Design beyond Design

Working Paper

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Introduction

When we embraced the internet we not just networked ourselves, we inadvertently also networked our problems. But when everything is connected, we leave the area of complicated problems enter the realm of real complexity [Snowden, 2007]. If we hold on to our conventional ways of thinking, progress slows down to trickle. Problems become intractable because there are so many things to take into consideration. Conventional organisations have huge trouble understanding the complex tangled world we live in. The appropriate response to the new challenges this brings is to develop new creative practices in our organisations that embrace complexity – working with it, not against it [Dorst, 2015]. This is where Design can possibly help because designers have always dealt with problems with of open, complex and dynamic nature, and developed sophisticated practices as a response.

For example, over the last 15 years Social Design has surfaced as a way to deal with the complex societal problems in new and unexpected ways [Tromp and Hekkert, 2018]. Designers have rightly realised that they have a lot of unique practices to bring in this space. In doing so, design has boldly moved away from its roots – effectively moving beyond ‘design’ as we knew it. But this movement of design-beyond- Design has proven to be only a qualified success. In retrospect, some attempts to do ‘social design’ by directly applying conventional design practices to societal issues were very naïve - at worst, they were also disrespectful of the knowledge and expertise of the people working in the social domain. The complexity of the issues they are dealing with is not to be underestimated. Then one can’t just move in as a designer and think you can solve the problems without listening very carefully to the people that have a much closer experience with the issues at hand. Many of these unfortunate failed social design projects weren’t even bad thinking or bad design - yet if a project is based on assumptions that are naïve, simplistic and/or wrong, nothing good will ever come of it (unfortunately, in social design there often is no clear client, so assumptions tend to go unchecked).

In this paper, we will focus on the question whether design is overextending when it tries to move into complexities such as it has encountered in the social realm. And if this is a step too far, what is holding design back from success? What does design need to learn to address these issues?
1 Hitting the ceiling

Most importantly, we will consider that design’s inability to deal with these social issues may have to do with the core paradigm of design itself. On reflection, design to date has shirked away from dealing with complex systems issues like infrastructure design - when a system gets really complex, we split it up in subsystems and deal with those one by one. This is very much an Engineering approach, not a design approach. The engineering approach makes it devilishly hard to re-integrate the partial solutions into a coherent whole later on in the process, and it tends to come with its own orientation and value set (effectiveness, efficiency: optimising a city for traffic flows is a great feat but it might make it unattractive for human inhabitation). And a lot of the complexity it today’s world actually sits in the human domain, rather than in the technological domain. Again design is ideally positioned to contribute, as it is a bridge-builder between technology and humanity, if only design would know how to do that.

As it is, we leave a lot of the complex issues of our day to the engineers.

This was brought home to me most poignantly when working at what is considered to be one of the worlds’ leading Art & Design schools. We were setting up a new masters degree, and being rightfully ambitious about teaching the students to deal with really complex problems in a designerly way. But a few weeks after the curriculum had kicked off, I met the study leader in the corridor and asked him how the students were doing. He mournfully responded: “… Kees, it has turned into furniture again …”. So, is there a limit to the complexity that design can handle? Or does our thinking about such problems naturally transition into engineering when the issues get too complex? Is there a way to avoid this?

Or is design hitting the ceiling?

2 Design as a form of reasoning

To understand this, we have to step back and consider what design actually is, in terms of a pattern of reasoning. The different kinds of reasoning can be described most succinctly in formal logic, which considers the world to exist of ‘elements’, such as people and things; connections between these elements, captured in a ‘pattern of relationships’ that guides the interactions of the elements; and the ‘outcome’ of a process in which the elements have interacted [Roozenburg, 1995]. This simple three-way distinction is enough to characterize the basic reasoning patterns of human problem solving. We can understand them by comparing different settings of the knowns and unknowns in the equation:
The four basic ways of reasoning are deduction, induction, normal abduction, and design abduction. For the purposes of this paper, we concentrate on the latter two. In abduction, we set out to create a new ‘what’ - a new ‘element’ for the problem situation—so that the interactions in the system lead to a desired outcome. This comes in two forms. (1) In normal abduction, we know the result, the value we want to achieve through the outcome, and also the ‘how’, the pattern of relationships that will help achieve the value we seek. The missing element is the ‘what’ (an object, a service, a system), which still needs to be created. In this type of abduction, the degree of innovation will be limited because we don’t question the ‘how’, and therefore exclude the creation of new scenarios. This is the reasoning pattern behind problem-solving: building on a tried and tested pattern of relationships (the ‘how’) to create a novel solution. (2) In design abduction, on the other hand, the starting point is that we only know something about the nature of the outcome, the desired value. So, the challenge is to figure out ‘what’ new elements to create, while there is no known or chosen ‘how’ that we can trust to lead to the desired outcome. As these are dependent on one another, they have to be developed simultaneously. This double creative step requires us to devise proposals for both the ‘what’ and the ‘how’, and test them in conjunction. In questioning the established patterns of relationships in a problem situation, design abduction creates both a new way of looking at the problem situation and a new way of acting within it.

We call the act of proposing such a hypothetical pattern of relationships ‘framing’. Framing is the key to design abduction, because the only way to approach an open and complex problem situation is to work backwards (from right to left in the equation): starting from the only known in the equation, the desired value, and then adopting or proposing a new frame. Once a credible, promising, or at least interesting frame is proposed, the creative practitioner can shift to normal abduction, envisioning the element that will allow the equation to be completed.
When we find ourselves in open, complex, dynamic and networked problem situations, we only have the ‘value-to-be-achieved’ to go on. We need to experimentally frame and reframe the situation until we find a way into the problem area that captures as much of the complexity as possible, and leads to action that is understood and supported by the stakeholders in the network. Thus design abduction is the only way to deal with open, complex, dynamic and networked problems, and it lies at the core of creative practice – not just in design, but for all disciplines.

3  Cognitive limit

This should raise a warning flag – in contrast to other ways of thinking, design abduction seeks to deal with two variables (the what and the how) at the same time. This might cause us to run up against the limits of our bounded rationality [Hatchuel, 2001]. Classic cognitive research has shown that we can only hold a limited amount of information in our heads (conscious brain) at any moment in time, and the limit has famously been set at ‘seven plus or minus two’ [Miller, 1956]. This has been of concern to design researchers for a long time (and for economists, seeking to explain why people are not ‘rational’ their decision making), and has led to arguments about the unstructuredness [Simon, 1973] and even ‘wickedness’ of design problems [Rittel and Webber, 1973]. This particular limit forces Herbert Simon to concede in his later writings that design cannot be a search process through the complete problems space, realized that design always takes place in a ‘partial problem space’ (without specifying the mechanism for selecting that partial problem space) [Dorst, 2003]. The core approach of the rational problem solving description of design is that the ill-structured problem needs to be simplified and structured before problem solving apparatus can click into gear - which basically means (in terms of the previous section) that one has to move from design abduction to normal abduction (from ‘design’ to ‘engineering-type problem solving’) before an answer or response can be achieved [Dorst, 2015]. This is exactly what we are trying to avoid, as this would limit the design paradigm.

But in design abduction, we may simply have too many balls in the air. This situation is broadly comparable to the one faced by scientists as they are attempting induction and engineers (or other
problem solvers) that are doing normal abduction – but then all rolled into one. This can easily overburden us, overstepping the magic seven-plus-or-minus-two boundary of our cognitive abilities.

The good news is that in design abduction, we don’t have to get it right in one go: design abduction is propositional. The problem is we are dealing with several propositions at the same time, that are related and linked through interdependencies. The act of framing the problem and framing possible solutions comes down to a considered sequence of creative (propositional), deductive and critical steps. This creates the need for a protracted process of the co-evolution of problem and solution [Maher, 1996], [Dorst and Cross, 2001] until a ‘fit’ is found. To compound our problems, the value-to-be-achieved can also shift again depending on that fit (solving a slightly different problem, but better…). This is a hard but also and exciting and playful process, which can literally feel like the juggling of concepts and ideas.

4 Strategies

What do we know that designers do to deal with this complexity? Many things… They resort to an extensive use of external representations, they display a strong preference for certain frames over others (as ‘this is what we bring to the problem situation’) [Lawson et al, 2009]. The many practical solutions to extending short-term memory are not the focus of this paper. We are interested here in the freasoning pattern of designing itself, and see if it loses its efficacy at higher levels of complexity. Fundamentally, we can identify at least eight different strategies forward – there may be more.

(1) Create complex chunks …
First of all, the elements of thinking that are mentioned in the ominous cognitive limit of seven-plus-or-minus-two are not bytes, but ‘chunks’ [Miller, 1956] [Chase and Simon, 1973]. These units of knowledge can be quite complex in their own right – indeed, an important part of the development of expertise is creation of more complex and sophisticated chunks [Lawson et al, 2009]. This is what gives experts an advantage over novices [Dorst, 2017] This growth in sophistication and complexity in the chunks is deemed to happen more or less naturally as one builds up experience, but there is no reason this could not be done deliberately and strategically. This actually was the strategy at the Art & Design school mentioned at the end of section 2: rather than requiring students to base their designs and decisions on research (declarative knowledge – which might have stemmed the flow of their intuitive approach to design challenges), the choice was made to teach how to build up an ‘informed intuition’ in the problem domain.

(2) Create a typology of design situations …
Although design theorists like to stress the uniqueness of design situations (some even claiming that every design situation is ‘essentially unique’ – whatever that means [Schon,1983 ]), all practitioners
know that this is not the case. An important way of building up experience is understanding these types of situations, and the Art of design then becomes ‘when to do what’ [Dorst, 1997]. Recognizing the pattern in a design situation helps pre-structure it, and gives an initial strategy to approach the problem situation. There are always differences in the detail, but this means that there is a ‘gambit’ into the complex problem arena. Care should be taken to treat this initial foray into the problem space with some lightness, and not fixate on it too much – earlier research has shown that this is hard, and designers tend to try and make such a ‘primary generator’ work at all costs [Darke, 1979].

(3) Construct a library of precedents...
The other side of this coin consists of having a broad understanding of precedents: earlier approaches and designs that might be applicable to the current design challenge. Again, having such a treasury of design frames and design solutions is often associated with expertise, to be built up over many years of practice, but it can also be constructed deliberately. Design agencies tend to do this by keeping some of the more interesting projects (the ones they identify with, or still want to think about) close at hand, for re-use. The drawings on the walls of a design studio refer to these projects – they are not decoration but the results of deliberate, strategic decision which projects to keep in peripheral view [Ken Yeang as quoted in Lawson et al, 2009, pp 63]. They are part of the method in the messiness of a design environment. A studio is also a library of frames and ideas.

(4) Mirror the external complexity in the team...
Then one can change the actor in this game – these first three points are based on the assumption that there is one designer, with one brain that needs to deal with a situation through the narrow funnel of its seven-plus-or-minus-two parallel processing capacity. But design happens in teams, so there can be more than one actor working in unison. That probably doesn’t translate in a linear increase in capacity (some of the chunks would need to be the same, so the actors within the team have a common ground [Valkenburg et al, 1998]) but in principle, the parallel processing capacity of all those brains could grow the design capacity. Especially when tasks are divided.

In really complex situations, co-design methods actually help by having relevant aspects of the problem situation be represented by people in the design team. But anecdotal evidence shows that there is a danger that the complexity of the design situation is then mirrored in the design team, and played out rather than resolved, leading to a possible paralysis. And through the complexity of the situation and the need to resolve the tension this creates, there is a constant danger of moving away from design abduction into normal abduction, for the sake of progress. It is very hard to keep a whole team on the track of design abduction.

(5) Resolve your inner paradoxes...
We always say that it is a complex world out there. And that is undoubtedly true. But the complexity that is really hard to deal with is the one within us, not the one out there [Dorst, 2017]. Our inner contradictions hold us to ransom by creating thought patterns that go around in vicious circles, and
ultimately keep us from progressing. Just realising the tension helps getting around these patterns. When interviewing experienced designers for a book on Design Expertise, my co-author Bryan Lawson and I were struck by the fact that older designers described their development as a designer not so much as a progress towards higher and higher levels of expertise (from A to B) but more as ‘becoming more themselves’, and how that made their design life less complicated (Wim Groeneboom quoted in Lawson et al (2009), pp 33). This makes you wonder: how much of expertise is about letting go, about attaining freedom than about gathering knowledge?

(6) Do a deliberate / systematic exploration

The deliberate / systemic exploration of the problem space through research, methods and tools like system maps, scenarios etcetera … is very important. This goes without saying – many of the approaches in the field of Systemic Design are based on this. While useful, there again is the caution to use these approaches and representations flexibly, and take care to stay in design abduction. Normal abduction is generally considered to be much more comfortable, as it has less variables and is ‘closer to a solution’. And we have to be mindful that the very creation of a representation/description already entails a selection and framing, and the assumptions behind these should be questioned regularly as these representations are used in designing.

(7) Layer the problem and solution

A practice is a deliberate and coherent set of activities intended to achieve something. Models of practices generally represent them as layered, with the layers containing statements on the Why, the How and the What.

Why?

(value, deep human needs)

v

Why?

(strategy and approach)

v

How?

(methods and tools)

v

What?

(actions)
The top layer describes the values you are setting out to achieve. In seeking to understand the roots of people’s behaviour, you dig for them by repeatedly asking questions like: ‘Why? What is this really about?’. Then there is a second layer of Why that describes the strategic approach to achieving these values. The third layer is more tactical and describes the How, the method(s) through which the goal is to be achieved. The fourth layer is that of the concrete actions that are seen as part of the practice – the What ([Max-Neef, 2005], [Dorst, 2017]. The layering of this is used in software engineering (the ‘architecture’) and fields like landscape design. By taking on these layers one by one, the cognitive load of design abduction is eased. Framing creation in design [Dorst, 2015] explicitly uses the layering to re-anchor the thinking about a problem in its deepest value (what is this really about), and build solutions from there.

(8) Think complexly...

Finally, one could say that all of the above is misguided. That we have mistaken the nature of the complex problem for one that is complicated [Snowden and Boone, 2007]. In dealing with really complex situations, we learn from complexity theory that we should actually forget about solutions. We are not going to solve this. In situations of true complexity the challenge is to create high-quality interventions that make the whole system move to a more desired state. This upends our view of what designing is … suddenly, we are beyond what can be achieved in a ‘project’. What is a result, in such circumstances? What is quality?

5  Conclusion: designing beyond the current design practices

These strategies are not new, they can all be traced back to the sophisticated design practices of expert designers and many of them have been described before in design research. Just considering a well-known case study of complex social design like the Kings Cross project done by the Designing Out Crime research centre in Sydney [Dorst, 2015, 2016], elements of six of these eight strategies can easily be identified.

But more empirical research is needed: if we develop a consolidated description of these strategies we can use them more deliberately, explicitly, strategically, and fold them into the curriculum of our design schools to prepare students of the complexity of the tasks ahead of them. And theoretical explorations are in order too: there clearly is a systematic model of the different ways design can approach complex problems that underlies these eight strategies – which will help practitioners choose the appropriate strategies for their situation, and might spark the development of new strategies that have not evolved in...
practice just yet. It could also open the door to borrowing such strategies from other fields, within and outside the designing disciplines.

If we look at the current state of the art in practice, the cutting edge of complexity is to be found social design projects, done by design agencies [Anderson et al, 2017] and design labs [van der Bijl-Brouwer, 2017]. Design was never made to deal with the bewildering complexity of social issues – so there is no reason to believe that it just can… And while design has a lot to bring already, it should rise to the challenge and develop strategies to deal with the complexity of the modern world.

References

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