as an epistemic practice, then.
In design prototypes fill different roles. Prototypes help to visualize and communicate an idea but also allows for inquiry (Gill et al., 2011). This is an important role when we assume that the artifact is not selfcontained, but qualities are a product of emergent practices and a constitutive enganglement. Even more as design is completed in use (Carroll, 2004).

Gill, C., Sanders, E., Shim, S. (2011). Prototypes as Inquiry, Visualization and Communication. International Conference on Engineering and Product Design Education. City University: London, UK.
Carroll, J. (2004). Completing Design in Use; Closing the Appropriation Cycle. ECIS 2004 Proceedings. Paper 44.

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THE PEDAGOGICAL MODEL „DESIGN AS INQUIRY“

A PROCESS MODEL

QESTIONING

EXPLORATION & FRAMING

ENVISIONING DESIGN OPTIONS

PROTOTYPING (& MATERIALIZING)

PROBING

PRESENTING & REFLECTING

AUTHORS: RICHTER, ALLERT

Education and Culture DG
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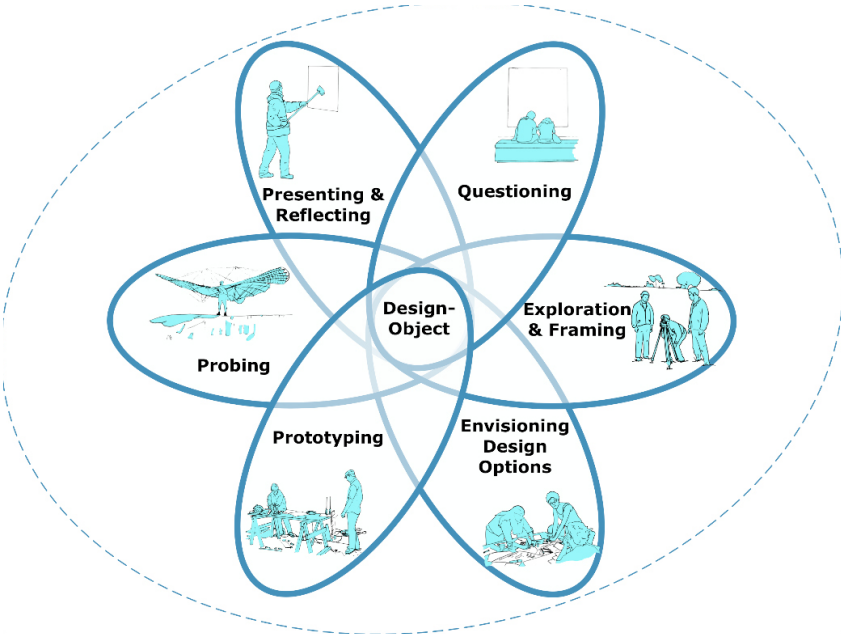
A PROCESS MODEL



The above model is an attempt to tell apart the main activities that make up the Design as Inquiry process. The model, that is depicted above, draws on the works of Purgathofer (2003), Löwgren & Stolterman (2004), and Allert & Richter (2009) and emphasizes the epistemic dimension of the design and inquiry process. The model divides the process into six distinct activities, which are organized around the "design object". The design object thereby entails both the more or less tangible thing, service, or intervention to be created as well as the evolving understanding of how this product is supposed to work, for whom and under which conditions. Design objects in this sense are also the objects of inquiry.

The core activities, which are described in more detail on the next pages, comprise questioning, exploration & framing, envisioning, prototyping (& materializing), probing as well as presenting & reflecting (and articulating & explaining throughout the entire process). These activities mark the main epistmic challenges we are facing throughout the design as inquiry process.

Even though the model provides some useful orientation and can also be understood as a rough guideline throught the design and inquiry process, it is important to note that these stages are seldomly followed in a strict order. In practice it is quite common to switch back and forth between the different activities. Furthermore both design and inquiry are not completed in one iteration but go through these activities repeatedly. Hence while providing a scaffold we have to keep in mind that every design process is unique and to some extend unpredictable. As Löwgren and Stolterman (2004) remind us:

"If the outcome can be predicted, it is by definition not a design process. Every design process is affected by the people responsible for carrying out the work and by existing conditions, such as available staff, tools, and time. The process is also a consequence of the specifics of the design situation at hand."A PROCESS MODEL

Allert, H. & Richter, C. (2009). Design as Knowledge Creation. E&PDE 09, Brighton, UK: 10 and 11 September 2009.
Löwgren, J. & Stolterman, E. (2004). Thoughtful Interaction Design - A Design Perspective on Information Technology- MIT Press: Cambridge.
Purgathofer, P. (2003). Designlehren - zur Gestaltung interaktiver Systeme. Habilitationsschrift, TU-Wien.

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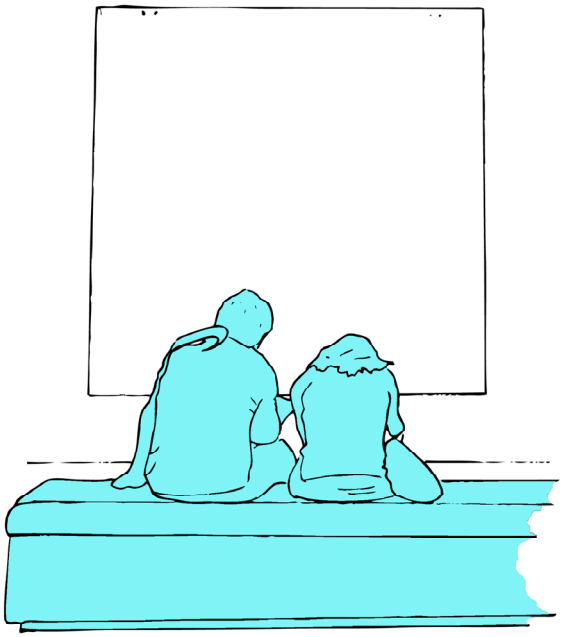
QUESTIONING



The search for a meaningful question constitutes a central entry point to the design and inquiry process.
The question provides for a preliminary conceptualization of the object of the design and inquiry process, yet it should not been phrased too narrowly to leave room for new ideas and different perspectives.

The question should be open ended. It has the following native form:
‚How might we achieve a significant improvement/change X for a group of people Y in context Z?‘

While it might be tempting to take "the problem" as given, it is important to contemplate on what is really at stake before trying to fix what appears to be evident. Reflecting upon what we conceive as a significant improvement or change as well as becoming clear about the stakeholders we aim to address and the contexts they act in is an essential step to scope the design and inquiry process.
Yet, questioning is far from being a trivial task, as it asks us to scrutinize what we are taking for granted and to reflect on our implict assumptions. Bertolt Brecht, the german playwright, put this issue as follows:

‚Before familiarity can turn into awareness the familiar must be stripped of its inconspicuousness; we must give up assuming that the object in question needs no explanation. However frequently recurrent, modest, vulgar it may be it will now be labeled as something unusual.‘

Brecht, B. (1994). Short Description of a New Technique of Acting which Produces an Alienation Effect. In: J. Willett (ed.). Brecht on Theatre: The Development of an Aesthetic (pp. 136-140).New York: Hill and Wang.

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HOW TO

There is no routine procedure on how to raise meaningful questions, yet the following activities might help you to come to terms with and reflect on what you are interested in:

1. **Describe the phenomenon your are interested in from as many perspectives as possible.** In which contexts, for whom and under which circumstances does the phenomenon occur, become relevant?
2. **Make a list of all those assumptions you have with respect to this phenomenon.** What motivates the people involved, what do they aim for, what do they desire? What are the constraints and contextual conditions? What can be taken for granted? What will not change? What has to be changed for sure?
3. **Scrutinize and put your assumptions to test.** Where do they come from and what is their justification? Are there exceptions or counter examples? Are there people that would not share your assumptions and could these be right as well?
4. **Collect everything that is related to the phenomenon you can get a hold on.** Search for examples, reports, documentaries, movies and talk to the people involved and other experts.
5. **Tell others about your question.** Explain to them why you think that your question is important and build on to their repsonses.
6. **Iterate**

TIPS

- It is important to realize that we can approach a certain phenomenon from different perspectives. Depending on the perspective we take other aspects will appear to be relevant. Laying out possible perspectives hence is more important than specific the „true“ problem.
- While it is highly advisable to be in touch with those people we want to design for we also need to be aware of the fact that their interests might differ. Adressing all these interests might be impossible.
- Note that the problem is open ended and that questioning is only a first step as in design the problem is explored and analysed more deeply through synthesis.

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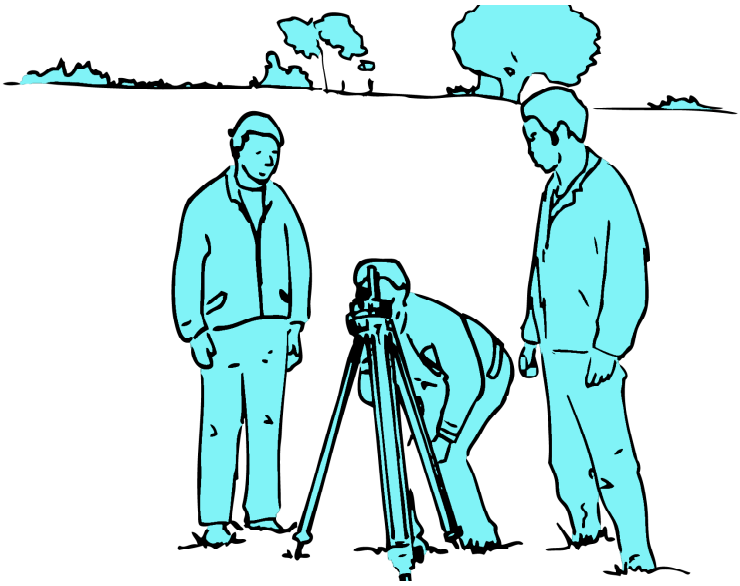
EXPLORATION & FRAMING



Exploration & Framing are aimed at collecting information about the object of design to be developed a tentative understanding of people's needs, practices, and the situation/context in which they act.
Exploration entails both the analysis of the status quo and prevailing practices as well as looking out for possible perspectives and design options.
Framing complemements the exploration by defining the designer's perspective on the situation at hand.
The aim of the exploration is not to evaluate potential design options but to look at the phenomenon of interest, usually a human activity, from different perspectives and to develop a preliminary understanding of the situations people are confronted with and acting in.

The focus of exploration is not so much on „*the average*" or „*the normal*", but on the *particular and unique.*
Exploration usually starts with questions aimed at *description*, such as:

- How do people carry out a certain activity? What are they doing and thinking?
- What is the context/environment the activity takes place in?
- What are the tools/media they are using and for which purpose?
- Are there noteworthy exceptions, variants, workarounds
- What are the problems people encounter/struggle with?

Later on, the focus switches to questiones aimed at *explanation*, such as:

- Why do people act the way they do? What are their motives, goals?
- What are the factors that influence their behavior, cause problems, etc.?

Yet, making sense of all this informaiton also requires develop what Nakakoji, Sumner & Harstad (1994) have called a perspective *‚a point of view, which implies that certain design goals exist, certain bodies of design knowledge are relevant, and certain solution forms are preferred'.*

Nakakoji, K., Sumner, T. & Harstad, B. (1994). Perspective-Based Critiquing: Helping DesignersCope withConflicts among DesignIntentions.Proc. of Conferenceon AI inDesign (AID'94),pp. 449-466.

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HOW TO

Exploration and framing roughly resembles the steps of a multiple case study:

1. **Specify or revise your designquestion.** The design question is not cast in stone but evolves throughout the design and inquiry process. Therefore it is important to check and update the designquestion continuously.
2. **Plan for data collection.** Decide on the „cases" you want to investigate and the methods you want to use. Depending on the phenomenon and design question data collection might include some form of observation, self-reports, non-reactive methods such as artifact analysis of self-experiments.
3. **Collect and analyze data case by case.** To get an idea of possible differences and variations the cases are analyzed separately first. Depending on the guiding question the data might be organized thematically or chronologically.
4. **Search for recurrent patterns & themes.** Once the individual cases have been analyzed they can be compared looking for similarities as well as differences. While similarities can reveal relevant structures and patterns, differences might provide hints for the potential space of action to be filled by design.
5. **Summarize your findings and cross-check.** The search for patterns and themes requires interpretation, hence it is advisable to cross-check the insights gained in this process with others, be it the stakeholders involved in the inquiry or simply some peers.

TIPS

- When planning for data collection it is important to decide on the sampling strategy of the cases to be investigated. While sometimes we might be interested in a representative sample, there are also other strategies availabe. For example we might look for the most extreme cases in order get a better idea on the existing variation or we might draw sample of cases centered around a particular aspect of the phenomenon we are interested in.

- The communication of findings is essential (a) to cross check and validate our findings but also (b) to convince others that the issues we are spotting are in fact worthwhile to ponder on. Therefore results should be described in a vivid format. Scenarios, Journey Frameworks, Rich Pictures or Storyboards provide useful tools towards this end.

Further Readings

Sleeswijk Visser, F., Stappers, P., van der Lugt, R. & Sanders, E.-N. (2005). Context-mapping: Experiences from Practice. CoDesign 1(2), 119 –149.
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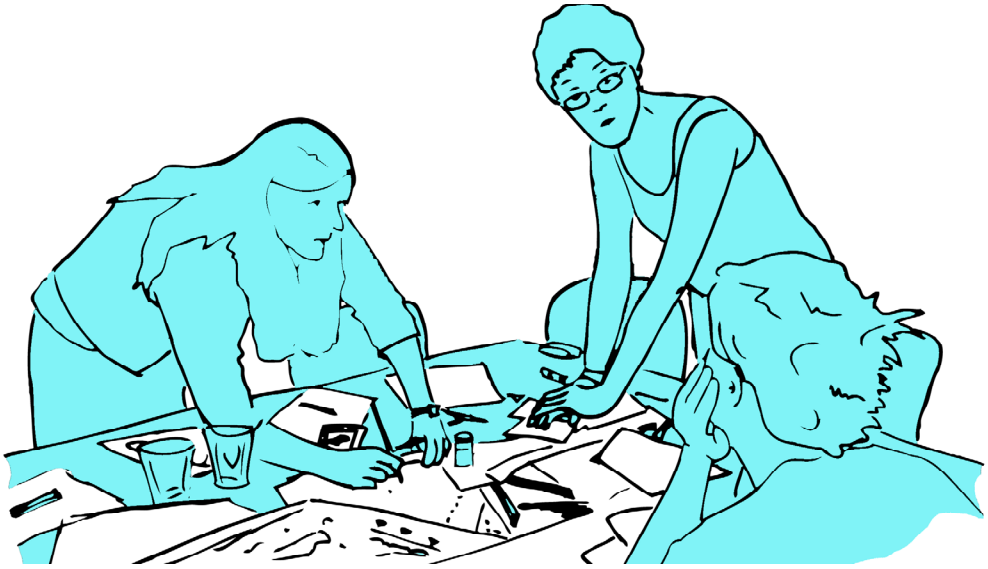
ENVISIONING DESIGN OPTIONS



The envisioning stage is focused on the development of design options that might provide answers to the design question. These design options are hypothetical in nature - if viable they should be capable to bring about the intended improvement or change. Developing design options is a highly iterative process in which proposals are assessed against available information and new options are continuously envisioned. This phase constitutes the creative core of the design process, in that it aims to create a vision on what might be, rather than focusing on what is. This phase is projective in nature, anticipating possible worlds that have not been realized yet. A vision can only be created from a certain perspective, hence designers have to decide on what they belief is relevant and desirable.

Envisioning options is a form of exploration (analysis through synthesis) which allows to understand the problem more deeply. Thus, developing several alternative options is a form of exploration, allowing you to question underlying assumptions.

The envisioning stage includes *divergent* phases in which ideas are generated and *convergent* phases in which these ideas are assessed and selected.

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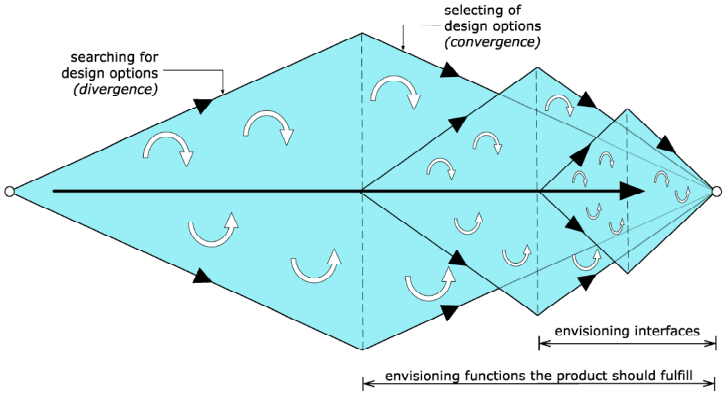
HOW TO

Envisioning design options is a highly iterative and to some extent messy process. The following steps hence provide a quite idealized account:

1. **Focus your design question on the most crucial issue(s)/problem(s) you identified.** While exploration and framing often reveal a multitude of issues/problems, some of them are usually more essential than others. Rather than trying to address all of them at once it is useful to focus on one or only a small subset of them first.
2. **Brainstorm on how your (focused) designquestion might be answered.** Develop as many ideas as you can think of, defer judgement, and build on the ideas of others.
3. **Reflect on your ideas**. Try to figure out what you like and dislike about each of the ideas you came up with.
4. **Select five to eight of the ideas and create a sketch to illustrate each of them.** Select those ideas you find most interesting, promising or intriguing. The ideas you select should be as different as possible, providing substantially different answers to the design question.
5. **Get in touch with a potential client/user, present your sketches, and collect feedback.** Try to figure out what they like/dislike about these ideas and whether they spot any dangers or opportunities.

TIPS

- A particular danger at this stage is that you fall in love with one of your own ideas, making you blind for the potentials of other ideas. To test whether you are already biased is to list the pros and cons for all the ideas you came up with. If there is an idea that only has pros but no cons you should become quite sceptical, because as practical experience tells, any ideas also has its tradeoffs. The aim therefore is not to find the „silver bullet" but an idea that holds greatest potential to increase the potential scope of action.
- Envisioning several options is a means to explore the design space (and the problem) more deeply (analysis through synthesis).
- Acknowledge that a design option (synthesis) can not be derived from analysis. Allow for an inspiring vision!
- You risk *design fixation* if envisioning is done without any analysis. On the other hand, you risk paralysis if you stick to analysis.
- *Envisioning a design option* is a creative step which demands to tolerate ambiguity.



Search for and Selection of Design Options

Further Readings

Buxton, B. (2007). Sketching User Experiences: Getting the Design Right and the Right Design. Amsterdam: Morgan Kaufman.

Dix, A., Ormerod, T., Twidale, M., Sas, C., Gomes da Silva, P., McKnight,L. (2006). Why bad ideas are a good idea. Proceedings of HCIEd.2006-1 inventivity, Ballina/Killaloe, Ireland. 23-24 March 2006.

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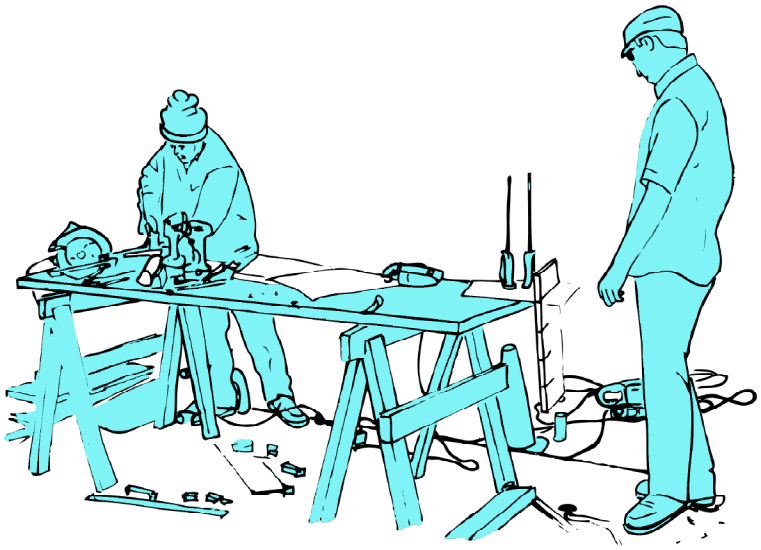
PROTOTYPING (& MATERIALIZING)



Prototyping fulfills an essentially dual function. On the one hand it constitutes inquiry into the feasibility and latent implications of the design options envisioned before. On the other hand it prepares for the practical testing and communication of the design options selected.

Prototyping should not be mixed up with the development of the *„final"* product. In its most general sense, prototyping refers to all those activities aimed to generate feedback on a design idea by creating and utilizing a manifest representation of it. Prototypes are not just means to prove or showcase a certain solution but also a powerful vehicle to explore characteristics of a product or service, to discover problems as well as to probe into new directions and gain trust in an idea.

‚Prototyping is an activity with the purpose of creating a manifestation that, in its simplest form, filters the qualities in which designers are interested, without distorting the understanding of the whole.' (Lim, Stolterman & Tenenberg, 2008)
Rather than producting a complete solution, the idea behind protoyping is to create a partial representation of the intended product or service that realizes just those qualities needed to answer a particular question. Depending on the question, prototypes might range from simple sketches and storyboards over mock-ups and role-plays to more or less comprehensive precursors of a final product or service. Being used as means for exploration and discovery prototypes are usually built, tested and rebuild in an iterative and agile manner.

‚The best prototype is one that, in the simplest and the most efficient way, makes the possibilities and limitations of a design idea visible and measurable.'(Lim, Stolterman & Tenenberg, 2008).

It is crucial to specify the question you would like to find an answer to (see *QUESTIONING*). Then conceptualize the prototype so that the question can be answered.

Lim, Y.-K., Stolterman, E., Tenenberg, J. (2008). The Anatomy of Prototypes: Prototypes as Filters, Prototypes as Manifestations of Design Ideas. ACM Transactions on Computer-Human Interaction, 15(2), 1-27.

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HOW TO

While actual creation and utilization of a prototype heavily depends on the purpose and kind of prototype to be made, the following steps are useful to keep in mind:

1. **Decide upon the purpose of the prototype and the question(s) you want to answer.** Do you want to prove or showcase the feasibility of an idea, do you want to inquire into the strength and weaknesses of some ideas or do you want to explore different directions more generally?
2. **Specify the aspects of the product or service that are relevant to answer your question(s) and focus on those.** For example, trying to understand whether the icons in the menubar of a text editor are comprehensible does not require the respective functionalities to be implemented. Conversely, aiming to figure out whether new safety regulations would fit into current practices does not require the existence of respective manuals or training programs.
3. **Choose the form of prototype that suits your purpose and question(s) best.** The form of prototype is bascially defined by (a) the material or medium used to create the prototype, (b) the resolution, i.e. the level of detail, and (c) the scope , the range of elements of the overall product or service covered by the prototype.
4. **Build the prototype.** Depending on the purpose of the prototype you might want to build the prototype on your own or in collaboration with colleagues, potential users and/or other stakeholders.
5. **Test or reflect on the prototype.** Depending on your question you might put the prototype to some type of test or simply reflect on whether the prototype matches your own expectations and try to figure out why it does so or why not.
6. **Modify the prototype or create a new one.** Revisions might be based on failures or shortcomings but also on new ideas and options that emerged while creating or testing the preceeding version.

TIPS

- Rather than trying to put everything into one prototype it is often advisable, to develop different prototoypes focused on specific questions and to make each prototype as simple as possible.
- Especially when using prototypes for exploratory purposes, an interesting „failure“ might be more helpful than the replication of a standard solution. Hence success prototyping does not require to come up with „the best“ solution but to learn and understand what works and what does not work. Its also advisable to keep track of the changes made to the prototypes and the questions and tentative answeres that popped up over different iterations.
- As there is rarely any single best solutions it is often useful to create various prototypes to explore different options to solve a problem.

Further Readings

Buchenau, M. & Suri, J. F. (2000). Experience Prototyping. Designing Interactive Systems. Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques. New York: ACM, 424-433.
Gill, C., Sanders, E., Shim, S. (2011). Prototypes as Inquiry, Visualization and Communication. Proc. of International Conference on Engineering and Product Design Education, 8 & 9 Sept. 2011, City University, London, UK, pp. 1-6.
Schrage, M. (1996). Cultures of Prototyping. In: T. Winograd (ed.). Bringing Design to Software (pp. 191-204). Boston: Addison Wesley.

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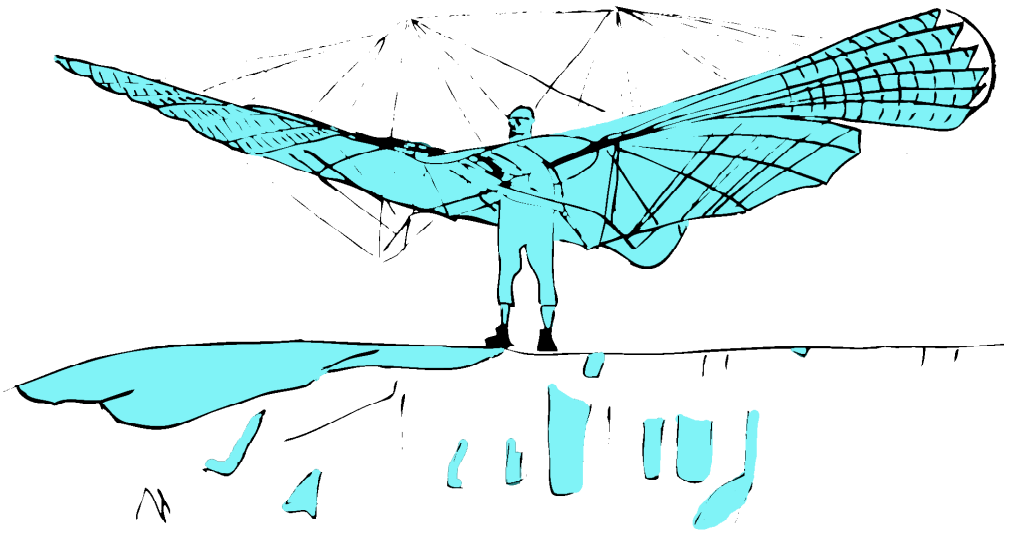
PROBING



Probing is aimed at testing the viability of the envisioned design option as well as its formative evaluation.

To increase the ecological validity and foster the detection of unintended side-effects probing should be carried out in realistic settings whenever possible.

Unexpected results and breakdowns are important outcomes of probing as they provide a unique learning opportunity.

Probing is an essential element of the design and inquiry process, as due to the complexity of the real world context we are never able to foresee all the consquences our product, service or intervention will have. Often we are even not able to assess whether our idea will work at all, without putting it into use.

Probing essentially parallels the so called formative approaches in evaluation research (cf. Worthen, Sanders & Fitzpatrick, 1997), that are aimed to provide useful information in improving the product, service, or intervention and that are geared towards actionable knowledge. Besides providing insights into the overall effectiveness, probing just like formative evaluation alos aims at explanations on why the product, service, or intervention is working as expected or not.

Worthen, B.R., Sanders, J.R., Fitzpatrick, J.L. (1997). Program Evaluation: Alternative Approaches and Practical Guidelines. 2nd ed.-New York: Addison Wesley.

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HOW TO

In general probing follows the overall structure as any evaluative process:

1. **Specify the purpose and object of the probing exercise.** Do you want to test the overall feasibility of your idea, do you want to learn why it works / does not work, and/or do you want to figure out how it can be improved? What are you going to test? For example, are you going to test whether the functionalities provided by the product or prototype work properly, how the product or service is acutally used or how it is assessed different stakeholders?
2. **Decide on the questions you want to answer and the criteria you want to apply.** The more precise the questions are phrased the more telling the answers probably will be. You should also think of the criteria or standards you want to apply in order to assess whether the product, service, intervention works out as expected.
3. **Decide on a procedure to test your product, service, or intervention empirically.** The selection of a procedure depends on the resources available as well as the purpose of the probing.
4. **Put your product, service, or intervention to test.** Carefully check whether the test provides you with the information you are looking for. If not, it might be necessary to rethink and adapt the procedure.
5. **Analyze and interpret your findings.** Check whether the product, service, or intervention worked out as expected. Carefully think about rival explanations that might have caused the observed effects.

TIPS

- There is no single way to probe a product, service, or intervention. While sometimes it might be advisable to carry out a sophisticated experiment with a randomized control group, there are other cases where it might suffice to ask a potential user for his or her opinion.
- Keep in mind that probing is a means for learning. A „failure“ that provides you with an insight on why something did not work might be more useful than an unexplained „success“.

Further Readings

Davidson, J.E. (2005). Evaluation Methodology Basics - The Nuts and Bolts of Sound Evaluation. Thousand Oaks: Sage Publications.
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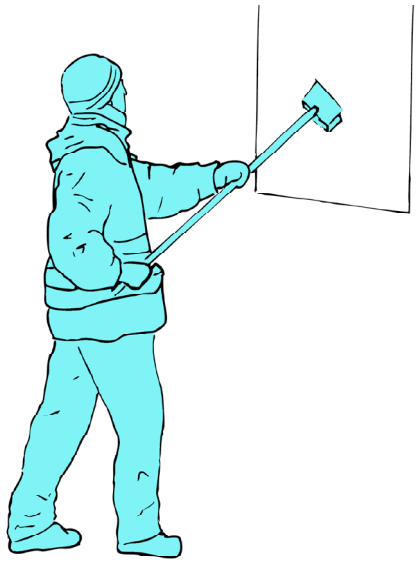
PRESENTING & REFLECTING



Sharing of findings, whether positive or negative, is an essential element of the design process as it allows others to build on one's own successes and failures. Design never starts from scratch but is part of a ongoing collective process.

The type of presentation and ways of dissemination thereby depend on the audience.

Even though presenting & reflecting is mentioned as the last activity, it is relevant throughout all stages of the design and inquiry process.

Or as Fogg (2003) put it:
‚Sharing ideas early and often is one key to success for designers of end-user products and services. Sharing with target users gives you feedback to help you improve your concept. Sharing with colleagues helps to ensure that everyone on the team has a similar vision. Sharing with your boss enables you to enlist her support and feedback early – and if he hates the concept, to turn your attention to something with more potential for your organization.‘

Fogg, B.J. (2003). Conceptual Designs – The Fastest Way to Capture and Share your Ideas. In: B. Laurel (ed.). Design Research: Methods and Perspectives (pp. 201-211). Cambridge: MIT press.

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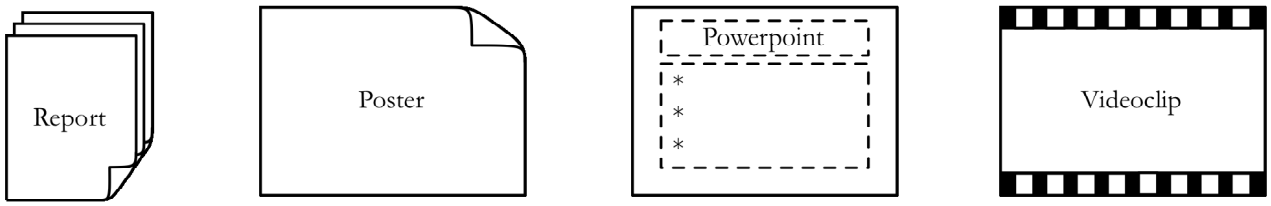
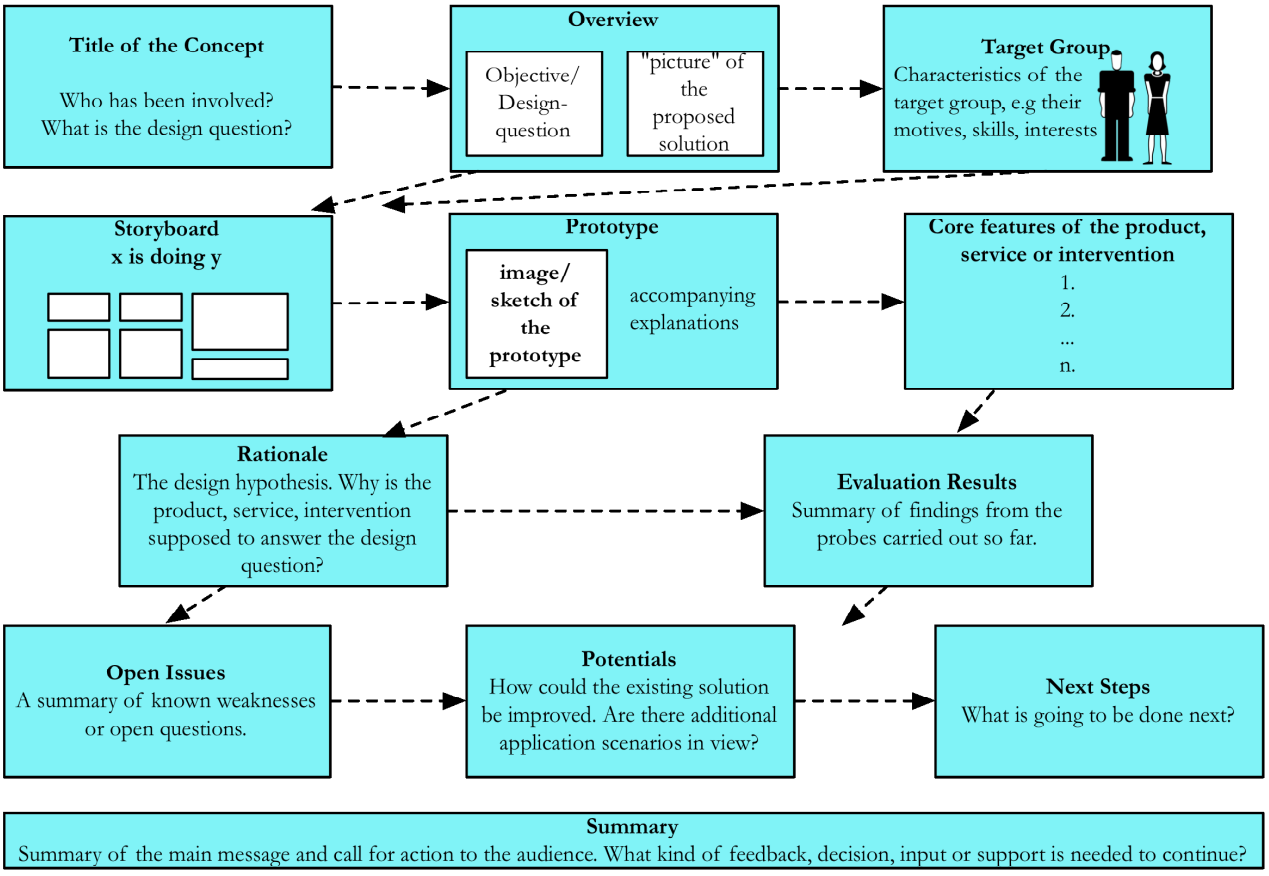
HOW TO

Different Media



Building Blocks for a Concept Presentation



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CASE STUDIES AND MULTIDISCIPLINARY DESIGN CHALLENGES

EXPLORING STUDENT'S LEARNING SITUATION WITH CULTURAL PROBES
AUTHORS: SCHALLER, REISAS

INNOVATIVE `THINKING GUIDES´ AS LEARNING SCENARIOS
AUTHORS: ALBRECHT, RICHTER

COLLECTION OF MULTIDISCIPLINARY DESIGN CHALLENGES

Education and Culture DG
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EXPLORING STUDENT'S LEARNING SITUATION

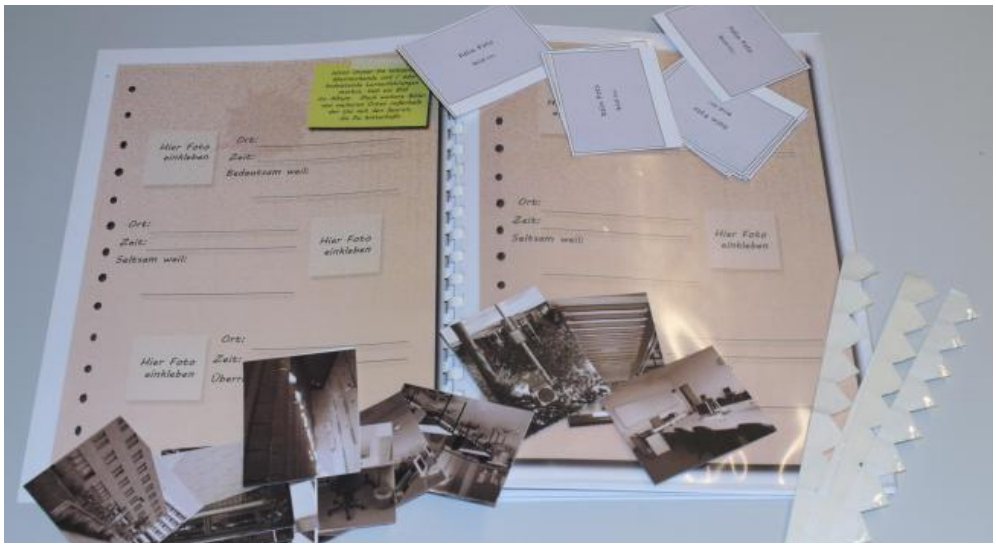

Photo by http://www.cultural-probes.paedagogik.uni-kiel.de

The Design Challenge
What do we have to keep in mind when planning new courses for the new curriculum in the bachelor and master studies?

Project Overview
In 2010 the faculty of pedagogy planned the new curriculum for the bachelor and master studies. To get a good foundation for the future courses it is necessary to find out more about the learning situation and context of the students. Therefore the department of media pedagogy conducted a exploratory study to gain more information about the values, feelings and the context of the students. 12 bachelor and master students for pedagogy participated in the exploration.

Process
The team created a probe kit with 13 different cultural probes which asked for different experiences of the learning situation and context of students. They were asked for traces of learning in their daily life, the things they want to do before their studies end or the 10 commandments which someone has to follow when he wants to survive at the university. The Students had two weeks to work with the probes. After that they was invited to short interviews where they could share their insights which they gained during the editing phase. The findings were summarized in scenarios which were discussed with the educators of the courses. In this discussion they generated their own hypothesis about the learning situation and context of the students and created their own solutions for their future courses.

Methods Used
We used some design methods to find out more about the learning situation, the values and feelings of the students. For this exploration we used:

- Cultural Probes to gain more information about the learning situation of the students while they were asked about their personal university survival kit, the traces of learning in their daily life or their evidences how they verify their learning process.
- Narrative Interviews to talk about the probes with the participants. What was important for them, what was surprising or where they come to special insights of their own process.
- Scenarios where the most important or

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amazing facts were abstracted (Storyboards, Comics, Personas or Diaries)
- The research team created some hypothesis about the learning situation together with the educators so they had some basis for their own conclusions and arrangements in their courses.

Solution

This project do not have a final solution as the insights of the work with the cultural probes are used in different settings and new design challenges.

Findings

Within the process and the exploration we interpreted the insights which we gain about the learning situation and the context of the students which we tried to express in some (sometimes polarizing) hypothesis:
- Learning has to be self organized. The courses and the academic studies debar the students from learning.
- Learning is a social process which is taking place in communities. The social community of the students is not the same community as the scientific community.
- The educators are seen as the communicators of the real truth.
- The students does not know exactly why the write academic thesis and who is interested in these works.

Lessons Learned

In the whole process we learned some things about the methods, the process and our own insights in the learning situation and context of students:
- We became aware that we transported our own assumptions through the design of the probes.
- Cultural probes should not be reflective as reflective probes don‘t allow imagination and feelings.
- The participants are also co-researchers in the whole process.
- The design of the probes should balance the motivational aspect and the seriousness of the exploration.

Outlook

The exploration included two perspectives: (1) the perspective to the methods and the process and how they could be refined, (2) the perspective on the contextual information about the learning situation of students. Therefore the outlook should also be divided in the two perspectives. Furthermore the impulses for the new courses should be introduced.

Methodically we want to play the insights back to the participants but also to the whole system (university). There should also be more reflection phases together in the process.

With regards to contents we learned that there could be a discrepancy between the concept of learning which the students have and the concept which the educators have. This could be an interesting option to do further exploration. Furthermore the communities of the students and the scientific community seems to be two different communities. Perhaps new concepts can help to integrate these two communities.

We gained some impulses for the further development of the courses and the curriculum. Some of them are already implemented, others are in planning:
- The bachelor and master students are supported in the search for topics for their master thesis through a hybrid concept with information about scientific writing and collaborative learning and working techniques.
- A new space concept is realized which supports the individual learning strategies of the students.
- A new mentoring concept was created which keeps the individual learning situation of the students in mind.

Credits

The project was implemented by the department for media pedagogy of the Christian-Albrechts-Universität zu Kiel. We want to thank all students who participated in this survey.

If you are interested in the probe kit please do not hesitate to send an email to: forschung@av-studio.uni-kiel.de..

INNOVATIVE `THINKING GUIDES´

Design challenge
The present case study describes the educational planning and practical implementation of a bachelor-level course on media-pedagogy. The underlying design challenge for us as educators and researchers was constructed as followed: How can we teach our students to solve problems of their living environment in a creative way.

Project Overview
We designed the course in a tandem with one psychologist and one pedagogue. One of use has experiences with similar courses but students of other disciplines for example interaction design. Our design challenge was designed for a bachelor-level course on media-pedagogy carried out at the Christian-Albrechts-University zu Kiel in winter term 2011/12 with a comprehensive 3 hours a week. The course was attended by 12 students of educational sciences and 6 students of computer sciences.

Process
The planning began by finding a common sense of the theoretical framework including design as inquiry, the pedagogical model and relevant methods. The course structure based on previous experiences made through courses in other settings. We imagined which knowledge our target group already could have with design as inquiry and creative problem-solving. Which practices do they already use? The biggest challenge was the unknown context.
During the whole process we had weekly meetings in which we discussed our didactical and methodical approach.

Methods used
For solving our design challenge we used different methods. For instance we discussed our proceeding in the sense of a peer review in working groups of our department. To get an imagination of how the students feel in their own design challenges we often used diagnostic phases while the course. To test our didactical and methodical proceeding we also asked our students to create a fever curve at the end of the term to give us a visual feedback.
During the course we introduced different design methods to the students. This is an incomplete list of methods they could use to solve their own design challenges:

- Search pictures in the internet to get various ideas what learning scenarios are
- Brainstorming to collect different existing thinking guides
- For the exploration and the location of the design objects we presented empirical methods as diaries, open and masked observation or interviews but also for example cultural probes
- Identification of themes and types in the exploration-data for example by clustering or temporal ordering
- As methods for describing their data we introduced scenarios, storyboards or rich pictures.
- QOC to link the possible solutions with different criteria which have to be solved
- Prototyping to test the design products and to get a deeper understanding of the design objects

Solution
At the beginning the students explored the field of learning scenarios concerning thinking guides. Thinking guides are defined as templates or models which gave actors a common frame of reference to solve problems creatively. For their own design-projects the students identified a situation in their daily working routines (context), the related activities and the target group for which they wanted to design a thinking guide. Before

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they formulated their own design challenges it was important that they located and explored existing solutions for their problems to get a deeper understanding of their design objects. In the next step they had to find eight different solutions for their challenges and evaluated them with the QOC-method. In the course time we permanently reflected the findings and supported the interchange between teachers and students but also their peer review. We moderated the peer review and structured the discussions with the aid of key questions, for example. They got to know different methods for the collection of data and produced different prototypes (interface sketches or paper based prototypes). To summarize their previous insights they had to create a concept according to a predetermined template:
1. Survey (Design challenge, description of the hypothesis) 2. General conditions (target Group, context, supported activity) 3. concept/design rationale (function of the thinking guide, description of the design-process) 4. prototype (type, addressed questions). They produced different prototypes and tested them with friends or other students. At the end of the process they designed posters and presented their thinking guides to the whole department. In an oral exam we screened their theoretical understanding of design as inquiry and they had to explain their design decisions during the process.

The quality of the solutions were very different. Depending on the explication of the underlying rationale some working groups were very vague and tended to well known-solutions. For the students it was unusual to reverse decisions once made for better or more creative ideas. Furthermore especially in the beginning of the process the students expected a pure knowledge transfer and feel unsafe with the learning as participation. This became evident in our course evaluation, with the help of a fever curve the students documented their personal motivation and interest and the group process.

Findings

We summarized the results from all fever curves and gave the plenum the chance to comment on speculation with the following lead questions: Did the group dynamics change while the phase of hypothesis development?
Did you understand the assignment? How did you feel with the feedback to your elaboration? Are there other factors or events that gave an explanation of the break/fall-off of the curve?
Summarized every group goes trough different phases. If you map these observations on the team -phase model from TUCKMANN the groups passed the norming-phase in which they developed their own working rules. Furthermore the students wanted to be supported very much in the phases of the generic model and asked a lot for feedback. Some students found it hard to compress their ideas and others have been determined for one solution.

Lessons Learned

The different working groups formulated open questions at the end of the course. As a conclusion of the seminar can be said that it might be helpful not to introduce to much methods for every process phase because the students tend to choose well-know methods. However if you introduce new methods it's good to have some examples for using it. This kind of seminar was a new experience for our goal. The latitude to solve problems of their living environment in a creative way and to develop new ideas was very unusual for some participants. This was determined by the feeling of some students to work very theoretical and impractical. We counteracted with giving them examples and with discussions.

Outlook

With the end of the course the students stopped their work. We as lecturers want to continue with the concept of the course. In summer term 2012 starts an new course in media pedagogy at the Christian-Albrechts-University zu Kiel with the students tasks to make a conception, a prototypical realization and evaluation of a game. The didactic concept and the methods will be similar to the one in this case study only the content will change to themes like game-based learning or

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special genres like serious games. In another course we will not ask the students to work in working groups. Instead the participants of the course, in cooperation with the teacher, will handle a common design challenge. The challenge is constructed as follow: How can we describe learning practices?

Credits
Special thanks to the participants of the course ‚Szenarien: mediengestützte Lernprozesse' in winterterm 2011/12 at the Christian-Albrechts-University zu Kiel department media pedagogy. The course was guided by Christoph Richter and Julia Lembke.

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MULTIDISCIPLINARY DESIGN CHALLENGES

1. How might we Design Educational Spaces for Lingua-cultural Encounters? Author: Gaisch

Faced with the current reality of increased efforts towards the internationalisation of higher education, disciplinary teachers find themselves more and more confronted with a highly diversified student body and the necessity to engage in English-medium instruction. This new educational setting requires a number of paradigm shifts on the part of the social agents, especially in view of hardened rules of appropriateness, recurrent practices and codes of significations.

In framing a lingua-cultural space where disciplinary teachers take on interdisciplinary identities and promote meta-learning development that allows all students to thrive, the present design challenge seeks to shed light on teaching and learning aspects from a variety of angles.
How do teachers, domestic students and internationally mobile students succeed in

- Creating a lingua-cultural space for knowledge sharing that is devoid of societal bias Engaging in a low-risk climate where all social agents are encouraged to participate
- Stepping out of their rigidly bounded area of science that allows them to deal with counter-intuitive contextualised knowledge
- Developing a level of personal mastery capable of the perception of meta-affordances

To navigate the design space of societal change which, by definition, is not approachable with traditional scientific modes of inquiry, it appears best to use the Design as Inquiry approach. A wicked problem of this kind does not require discovery of truth, but a situative perspective that lends itself well for contextualised settings that seek educational change for positive action.

2. How to support the Nomadic Knowledge Practices of students on campus? Authors: Allert, Richter

In this Design Challenge we frame a situation throughout the entire design and inquiry process based on a given concept. This allows those who are participating in both - the practice itself and the process of ‚design as inquiry' to distance from their everyday perspective onto the practice they aim to understand and transform. The design challenge is: How to support the nomadic knowledge practices of students on campus? Thus the frame is the concept of nomadic practices (cp. Su & Mark, 2008) and the challenge asks to understand knowledge work of students as nomadic practices. Students do not have their allocated personal office space but wander about the campus. Nevertheless students are not isolated from their environment. They need to respond to resources and work with the given. Furthermore, students participate in university life through maintaining their form of identity and generating a students' culture. At the same time, students relate to the environment based on their social, political and economic status.
The design challenge is twofold. First: Exploring existing practices of nomadic workstyles among students: Students ways of working seem to resemble those of nomadic workers in that (i) they often have to change places, (ii) they work wherever they happen to be and (iii) constantly carrying, managing and reconfiguring their own resources (cf. Su & Mark, 2008). But how do students actually create and make use of ad hoc workspaces? What kind of technologies do they use and why? What problems do they encounter? Second: Intervening and developing concepts. Nomadic ways of working open up new opportunities for freelancers as well as organizations. However, working on the move still poses significant challenges for the nomads (cf. Su and Mark; 2008) How can a nomadic workstyle be

Williams, R.; Karousou, R. & Gumtau, S. Affordances for Learning and Research. Project Report for the Higher Education Academy. University of Portsmouth, 2008. Retrieved from http://learning-affordances.wikispaces.com/Project+Report

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facilitated? How could concepts look like that build on Su's and Mark's design insights?

3. Assistive Thinking: How to build capacity and competence among citizens to actively engage in the genesis of technology and to participate in a digital democracy?
Authors: Allert, Reisas

Pea (1987) states that he takes „as axiomatic that intelligence is not a quality of the mind alone, but a product of the relation between mental structures and the tools of the intellect provided by the culture (Bruner, 1966; Cole & Griffin, 1980; Luria, 1976, 1979; Olson, 1976, 1985; Olson & Bruner, 1974; Pea, 1985b; Vygotsky, 1962, 1978). Let us call these tools cognitive technologies." (Pea, 1987:92). Cognition and technology are not independant from each other, but epistemic processes and artefacts are constitutively entangled and emergent. Furthermore, technological options and society co-evolve. This also means that we can not trace and reflect on that entanglement from an objective and outside perspective. As future is contingent we never know what situation we will be in tomorrow and how we may shape it collectively. A respective design challenge is: How to build capacity and competence among citizens to actively engage in the genesis of technology and to participate in a digital democracy? To narrow down this challenge and to make it more comprehensible, the concrete design question is: What option is technically feasible, but socially not acceptable? This allows to design and intervene in a form which produces a reference point which allows for discourse.

4. How to Design Spaces That Encourage Active Engagement?
Authors: Hemmecke, Reisas, Allert

Whether we want to learn, discuss, care for each other & our surroundings, or simply have fun, the respective social encounters are enabled but also shaped by the spaces available to us. Space is not limited to physical space, but includes mental, social, cultural as well as virtual space. We see ourselves as creators of space as well as influenced by the culturally evolved space and its underlying practices.

The design challenge "How to design spaces that encourage active engagement?" brings together ideas from different perspectives: practitioners, teachers, students and researchers by asking the following questions:

- How to create an (organisational) climate (space) for knowledge sharing and (organisational) learning?
- How to engage students in collective learning in higher education?
- How to stimulate/provoke/trigger the appropriation/reclaimation of (semi)-public spaces for novel forms of social engagement and citizenship?
- How to create creative co-design environments?
- How to use spaces for inquiry in research?

5. How might we Act and Inquire in an Unfinished Universe? - Do We Intervene to Understand?
Authors: Allert, Reisas, Richter

Established expectations towards science as well as higher education have been severely challenged in the last decade(s). In particular, science and higher education are becoming more and more expected not only to provide explanations about the world as it is, but also to respond to concrete social, economic, or ecological needs and to foster innovation. With this shift in focus scientists and scholars are not simply asked to apply their findings to practical problems, but they are confronted both with a completely different kind of problems as well as a new perspective on the phenomena of interest.

Science is asked to answer questions such as: How do good schools look like? How can we foster critical and creative thinking? How can we handle climate change? How can we develop adequate therapies in medicine? Answering these questions requires scientists to engage in local situations and change brings about change it is and when we assume the world not to be static, science can no longer predict and generalize.
The kind of problems scientists become engaged with and students need to be prepared

Su, N.M., & Mark, G. (2008). Designing for nomadic work. In Proceedings of the 7th ACM conference on Designing interactive systems. ACM, pp. 305-314.
Pea, R. D. (1987). Cognitive technologies for mathematics education. In A. Schoenfeld (Ed.), Cognitive science and mathematics education (pp. 89-122). Hillsdale, NJ: Erlbaum.

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for are not only complex but even wicked in that every attempt to address these problems will inevitably change the very problem. By the same token it is apparent that the phenomena scientists are asked to investigate are not given, but in fact essentially shaped by and contingent on human intervention?

To narrow it down this change in focus raises a multitude of questions for scientists as well as lecturers:

- How should we go about studying phenomena that take place in contexts that are object to human intervention?
- How can we explain phenomena, when predictions become impossible?
- How do we assess the urgency of problems to be tackled and how do we evaluate needs?
- How do we make use of our lack of knowledge in situations far too complex to get a hold of?
- How do we account for the effectiveness of an intervention in an authentic setting?
- Where do the ideas come from that we propose and how can these be justified?
- And how do we prepare our students for all of this?

This design challenge forces us to question our role as researchers and practitioners: What are we contributing? How do we define ourselves? What societal expectations do we actually perceive? Are our underlying assumptions, assignments or the ways we conduct science and formulate research questions changing as well? How can we deal with uncertainty?

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TEACHING AND LEARNING MATERIALS

DESIGN AS A CO-EVOLUTIONARY PROCESS
AUTHORS: RICHTER, REISAS

THE SPEED DESIGN PROCESS
AUTHORS: ALLERT, REISAS, RICHTER

ARTICULATION & DOCUMENTATION OF PROJECT RESULTS
AUTHORS: RICHTER, REISAS

POSTER COLLECTION
AUTHORS: REISAS, ALLERT, RICHTER, REICHELT

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C | A | U

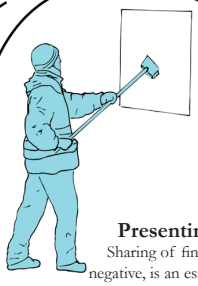
Metropolia

FH Oberösterreich

Document your w
Take notes and photos o
during each of the phase
your material. Even earlie
drafts can be valuable to
decisions and insights.

Stand to "your" mistakes!
Presenting your failed attempts can be a way to evoke new ideas within your audience and within yourself. Not every project will be a success, because starting from a hard question makes it most likely that you haven't found all the answers (yet).

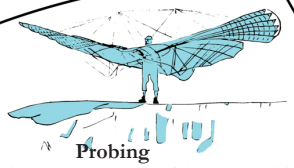
Assessment



Presenting and Reflecting

Sharing of findings, whether positive or negative, is an essential element of the design process. It allows for a critical analysis of findings, hypotheses, assumptions and design options as well as it allows others to build on one's own successes and failures. Design never starts from scratch but is part of an ongoing collective process. It can initiate further research and helps to develop a more precise frame to build upon. The type of presentation and ways of dissemination thereby depend on the audience.

Make your ideas tangible!
Flesh out your idea as a sketch, a model or a prototype. More important than the final product is here the joint exploration of the idea. Preferably you select a format of display that is fast to construct and easily available.



Probing

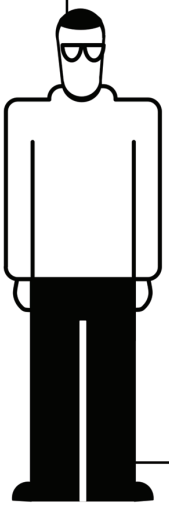
Probing is aimed at testing the viability of the envisioned design option as well as its formative evaluation. To increase the ecological validity and foster the detection of unintended side-effects probing should be carried out in realistic settings whenever possible. Unexpected results and breakdowns are important outcomes of probing as they provide a unique learning opportunity. The knowledge gained during this phase will help to gain a deeper understanding of the problem and to refine the hypothesis: The designer can question his underlying assumptions and identify contradictions and surprising elements.

Design
Object

In the pedagogical model as presented here, design is understood as an co-evolutionary process that does not only result in new products, services or concepts, but also provides insights into the situation to be changed. By design we do not refer to a particular profession or discipline, but to a general mode of inquiry and critic that aims to gain insights by means of reflective intervention.

Due to an iterative process various design options can be developed. Diverse scopes of actions can be considered and questions like the following can be answered: What works under which conditions? What are the underlying assumptions and mechanisms? Are the design options imaginable and socially acceptable?

Please keep in mind that the pedagogical model is rather suitable for tasks that require creative design solutions then routine tasks. The designer can start the design process at any point and is not necessarily restricted to undergo a chronological order, because the phases are more likely to be intertwined.

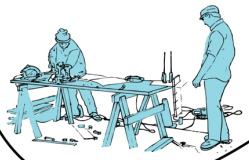


Be minimal!
Focus on the crucial aspects of your solution and try to realize them with efficiency. The sooner an idea is materialized, the sooner it can be tested.

Composition

Prototyping (& Materializing)

Prototyping fulfills an essentially dual function. On the one hand it constitutes inquiry into the feasibility and latent implications of the design options envisioned before. On the other hand it prepares for the practical testing and communication of the design options selected. Prototyping should not be mixed up with the development of the „final" product. In its most general sense, prototyping refers to all those activities aimed to generate feedback on a core idea of the hypothesis by creating and utilizing a manifest representation of it. Prototypes can be seen as catalysts, which make practices, assumptions and contradictions visible.



Ask for feedba
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Design as a co-evolutionary Process

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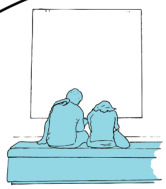


Questioning

The search for a meaningful question constitutes a central entry point to the design and inquiry process. The question provides for a preliminary conceptualization of the object of the design and inquiry process, yet it should not been phrased too narrowly to leave room for new ideas and different perspectives. The question should be open ended. It has the following native form:
„How might we achieve a significant improvement/change X for a group of people Y in context Z?"
Questioning is far from being a trivial task, as it asks us to scrutinize what we are taking for granted and to reflect on our implict assumptions.

Build on ideas!
Learn how others approached similar questions and what they found out. The goal is not to blindly adopt ideas but to learn from them.

Inquiry

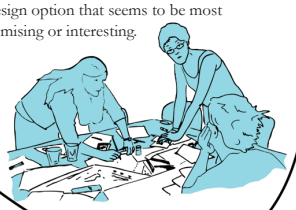
Generate alternative perspectives!
Observe your design object from different angles because real problems can rarely be defined and challenged from one perspective alone.
This will help you to set a frame that is broad enough to come up with various design options, but focused enough to tackle the problem at hand.

Framing and Visioning

Exploration & Framing are aimed at collecting information about the object of design to be developed a tentative understanding of people's needs, practices, and the situation/context in which they act. Exploration entails both the analysis of the status quo and prevailing practices as well as looking out for possible perspectives and design options. Framing complements the exploration by defining the designer's perspective on the situation at hand.

Envisioning Design Options

The envisioning stage is focused on the development of design options that might provide answers to the design question. These design options are hypothetical in nature - if viable they should be capable to bring about the intended improvement or change. Developing design options is a highly iterative process in which proposals are assessed against available information and new options are continuously envisioned. They help to discern phenomena and to get a better understanding of underlying assumptions. To prevent a design fixation various design options should be developed. This phase concludes in the selection of a design option that seems to be most promising or interesting.



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Be in contact!
Seek out whoever is interested in or working on your questions. Find out who is involved. These contacts can help you to change your perspective, to learn from each other and to engage in fertile discussion.

Exploration

Free and share your imagination!
Do not search for the ultimate idea but consider everything that could be tied into your design object. Instead of brooding alone over single ideas but engage other people. More important that the quality of every idea is their all over variety.

Weblinks:

www.t-h-inker.net

http://www.knowledge-through-design.uni-kiel.de/

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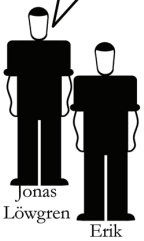
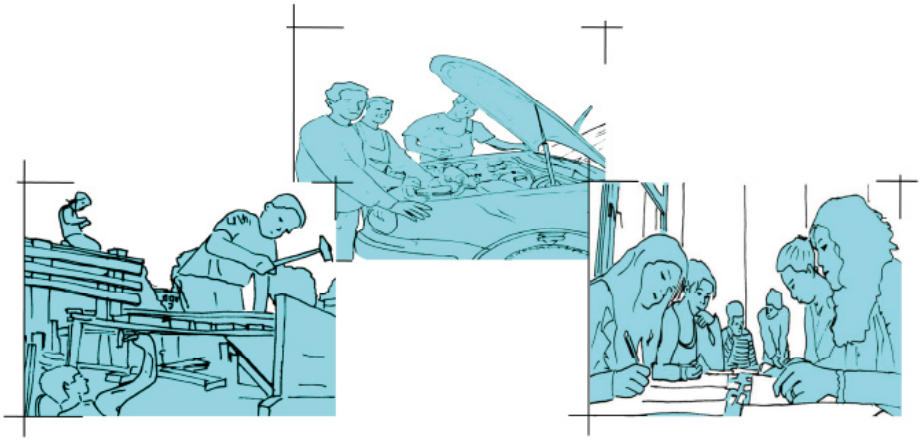
Every design process is unique. The preconditions for design work change from one occasion to the next. This means that design work is impossible to predict. If the outcome *can* be predicted, it is by definition not a design process. Every design process is affected by the people responsible for carrying out the work an by existing conditions, such as available staff, tools, and time. The process is also a consequence of the specifics of the design situation at hand.



Jonas Löwgren
Erik Stolterman

THE SPEED DESIGN PROCESS



Design as Inquiry:
A Speed Design Process by
the Example of Collaborative Note Taking

Heidrun Allert, Sabine Reisas & Christoph Richter

T[H]INKER C|A|U

Design the perfect note (taking) book

Write down the most relevant requirements.
(3 min)

- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐

T[H]INKER C|A|U

Introduction
Instead of an introductory talk we want to approach the field of "Collaborative Note Taking" from a practical angle. Therefore a small design project will be the main focus of this workshop. After this session we would like to invite you to discuss the possibilities and limits of this approach.
Due to the narrow time frame we will ask you to accomplish each task in a very short period. This circumstance is caused not only by the pragmatic factor of time but plays a content-related role – as will be addressed later on.

Instruction
(With this task the participants will firstly experience a typical method of problem-solving to hereafter perceive the approach instructed by the Speed Design Process as an alternative way.)
The subject of our design project will be the conception of an "ideal notebook". To begin the design process the first important step is to outline the requirements of a notebook. What should a notebook in any case provide/contain, to be considered ideal? To be considered better than a conventional/already existing notebook?

Review
"How does it feel?"
"This is a typical approach of problem-solving that starts from a given problem, is based on prior assumptions and experiences and operates with an already existing idea."
"In this workshop we invite you to try out another approach."

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Find a Partner
Come together in teams of two (the partners should not know each other). Apply the roles: Designer and User.

Interview your Partner to learn of their note taking habits. With this first step we seek to find out more about the particular person and their activities. We do not design for Mister X. Our goal is to understand how and why our partner takes and uses his notes.
During the interview is important to be as concrete as possible. For example ask your partner to show you some notes that they happen to have with them. Focus on w-questions. You can use post-it's to write down every aspect. This may help you later to insert or rearrange other steps of the process.

Deepen the interview
In a second and third interview round you try to learn more about motives, difficulties and potentials.
Focus on why-questions and be an empathetic observer.

Examine the results
In this step you condense your information. Critical incidents can be of a positive as well as of a negative nature.

Phrase a design question.
In this step the goal is to define your own point of view.
Which "problem" do you want to approach?
It is a necessity for this step to be selective. Here it is more fruitful to take on a key problem instead of attempting to solve everything all at once.

~~Design the perfect note (taking) book~~

Explore how and why your partner takes notes.
Focus on those which she/he shares with others.

1. Ask your partner to show you artifacts and where you take/took your notes (2x4 min)

Reconstruct practices of note taking. Use Post-Ist to organize here

2. Enlarge upon this, focussing on critical events and motives (2x3 min)

3. Ask about those cases/traces where your notes also might be of values for others. Ask for examples. Be an empathetic observer! (2x3 min)

Visioning

4. Sight your provisional results (3 min)

Summerize your partners` goals & motives of note taking:

Critical incidents: What hinders and facilitates the use of notes?

5. State your vision for your partners`better future (3 min)

How might I facilitate

_____ who is very special
name

regarding _____

by taking into account _____

_____
critical incidents/ conditions

in order to achieve _____
goals/ motives

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Generate Hypotheses (options)

6. Sketch 5 possible answers to the design questions (5 min)

7. Present your partner the options and note his/her feedback (2 x 5 min)

Notes

Sketch 5 very different options to solve your design question

With this step it is important that the 5 solutions refer to one design question and not to 5 separate problems. Anchor the essence of your idea with a sketch in keep in mind, to envision design options that are as diverse as possible.

Present your partner your ideas and make a note of their feedback

In this step you are not interested in defending your idea but to learn, how your partner reacts. Do your solutions apply to your partner's needs and wishes?

Materialize & Operationalize one design option

8. Decide for one option that allows you to find out about and elaborate. (3 min)

Scribble! A good choice is that option which you would like to trust in, but which is most unclear of what will happen in using it. What takes effect regarding your vision/goals?

9. Materialize an interactive prototype, which allows your partner to experience your idea (7 min) ➔ *leave this page! (Bodystorming, Storyboard, models…)*

Choose and flesh out one of your solutions

How would a viable solution look like according to your available information?
What aspects does your solution include?
How would your solution affect the practice of note taking?
What would change, if your solution proves to be successful?

Create an interactive prototype

Create a physical prototype that helps your partner to envision how it would be to use your solution. Your prototype is not the final product but a first attempt.

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Probing, gaining trust & exploring deeper

10. Allow your partner to experience your prototype and sketch what you find out about what worked / what didn`t work, under which conditions and what made it work. What was/ is the catalyst for that? (2 x 4 min)

strengths	*weaknesses:*
chances	*risks*

Present your prototype to your partner and collect feedback
Explain the functionalities of your prototype to your partner. Ask them to play and experiment for themselves.
Gather information on strengths, weaknesses, chances and risks from your partner's point of view.
Do not defend your prototype but try to learn from it.

Explain and communicate your insights

11. What did you learn about note taking and sharing? (2 min)

12. Reformulate your design questions (3 min)

Is the design question (step 5) still adequate? How would you rephrase it now?

What have you learned about notes?
The goal of this exercise is not a final product but insights in the variety of usages and interactions.
Answer/rework your design question
Design, in general, is an iterative process.

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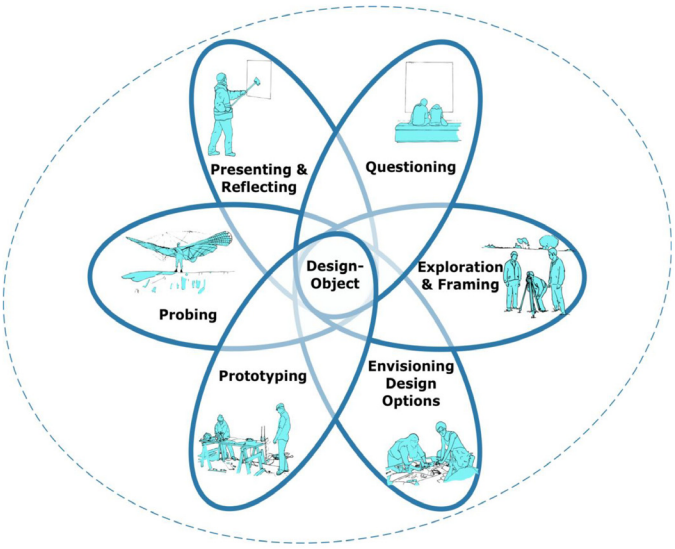
Overview of a design process



Guiding thoughts

Be curious and surprised!
Be in contact!
Build on ideas of others!
Develop alternative perspectives!
Let your imagination run free & share it with others!
Call for feedback!
Objectify your ideas!
Be minimalistic!
Make mistakes early & learn from them!
Document your working process!
Stick by „your“ mistakes!

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Diskussion

What did you find out about taking notes

What did you expect? What was unexpected or even surprising?

What became operative?

Find out more about the project

„Creating Knowledge through Design and Conceptual Innovation“

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Facebook:
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Website:
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ARTICULATION & DOCUMENTATION OF PROJECT RESULTS

TEMPLATE: PROJECT REPORT FORMAT
AUTHORS: RICHTER, REISAS
TEMPLATE: POSTER PRESENTATION
AUTHORS: RICHTER, REISAS

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Project Report Format

1st Author Name
matriculation number

2nd Author Name
matriculation number

3rd Author Name
matriculation number

ABSTRACT
This document describes the formatting requirements as well as expected contents for the project reports. It can also be used as a template. Please read this document carefully and structure your report accordingly.

INTRODUCTION

This format is to be used for submissions of the project report. The template should give your report a consistent, high-quality appearance. In essence, you should format your paper exactly like this document. The easiest way to do this is simply to replace the content of this document with your own material. This document is a synthesis of templates used in various conferences, in particular it draws on the formats used by the ACM SIGCHI as well as the CSCL.

TOTAL NUMBER OF PAGES

The reports should be 7 pages long. This includes everything: from the title to the references.

PAGE SIZE AND COLUMNS

On each page your material should be centered on an A4 page, beginning 1.9 cm (.75 in.) from the top of the page, with a .85 cm (.33 in.) space between two 8.4 cm (3.3 in.) columns. Right margins should be justified, not ragged (except for the references section). Beware, especially when using this template on a Macintosh, Word can change these dimensions in unexpected ways.

TYPESET TEXT

Prepare your submissions using Microsoft Word on a PC or Mac.

Title and Authors

Your report's title, authors and matriculation number should run across the full width of the page in a single column 17.8 cm (7 in.) wide. The title should be in Helvetica 18-point bold; use Arial if Helvetica is not available. Authors' names should be in Times Roman 12-point bold, and matriculation numbers in Times Roman 12-point (not bold, nor italic).

To position names and matriculation numbers, use a single-row table with invisible borders, as in this document. Alternatively, if only one address is needed, use a centered tab stop to center all name and address text on the page. Leave one 10-pt line of white space below the matriculation numbers.

Normal or Body Text

Please use a 10-point Times Roman font or, if this is unavailable, another proportional font with serifs, as close as possible in appearance to Times Roman 10-point. On a Macintosh, use the font named Times and not Times New Roman. Please use sans-serif or non-proportional fonts only for special purposes, such as headings.

Subsequent Pages

On pages beyond the first, start at the top of the page and continue in double-column format. The two columns on the last page should be of equal length.

FIGURES/CAPTIONS

Place figures and tables at the top or bottom of the appropriate column or columns, on the same page as the relevant text (see Figure 1).

A figure or table may extend across both columns to a maximum width of 17.78 cm (7 in.).

Captions should be Times New Roman 9-point bold (`Caption` Style in this template file). They should be numbered (e.g., "Table 1" or "Figure 2"), centered and placed beneath the figure or table. Please note that the words "Figure" and "Table" should be spelled out (e.g., "Figure" rather than "Fig.") wherever they occur.

REFERENCES AND CITATIONS

Use the standard APA (American Psychological Association) format for references – that is, a list at the end of the article, ordered alphabetically by first author, and referenced by publication year in parentheses. Be consistent with capitalization. See the examples of references at the end of this document. Within your text, cite the references with (Author, year).

SECTIONS

The heading of a section should be in Helvetica 9-point bold, all in capitals (`Heading 1` Style in this template file). Use Arial if Helvetica is not available. Sections should not be numbered.

Subsections

Headings of subsections should be in Helvetica 9-point bold with initial letters capitalized (`Heading 2`). (Note: For sub-sections and sub-subsections, a word like *the* or *of* is not capitalized unless it is the first word of the heading.)

Sub-subsections

Headings for sub-subsections should be in Helvetica 9-point italic with initial letters capitalized (`Heading 3`).

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Figure 1. With Caption Below, be sure to have a good resolution image.

LANGUAGE AND STYLE

The report can be written in English or German. Spelling and punctuation may use any dialect of English (e.g., British, Canadian, US, etc.) provided this is done consistently. Hyphenation is optional. To ensure suitability for an international audience, please pay attention to the following:[1]

- Write in a straightforward style.
- Try to avoid long or complex sentence structures.
- Briefly define or explain all technical terms that may be unfamiliar to readers.
- Explain all acronyms the first time they are used in your text – e.g., "Digital Signal Processing (DSP)".
- Explain local references (e.g., not everyone knows all city names in a particular country).
- Explain "insider" comments. Ensure that your whole audience understands any reference whose meaning you do not describe (e.g., do not assume that everyone has used a Macintosh or a particular application).
- Explain colloquial language and puns. Understanding phrases like "red herring" may require a local knowledge of English. Humor and irony are difficult to translate.

STRUCTURE AND CONTENTS OF THE REPORT

The report should be a self-contained document. The report should be roughly structured as follows:

Abstract

The abstract should provide the reader with a concise summary of the report. The abstract should include the following information:

- The topic of the project
- The problem you address
- Why this question has not been answered adequately yet.
- How you addressed the problem
- What you achieved
- The impact/implications of this achievement.

The abstract address this issues with one sentence each. For more details on how to write an abstract see Easterbrook (2010).

Introduction

The introduction should inform the reader about (a) the motivation for and object of the project, (b) the aim and intended outcomes of the study, as well as (c) the structure of the report.

- What is the main question you want to answer with this report and why is this an important question?
- What did you want to achieve with this project?
- What kind of outcome did you produce, e.g. a taxonomy, design guidelines, recommendations for product development, a conceptual sketch, a prototype, …
- What are the subsequent sections about?

Background / Theory

In this section you should provide the reader with the necessary background information to understand the scope and purpose of the project, the work you build upon as well as your guiding assumptions.

- What kind of application scenario, target group, or product did you focus on and why?
- What are the products, theories, or empirical findings you build upon or that motivate your work
- What are the assumptions, or in case of an evaluation study the evaluative criteria, you take for granted or want to apply?

Method / Approach

Here you should provide the reader with an account of what you actually did in order to answer the question raised in the introduction.

- What methods did you use and how did you apply them?
- Why have you chosen these methods?

Results

The results section should give an illustrative description of the results you obtained. Depending on what you have done, this section might include for example a vivid description of users current practices, the outcomes of an evaluation study and/or a description of a concept or prototype together with an explanation of the design decisions made.

Discussion

In the end of the report you should provide a tentative answer to your initial question. Please include the following information:

- What makes it work?
- What works under which condition?
- How was the situation transformed?

[1] Note that the items in this bulleted list were formatted using the `Bullet` Style (in this template file). Numbered lists are allowed.

Here you can also discuss the strengths and weaknesses of the method you have chosen, outline open questions, shortcomings and give an outlook on possible next steps.

References

The report should end with a list of references. Please list only those sources that are actually cited in the text.

REFERENCES

Anderson, R. E. (1992). Social impacts of computing: Codes of professional ethics. *Social Science Computing Review, 10*(2), 453-469.

Conger., S., and Loch, K. D. (Eds.) (1995). Ethics and computer use. *Communications of the ACM*, *38*(12) (entire issue).

Easterbrook, S. (2010). *How to write a scientific abstract in six easy steps*. Online at: http://www.easterbrook.ca/steve/2010/01/how-to-write-a-scientific-abstract-in-six-easy-steps/.

Mackay, W. E. (1995). Ethics, lies and videotape. Proceedings of CHI '95 (Denver, CO, May 1995), ACM Press, 138-145.

Schwartz, M., and Task Force on Bias-Free Language (1995). *Guidelines for Bias-Free Writing*. Indiana University Press, Bloomington, IN.

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Title of the concept/project

Names of all contributors

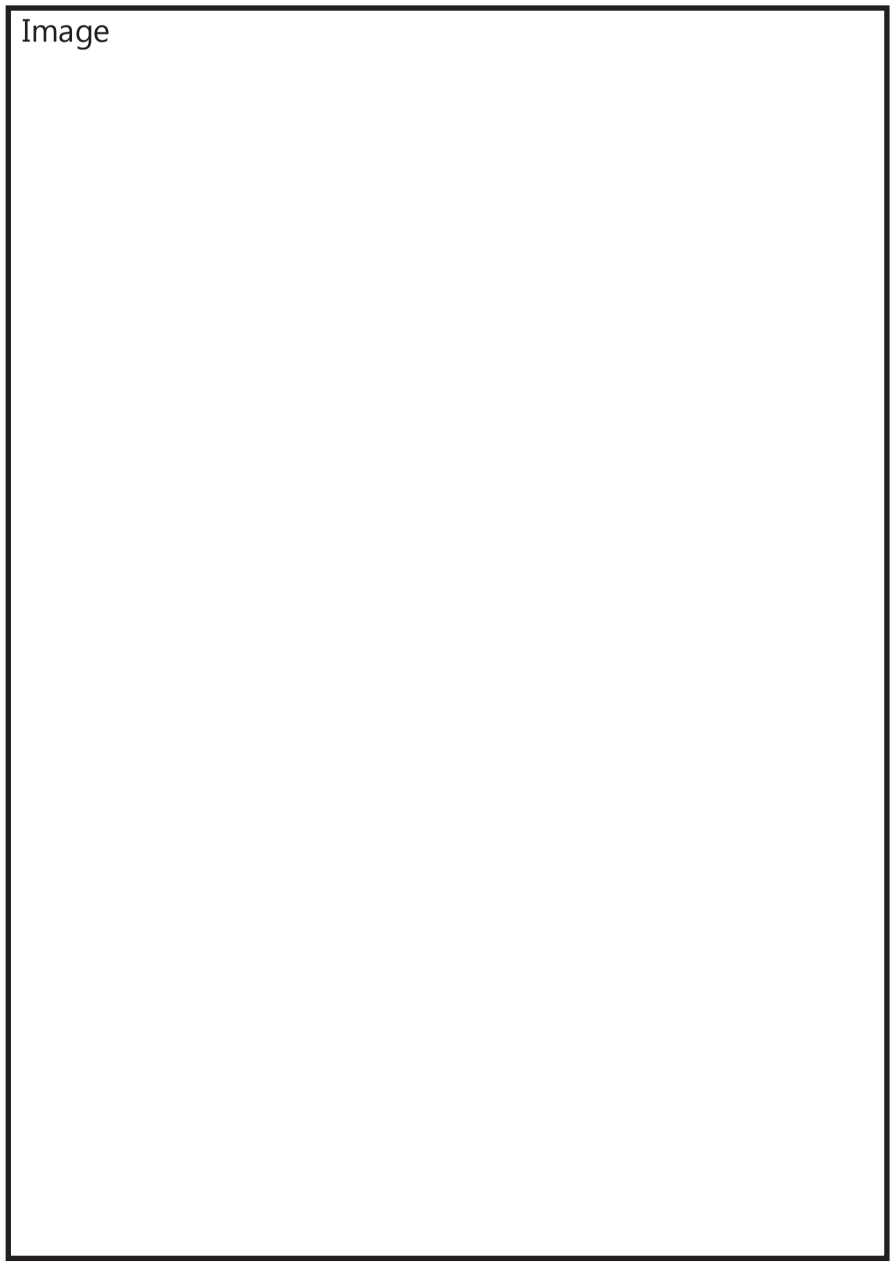
Design question/ Design challange (one sentence)

Background

Short description of target audience, motivation and context of usage.

Idea/Solution

Description and explenation of the idea/solution/design hypothesis.



Process

Short description of the major steps of the design process.

Evaluation results

Summary of the major evaluation results.

Insights

The primal insights concerning the design question and/or the design process.

Outlook

The next steps and open questions.

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Framing and Visioning	Envisioning Design Options	Prototyping (& Materializing)	Probing
Short description of the applied methods.	Short description of the applied methods.	Short description of the applied methods.	Short description of the applied methods.
Image	Image	Image	Image
The achieved results of this phase (form and content).	The achieved results of this phase (form and content).	The achieved results of this phase (form and content).	The achieved results of this phase (form and content).
Short description of critacal incidents and/or Lessons Learned in relation to the applied methods.	Short description of critacal incidents and/or Lessons Learned in relation to the applied methods.	Short description of critacal incidents and/or Lessons Learned in relation to the applied methods.	Short description of critacal incidents and/or Lessons Learned in relation to the applied methods.

POSTER COLLECTION

BEST PRACTICE EXAMPLE & PROCESS MODEL

METHODS OF DATA COLLECTION

IDENTIFICATION OF PATTERNS & THEMES/ILLUSTRATIVE DESCRIPTIONS

TYPES OF PROTOTYPING

AUTHORS: REISAS, ALLERT, RICHTER, REICHELT

Education and Culture DG
Lifelong Learning Programme

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T[H]INKER

Best Practice Example and Process Model of Design as Inquiry

1st Winter School on Assistive Thinking: "The entanglement of technology and human epistemological practices"

Organisational Framework

Design as Inquiry, the pedagogical concept for the Winter School on Assistive Thinking: "The entanglement of technology and human epistemological practices" was developed in the context of the EU-Project Design as Knowledge Creation and Conceptual Innovation [1]
While being embedded within the curriculum of the master's degree of educational science, the winter school was also open to students pursuing other majors.

Dates: 03.03.-07.03.2014
Participants: 14 students from various Bachelor and Master programs
Responsibillity: Sabine Reisas M.A., Dr. F.-W. Lehmhaus,
Prof. Dr. Heidrun Allert
Insitute of Educational Science, Department of Media Education/Educational Computer Science of Kiel University

Objectives

The focus of the winter school was to explore the prospects of informational and communicational technologies. The task was to investigate worthwhile possibilities and prospects of technological development and to furthermore locate the limits of social compatibility and acceptance.
Here an particular emphasis was put on the realization of the following aspects:

- **Inquiry based learning: Students interact and experience themselves as researchers within their own professions**
- **working interdisciplinary and collaboratively**
- **becoming acquainted with a diverse pool of research methods**
- **articulation of gained insights and generated knowledge**
- **exposing the prevailing norms and values of our society and investigate them from a critical perspective**
- **conceiving their findings within social, material and cultural contexts (as socio-material practices)**

Design as Inquiry

The pedagogical approach of Design as Inquiry served as a conceptual framework for the winter school. Originating from the traditions of design based research this approach fokuses particularly on the process of knowledgebuilding. By exploring the capabilities of the social world the students learn to develop innovative solutions and thereby explore the boundaries of the socially acceptable.
Throughout the design process, implicit assumptions become visible and social and ethical perspectives become accessible for thorough investigations.
Our educational scenario enables students to design technology based concepts and make reasonable design decisions. The task was not to primarily focus on the development of technologies but to start out with the support of specific human acttivities, for example researching or taking notes.

Preparation

In preparation of the winter school the students were introduced to ethnographic research practices. They took on a role of co-investigators and **explored their own media ecology as well as the impact of technologies** in the course of their everyday experiences and actions.
In a further step their research of current social and academic discourses enabled the students to tie in their results with a view on social and cultural phenomena as socio-material practices

Introduction to

The Process -

Initiating the winter school the students experienced the design process in a fast paced **"Speed-Design" Workshop**. Using the example of "taking notes" as an action that was to be explored and technologically supported they gained an immersive conception of the next weeks overall procedure.

The Thematic and Theoretical Background -

An initial presentation introduced the state of research within the fields of assistive technology and the concept of Assistive Thinking. Further as conceptual framework a practice-theoretical perspective was established.

The Material -

The students got to know **several scenarios of application of current technologies** (e.g. e-Textiles, 3D Printing) and were encouraged to make their first hands-on experiences with the diverse material available for the realization of their concepts and ideas.


Prototyping material

Defining Themes

The **large group methods World Café and Open Space** proved successful to foster the process of exposing socially relevant topics and getting together in working groups to approach them. Here the students tied in their ethnographic research with current social and academic discourses. Based on their findings they generated working hypothesis they considered to be of particular interest as well as of pedagogical importance.

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Process: Design as Inquiry


Students presenting their insights


A group is discussing ideas


Keynotes by Emanuele Bardone, PhD and Sebastian H.D. Fiedler, PhD

Exploration

After forming groups the students **formulated their design questions** and made use of ethnographic methods to explore their range of topics. This phase was majorly important to **construct a theoretical foundation for their design decisions** later on.
In addition it was necessary for the students to get familiar with the current state of research concerning their subjects.

+ Workshop
Methods of Exploring

Keynote Talks

One of the winter schools objectives was to embed the central themes in interdisciplinary discourses and to thereby **engage the students in the academic exchange** as well. To achieve this, the keynote talks, made possible by the PerLe-Project, played an important part.
A **connection to actual research practice** was established by an insightful presentation of the EU-funded Project Idea Garden [2], realized at the department of Media Education/Educational Computer Science of Kiel University.

Framing and Visioning

With the proceeding investigations implicit assumptions and underlying correlations were made explicable. They served as a basis to **envision several inherently different design options**. For the next phase, the materialization and probing of prototypes it was fertile to come up with **especially exciting and intriguing alternatives.**

+ Workshops:
Recourses and Materials
Generating Ideas


Students in conversation during the World Café

Exploration of a topic

Explaining, Articulation and Communicating

Continuous feedback and consultations with the staff and the keynote speakers as well as several presentations in front of the whole group gave the students the opportunity to repeatedly share their projects. They were challenged to put forward solid argumentations and to **steadily reconsider and even restate their design hypotheses.**

Materializing and Probing

The students realized one of their ideas as a prototype and directly deployed their creations to further approach and investigate their subjects. This iterative process lead to a progressive creation of knowledge - social and cultural implications became visible and thereby accessible to a more extensive reflection. In this manner the students were able to **acquire a better grasp of multifaceted phenomena and complex problems and to develop an array of innovative solutions.**

+ Workshop: Methods of Probing

Presentation

Closing the winter school, a collective presentation gave the students the opportunity to **share their working process as well as their gained insights** with the group and the staff. They received valuable feedback to further pursue and document their projects in the following weeks.

Documentation

For the documentation of the winter school the students were asked to present their generated knowledge within established standards of academic publication. Additionally they visualized their process in form of a poster. In this way they were able to **contribute their insights to the current discourses of the academic community.**

If you want to learn more about the concept of Design as Inquiry and the mentioned methods, join us on
www.t-h-inker.net
T[H]INKER is a community platform aimed to foster exchange and collaboration on design as inquiry throughout all disciplines. It welcomes teachers, researchers, students, and creative knowledge workers interested in work at the intersection of scientific inquiry into „what is" and designerly exploration of „what might be".
On T[H]INKER.net you can share your ideas, find friendly contacts, collaborate, get reliable answers and useful materials.

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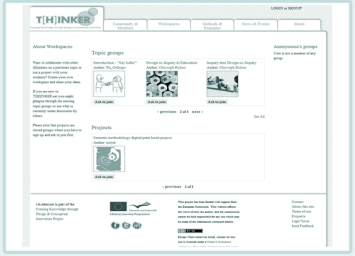

Resource

[1] More information on the pedagogical Model "Design as Inquiry" :
www.knowledge-through-design.uni-kiel.de
Methods and use-cases :
www.t-h-inker.net
[2] **www.idea-garden.org**
[3] Experience report of a participant:
www.knowledge-through-design.uni-kiel.de/component/k2/item/194-winterschool2014experience

T[H]INKER

Methods of Data Collection

Selection of Methods for Exploring and Framing

Specification of the designquestion → **Collection of information** → **Identification of recurrent patterns and themes** → **Illustrative description of findings**

Open Observation

Open observation refers to the systematic elicitation and documentation of specified units of behavior or features of certain systems. The observed persons are aware of the fact that they are being observed. For exploratory purposes open observation usually takes place in the field.

Fields of Application/Prerequisites:
- Relevant events/features have to be observable
- Access to the situation

Literature
Preece, J.; Rogers, Y. & Sharp, H. (2002), Interaction Design - Beyond Human-Computer Interaction, John Wiley & Sons: New York.

Photo by Sabine Reisas, Heidrun Allert & Marten Friedrichsen

Hidden Observation

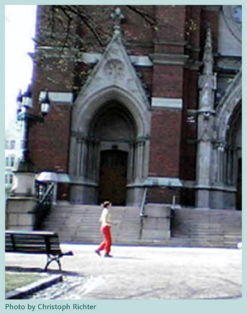

Photo by Christoph Richter

Hidden observation refers to the systematic elication and documentation of specified units of behavior or features of certain system. The observed persons are not aware of the fact that they are being observed. For exploratory purposes open observation usually takes place in the field.

Fields of Application/Prerequisites
- Relevant events/features have to be observable
- Behavior in public situations
- Data protection can be guaranteed.

Literature
Preece, J.; Rogers, Y. & Sharp, H. (2002), Interaction Design - Beyond Human-Computer Interaction, John Wiley & Sons: New York.

Journals & Diaries

Journals & diaries are used to document events by an actor him-/herself.
Journals & diaries usually provide guiding questions or triggers that should help the actor to recall relevant events.

Fields of Application/Prerequisites

Self-Experiment

In the course of a **self-experiment** the explorer uses a product or service him-/herself to gain some first-hand-experiences on how it is/feels to use this product or service. The explorer might also try to simulate handicaps of the user, such as motoric or perceptual limitations. Similar approaches have been labeled Customer Journeys und das Empathic Design in the literature.

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- Longterm processes and rare events
- Limited access to the situation for an external observer.

Literature
Preece, J.; Rogers, Y. & Sharp, H. (2002), Interaction Design - Beyond Human-Computer Interaction, John Wiley & Sons: New York.

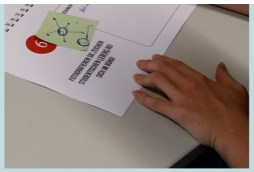

Photo by Sabine Reisas & Marten Friedrichsen

Artefact Analysis

Artefacts and marks of their use provide another source of information. When collecting data about artefacts and their usage it is important to take into account the context in which the artefacts are to be found as well.

Fields of Application/Prerequisites
- Rare events & longterm processes
- Events or processes a lot of people are engaged in without direct interaction among each other.

Literature
Ramduny-Ellus, D.; Dix, A.; Rayson, P.; Onditi, V. & Sommerville, I. (2005). Artefacts as designed, Artefacts as used: resources for uncovering activity dynamics, Cognition Technology and Work, 7(2), 76-87.

Photo by Christoph Richter

User Generated Design

People are not just passive users, but often adapt, modify or combine existing products to suit their particular needs. Cases of misuse might shed light on shortcomings as well as users' needs.

Fields of Application/Prerequisites
- Products that can be misused/appropriated.

Literature
Brandes, U., Erlhoff, M., Schemmann, N. (2009). Designtheorie und Designforschung. Paderborn: Fink.

Photo by Christoph Richter

Photo by Sabine Reisas & Heidrun Allert

Fields of Application/Prerequisites
- Experiences of the prospected user differ considerably from those of the designer
- Complementary to other methods

Literature
Brandes, U., Erlhoff, M., Schemmann, N. (2009). Designtheorie und Designforschung. Paderborn: Fink.

Cultural Probes

Photo by Elisa Ruhl, http://www.idea-garden.org

Participants receive a collection of materials (e.g. disposable cameras, maps, diaries, postcards) and a series of (creative / provocative) tasks. These tasks are supposed to foster exploration and imagination on the side of the participant.

Fields of Application/Prerequisites
- Personal visions, attitudes and emotions
- Limited access to the situation for an external observer.

Literature
Gaver, B.; Dunne, T. & Pacenti, E. (1999). Design: Cultural probes, interactions, 6(1), 21-29.
Sleeswijk Visser, F. ., Stappers, P., van der Lugt, R. & Sanders, E.-N. (2005).Contextmapping: Experiences from Practice. CoDesign 1(2), 11 –149.

Interviews

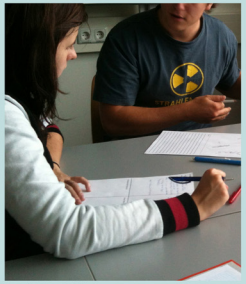

Photo by Christoph Richter

Interviews are a form of verbal inquiry. For exploratory purposes open-ended questions and half-structured interview guidelines are used. Alternatively interviewees might be asked to report on certain events or processes in narrative form (story-telling).

Fields of Application/Prerequisites
- Attitudes and emotions
- Complementary to other methods

Literature
Evenson, S. (2006), Directed Storytelling: Interpreting Experience for Design, in Audrey Bennett, ed., Design Studies - Theory and Research in Graphic Design, Princeton Architectural Press, New York, pp. 231-240.
Preece, J.; Rogers, Y. & Sharp, H. (2002), Interaction Design - Beyond Human-Computer Interaction, John Wiley & Sons: New York.

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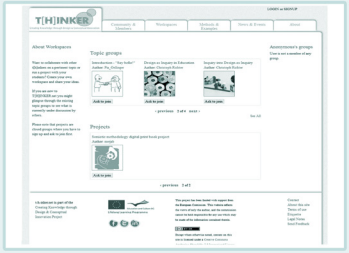

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Creating Knowledge through Design & Conceptual Innovation

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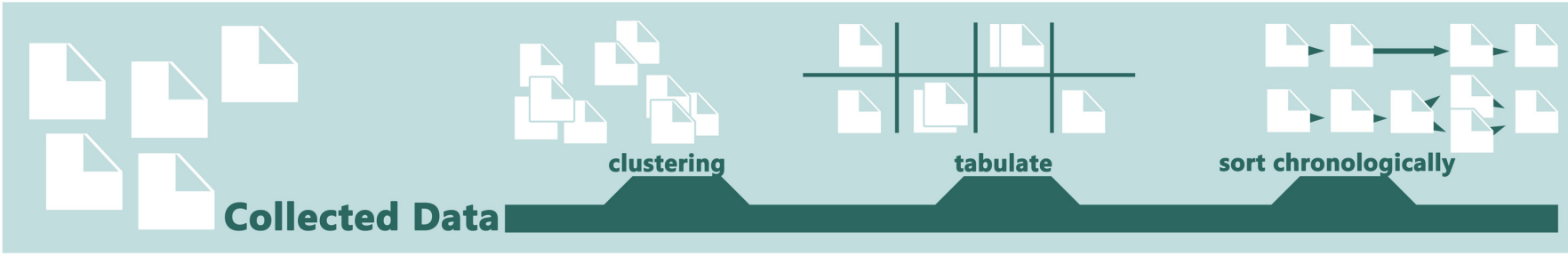
Identification of Patterns & Themes/ Illustrative Description

Selection of Methods for Framing and Visioning



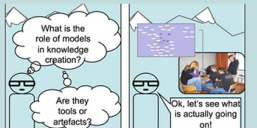
Specification of the designquestion → **Collection of information** → **Identification of recurrent patterns and themes** → **Illustrative description of findings**

Scenarios

A **scenario** is a narrative description of a possible course of events that might reasonably take place. A scenario should stimulate thinking about possible occurences in the courses of action. It should take into account specifities of the actors as well as the situation they are acting in.
A scenario should provide tentative answers to the following ques-

Storyboards

Storyboards describe important activities in form of visual narratives, similar to comics. Storyboards are focused on the encounters, experiences, thoughts and emotions of the protagonists.
The drawings of a storyboard are most successful when they provide enough context but leave out needless details that would only distract from the storyboards purpose. Text is used to sublement



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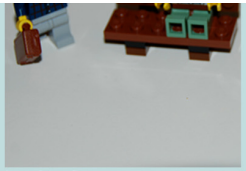

Photo by Christoph Richter

tions: What are the **contextual factors** that have an impact on the actor's goals and the course of action? **Who** is involved and what are his/her characteristics? What are the **goals and motives** of the actor(s)? What are they **thinking** and what are they **doing**? What are the **events** that shape the course of action?

Literature

Rosson, M. & Carroll, J. (2002). Usability Engineering: Scenario-Based Development of Human-Computer Interaction. San Francisco: Morgan Kaufmann.

Disruptive Images

Disruptive Images present familiar things in an unfamiliar light. They combine different Images of recognizable objects to display them out of context and thereby evoke surprise and wonder so that a viewer can gain a new experience of the object or visual clues.
The method is mostly applied in early dtages of the design process to make the design goal visible and to visually communicate and discuss it at a high level of abstraction. Thus the outcomes of the technique can be described as a design vision rather than concrete descriptions of a design goal.

Literature:

Eggink, Wouter (2011), Disruptive Images: Stimulating Creative Solutions by Visualizing the Design Vision. International conference on engineering and product design education. 9. September 2011, City University, London.

Personas

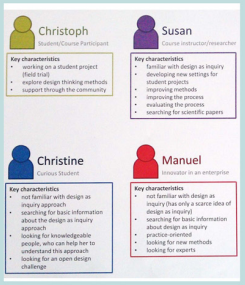

Photo by Sabine Reisas, www.t-h-inker.net

Personas are descriptions of representative user profiles. They provide name and photograph of a person as well as a narrative account of their life situation, their goals and their behavior relevant to the design question. It is customary to work with three to fife personas to illustrate user archetypes, behavior patterns and recurring themes.
As such personas are method to humanise the design focus, to test and refine scenarios and to foster the communication with for example clients.

Literature:

Martin, Bella; Hanington, Bruce (2012), Universal Methods of Design 100 Ways to research complex Problems, Develop innovative Ideas and Design Effective Solutions, Rockport Publishers, Beverly.

Journey Frameworks

A **Journey Framework** describes typical course of action in form of an illustrated process model. Besides describing stakeholders overt actions it also portrays their thougts and feelings.
Alternative courses of action, decision points and iterations can be included.
Perspectives of different stakeholders are depicted in parallel together with illustrative images. durch Bilder oder Zeichnungen dargestellt.

Literature:

Hawthorne, C. (2002). Ideo's Design Cure: Can it fix our sick health-care system?, Metropolis.

Rich Pictures

Rich Pictures aim to depict the interrelations of different activities with a socio-technical system. The are focused on the interactions of different stakeholders and the artefacts they are using.
Core elements of a rich picture are:
Roles – the functions people fill within a social system.
Artefacts – Documents, tools and media used to carry out activities.
Activities – goal-directed processes within a social system, most often directed towards the creation of a certain product.
Actions – tasks under the responsibility or accomplished by certain roles.

Literature

Checkland, P., Holwell, S. (1998). Information, Systems and Information Systems. Chichester: Wiley.

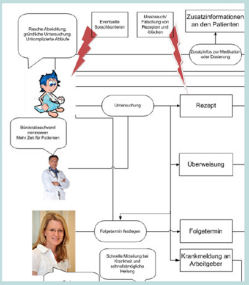

Photo by Christoph Richter

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Creating Knowledge through Design & Conceptual Innovation

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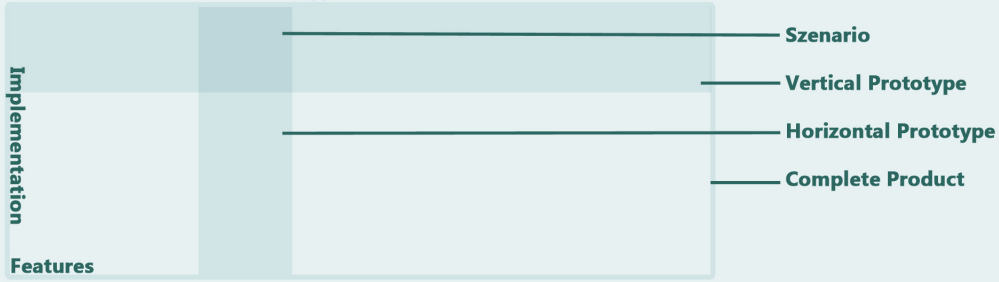
T[H]INKER

Prototyping

Selection of varoius ways to Materialize

Prototyping fulfills an essentially function.
It constitutes an inquiry into the feasibility and underlying latent implications of the design options envisioned before.
Prototyping should not be mixed up with the development of the „final" product. Its main purpose is to assess whether the envisioned design option is potentially capable to bring about the intended improvement or change.
In fact, a prototype can be anything from a paper-based storyboard through to a complex piece of software, and from a cardboard mockup to a molded or pressed piece of metal. A prototype allows stakeholders to interact with an envisioned product, to gain some experience of using it in a realistic setting, and to explore imagined use. Furthermore it gives the opportunity to question the designhypothesis. In this approach (Design as Inquiry) it enables the designer to find out more about a problem and if necessary to reframe the designchallenge

Vertical and Horizontal Prototypes



Physical Prototypes

A **Physical Prototype** is a simulation of the physical properties of the intended product.

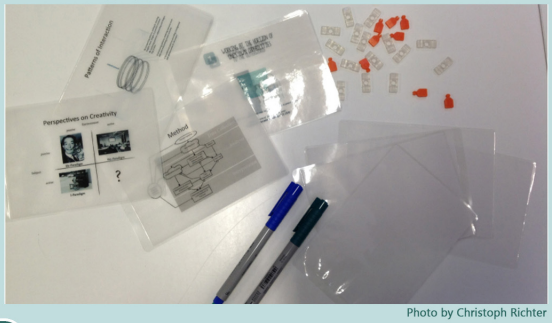


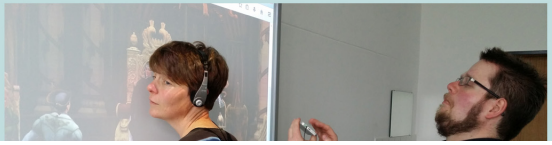
Photo by Christoph Richter

Dynamic Paper Prototypes

Paper Prototypes simulate possible states of the interface and interface elements by using sheets of paper or post-its. While the user „interacts" with the paperprototype, the designer simulates the product's behavior according to the „inputs" provided by user.

Wizard of Oz

When using a **Wizard of Oz Prototype,** the in- and



Video Prototypes

Lifelong Learning Programme
Education and Culture DG
The project was funded with the support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therin.

output device is hidden from the user and connected to a human operator who simulates the not-yet-existing functionalities of the product.

Photo by Sabine Reisas, Heidrun Allert & Marten Friedrichsen

Digital Prototypes

With a **digital Prototype** elements of the interface and selected functionalities of the intended product are represented digitally.

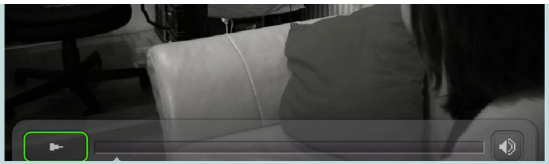


Photo by Christoph Richter

Viedeo Prototypes are video-recordings of people, that play out usage scenarios pretending to interact with the product.

Bricolage Prototypes

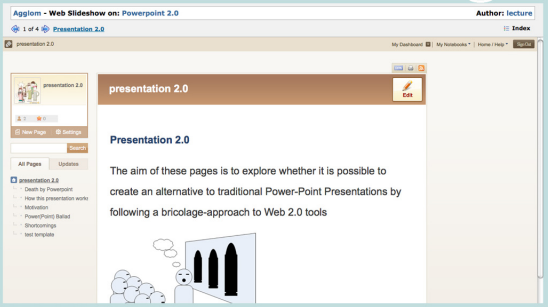


Photo by Christoph Richter

Intended functionalities are simulated by means of already existing tools and services, or a re-combination of these tools & services.

Wireframe Models

Wireframe Models and Interface Sketches provide visual representations of the structural and functional elements of a human-computer interface, abstracting from the actual graphical design.

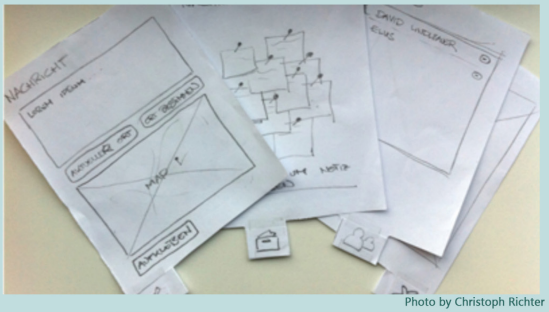


Photo by Christoph Richter

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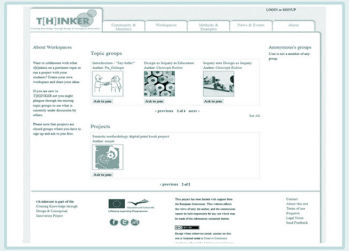

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