Putting the horse in front of the wagon  

how a multi-contextual approach can help enrich the arsenal of designers to equip them to address contemporary challenges

Working Paper

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Abstract and key message: nowadays virtually all substantial design challenges display a level of complexity. One of several common ways to address such contemporary complex design challenges is one of early simplification: e.g. focus on one use case, dive deep into needs of a particular beneficiary group, develop and implement an (optimal) solution and then perhaps later move on to variations. We argue for the opposite response: early systematic contextual variation (beneficiary groups, affluence segments, geographical regions) and later simplification, e.g. when deciding on implementation steps. The early network variation enriches the conceptual design space, also for the initial context. An overarching approach that revolves around this principle is Context Variation by Design (CVD). It builds on and can add value to several existing design thoughts and practices. Explicitly encouraging early variation has so far demonstrated to contribute to the arsenal of (junior) designers, based on results as well as according to their own reflection. This paper aims to position the approach in the larger landscape, striving to show how it can work together with currently used methods that are based on similar principles.

Setting the scene

In this working paper, we introduce slightly more in depth what was presented at RSD6 in the session with the above title, following the same storyline which we summarise in this first section. Complexity and design were originally separate fields, the former more aimed at mapping out relations between elements and the latter, apart from “shaping forms” at solving, and later also setting problems. While some design authors claimed that designers by virtue of their way of thinking (design thinking) by definition tackle complexity adequately, e.g. (Buchanan, 1992), (Cross, 2001), (Dunne & Martin, 2006), (Nelson, 2007), (Brown, 2008) it is not necessarily evident whether this always occurs in real life and whether (junior) designers are by education well equipped to act on this promise.
Methods like systemic design (Jones, 2014, 2015a) and systems oriented design (Sevaldson, 2013, 2017) attempt to merge the fields of system thinking and design, in an evolving process. While the field of systems thinking itself can contribute to a better understanding of complex systems, its formalised and normative presentation initially did not go down well with many designers who feel intuition and non-modelled dialogue have a place as well (Collopy, 2009), (Sevaldson, 2014, 2017). Hence, the fields have certainly not fully converged yet. The RSD conferences series is one contributing force for this movement to occur.

To support this convergence and ideally mutual strengthening, we suggest a complementary design approach. The key point of this approach is to engage in early (network\(^1\)) variation instead of what is often – though not always – done: early simplification of the design challenge, i.e. be guided by reductionism (Nelson, 2007). Exploring why this makes sense and how it can add value to the existing, evolving, design landscape is the main line of this paper. The approach itself (see later for details) is not a blueprint, because this would contradict the very nature of complexity: catching it in a blueprint or tool from the outset would not invoke the attitude that is necessary to deal with complexity in the first place. This does not categorically exclude the use of tools. We feel it just should not be the first impulse to ask for them to start the journey.

This however, also makes it difficult to ‘sell’ the use of the approach because people, including designers, as has become clear in many instances, tend to favour some form of blueprint to support them in their challenges, see e.g. (Lewis, 1992). This is well captured by two (of many) quotes of junior designers while being introduced to the approach: “Invoking creativity is already difficult enough, then I at least need a step-wise process to do that” and “I see the value but if I don’t know how to do it, I won’t”. Striking the right balance between such desire for “toolification”, and providing less prescriptive levels of guidance that encourage high levels of creativity will be one point of attention for further socialising the approach in practice.

So far advanced design students who have used the approach, by and large, reported that it adds value to their arsenal. This also implies that it does not have to replace (other) methods: developing a design method arsenal is not a zero-sum game. This general sense of added value has been confirmed at RSD6 where most reactions encouraged further use of this approach so designers have it on their radar when being confronted with a contemporary design challenge.

**What’s going on, in more detail?**

We observe that – at least in some cases – designers, let alone managers, who want to address complex issues currently cannot resist the temptation to fight this complexity with early simplification, i.e. they want to reduce the scope of their (design) challenge so it becomes more manageable and they get the feeling that they control the process, e.g. (Backx, Hilberath, Messenbock, Morieux, & Streubel, 2017). The more people are involved in the process that is subject to management dynamics the higher the chance that this occurs. While they may acknowledge that differences exist between contexts (e.g. user groups, affluence levels, countries), to avoid the assumed tension of working with this diversity, they tend to zoom in on

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\(^1\) Throughout the paper we use “network” meaning “direct stakeholders to gather information from to feed into a design space”. “Network variation” then logically refers to going beyond an initial group of stakeholders who are relevant for one specific target group, geography etc.
one specific context. This enables them to focus, get back a feeling of control and develop a solution that works in that particular context. That solution is then primarily based on contextual intelligence (Khanna, 2014). It may be inspired by ‘external’ information, but in a controlled way. After this has been achieved and the solution for the initial context has been implemented, variations for new contexts can then be started to be developed. This strategy can be used both in more traditional process methods (Beitz & Pahl, 1996), (Pahl, Beitz, Feldhusen, & Grote, 2007) or more iterative, ‘circular’ design process models (Cross & Roozenburg, 1992), (Buijs, 2003).

This paradigm of "early simplification, later variation" seems to make practical sense. It seems to acknowledge, but then for pragmatic reasons consciously push forward complexity. They reduce an open system to a much better controllable closed one because of its limited scope. That however also means that reality is ignored since in real life it is seldom one target group or region or another contextual boundary that is representative for the multiformity of a problem to be addressed. Even if the limitations of such boundaries are acknowledged in thought, they are not always in practice, for example due to emphasis on a specific output and an efficient process. Early success and achieving S.M.A.R.T. targets can prevent managers and thus designers to adopt an attitude to work with the complexity. The latter would include appreciating the complex richness of the real-life situation by means of the process of creating insights and building rich pictures instead of obsessing with the tangible result (Lewis, 1992), (Checkland, 2000).

**Consequences**

While this strategy looks appealing, it seems to favour a desire for (management) control and reducing uncertainties rather than addressing a real-life issue which in fact will always exhibit uncertainties. Too much focus on controlling them is illusionary (Flach, 2015). Complex situations seem complex for a reason: reality is complex. Early, or as we would argue, premature, simplification increases control on the process and channels the output but has several consequences which together clarify why – to put it carefully - it is not the right response. We mention a few of these consequences:

- **Heads down design**: Simplified analysis by focusing on a particular context, i.e. use case, results in incomplete views, which is certain to result in a design space with limited relevance. The analysis refers to a limited group, a small part of the issue and/or a short duration in time. In short, it leads to heads down design (Meyerson, 2015). This risk is ironically particularly alive if a (narrow form of) human centred design, or the much-lauded method of design thinking is used. By its focus on the Person, thereby (perhaps unconsciously) resulting in a narrow use case focus, many connections with the larger system can easily get lost, whether the designer intends to or not.
- **Path dependency**: Any next step to improve the initial solution will be a small variation on the first step, even if next steps like involving new beneficiary groups in fact require a different way of looking at the situation and different directions (Jones, 2015b). With early simplification, there is no way of avoiding this. Early success (= an adopted product), often encouraged by financers, can slow down success in multiple contexts later because the design (direction) has to be primarily redone, and the opportunity to bring together distributed intelligence and create synergies early on has not been used.
- **Early zooming reduces the solution space**: This tendency or even felt urgency to reduce the number of variables to a number we can humanly handle is called bounded rationality (Simon, 1969). Since complexity in real life is however characterised by more
elements and interactions, severely reducing these is unlikely to lead to something meaningful in real life. The call for meaning also refers to the increasing necessity for designers to go for ‘impact’, i.e. large-scale positive societal effects.

Likewise, the other end of the scale prescribes to engage in full systemic thinking and model the entire system around the problem at hand. While this might prevent some of the limitations above, this has so far presented designers with other ones;

- **Fact focus:** as stated systems thinking has traditionally been forced upon the design world from a normative, technocratic perspective (Collopy, 2009), (Sevaldson, 2017). This is not the type of reasoning that designers overly appreciate, and arguably not the type of thinking that is required to deal with complexity. Fields like systemic design and systems oriented design aim to overcome these barriers, their use is not yet fully common practice.
- **Lack of dialogue:** as a consequence, the preference of system thinkers to work with (“one right”) model, leaves little room for the generative dialogue that designers typically need to map a landscape or appreciate the actual situation (Checkland, 1981). While this dialogue may seem needless time wasting to some, it is an essential part of how designers operate: creativity feeds on ambiguity and interaction and this requires a process and not just attention for the output (Lewis, 1992).

In short, design methods like design thinking and human-centred design, as well as methods of systems thinking when used in a strict sense, present us with problems if we really want to wholeheartedly and passionately address challenges of a multiform nature.

**Can we think of an alternative?**

Alternatives are possible and as already alluded to, several authors have provided thoughts and methods on this. New ways forward are never born in a vacuum, they build on other thoughts and vice versa.

**The ingredients**

Below we include a representative while not exhaustive list of ingredients that can guide alternative paths. Several authors have presented at one or more RSD-conferences.

- Accepting the reality of contemporary society being complex is the first step in enabling yourself to deal with it: “fight complexity with complexity” (Stacey, 1996).
- Move beyond simply putting (human) users central as the solution, apply more systemic thinking (Jones, 2015b) or whole systems thinking (Blizzard & Klotz, 2012) throughout.
- Information that is novel to you, i.e. enriches your overall view, is more likely to reside at or over the edge of your network than in the centre (Sunstein & Hastie, 2015).
- Design spaces should always contain multiple interacting media. Such “rich” design spaces are more likely to map the essence of complex interrelations (Sevaldson, 2008).
- Tools and the processes to use them, like GIGA Mapping (Sevaldson, 2011) and rich picture diagrams (Checkland, 1981), (Lewis, 1992) are helpful to map and connect the many different possible projections of a problem landscape.
- Especially in issue definition phase, (Dorst, 2015) suggests the activity of (re)framing. How can reframing be made as relevant as possible? One element that may help is considering multiple perspectives by involving different types of people (Suen, 2015).
- The recent development of Open-ended Design suggests to intentionally leave several parts of the design results open, to allow for future adaptations without having to apply all resources again (Ostuzzi, De Couverre, Detand, & Saldien, 2017).
Generative sensing (Sevaldson, 2014) and acknowledging the “web of interconnections that weaves complexity” (Montuori, 2011), as well as a degree of humility on not-knowing (Montuori, 2012), are starting principles for processes that can create a better understanding of whatever complexity we are confronted with.

While moving from single-angle to collaborative inquiry is a good step, the move we really need to make is to shared inquiry, to arrive at true integration of multiple perspectives and by that start seeing new emerging patterns (Nelson, 2014).

To source inspiration that turns out to be relevant, it should neither be too close (i.e., too obvious) nor too far removed (i.e. arbitrary) from the challenge at hand (Gonçalves, 2016). However, students do not get much guidance how to achieve this.

An attempt to create more dialogue between systemic thinking and design, the Systems Oriented Design (SOD)-method, enables designers to capitalise on the inherent systemic nature of design by considering and visualising the whole Gestalt (Koffka, 2013) and encourage designers to use their specific skills (Sevaldson, 2017).

The bigger picture
The above inventory provides ingredients for dealing with complex design challenges. We propose an approach and associated attitude that by creatively combining them provides a next step: Context Variation by Design (CVD). Amongst others, it combines four main time-honoured principles to shape the design process. These were first revived by (Muller, 1999) and later used by e.g. (Leenders, Van Engelen, & Kratzer, 2007): systematic variation including of networks, hierarchical decomposition (focusing on aspects and relations, instead of sub-systems and sub-problems), satisficing (move away from optimising, which is not possible anyway in a complex system) and discursiveness (all phases are important, but not in a given order).

Some of these principles go as far back as to Leonardo da Vinci. The key is to apply them so together they contribute to a rich design space that allows crucial connections to be revealed by avoiding early simplification. In CVD-terms, these revealed connections are called “shared insights”. Looking for such connections is not unique, but a CVD mindset ensures that the diversity of perspectives extends beyond the demarcation of one context.

A central construct in this approach is to aim for the multi-contextual richness of the design space to become visible and palpable. Richness as a defined construct is a little researched area. It is mostly considered as a given characteristic, e.g. rich pictures, rich design spaces, rich landscapes, without an obviously agreed interpretation. Our work intends to take it one step further because we feel that creating a common language around this notion might improve the discussion about it, thereby raising the awareness and consequently lead to higher quality design results. Research to this effect has shown promising first results and will be continued.

A primary manifestation of this striving for richness is the revelation of patterns in the information that is brought together, which then can be subsequent food for discussions and design decisions that would have been unlikely otherwise, e.g. (Kersten, Diehl, & Crul, 2017). In complexity terms, the process to turn lower order chaos in “higher order patterns” (Johnson, 2002) can be observed. This layer of less formal and not necessarily obvious connections and patterns is the one that typically emerges from the interaction and discussion that represents the aforementioned richness.
What might this approach add for designers (and others)?

What, in the end, does CVD-driven thinking add to a designer’s arsenal? We argue, supported by ample evaluations and discussion with (junior and senior) designers, that it adds this: we know that open system models represent reality more accurately but also pose more challenges in dealing with it; we also know that closed systems models align better with limited human capabilities to keep overview and therefore control. The suggested early network variation is an attempt to address this by creating a multiple interconnected closed system, where the different contextual perspectives are the main source of the multiplicity. Thereby it prevents that the contextual hat of a lead designer does not unduly limit the design space. At the same time the risk of infinite divergence is also limited. This combination seems a good middle ground to walk on for contemporary design challenges.

We therefore consider the explicit value the notion that when faced with a complex challenge we should encourage the dynamic of early systematic variation (of products, markets and networks) and if still necessary save simplification for later, e.g. by starting implementation in one context.

Bringing the collective intelligence together in a rich connected design space is the main purpose of this way of thinking. In a non-linear discursive design process such connections might be found anyway, but the explicit notion of early network variation removes all doubts that this will occur before major decisions have been made. It also adds to the general method of human-centred design: a multi-contextual approach will be people-centred, but will not allow for a premature focus on a particular group to dominate the process. Experiences so far do show that this approach can yield positive results in terms of creativity, richness (Kersten, Diehl, Crul, & Van Engelen, 2016) and also eventual performance of the results (Kersten, Long, Diehl, Crul, & Van Engelen, 2017).

This is what we aim for by putting the horse in front of the wagon: letting the collective intelligence pull the weight of the challenge with some clarity of direction, not let one horsepower push the whole weight over roads it cannot properly see.

Almost everybody who is confronted with this line of thinking supports the conceptual notion that “putting the horse in front of the wagon” is a good idea. It sounds like common sense but, as many people admit, that does not mean it is common practice yet. The notion of informal connections and patterns being revealed since they have been more intentionally sought, is acknowledged to likely lead to a more complete and holistic picture of the real-life situation. Less control over and therefore more room for unexpected outcomes are then consequences.

Conceptual examples of what we can expect when we create design spaces where generative richness is in this way encouraged are adaptive and adaptable product/service architectures and integrated multi-context business models. In all cases, we like to emphasise that even CVD-driven adaptive architectures cannot foresee all possible (future) requirements; we put forward however that architectures are more likely to be adaptive if they are based on different actual use cases and the associated diverse intelligence.

A few specific (anonymised) examples from practice demonstrate the described effects.

- In a project related to maternal health care the focus was first on emerging economies in Africa; it was quickly realised that families in Western countries were relevant as well, also in terms of viability of the business case. By exploring these very different contexts
together from the start, and bringing the insights together early on, some crucial "shared insights" were generated. The core set of requirements could be covered by a relatively simple and therefore affordable to produce hardware device, while the requirements with regards to information processing and display could be caught in a software layer. That software and choice for the display device it is used on (PC, tablet, smartphone) can then be made circumstance-dependent. With only one use context in mind there would not have been a reason or need to develop such an adaptive architecture.

- In a project that was focused on developing mobile sanitation solutions in India, the initial idea was to focus on one main city where the company had existing presence. When the search area on our request was expanded, the inclusion and consideration of other (geographical) areas soon revealed that the potential number of use cases and therefore commercial opportunities was much higher than initially considered, e.g. from household use to religious festivals to semi-permanent sites like refugee camps and construction sites. Such expansion of use-cases also implied that built in guidance given to users would have to cater for many more languages. This resulted in a design requirement that such guidance should be primarily icon-based. By identifying this in an early stage, the designers could source in requirements and reactions of a wide(r) variety of potential user groups related to possible icons. In this way, the communication 'architecture' covered a wider initial range that was also inherently adaptive for future changes. As unplanned but welcome spin-off benefit the icon-based communication would also increase usability for illiterate people. This enhanced the social nature of the project. Focusing on one main use case might conceivably have resulted in icon-based communication but there would have been a much less diverse input about the possible interpretations and the required range of icons.

In summary and looking for next steps

We conclude by briefly summarising the line of reasoning also in relation to work of others, then take this as basis to formulate next steps

Looking back

As stated, the core message that we want to convey with this paper highlights the value of early (network) variation with benefits not only for the longer term (scalability) but also for the short term because the thusly convened collective intelligence create a rich appreciation of the multiformity of the issue. This is the basis for a high quality, adaptable as well as adaptive design architecture (conceptual and actual). This result opposes solutions that for practical and for (management) control oriented reasons focus on one use case. Even if that has been done in a systemic way, it has not enjoyed the multi-contextual scrutiny that could have improved it and has a limited chance of remaining relevant once the scope is expanded to new use-cases. The latter would result in delays in addressing the needs of a large number of diverse beneficiaries.

By approaching the challenge in this way, several existing developments are taken forward:
- One has direction for multi-sided reframing, enriching the concept of (Dorst, 2015).
- One can use systemic design principles while ensuring the system under consideration is not too narrow, connecting to the work of (Jones, 2014) and (Blizzard & Klotz, 2012).
- One brings together the diverse intelligence that is needed to sense the multiformity of the problem, addressing concerns of (Montuori, 2012) and (Sevaldson, 2014, 2017).
- One has guidance on whom to involve in a shared inquiry, enabling (Suen, 2015)’s ideas,
- One has guidance on where to source inspiration, building on (Gonçalves, 2016)’ work by giving direction on how to decide where to look.
• One creates more space for integrated pictures and emergence (Stacey, 1996), (Nelson, 2014) with lower risks of heads down design (Meyerson, 2015) and path dependencies based on early simplifications (Jones, 2015b).

• One has created conditions that increase the chance of the process of creating rich pictures (Checkland, 1981, 2000) covering a more diverse perspective, increasing their relevance.

• One has explicit insights into parts of the design architecture that can be fixed, open or adaptive, instead of having to guess, thus strengthening the work of (Ostuzzi et al., 2017).

Looking forward
How can we take the above forward into actionable next steps, for academics as well as practitioners? We suggest the following:

• **Empirical insights**: testing this way of thinking and designing in practice needs to continue to gain more understanding for the types of challenges when the expected added value (i.e. higher quality and adaptiveness of the design architecture) justifies the extra effort. The development of richness as a defined construct may play a role in this, as well as careful development of guidance to facilitate this way of thinking in practice.

• **Positioning**: as stated, the ingredients that have inspired this way of thinking make clear that it is connected to many existing developments. This presents challenges in ‘proving’ what the ‘exact’ added value is. This might be more problematic in an academic than practical sense.

• **Implementation**: many of our cases so far have not yet gone to the stage of implementation. This mostly has to do with the projects which are typically accommodated by willing principals, but without immediate urgency to move to market. Including that phase would be a welcome step to get more empirical insights how results hold up in practice.

• **Outside views**: just like the approach celebrates the value of combining contextual perspectives, so too it might benefit from inviting such perspectives. How would insights from for example entrepreneurs, psychologists, development practitioners constructively add to our own rich picture?

Reference list, basis for full paper


