

Jun 25th, 12:00 AM

The Role(s) of Process Models in Design Practice

Søren Iversen
Spires United

Mads Kunø
Creuna

Peter Vistisen
Aalborg University

Follow this and additional works at: <https://dl.designresearchsociety.org/drs-conference-papers>

Citation

Iversen, S., Kunø, M., and Vistisen, P. (2018) The Role(s) of Process Models in Design Practice, in Storni, C., Leahy, K., McMahon, M., Lloyd, P. and Bohemia, E. (eds.), *Design as a catalyst for change - DRS International Conference 2018*, 25-28 June, Limerick, Ireland. <https://doi.org/10.21606/drs.2018.289>

This Research Paper is brought to you for free and open access by the Conference Proceedings at DRS Digital Library. It has been accepted for inclusion in DRS Biennial Conference Series by an authorized administrator of DRS Digital Library. For more information, please contact DL@designresearchsociety.org.

The Role(s) of Process Models in Design Practice

IVERSEN Søren^a; KUNØ Mads^b and VISTISEN Peter^{c*}

^a Spires United

^b Creuna

^c Aalborg University

* Corresponding author e-mail: vistisen@hum.aau.dk

doi: 10.21606/drs.2018.289

This paper investigates how design process models are implemented and used in design-driven organisations. The archetypical theoretical framing of process models, describe their primary role as guiding the design process, and assign roles and deliverables throughout the process. We hypothesise that the process models also take more communicative roles in practice, both in terms of creating an internal design rationale, as well as demystifying the black box of design thinking to external stakeholders. We investigate this hypothesis through an interview study of four major danish design-driven organisations, and analyse the different roles their archetypical process models take in their organisations. The main contribution is the identification of three, often overlapping roles, which design process models showed to assume in design-driven organisations: *process guidance*, *adding transparency in external communication*, and internally as a formal description of an *organization's design rationale*. We discuss how the mix of these three roles added together can support and catalyse how design-driven organisations define themselves, and position them in practice, as well as how the theoretical discourse of process literature might be re-catalysed by these very different roles observed in practice.

design process, process models, design thinking, design management

1 Introduction

The point of venture for this paper is an observed paradox in the practical application of design thinking - namely how design process models are implemented and used in design-driven companies and organisations. The role of process models are originally conceived and described as formalised workflow and practices, with the aim of assuring a re-usable and transparent road from A to B in a given process (e.g. Howard, Culley, & Dekonick 2008). Popularised in both management and systems development literature, the recent decades rise of design thinking and design-driven organisations, has created an increased interest in attempting to formalize the archetypical elements of the design process. Since then, multiple different structures, metaphors and rationales has been used to



This work is licensed under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International License.

<https://creativecommons.org/licenses/by-nc-sa/4.0/>

describe the process of design - all serving as different ways of formalizing the key attributes from design thinking (Cross 2006).

Process models in design has enjoyed a relative success and both practice and academia with the amount of publications on the topic, as well as design-driven organisations explicitly stating a version of an archetypical model as 'their approach'. However, when put under further scrutiny, the practical application of process models does not always seem to follow the ideals of their theoretical foundations, and often seem to carry more than function depending on the situation in the design practice. This is evident both from case studies from design-driven companies, as well as in the different ways they externally communicate their process to stakeholders and design peers. The author's own experiences, from varying design practices, supports this observed pattern - varying from being internally guiding process, to communicating with clients, and further to act as a more abstract cultural guideline for how a specific design practice describes its vision for design.

Building upon this, we hypothesize that there is more to the theory and method of process models in design than meets the eye, and that process models carry a plurality of meanings besides their intended process guiding purpose. Building upon this hypothesis this paper explores the following broad research question: *What is the role of process models in design-driven organisations?* We pose this question to explore the relation between the different, and often ambivalent, roles process models take in different practices, and furthermore to provide a more nuanced perspective on the theory from which the most archetypical design process models are grounded.

To explore the research question, we have made an empirical study of representatives from design-driven organisations in Denmark, ranging from start-ups (20-40 employees) to large organisations (1000+ employees). The research setup is a mix of semi-structured interviews, and a workshop mapping both how the organisations visualize their process, as well as challenging which roles these process models take at different times in their practice.

2 Design thinking as the organizational driver

For the scope of our inquiry, we have chosen to focus on what we label as 'design-driven organisations'. This is to be understood through the umbrella term of 'Design Thinking', leveraging Brown's (2009) description on the use of the sensibility, and methods of designers, to match user needs, technology feasibility and business viability with each other. The recent decades spike in interest in the potential of Design Thinking is especially driven by the efforts to address how it can transform the decision-making processes of organisations (e.g. Martin & Dunne 2009), and spearhead innovation (Brown & Wyatt 2015, Verganti 2009). From traditionally being introduced as a latter step in product development, design thinking has propelled design into a broader adaptable mindset, which can be applied to both product development, customer service, as well as upper management. In 2015, Brown concluded that design thinking had succeeded in both making its way to the top of Forbes 500 companies, as well as being the dominant mindset behind the decades much heralded disruptive startups. As such, when we speak of design-driven organisation we speak of broad range of organisational structure and types, with the one common factor, that they apply design as a decisive mindset for their practice.

Based on this broad definition of design-driven organisations, it is necessary to narrow the scope and contextualize it to practice. The empirical research has been focused on gathering insights concerning the danish branch of design agencies, working with design on a strategic level in the development of digital solutions. In order to frame this specific field, we created a framework to act as a focal point for the empirical research. Based on information from the Central Business Register (CVR) and the Danish branch code system (virk.dk, 2017), the field of interest is defined as organizations with a commercial focus on design, in the sense of both design execution as well as on a more strategic level.


BRANCHE WITHIN DESIGN / PLACEMENT	COMMUNICATION DESIGN AND GRAPHIC DESIGN	INDUSTRIAL DESIGN AND PRODUCT DESIGN	COMPUTER PROGRAMMING	INTERIOR DESIGNERS	CONSULTANCY REGARDING INFORMATION TECHNOLOGY	ARTISTIC CREATION
IN-HOUSE					ANONYMOUS CASE COMPANY LUX DEPARTMENT IN PUBLIC IT	
DIGITAL AGENCY						
CONSULTANCY						

Figure 1: Mapping the different design-driven organisations considered for the empirical study.

As shown in figure 1, the framework consists of six specific branch areas divided into three organizational practices within the design industry. The study is constrained to organisations who have already adopted design as a decisive mindset for their practice. We argue this scope provides an optimal point of venture for studying the roles of process models in design, with fewer variables to consider, than had we investigated less design mature organisations. A broader organisational focus could have contributed with other, very relevant, perspectives on the role of process models in practice, however these perspectives would require further research into the specific organisations and their design practice, and were thus out of scope of this initiating study. The next section will briefly introduce the archetypical forms of process models, which can be identified across the field of the mapped design practice.

3 Process models in design

In order to identify different roles of process models in design-driven organisations a smaller systematic literature review has been conducted to clarify different theoretical foundations on which process models have been developed. From this we have identified a series of what we argue stands as 'archetypes' for many different manifestations of process models. One of such archetypal perspectives on process models is the linear perspective, which is often associated with the waterfall model as described by Royce (1970). This representation of a linear process resembles a waterfall in visualising a sequential relationship between the different stages of a process. Although the waterfall model is often used in order to describe a pure linear process it was developed as a means to show a process that is "(...) risky and invites failure" (Royce, 1970). Even though the linear rationale has since been much criticised (e.g. Buchanan 1992, Fallman 2003, Jonas 2007) for not reflecting practice, a degree of linearity is still often identified not only in engineering, but also in design-driven organisations process models.

As process models evolve and the need for visualising the iterative nature of design processes emerge, the representations of processes co-evolve accordingly. A classic occurring example of this is the so-called 'double diamond' (TBDC, 2007), showing the process as a continuous shift of convergence and divergence. A related archetype, which shows progression from linear convergence as well depicting divergence as the iterative part of the process, is the *Design funnel*, proposed by Pugh (1990). Through the design funnel the iterative aspect of a process is shown by visualising activities as alternating between either diverging or converging activities. The model can further be described as being *controlled-convergence* (Buxton, 2007). Controlled-convergence covers a process that essentially shows the overall convergent nature of the process but through integrated evaluating activities the iterative aspect of the model is shown. The overall nature of the model seems to be convergent where Pugh broke with the waterfall model by integrating divergent activities and thereby implementing an approach to process models less rigorous than the waterfall model. Another perspective on the nature of iterative moves in process models is presented by Gould & Lewis (1985), where it is stated that innovative solutions and designs demand time, development, and redefining. An iterative approach creates the possibility of redefining the problem space and thereby the possibility of specifying the solution space (Gould & Lewis, 1985).

In the direct opposite the linearity of the waterfall model we find the various depiction of the iterative process as a *Spiral model*, which in contrast clearly visualises iterations throughout a

continuous process (e.g. Boehm, 1988 and ISO, 2010). The spiral archetype is developed, like the waterfall model, to organise the development of larger product development. As seen in the visualisation of the model, the process undergoes several iterations where each step in an iteration builds upon the previous iteration and the included steps, again this serves as a representation of the co-evolving problem space and solution space. Other oft-quoted variations of this archetype is the ISO-9241-210 model of user-centered design, operating through the same basic metaphor and logic.

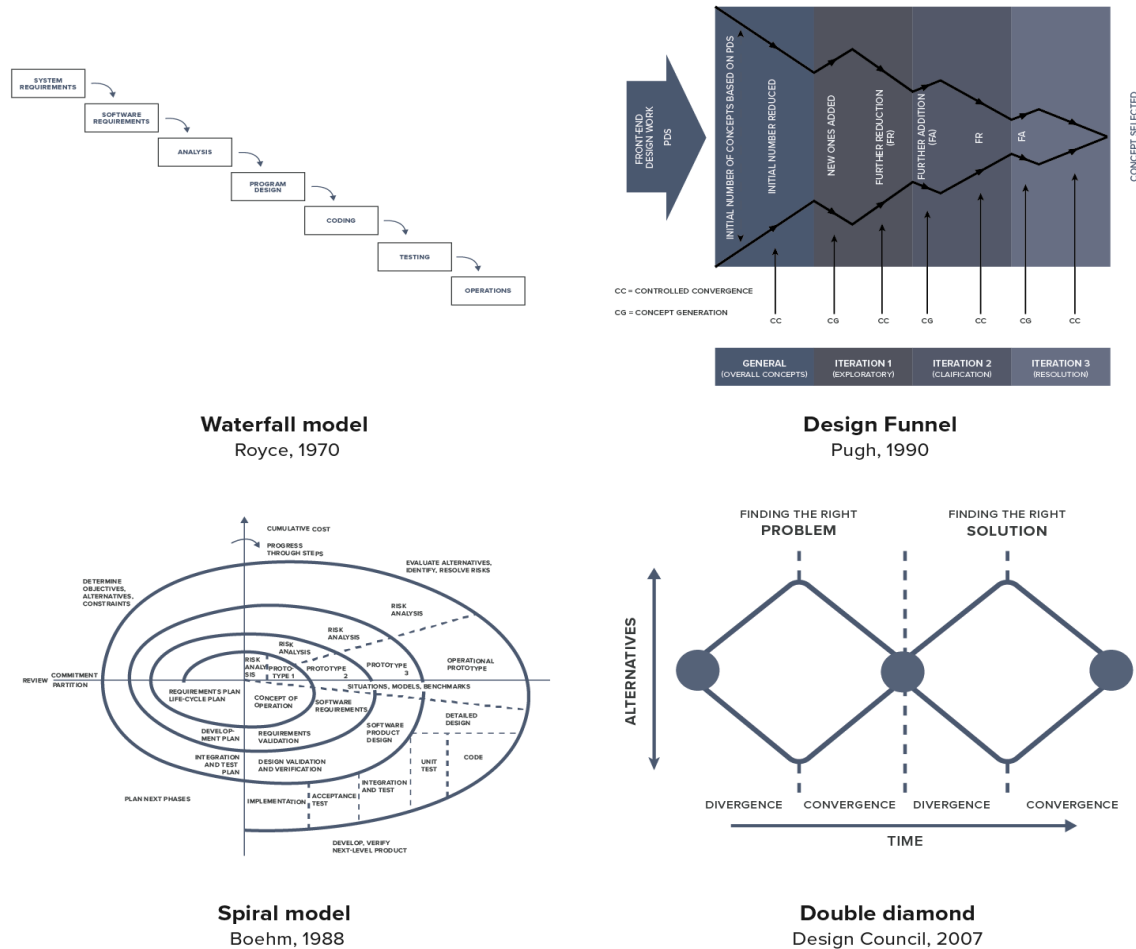


Figure 2: The four archetypal process model designs, which depicts the metaphors and logics of many related models.

When researching different perspectives of process models one thing, at least, seems to be in common whether it is the linear or the iterative models. They serve the purpose of visualising the road undertaken in getting from problem to solution in a structured way. In a similar way to this brief review Howard, Culley, & Dekonick (2008) have done a thorough review of different process models and have come up with six general stages on which design processes are commonly built. The six stages are; *Establishing a need, Analysis of task, Conceptual design, Embodiment design, Detailed design and Implementation*. We argue these six stages can all be identified in the four archetypal process model design we have listed in the above. The difference is thus not the individual parts, but how the sum of the parts describes different logics and rationales for, how the process of design should be organised. As such, the four archetypal process models represents an interesting point of venture for identifying, how these different logics come into play in different applied practices. To this end it becomes a critical factor both to identify whether the logics are

followed, but if the role of models in practice actually follow the rationale for why the models were created in the first place.

4 Data Collection

The scope of the review was a search for archetypes, which could be identified across a broad range of prior contributions in design research, inspired by the *systemic quantitative review* (Pickering & Byrne 2014) approach in which groups of related sources are gathered and organised to identify their 'common ground' (appendix 1). As such, the identified archetypes, are the result of identifying which original common ground many different variations of process models seem to originate from.

The empirical study was conducted as a series of semi-structured qualitative interviews, following the principles of Kvale & Brinkmann (2009) and Bryman (2016) of addressing the interview situations as getting a reflective introspection on the interviewees practice (appendix 2). In order to promote the articulation of more tacit and latent information Sanders & Stappers (2013), we devised an interview canvas (appendix 3), to guide the interview situation, in which the participants were asked to sketch out different aspects, such as organisational values, their interpretation of design thinking, and provide a visualisation of their process model.

The elective criteria, for which organisations to study, was to provide as broad a scope as possible - from small agencies to large departmentalised organisations with in-house design competencies. Furthermore, a criteria was also the maturity of the organisation - for how long had the organisation had a design-driven focus, or even existed at all? From these criteria, we invited design managers from the following organisations to participate in four interviews:

				
“ABOUT US”	We have a broad variety of services, such as; software, systems and infrastructure, aswell as consultancy, operations and development. (Edited to anonymize)	We have stubbornly insisted on integrating a digital agency's focus on creating customer contact, with a direct marketing agency's focus on retaining it.	We are a team of designers and strategists who live, breathe and dream digital. Our approach is strategic, our tool is design.	Creuna is a customer experience agency. We have made it our mission to help you wow your customers with smooth and memorable online experiences.
SIZE CVR DATA	1000+ employees 3. QTR. 2016	100-199 employees 2. QTR. 2017	20-40 employees 2. QTR. 2016	50-99 employees 2. QTR. 2016
VALUE PROPOSITION	“IT infrastructure” “Everything under the UX hat”	“Dialog” “Insight-based intelligent solutions”	“Own the front end” “Digital products and services”	“Strategic customer experience bureau” “Born digital”
INTERVIEWEE	Anonymized interviewee (AI)	Christina Rind (CR) COO & Partner Morten Kold (MK) Creative Director	Klaus Silberbauer (KS) Creative Director & Founding partner	Nicolai Borchorst (NB) User Experience Lead

Figure 3: Sampled information, and interviewed stakeholder, from each studied design-driven organisation.

Each interview ranges from 1-2 hours, in which the participants gradually sketched out the canvases in response to the interview questions. In this regard, we consider both the canvases and the

transcribed interviews being triangulated data sources - qualitatively informing aspects of each other.

When seeking participants from a broad scope of criteria it naturally limits both the amount of included cases of each specific organisational setup, and includes some margin of error in regard to whether one of the setups are an anomaly or a fitting representative of the given practice. Thus, the scope of the data is to be considered as a pilot study, qualifying if there is merit to engage in more studies of the different roles design process models can take in design-driven organisations.

5 Analysis

This section will present the key themes and insights from the interview study with the four design companies. We present a descriptive analysis of how the companies frame their design process, and further how they elaborate and reflect upon the role their respective process models play in their practice. The analysis is categorised in a series of sub-themes, each given their own sub-heading to organise the section. The section summarises the insights into three distinctive roles design process models shows to take in practice; process guidance, internal design rationale, external stakeholder communication.

5.1 *The need for a process model*

When surveying the multiplicity of different process models in the industry, there is an industry tendency to lean upon one or more of the four archetypical process models described above. However, the majority of companies promote their own company specific adaption of the archetypical process models. This wide usage of company specific models have been raising the question of why and how these models are formed and implemented across the companies. The interviews give an indication that the implementation of internal processes is a result of company growth and a need for a common work culture:

"They [process models] were originally created, because we had grown too much for Martin and me to be able tell everyone how they should act. So they were made to create clarity and because we had grown too much to be properly aligned". (CR, Magnetix, 00:41:12).

The companies implement formal processes and visualize these by designing process models, as a result of an internal growth and increasing staff numbers. These internal processes are designed as a way to insure a consistent way of work as well as contributing to a common work culture. In the quote, one of the founders of Magnetix describe how they found it necessary to create a consistent way of work, because the company had grown too much for them to be able to pass on the existing and non-described internal processes. This need for internal structure is a recurring theme among the interviewed companies. At the anonymized company, the largest of the involved companies, they are undergoing a continuous (re)construction of their process model which, as described by their Head of UX, is a result of streamlining and formalising the internal processes:

"... what we want with the process model is to ensure that people work more structured." (AI, Anonymous company, 00:38:25).

At Think, the smallest of the companies, they are in the initial stages of the construction of their design process. One of the company partners describes the stage they are in, as in between informal and formal processes:

"It's also kind of a project model and the two things often get messed up together [...] we have basically been running it without a design process, letting the individual project guide the process, but now we have become a bit more structured and therefore we have recently introduced, or at least tried to become, a bit more formal about our design process, but it is still very informal." (KS, THINK, 00:56:09).

The company is in the process of implementing more formal processes and is utilizing the process models as a tool and a guide for structuring their process, for thereby to clean up their current approach or lack of the same. This unstructured way of working has some very specific side effects, affecting the company's overall development process in a negative way, causing them to repeatedly make the same mistakes:

"We could really get better at it [structuring the processes], sometimes we are a bit too Laissez Faire and a little too custom made, trying to reinvent the wheel all over again." (KS, THINK, 01:16:24).

As made clear, the companies implement more formal process models, as a result of growth and in need of more structured internal ways of work. It is also clear that the companies draw on different process archetypes approaches in solving these structural issues. It is one thing to accept the need for a more structured approach and acting accordingly, and to actually implement a process across the company. This can be difficult for companies working from a Design Thinking approach. This calls for a process model which is structured enough to firmly guide the process, creating a strong way of work, but still provide openness and transparency, making room for human intuition and agility. But process models and strict ways of work can also be a limiting factor, creating boundaries too firm which limits the creativity and the participating employees. In these cases, the structuring and internal processes have been too dominating, leaving the companies paralysed within themselves. As detailed by THINK:

"We are becoming increasingly sceptical concerning the types of project models, which claims that they can do everything [...] It quickly ends up in a Prince2 kind of thing, where you have to take every potential outcome into consideration. And where you sort of try to remove the human aspect and the intuition from the equation. [...] The problem is that you rarely know what to make and then all the models fall apart." (KS, THINK, 01:00:07).

The companies want structure and guidance, but do not want to compromise their agility and possibly removing the human aspect in doing so. They seek a common middle ground between structure and openness, by which they seek to utilize different models as a basis for creating their own. This is an indication that more theoretical described approaches, mentioned in this article as the archetypical models, are not directly compatible in the company's everyday practice:

"...it's true that the first part is mostly 'waterfall', and we do that part in minor stages because otherwise we will never get to this point [implementation]. There are some things that need to be done in that way, because we cannot continue to reconsider the objectives, as well that we cannot continue to reconsider the platform selections. So, therefore, this part, quite right, becomes very waterfall'ish." (CR, Magnetix, 00:55:10).

We here see a hint of how both linear and circular processes structures not just the process, but also inform the culture of the company on more abstract level. They are creating a work culture where the initial phases of the process are strongly structured, inspired by the Waterfall model, whereas the latter phases are more iterative and agile. This is, for the company, a necessary approach because they, pressured by upcoming deadlines and external factors, need to move forward in order to reach implementation and thereby the more iterative stages. This method has been used in spite of the recognition of other more suitable approaches, as described by the company COO "[...] *There are some things that need to be done in that way.*" (CR, Magnetix, 00:55:10). This need for building upon the theoretical methods, for thereby to modify and adapt them to their current practice, is for Magnetix a way of coping with the more external factors. By modifying the theoretical approaches, they seek a way to push projects forwards towards the externally specified deadline, without compromising their own way of work. The theory describing the iterative approaches to the design process, is not providing the companies with a specific answer to when or how to end the process. In practice the companies are experiencing a process, that is strongly framed by their client's deadlines

and other external factors. Therefore the companies combine linear and iterative approaches in different stages of the process, to ensure progression - internally pushing the project forward and externally visualizing and documenting the actual progression of the process.

This need for building upon the more established archetypes, for thereby to modify and adapt them to their current practice, is also described by the UX-lead at Creuna, by exemplifying how they roughly use the Double Diamond model as their way of working..

"... what we really do is, roughly speaking, in ... I'm sure you know about Double Diamond - converging and diverging. That's basically what we do." (NB, Creuna, 00:45:45).

This way of redesigning the theoretical frameworks known from academia, is an approach used by all involved companies. As illustrated in the visualizations beneath, all companies draw on several different theoretical archetypes in their process model. As it shows the companies all seek inspiration or simply guidance in several different theoretical frameworks, when designing their own. This indicates that the existing process models as described in the academic literature are not directly transferable to the company's' actual practice. This underlines the article's initial assumption, of a gap between theory and practice, concerning the usage of design process models, in the field of design-driven companies.

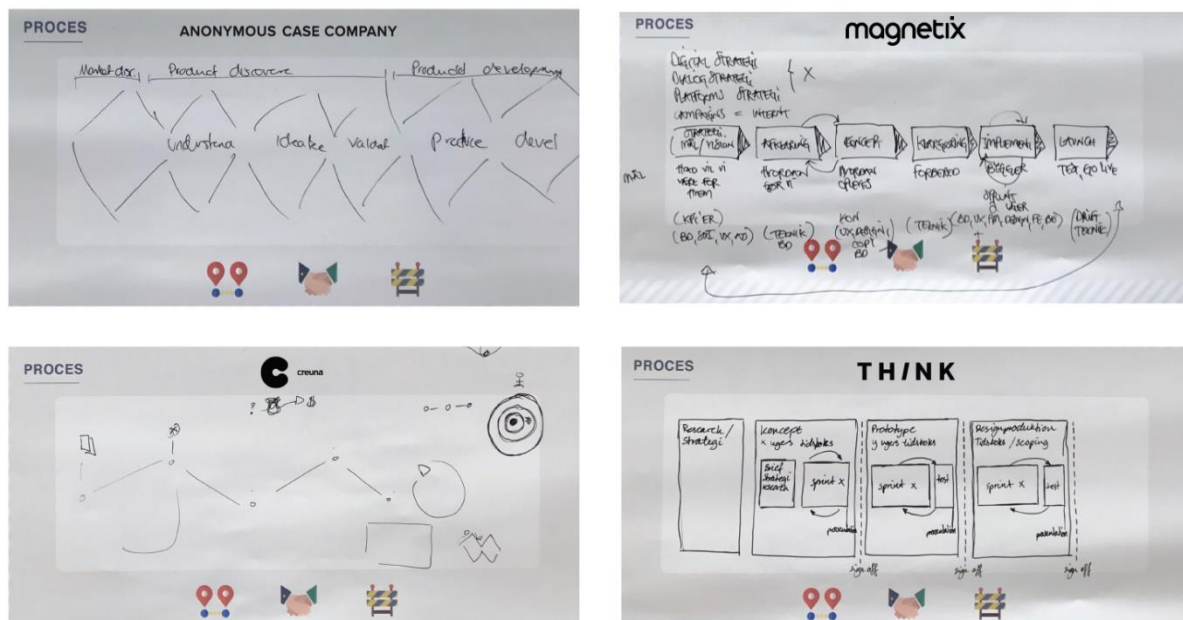


Figure 4: The four sketches made by the interviewed organisations of their process models.

5.2 Internal and external models

Another theme throughout the interviews is the two-sided purpose, internal and external, of the process models. One of the organisations have developed their process model, primarily, for internal use and argue they would have to create a simplified version in order to use it externally. As the following quote states, the external purpose of the process model is a secondary priority for the company.

"... to make a simplified version we can use externally, but then again, we have agreed that this is actually a secondary objective" (AI, Anonymous company, 00:41:24).

Stating that the process model has a secondary purpose makes it clear that a process model can be used in different contexts and with different purposes. The quote also shows that within the given company there is a difference between a process model with an internal focus opposed to a model aimed at external use. An internally aimed model has a higher complexity and must be simplified in

order to be used externally. The complexity of the internal models is substantiated when the same company explains how different stages of their process model is followed by a "checklist" of potential activities for each stage;

"This is where it starts to show why it is a tool, because here we have some of these... Some sort of checklist. What do we need to know at this stage?" (AI, Anonymous company, 00:46:25).

Thus, the internally aimed model is supported by a list which assists the company in the different stages throughout their process.

Another perspective is the case in which the process models are flexible in nature. Multiple instances in the interviews show how the team in collaboration with the client discuss how the process should be structured and how different tools are chosen based on the desired outcome of the process:

"...then we'll discuss back and forth and coordinate and develop some sort of process that we... And try to convince them [the client] to go in our direction, what we think is a good process to structure the tasks. It isn't always successful." (NB, Creuna, 00:27:48).

"What is the right tool for this process, and then we'll choose based on what we want to gain from the process" (NB, Creuna, 00:29:39).

It is also shown how the process and discussion about the process isn't always successful and how the discussion is influenced by the desired outcome. This indicates that the company is working with different processes or at least different elements that are put together in order to combine a suitable process for a given project and client. By working with a process model in this way the company underlines the need of an external orientation in their process model. The company use their model in collaboration with their clients as an external communication tool as well as process guidance. This points back to the aforementioned perspective on how process models, which do not take the human aspect, intuition, and knowledge of what you are designing, into account often fall apart.

These perspectives give merit to the claim, that the needed level of flexibility in the different process models indicate that process model have multiple purposes, beyond just formally guiding the process. A process model can't be used in internal or external contexts without some level of context adaptation.

5.3 Design and creativity

This final part of the analysis serves to show how the organisations put their process models to play as tools for external communication as well as guiding the process and serving as an internal design rationale.

The organisations all agree on design thinking as a foundation for their activities but they utilize different theoretical perspectives to catalyse their design practice. As well as the organisations have different perspectives on design thinking, they are also met with different definitions from collaborators and clients. As shown through the following quote one of the organisations are often contacted much later in the design process than they would prefer.

"Yes, and what mostly happens is that the first couple of times people call us, then they have called us in the 11th hour and asked for some design or usability test. And then I'll respond "of course, sure we'll help you but you have to be aware of what you are actually asking me, is to put makeup on a dead pig." [...] So can we agree that we'll help you with this and next time you'll call us a bit earlier in the process, because for the same amount of money we can actually provide so much more value to the project." (AI, Anonymous company, 00:20:31).

By often being involved later in the process than they prefer, the organisation must explain their competencies externally. The need for this external orientation in a process model can be seen as result of the missing alignment between the differences in definition of design in the organisations and with their clients and collaborators. These different definitions underline some of the challenges the organisations must overcome when creating their process models, because the models do not only have to take the organisations views into account but also the contradicting views of their clients and collaborators.

Even though the organisations are met with different definitions they also seem to identify a change in definitions they meet. This change and the growing alignment is experienced with both clients and amongst other organisations within the same line of business. One of the organisations have started to submit designs to various award shows recently and only because the submissions are being judged based on complexity over pure visual qualities. This shift in criteria can serve as an indicator showing how design as more than visual design is gaining traction with both clients and collaborators.

One organisation emphasizes how they contribute to changing the mindset of the people they interact with as a means to push the different understandings and definitions of design.

"I usually say that our primary task is to change the minds of people. Because when we meet people for the first time who have never worked with us before then working with us should make them never go back to their prior ways of doing things." (A1, Anonymous company, 00:36:41).

This quote underlines how the organisation is trying to help the change in mindset along by focusing on the minds of the people they work with. By doing so the organisation may encounter certain needs with regards to their process model, because the model needs to portray the organisational process for internal and external users alike. And by encountering these certain needs during a process that involves clients and collaborators, the organisations experience a need for process models which also serve as external communication tools. By having a process model, which ensures that an organisation's definition of design is clarified, they have a tool that can help the organisation reach the desired level of alignment with their clients and collaborators.

6 Discussion

Through the analysis we saw how the four involved organisations experience different purposes for their process models as tools for guiding their processes, external communication, and as manifestation of the organisation's internal design rationale. This underline one of the initial claims made in the introduction where we stated experienced differences in the theoretical foundation for the process models opposed to their practical application within four different design-driven organisations. The practical application of a process model can, based on this study, be oriented in three different orientations; process guidance, external communication, and internal design rationale.

As process guidance the process models are often used to ensure that a given project goes from A to B in the desired way. The organisations experience a need for this process guidance when growing in size and thereby becoming too big to ensure the same level of quality across the entire organisation and across their different projects. As a result, the organisations formalize their processes and thereby they secure a certain quality level in their design practice. As such, the process models are practiced as they are preached theoretically so to speak. However, it is also evident, that all the interviewed organisations claim that the process is more of a guide, than strict doctrine to follow step by step. Investigating less design-driven organisations, and from entirely other fields of business, could further nuance the reasons for implementing design process models in an organisation. From our study it could be hypothesised that implementing design processes in non-design organisations would be used as an internal communication device to clarify the benefit of

design throughout the organisation. Introducing a design practice into a non-design focused organisations entails a foundation for explaining and justifying the involvement of design on higher organisational levels.

With regards to process models as an external communication tool, the organisations are met with differing definitions of design from all external factors. To accommodate these varying definitions and needs, the organisations experience a need to explain their competencies and internal definitions to all external stakeholders in a process. To accommodate this the organisations, create process models which take the different external factors into account. They incorporate some level of scalability into their models in order to be able to scale their process model according to the varying needs they are met with. This scalability empowers the organisations to scale their process in compliance with any given stakeholder. At the same time the need for scalability comes with a cost, which is a smaller level of detail in their respective models. We saw one organisation explicitly stating that if they were to show their model to external stakeholders, it would require them to create their process model in a simplified version for external use. This observation underlines the point made through the previous review, where the common understanding of design has matured. The organisations' experienced needs regarding external use of process models exemplifies how design thinking still needs further maturing to be fully transferable to stakeholders outside the design practice. Until this maturity has reached the desired levels, rendering the translation of design obsolete, design practitioners face a challenge in translating design to stakeholders and the scalability of a process model can be seen as a step in the translation process. Thus, through the role as external communication tools, process models act as way to de-mystify the 'black box' of the design process, providing an ethos for how design thinking can provide value for the given stakeholder.

The external stakeholders prompt the design-driven organisations to align their internal design practice. In the interviewed organisations, this is practiced by increasing the complexity of the process models, and by doing so, the organisations are able to align the internal definitions required throughout the entire process. This dilemma result in a need for the organisations to be required to explain their internal competencies to external stakeholders. Thus, by having their internal process thoroughly described they are able to account for different scenarios and explain how their competencies can be of use in the specific scenario of a given design situation.

By articulating the different purposes a process model can have, an organisation is able to frame their process model accordingly. If the purpose in a given context of use is to externally explain a company's process then scalability is more important than complexity. Because if the company can make their process model "fit" with the requirements of a stakeholder then they are able to align their definitions, and the stakeholder might be able to better see a convergence between their own definitions and the definitions of the design-driven organisation. In the same way an organisation is able to ensure that their competencies are articulated in the same manner across the organisation, when focusing on their process model in an internal perspective. When organisations are able to clearly articulate their internal competencies through their process models they are also able to utilize this articulation as an external representation of the organisation culture. By doing so an organisation can utilize their internal efforts externally. By increasing the complexity in this context an organisation is able to take many different contexts of use into account and thereby embracing the different needs they experience in their design practice.

7 Conclusion

The main point made through this article is that design-driven organisations can benefit from articulating the purpose of their specific use of archetypical process models of design. Process models can be aimed at several different purposes and undertake a multitude of roles. Through the article we have identified three main roles that process models take in practice; process guidance, External communication, and internal design rationale.

We argue that design-driven organisations need to be aware of the desired context of use concerning their process model, and when the role changes from e.g. process guidance towards demystifying the black box of the process to external stakeholders. Through this awareness the organisations should be able to focus their process model accordingly. Through the analysis it was stated how the different design-driven organisations, implicitly, focus on different characteristics with their design practice through their process model.

One common thing seen throughout the article and the different involved organisations is that scalability seems to be very important with regards to developing a process model. For more obvious reasons the ability to scale a process model is beneficial for an organisation when focusing on process guidance. If a model is scalable the organisation is able to use their model in varying projects with different stakeholders.

In the context of an external communication tool, scalability is an essential quality in an organisations process model because a scalable model is more versatile in nature. By being versatile the model can be applied to different contexts and with different stakeholders. This is crucial for the organisations by the fact that they encounter many different stakeholders with very different understandings and definitions of design. These organisations utilize their process models as a tool to help them translate their design practice towards different stakeholders. This feeds into the discussion of how the results of this study could potentially be valuable beyond design-driven organisations. The examination of the roles of design process models could be sculpted to investigate other organisational types, and look for both differences and similarities in their practice use across multiple organisational types and stakeholder setups. This broader application of theoretical perspectives in practice could also potentially help organisations outside of the design domain see the value of design thinking.

Regarding process models as an internal design rationale, the organisations experience a need for articulating internal processes and specific design activities. This need again can be met by incorporating scalability into the internally aimed process models. The initial need for an internal model often emerge when the organisation experience growth in size and thereby experience a need for internal alignment. If an organisation develops a process model that is scalable then the organisation is able to scale their model according to the growth they will experience.

In summary, for a design-driven organisation to be able to clearly encompass the different contexts of use, they can benefit from articulating their process model according to the specific context of use - process guidance, internal design rationale, or external communication tool. In this regard, we conclude on the principle that practice without theory is blind, but theory without practice is likewise without much value. Thus, we argue that there is a need to re-examine how theory dictates the role of the process models in design, and for design-driven organisations to catalyse their practice through this extended theoretical scope of the different roles of process models.

8 References

- Buxton, B. (2007). *Sketching user experiences: Getting the design right and the right design*. San Francisco, CA: Morgan Kaufmann Publishers
- Buchanan, R. (1992). Wicked problems in design thinking. *Design Issues*, 8(2), 5–21. MIT Press
- Boehm, B.W (1988). A Spiral Model of Software Development and Enhancement. *Computer*, 21(5), 61-72.
- Brown, T. (2008) Design Thinking. *Harvard Business Review*, 85-92
- Brown, T. (2009) *Change by design: how design thinking transforms organizations and inspires innovation*. Harper Business Press
- Brown & Wyatt (2007) Design Thinking for Social Innovation, *Annual Review of Policy Design*, vol 3, no 1.
- Bryman, A. (2016). The research proces. I A. Bryman (Red.), *Social research methods* (5th udg., s. 1–146). United Kingdom: Oxford University Press.
- Cross, N. (2006). *Designerly Ways of Knowing*. London: Springer-Verlag
- Fallman, D. (2003). Design-oriented human-computer interaction (p. 225). ACM Press.

- Gould, J. D., & Lewis, C. (1985). Designing for usability: key principles and what designers think. *Communications of the ACM*, 28(3), 300–311.
- Howard, T. J., Culley, S. J., & Dekoninck, E. (2008). Describing the creative design process by the integration of engineering design and cognitive psychology literature. *Design Studies*, 29(2), 160–180.
- International Organisation for Standardization (2010) ISO 9241-210. Retrieved 10. October 2017, from <https://www.iso.org/standard/52075.html>
- Jonas, W. (2007). Design Research and its Meaning to the Methodological Development of the Discipline. In R. Michel (Ed.), *Design Research Now* (pp. 187–206). Birkhäuser Basel.
- Kvale, S., & Brinkmann, S. (2009). *InterView: introduktion til et håndværk*. Kbh.: Hans Reitzels Forlag.
- Martin, R., & Dunne, D. (2006) "Design Thinking and How It Will Change Management Education", i *Academy of Management Learning & Education* Vol. 5, No 4, p. 512-533, Rotman Management School
- Pickering, C.M. and Byrne, J. (2014). The benefits of publishing systematic quantitative literature reviews for PhD candidates and other early career researchers. *Higher Education Research and Development*. 33: 534-548
- Pugh, S. (1990). *Total design: Integrated methods for successful product engineering*. Reading MA: Addison-Wesley.
- Royce, B. W. W. (1970). Managing the Development of Large Software Systems: Concepts and Techniques. *IEEE WESCON*, 328–338.
- Sanders, E. B. N., & Stappers, P. J. (2013). *Convivial Toolbox: Generative research for the front end of design*. Amsterdam: BIS Publishers B.V.
- The British Design Council. (2007). A study of the design process. Retrieved 7. November 2017, from http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council%20%282%29.pdf
- Verganti, R. (2009). *Design-driven Innovation: Changing the Rules of Competition by Radically Innovating what Things Mean*. Harvard Business Press.
- Virk.dk. (2017). Retrieved 10. October 2017, from <https://datacvr.virk.dk/data/cvr-hjælp/om-cvr/hvad-er-cvr>

Appendices

Appendix 1:

Systematic quantitative review, Retrieved 8. November 2017, from https://www.dropbox.com/sh/47zu0tcnc8s9xtt/AADJw2lxOtkYIdvW3BmuY_D1a?dl=0

Appendix 2: Interview transcriptions, Retrieved 8. November 2017, from

<https://www.dropbox.com/sh/ofmrmwu97gbmwbl/AADVGMzeVT5dKYK9Aw0YI5ZXa?dl=0>

Appendix 3: Interview canvas, Retrieved 8. November 2017, from

<https://www.dropbox.com/sh/9bglc5wg7821izo/AAB9BqnALh5t77thYQy9ywjCa?dl=0>