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CONDITIONS AND CONSTRAINTS OF COLLABORATIVE DESIGNERLY WORK

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ABSTRACT

As the problems we face today become more complex and larger scale, designers need to investigate what people actually do, what they value, and how they understand things. This human-centred approach to solving complex problems requires greater breadth and depth of expertise, than any single designer can possess. Therefore it becomes necessary for designers to work in collaborative situations to share knowledge with different stakeholders and understand the interaction between people and their environments.

Drawing on a recent series of interviews (n=14), this paper provides insight into what collaboration means from the point of view of professional designers. The paper focuses on designers' experiences of the conditions and challenges of new product development.

Keywords: Collaborative design, Interdisciplinarity, Design Activity, Design Methodology

INTRODUCTION

As design makes the transition from a craft to a profession, it is shifting its focus from objects to the processes of setting and solving problems. The object centred approach is related to the craft tradition of design. Craft presents the view of designing as a form of habituated know-how that allows the individual craftsman to respond intuitively to specific situations. According to Jones (1980) craft evolution produces form through the "countless failures and successes in a process of trial-and-error over many centuries" (p19). The craftsman works through using intuition and tacit knowledge embodied in the skills and techniques passed down from the master to the apprentice through many

years of ritual and imitation (Friedman, 1997). While Jones (1980) admits that the gradual development of form through recreation of shapes through apprenticeship "can produce an astonishingly well-balanced result and a close fit to the need of the user" he states that that this slow and costly sequential process of relying of precedents can develop "discordant features" and cannot assimilate sudden changes in demand (p.19). This form of tacit knowledge remains an aspect of professional practice today, however, modern education cannot afford the decades of training that are required for traditional guild style craft education (Friedman, 1997).

Design as a form of problem setting and solving is more complex and requires knowledge and greater depth of expertise than a solo designer can individually possess. This forces designers to investigate what people actually do, what they value, and how they understand things (Poggenpohl, 2009). This human-centred approach requires that designers work with sociologists, anthropologists, psychologists, engineers, and other stakeholders to understand the interaction between people and their environments. This also requires that designers participate in decision-making at the beginning of the development process, where the parameters of design problems are still undefined, and collaborate with different stakeholders.

This change towards collaborative work implies that the skills and knowledge that designers need in order to work effectively with stakeholders are different than those that characterize the object-centred craft tradition. The necessity of collaboration requires designers to possess the analytical, logical, and rhetorical skills that form the basis of a profession supported by a discipline.

COLLABORATION

Collaboration in design is related to a number of complex issues including the relationship between design and science. The literature concerning the relationship between design and science is extensive and there have been a number of reviews that have traced its history and considered its implications (Bayazit, 2004, Cross, 1984, 2001, Dorst, 2008, Glanville, 1999, Margolin, 1998). It is common to divide the historical relationship between design and science in the 20th century into two periods that correspond to before and after the transition from positivism to post-positivism in philosophy of science. The first period began with the modern movement in the 1920s and continued with the first-generation design methods movement up until the 1960s. The second period began in the late 1960s with the rejection of the positivist approach and the reflective turn in design methods. Collaboration was a significant concern within both these periods although it was approached in different ways. We can explore these different approaches through considering collaboration from these two perspectives of design method and design practice.

DESIGN METHOD

Rapid industrialisation in the early 20th century saw an increasing concern with the scientific production of products. At this time design began to approach collaboration as a matter of adopting the common language of science. This approach is apparent in the intimate relationship between the Logical Positivist philosophy of the Vienna Circle and the scientific modernism of the Bauhaus. The Bauhaus "laboratories" attempted to use scientific principles to combine primitive colour relations and basic geometrical forms to develop prototypes for mass production that would eliminate the decorative and create a new anti-aesthetic aesthetic that would prize functionality. As Walter Gropius (as cited in Krukowski, 1992) put it:

Artists at the Bauhaus attempted to find an objective common denominator of form - in a way to develop a science of design. Such a foundation of general, superpersonal formal laws provides an organic and unifying background for various talents. Expression then has reference to the same universally acknowledged basic concepts. (p. 203)

The modernist construction of form out of elemental geometric shapes and colours is a correlate of the verbal development of theories out of logic and elementary bits of perception. Both artist and philosopher fastened on the simple and the functional; both sought to unify disparate domains through a common foundation of scientific language (Krukowski, 1992).

This close relationship between positivist science and design continued into the 1950s and early 1960's within the so-called "design methods movement". This design movement was based the idea that the techniques and approaches to problem solving, management and operational research which were formulated during World War 2 in the development of arms and war time equipment and then later refined through large-scale technological projects such as the development of satellites by NASA, might profitably be transferred into civilian or other design areas (Bayazit, 2004, Cross, 2001, Rittel, 1984). The design methods movement was concerned with developing a form of "design science" that aimed at incorporating scientific techniques in order to develop a rational, systematic approach to the management of the design process (Cross, 1984). Its protagonists were attempting to work out the rational criteria of optimal decision making, not just the utilization of scientific knowledge in the manufacture of products but as approaching design as a scientific activity in itself (Bayazit, 2004, Cross, 2001). This approach also utilised the same two-phase linear method of Logical Positivism, comprising of first reduction and then construction. In the reduction stage the designer analyses the problem to determine all of its elements and specify all of the requirements that a successful design solution must have. Then in the second stage the designer synthesises the solution though combining and balancing the requirements against each other, yielding a final plan to be carried into production (Buchanan, 1992).

DESIGN PRACTICE

In the later half of the 20th century there were a number of challenges to the methods of the design science approach. Two significant challenges came

from Horst Rittel and Donald Schon, whose work became known as the so called second generation and reflective turn of design methods (Bousbaci, 2008; Rittel, 1984; Schon, 1995). Both Rittel and Schon made arguments that challenged the goal of a universal design method. Instead they proposed that design was better to be understood as a form of rhetoric; one which Rittel described as an argument and Schon described as a conversation. Rittel and Schon recognised that the interaction between people is significant and their concepts of argument and conversation reflect this view.

Rittel's argumentative approach shifts the focus of designing to the beginning of the planning process where the objectives and aspects of the problem are discussed and debated (Rittel, 1984). The foundation of Rittel's approach is the anti-expert driven assumption of the "symmetry of ignorance" between all the participants in the planning process. This means that the expertise as well as the ignorance related to a particular problem is distributed over all the participants and that no participant is justified in claiming that their expertise is superior to anyone else's (Rittel, 1984). It follows from this assumption that because the knowledge needed to address a design problem is distributed among many people therefore maximum participation in the design process is needed in order to activate as much knowledge as possible. Hence Rittel argues that the knowledge of those who are likely to be affected by the implemented design solution is of particular importance.

Rather than an objective entity, according to Rittel (1984), a design problem is an indeterminate network of issues with pros and cons to be approached through an evolutionary process of debate. Statements are made and then systematically challenged in order to expose them to view points from different sides. The point of this argumentative process of systemic inquiry and organised criticism is to increase the probability that something essential is not left out. In addition the experience of having participated in developing a solution matters to the people who are affected by it (Rittel, 1984). Rittel's approach recognises that the

design process is necessarily social rather than merely technical.

In contrast to the approach of the design methods movement, Schon maintains that design practice has as much to do with finding and framing problems as it does with producing solutions (Schon, 1995). For Schon (1995) design practice is concerned with Reflection-in/on-action, concepts which are "central to the way professionals deal with uncertainty, instability, uniqueness and value conflict" (p. 50). A practitioner's ability to reflect-in-action is based on a "repertoire of expectations, images and techniques" the practice of which overtime becomes "increasingly tacit, spontaneous and automatic" (Schon, 1995, p. 60). Reflective practice involves applying this tacit repertoire of techniques and knowledge of criteria at once, constituting a single judgmental action.

METHODOLOGY

Empirical research focusing on design practice within the last 20 years or so has been influenced by protocol analysis methodology, a methods that was developed by researchers such as Herbert Simon (1996) and pioneered in design methodology by Nigel Cross (Cross, 1984; 1996). Protocol Analysis methods approached the issue of which interactions within the design process to included or exclude by drawing a close boundary and focusing on short passages of speech, within the "reflective conversation with the situation" through "speak aloud" studies where designers vocalise their decisions and design moves (McDonnell & Lloyd, 2009). The protocol analysis approach often focused on small sections of the design process, often under artificial conditions, using imaginary design problems and often undertaken by ad hoc groups of designers or design students working on competitions at university (Cross, 1996; McDonnell, 2009).

As this boundary widens, different types of research questions must asked and consequently, different research methods used. Recently there have been more and more studies using methods from the social sciences and anthropology. Within these studies, social science approaches such as ethnography have

shown themselves to be a useful (Bucciarelli, 1994, 2002; Vinck & Blanco, 2003; Yaneva, 2005)

The paper draws on data collected during a recent interview-based study of professional designers, regarding their experiences of working in collaborative settings. Responses from fourteen (n=14) semi-structured in-context interviews of approximately 60 minutes in duration are presented. Designers from ten different professional specialisations at two expertise levels are included (Table 1). Expertise was interpreted according to the model developed by Hubert Dreyfus as adapted by Kees Dorst (2008). “Competent designers... select the elements in a situation that are relevant, and choose a plan to achieve the goals. Problem solving at this level involves the seeking of opportunities, and of building up expectations... The real *expert* has many years of experience which allows them to recognise high-level patterns in design situations and respond to a specific situation intuitively, and performing the appropriate action, straightaway” (p. 9). Due to the small sample size, the insights presented here do not aim to seek statistical generalization but rather to explore some of the aspects of collaborative designerly work.

Respondent ID	Professional Specialisation	Expertise Level
01	Software Design	Expert
02	Design Research	Competent
03	Exhibition Design	Competent
04	Design Research	Competent
05	Product Design	Expert
06	Product Design	Expert
07	Graphic Design	Competent
08	Industrial Design	Expert
09	Interior Design	Competent
10	Design Thinking	Expert
11	Illustration	Competent
12	Industrial Design	Competent
13	Industrial Design	Competent
14	Motion Graphics	Expert

Table 1. Interview respondent profiles

The interview data was analysed using a critical realist grounded theory based theoretical perspective and the analysis process was supported

by NVivo computer-assisted qualitative data analysis software (Hammersley, 2002). The interview transcripts were coded using constant comparative method revealing an initial set of 23 themes. Related themes were sorted into groups and the corresponding data interpreted by the researcher and summarised. The following sections present the respondents’ perspectives on the conditions and constraints of collaborative designerly work, through author’s intellectual reflection of the interview data with the literature of design method and design practice.

METHODS OF COLLABORATION

COMMUNICATION AND PRODUCTIVITY

CONDITIONS

I think when you have a team that works well together everyone knows, everyone is contributing something to the team, they know what they are contributing, they know their role, and things get, things get done. (Respondent 01)

At its most basic, collaboration supports productivity through the simple means of providing resources or sharing administrative burdens. This basic level of collaboration is supported through communication as the efficient transfer of information. Efficient communication allows an idea to be quickly formulated and the design to be developed without the need for reworking. In terms of design process, collaboration can simply involve getting feedback on an idea – it might only take a couple of minutes or an hour. This is a sense of collaboration as refining a given design. It is less a dialogue between equal partners but rather the case of a single participant defending their concept.

CONSTRAINTS

I came into it with no knowledge on the scientific applications so I was forced to ask the questions and make the scientists better communicate the technology to me, so that was a challenge, being able to get the scientists to communicate to me in a sense where I could understand and comprehend what they were talking about because terminology was a challenge. (Respondent 04)

Communication problems can result in a participant being excluded from the discussion due to their being unfamiliar with discipline specific language. Alternatively others may use technical jargon in an intentionally obstructive way, for instance to establish superiority or simply to show off. Other communication issues can result from failing to understand the hierarchy of importance of information within a discipline's language system, for instance misunderstanding that the accuracy of information contained in CAD files often supersede those contained in sketch drawings.

MULTIPLE SPECIALIST SKILLS

CONDITIONS

No one can see enough, know enough, understand enough, to wrap their brain around it, you need multiple perspectives you need multiple disciplines... you got this larger thinking footprint. That's really the benefit, you can get more powerful thinking out of a group than anyone individually. (Respondent 10)

As a method, collaboration was seen as a means to address a greater range of problems or a more complex problem that is beyond a single designer's capacity to fully understand. In this sense of providing multiple specialist skills, collaboration involves utilizing different experts' specialist technical experience to address more of the issues. Here, collaboration is an extra investment that enabled the designers to identify a designs strengths and weaknesses by utilising others' different perspectives.

CONSTRAINTS

So in teams where collaboration hasn't been as strong you'll get much closer to the point where you can't change the design and suddenly you do have to change the design because someone hasn't told you "oh we actually have this component that is here, shit, that means we can't put a bit of metal here", so that completely changes your approach. So instead of having eight weeks to resolve that, you only have three weeks or worst case no one has said anything after the design was approved, when really you should be ironing out the minor kinks, instead you are forced to go back and redesign something before they start sending files off to start tooling. (Respondent 08)

Because of their different disciplinary approaches, different specialists may arrive at different conclusions and after differing periods of time. This can result in critical resources, information, feedback or design decisions being delivered either late or very close the end of the development process. This can result in knock-on effects that force reworking of the design and produce a barrier in the development process.

PRACTICE OF COLLABORATION

COMMUNICATION

CONDITIONS

I was feed feeding him textures and materials and giving him layer photoshop files and going "this is what I've done", um and then he'd fire that back and go "it's great but can I just move some stuff around and add a bit of my style to it?" So we were feeding stuff back and forth until it got to a point where we were both happy with it. (Respondent 11)

The respondents' reports indicate that the practice of collaboration is more dynamic and social. There is greater "back and forth" of suggestions, and different options are proposed to work through problems. When this more dynamic level of collaborative practice was working well, respondents' reported that it is often easier to share a drawing or prototype than to verbalise an idea. Partial sentences or simple sketches communicate rich information seamlessly; participants are on the same "wavelength" and can finish each other's sentences. Collaborative practice was described as a "fluid" way of working without a clearly predefined end point, where the iterative process is a two-way feedback of suggestions and conflicts.

CONSTRAINTS

We use a lot of um, tentative language, which allows people to, it leaves the door open for conversation, so, people at [company], or those that do well at [company], tend to get um, very good at choosing when to be definitive and directive and, almost over confident in a sense to push things forward, and when to be very tentative and sort of suggestive and open in order to allow discussion and cooperation. (Respondent 05)

Collaborative practice was often described as a more enjoyable process, or even exciting, invigorating, magical, and awesome. It is a way of working where one can give up some control and there is freedom to experiment and to talk with less pressure and fear because there is the support of the others. However, within a collaborative discussion language needs to be used judiciously. The freedom of this dynamic form of practice is moderated with remaining open to criticism as well as receiving affirmation.

ITERATION

CONDITIONS

I think the, any collaboration is a series of social interactions you know, and you know I think with anything of that nature, it always has cycles, it always has waves... I think trying to assess collaboration moment by moment can be problematic, I think you have step back and say "has this collaborative venture over a period of time generated the kind of results that we were expecting". (Respondent 10)

Within the practice of collaboration, participants recognize that good ideas very rarely come fully formed. This iterative aspect of the practice of collaboration is a process of testing and learning as a process occurring in between a series of concepts or prototypes. The solution to the design problem is drawn out through making and sharing and remaking and sharing and remaking.

CONSTRAINTS

All those conversations, it's frequently about getting to that point of agreement and consensus around what we should recommend to the client, and what is true and what is best, um, so you know a lot of conversation back and forth between the teams members, like arguing effectively, but normally nicer. (Respondent 05)

The collaborative practice of building on the ideas of others requires courage and the tacit permission of other participants for their ideas to be criticised as well as added to. This back and forth can involve arguing an idea and explaining its logic in a way that is for the common good and always aimed to enhance the project.

DEFINING GOALS

CONDITIONS

We have internal kick offs as well as kick off meetings with the client, where we share what our goals are for the project. So we all sort of define how we understand the brief for the project, what is it that we are trying to do for the client, and we talk about what we'd like to get out of the project ourselves as well. So "I'd love to learn something new in terms of a skill" or "I'd like to spend more time with the client because that's not something I get to do very often and I'd like to interact with the client professionally". (Respondent 05)

Two aspects of collaborative work that goes beyond the boundary of solving the design problem, are establishing how to achieve personal goals within a project as well as trying to ensure that the project will make a contribution the discipline of design. This involves extra design work at the early stages of the project to see if there is something meaningful in the client's brief that also overlaps with the interests of the designers.

Basically a lot of the stuff we churn out, and it will be the same in all facets of design, makes its way just to retail, it's selling someone a product at the end of the day. It gets to the point where you call it bread and butter... part of being kind of a healthy human is change and so the common goal that we are going to achieve out of this, and we've all talked about it, is escaping everyday design life for commercial purposes, and I don't know, basically achieving the satisfaction of creating something on screen for other people. (Respondent 14)

Making a higher-level contribution to the discipline of design or to culture, rather than focusing on how much time it took or the process used to achieve it, ultimately makes for more satisfying work. Designing together in a team may be done simply for the enjoyment of doing good design work with other designers who want to achieve the same satisfaction of design for design's sake.

CONSTRAINTS

So when it's not going well people might sort of remove themselves from the conversation or they'll put up barriers. They say, you know, "this won't work", and it's very easy to shoot down ideas. (Respondent 05)

Disagreement on the purpose of a design between participants in collaboration may cause a participant to withdraw their mental investment in the project, which can cause the participant to lose feelings of responsibility for the outcome and not put in the same effort. When a participant feels intimidated or has less responsibility than they would like, or when another participant takes over, the collaboration can become one-sided.

ENVIRONMENT AND ROLES

CONDITIONS

Yesterday we were in a classic board room and you could see the the, it's power architecture, they are usually long narrow rooms, they are designed to have someone at the head and say look at me I am in charge, we were really struggling, the space was awkward to work with, if you can take the status structures out of the space, everyone sitting at small tables, informal dress, mixing teams, learning first names, all those sorts of things that start to socially level the situation: underappreciated but extraordinarily important. (Respondent 10)

The environment where collaborative practice takes place is also significant. Having a separate space differently organised from usual day-to-day workspace, where participants can come together at key junctures, can make collaborative sessions more productive. Simply changing setting by going to a cafe for instance can make a difference, but also turning the phone off, being away from the computers, having easy access to hand drawing materials, having a time limit, are all aspects that can help the participants get into the “right frame of mind”, create intensity and keep the collaborative work focused.

CONSTRAINTS

Usually when one set of people in the team don't have respect what the other people are doing, they get dismissive of the other persons role, which builds bad blood, I need to have respect for what the other person is doing otherwise they aren't going to respect me and we aren't going to get along we aren't going to talk enough. (Respondent 08)

In early stages of collaboration, different participants' roles and contribution may be unclear

and time is needed for those roles to be solidified. In contrast, bringing in an outsider into a group whose role does not bear on the problem, or where roles have already become understood, can cause distrust and misunderstanding of motivations. In addition, the quality of the collaboration can be detrimentally influenced when a more senior person uses their position in a hierarchy to overstep the limits of their knowledge to make inappropriate decisions. A similar barrier to collaboration can occur due to participants occupying equal positions in an organisation's hierarchy due to their experience but having differing levels technical skill, and so having differing abilities to contribute productively. Often, one participant's input might simply carry more weight because of their position in the organisation's hierarchy.

DISCUSSION

The majority of the respondents' experiences are consistent with collaboration at the design practice level, with very few reports of using design methods in the sense of following prescriptive models posited by positivist design science. This may support the common criticism of design science that, in practice, designers do not use “design methods”. On the other hand, it may be due to the level of expertise of the respondents or the particular types of projects they worked on. While the interviewees' responses correspond to many of the descriptions presented by Rittel and Schon's perspectives of design practice, there was also significant data reported that widens the boundary of design methodology further.

OWNERSHIP AND RESPONSIBILITY

The discussion involved in designerly collaborations can be more important than the design outcomes themselves. Participating in collaboration gives people a feeling of ownership, and they then may be more likely to see the process through, and find the outcomes more acceptable and give their consent. Collaboration can strengthen relationships between participants and can build trust in participants' ability to contribute. However it can take a long time for a participant to share the responsibility for something they have been working intensively on with others. Conversely, lacking a feeling of responsibility for collaboration can also create

feelings vulnerability if it is suspected that another participant has hidden something important. Responsibility can also create a feeling of obligation to the collaboration that can complicate the boundary between the interests of the collaboration and the interests of the individuals.

INTERDISCIPLINARITY

Successful interdisciplinary collaborative work at higher levels of practice, requires participants to gain a working understanding of the fundamental knowledge of the foreign disciplines, as well as appreciation for their day-to-day logics of practice. The success of an interdisciplinary collaboration can be compromised when a participant is motivated by applying the latest, but ultimately inappropriate, knowledge from another field; or by trying to apply an approach that is too technical for a particular problem; or by producing a solution where the value is not self evident to another discipline. Discipline specific language boundaries can cause participants' to be excluded because their potential to contribute is not recognised, or the logic and approach underpinning their contribution is not appreciated.

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