Editorial: Designing in the Wild

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The opening chapter of Edwin Hutchins' (1995) now classic book *Cognition in the Wild* invites the reader inside the navigation bridge of the U.S.S. Palau, a navy vessel, where Ed Hutchins is observing the navigation team as the ship is returning to San Diego Harbor through a narrow channel. All of a sudden, steam-drum pressure drops markedly, leading quickly to a halt in all machinery operated by the steam turbine, including the turbine generators that produce the ship's electrical power. Within a few minutes all electrical power is lost throughout the vessel and all electrical devices without emergency power supplies cease to function, leaving the ship outside of full control. Through Ed Hutchins' interdisciplinary *cognitive ethnography,* the reader is taken on an intriguing intellectual journey that incorporates a detailed investigation of the computational basis of navigation, a meticulous exploration of the social organisation of the navigation team as a cognitive and computational system and a thorough examination of how the navigation team eventually manages to bring the ship safely to harbor.

With the phrase "cognition in the wild", Ed Hutchins is referring to human cognition in its normal habitat, that is, to naturally occurring, culturally constituted human activity, as opposed to cognitive studies of "captive" humans in the researcher's laboratory. In using this metaphor, Hutchins hoped to evoke a sense of the *ecology* of thinking, in which human cognition interacts with an environment rich in organising resources (see Hutchins, 1995, pp. xiii-xiv). The present special issue is motivated by a similar ambition, which is to examine design in its natural habitat as opposed to the laboratory or classroom, where much design research has traditionally been conducted. We invite the reader into the design field to observe the highly energised daily practices of one particular design team operating in a large and complex international corporate setting. In this context we witness confusing, cross-cultural exchanges with lead-users, we see the collaborative generation, structuring and re-structuring of creative ideas as reflected in external design materials (chiefly hundreds of Post-It notes) and we notice how the design team's management of organisational life involves the frequent interaction with multiple stakeholders and departments. That is, we take a deep dive into situated design practices in one concrete case of a professional design team bringing their project to harbor, studied in the wild using an ethnographic approach, particularly *in situ* observation and recording.

1. Ethnographic Approaches in Design Research

An ethnographic approach to design research allows for many more variables to be drawn into the analysis of design activity than is possible with typical laboratory studies and experiments, which often focus on the identification of cause-effect relations in controlled environments. In addition, ethnographic studies of design permit different levels of analysis from a multiplicity of methodological and theoretical perspectives, whether cognitive (e.g., Ball & Ormerod, 2000a, 2000b; Christensen & Ball, 2014), socio-cognitive (e.g., Reid, Culverhouse, Jagodzinski, Parsons, & Burningham, 2000), ethnomethodological (e.g., Button, 2000) or cultural (e.g., Bucciarelli, 1988). Examining design in this way enables the establishment of a rich and multi-layered conceptual understanding of design behaviour (see Ormerod & Ball, 2017, for a detailed discussion of methodological and data triangulation in the analysis of design activity). Some of the "wildness" of applying ethnography in a real-world design context thus also extends to the act of data analysis itself, inasmuch as an ethnographic approach facilitates a nuanced and eclectic understanding of the complex interactions that arise in the socially-embedded and culturally-laden interplay between multiple actors and stakeholders and the resources and artifacts at their disposal.

Indeed, because ethnography licenses an understanding of design through varied conceptual lenses it is arguably the approach to data collection that is best suited for studying the richness of design practice in action. This view is made even more manifest because of emerging evidence that design practice is itself evolving rapidly as designers deal with ever more open, complex, dynamic, and networked design problems (Dorst, 2015) that involve increasing numbers of stakeholders, actors, disciplines, designer roles and ways of working (Valkenburg, Sluijs, & Kleinsmann, 2016). Ethnography is thus suitable for the study of design practice, not just because it allows for the inclusion of additional types and levels of analysis, but also because design, as an evolving form of professional practice, invites such an investigative approach.

While the title of the current special issue pays due homage to Ed Hutchins, we note one crucial difference in our approaches to studying real-world activity: while the anthropologist, Hutchins, recounts his own riveting observations and analyses of having "been there" in the navigation bridge of the U.S.S. Palau, we instead sought to engage a large number of research teams in the analysis and interpretation of a shared, ethnographically-derived dataset comprising video footage of design

behaviour in action in the complex, international, corporate setting that we have mentioned above. Using video data as well as transcriptions of dialogue and background information as their starting point, each research team was able to pursue data analyses from its members' own preferred methodological and theoretical standpoint so that they could address conceptual issues that aligned with their predilections in relation to what they viewed as being the interesting and important elements of real-world design practice.

2. The 11th Design Thinking Research Symposium

The papers presented in this special issue all stem from the 11th Design Thinking Research Symposium (DTRS11) held at Copenhagen Business School, Denmark, in November 2016. This symposium represented the culmination of the data-sharing approach to design research that we have outlined above, with the DTRS11 delegates all having received the common, ethnographically-derived dataset well in advance of the symposium so as to allow them sufficient time to analyse the data and produce a formal write-up of findings. The in-field design data that delegates received had been collected by the symposium organisers over a four-month period during 2015 and 2016. The transcribed dataset was shared with symposium delegates in the first half of 2016, after which each participating research team produced a symposium paper that was peer reviewed and further developed ahead of the symposium itself. The final research output from DTRS11 included 28 symposium papers from international research teams and a 30 chapter edited book (Christensen, Ball, & Halskov, 2017a), with selected papers presented in this current special issue as well as in a special issue of the journal *Co-Design*, with a specific focus on the theme of "Designing across Cultures".

DTRS11 marked the 25th anniversary of the symposium series, where video-based data-sharing has been both a pioneering and recurring way of organising the symposium ever since Nigel Cross, Henri Christiaans and Kees Dorst championed the first data-sharing event in what later became known as DTRS2 (see the brief historical outline of the symposium series by Nigel Cross, who has helpfully produced an afterword to this special issue; see also Christensen, Ball, & Halskov, 2017b). More than a decade went by before Janet McDonnell and Peter Lloyd picked up the data-sharing format for DTRS7 (McDonnell & Lloyd, 2009), with this format subsequently being emulated once again in the symposium organised by Robin Adams for DTRS10 (Adams & Siddiqui, 2016). For

DTRS11, however, the guiding principle in organising the collection of data was to extend beyond the spatio-temporal boundaries that have previously demarcated the data collection for the other symposia within the DTRS series (see Christensen et al., 2017b). As such, the aim was to shift the focus to a design team that could be tracked over an extended period of time and across different contextual settings in accordance with all of the complexities associated with designing in the wild.

To achieve our ambition, we recorded 150+ hours of video footage of the activities of a professional design team from a Scandinavian User Involvement Department. This team's expertise encompasses research, design and prototype development, with the team's main focus being concerned with user experiences. The design work that we captured for DTRS11 involved the team pursuing a project in collaboration with the Accessories Department of a worldwide manufacturer within the automotive industry, with the Department's aim being to develop specialist accessories and cradle-to-grave products for car owners. The unique task that the design team was working on as part of this collaborative venture related to increasing the take-up rate of car accessories by Chinese premium car users by attempting to align such accessories with the users' identified "transportation needs, habits, pains, pleasures and aspirations" (see Christensen and Abildgaard, 2017, for further background details). More specifically, the design task was formulated by the design team as follows: "*How might we evoke and capture the attention of the urbanite so that we secure their emotional engagement and establish long-term Company brand/product/service commitments?*" In tackling this goal, the design team set about planning, designing and executing two co-creation workshops that would take place in China with lead users (referred to as "urbanites") so as to develop a "concept package" to redefine the company's accessory offering.

Over the four-month period during which we followed the design team we traced the natural course of the design process on a day-to-day basis. This temporal extension of data capture was matched by a spatial one, as we traced design activity across continents, filming wherever design activity occurred, whether in the design team's normal Scandinavian office habitat or else following the design team to Asia where they conducted cross-cultural user studies and the two co-creation workshops with lead users. All data were collected *in situ*, in the design team's natural environments, as opposed to in a controlled environment or an experimental setting. We aimed to collect quality video recordings of the interactions between the professional designers during their ongoing design process as well as their interactions with stakeholders and lead users. As we

followed the design team, it became apparent that the data we were collecting could fundamentally be characterised as involving co-creation with lead users as well as involving multiple cross-cultural design interactions, leading to us to badge DTRS11 as being focused on "cross-cultural co-creation". We note that the design team's "soft" deliverables that resulted from the project included design mock-ups, wireframe models and user scenarios exemplifying a new line of car accessories and digital products, including apps. These deliverables were handed over to relevant stakeholders in the form of a delivery report that also included the design team's reflections on all phases of the project, together with the presentation of a new user-centred "strategy" aimed at creating product offerings deemed to be both relevant and desirable to the Chinese market.

From the full 150+ hours of raw data that we collected, we selected 15 hours and 24 minutes of video recordings and 1 hour and 56 minutes of audio recordings of two interviews with the design team leader, along with additional pictures and materials. This subset of the video and audio data constituted what we refer to as the shared dataset, which also included full-length transcriptions of the videos and interviews, additional written documents (e.g., project briefs, field plans and moderation guides), along with photos of meeting walls and whiteboards with Post-it notes as well as photos of other artefacts and mock-ups that were generated by the design team. Our aim was for the data to provide multiple entry points for analysis, allowing each research teams a wide range of analytic options regarding their methodological approach and theoretical interests. The videos included a variety of collaborative design activities at various stages of the design team's process, including planning, ideation and designing as well as the implementation of the two co-creation workshops with lead users. The recorded sessions included variations in structure and stages in the design process, such as stakeholder meetings, meetings with external consultants, core-team meetings, workshops, sprint sessions, brainstorming sessions, spontaneous idea generation sessions and briefing sessions. For a full description of methods deployed for the collection, selection, and sharing of these data see Christensen and Abildgaard (2017).

3. Designing in the Wild: The Complexity of Real-World Design

The papers selected for this special issue diverge in several directions, whilst at the same time all informing a deeper understanding of the inherent complexity of designing in the wild. For example, many of the papers emphasise how real-world design that is extended over both time and settings is

a highly situated and distributed practice that centres fundamentally around designers' interactions with *artifacts*, similar to what Hutchins (1995) illustrated in his research. In addition, all of the papers reveal very clearly that design can only truly be understood by focusing not just on the cognitive aspects of design thinking and reasoning, but also on the socio-cultural dimensions of collaborative design behaviour, such as the roles played by negotiation, consensus formation and coherence building (again resonating with Hutchins', 1995, observations).

In their contribution, Shroyer, Lovins, Turns, Cardella, and Atman tackle head on the complexities of analysing designing in the wild with their focus on understanding how creative idea generation arises across different timescales in projects that extend over several months. Shroyer et al. note – as we have done – that most extant studies of design ideation have been conducted in laboratory settings with short timescales. As such, there is limited understanding of how designers engage in idea generation in everyday design practice extended over long timeframes. Shroyer et al. address this issue by means of a qualitative investigation of the DTRS11 dataset, focusing on the design team's idea generation at five hierarchically organised timescales that range from the macro level to the micro level. At each level of increasing granularity, they examine the organisation of the team's idea-generation activities, the techniques and tools involved and the ideas that are produced. What is especially fascinating about this analysis is the considerable degree of *structure* that is inherent in idea-generation activity, especially at higher levels of analysis, although at the lowest level it is also clear that this structure gives way to elements of collaborative idea generation that are fragmented, disorganised and co-constituted. Also of interest is the way in which an idea is often presented not as an implementable solution, but as a constrained space of *possible* solutions, which Shroyer et al. evocatively refer to as an "ideaspace".

As noted by Shroyer et al., the design team's co-construction of an ideaspace resembles the process of building *coherence* through "collaborative inquiry", which is the specific analytic focus of the article by Adams, Aleong, Goldstein, and Solis. Furthermore, the concept of an ideaspace also has resonances with Schön's (1983) notion of *framing*, which is a further key theme in Adams et al.'s contribution – and, indeed, in many of the other articles in this special issue. Framing is fundamental to design activity and involves the process of formulating, organising and clarifying a problematic situation, both in terms of end goals and the means available to attempt to achieve them (see Dorst, 2011; Schön, 1983). Adams et al. remind us that it can be difficult to define when a

frame has been introduced because such frames are often only rendered visible as a consequence of downstream design moves (see also Valkenburg & Dorst, 1998). In this way, framing in a design team is viewed by Adams et al. as a process of *rendering* a multi-dimensional problem space through collaborative inquiry, where various perspectives exist that are sometimes oppositional and need to be reconciled in order to build a frame that is coherent and based on knowledge that is consensually valid for the team.

McDonnell contribution to this Special Issue is concerned with analysing what can go wrong in collaborative design when a team fails to benefit from a particular framing of a design problem. As McDonnell notes, a key benefit of framing as conceptualised by Schön (1983) is that it enables designers to impose order and coherence on complex, uncertain and unstable situations so that good design decisions can be made. In this way, effective framing enforces a *discipline* by inviting and supporting certain moves and ruling out others. McDonnell's analysis indicates that the design team's framing was poorly operationalised in the design episode that she examined, leading the team to move around a design space where too many possibilities were kept in play and where options that were identified were incompatible with self-imposed constraints. In essence, the designers failed to set a suitable frame and were therefore unable to benefit from the discipline that such a frame can afford. McDonnell's analysis is important in underscoring how real-world design can fail to progress because of inappropriate framing, whether this arises from deficiencies in general design expertise or from a lack of experience of a specific design context.

Lloyd and Oak's article also draws on Schön's notion of framing as a means for designers to structure and anchor their collaborative activity. Lloyd and Oak's particular focus is to show how frames can be expressed, at least partially, through the co-construction of verbal *stories* that capture the relationships between actors and the unfolding temporal dynamics of their actions. Lloyd and Oak focus in detail on two particular stories that emerged in the collaborative design work that they examined, that is, the stories of "sexy commitment" and "Mercedes guy". Such stories are viewed by Lloyd and Oak as helping designers to navigate and negotiate what they refer to as *value tension*. This is the presence of opposing values that do not necessarily need to be resolved, but which can instead co-exist during the design process as a way to inform creative product development (see also Adams et al.'s article for further discussion of the inherent contradictions that arise during problem framing in design).

In their article, Dove, Abildgaard, Biskjaer, Hansen, Christensen, and Halskov explore further ways in which collaborative design activity can be structured and framed, this time through an analysis of externalisation activities relating to the use of Post-It notes. The ubiquitous Post-It provides a simple, yet powerful and flexible, representational medium for capturing ideas and imposing a degree of organisation on a complex situation. Dove et al. draw on the theoretical framework that Dix and Gongora (2011) have advanced for understanding external representations in design, which revolves around their informational, formational, transformational and transcendental functions. Dove et al. exemplify the way in which these functions are served by Post-Its in design team cognition, with a particularly important emphasis being placed on the transcendental role of Post-Its in facilitating idea grouping and restructuring to prompt the emergence of creative insights.

Menning, Grasnick, Ewald, Dobrigkeit, and Nicolai provide a contribution that is also concerned with the potential causal determinants of idea generation in collaborative design, with their particular interest being on the role played by mental focus shifts in design dialogue. Menning et al. investigate such mental focus shifts by identifying all instances of *low coherent statements* in the conversation transcripts using Latent Semantic Analysis techniques (e.g., Dong, 2005) together with the application of a topic modelling approach to evaluate the semantic relatedness between sentences. Menning et al. then categorise the different instances of low coherent statements as reflecting topic drifting, topic integration or topic jumping, with the majority arising in the first two categories. The subsequent application of conversation analysis to further understand and categorise the nature of low coherent statements reveals that topic drifting and integration reflect the extent to which designers tend to shift topics "within" an existing design issue as opposed to completely disrupting the issue.

In interpreting their findings, Menning et al. very sensibly side-step the challenge of attempting to shine light on the *causal* connection between variables when their evidence only supports the existence of correlations. In their case, the ultimate issue that is at stake is whether verbalised focus shifts (operationalised as low coherent statements) serve to *engender* creative ideas or whether creative ideas manifest themselves as verbal focus shifts. Of course, it might also be that verbal focus shifts and creative idea generation are both caused by a third variable, perhaps external manipulations of the type examined in Dove et al.'s analysis of Post-It usage in design or shifting

levels of epistemic certainty/uncertainty regarding ongoing design activity (see Christensen & Ball, 2018). The problem of determining the potential causal relationships that may exist between the many variables at play in complex, real-world design will require a vast amount of further research. Such studies need to pay close attention to the dynamic unfolding of design activities over time, as this temporal focus is often essential for understanding how downstream consequences are entrained to the occurrence of antecedent events.

This latter observation brings us back full circle to recognise once again the value of Shroyer et al.'s contribution with its emphasis on capturing the way in which creative idea generation arises across different timescales that range from the macro to the micro. Shroyer et al.'s ideaspace formalism may help researchers to develop a deeper understanding of the causal determinants of idea generation during collaborative design activity, much as the method of Linkography has also proved to be useful in identifying the associations between different design moves over time (e.g., see Goldschmidt, 2014; Goldsmith & Tatsa, 2005). Ultimately, however, it seems clear that to gain a full causal understanding of designing in the wild it will be necessary to adopt a multi-layered and multi-method approach that integrates various insights deriving from the analysis of designers' verbalisations, external representations and overt manipulations. The articles in this special issue all point the way toward the development of such a rich, integrated understanding of collaborative design through the analysis of large, shared datasets. Finally, as befits a collection of articles that derive from the 25th anniversary DTRS event, the special issue will end with an epilogue authored by Kees Dorst, which focuses on the role of the symposium series as a catalyst for research in design thinking, both in the past and with an eye to what the future might herald.

Acknowledgements

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