Creating Shared Understanding in Product Development Teams

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How to ‘Build the Beginning’

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Foreword

This is both a timely book and a timeless book, for it touches the foundation of creative collaboration among humans. In industry, academia, government, and civil society we are now constantly confronted with the challenge of finding solutions to ever more ill-defined and complex problems. While the infrastructure of the Internet has given us access to large amounts of information, we still need to work in teams and other forms of representative groups composed of members from diverse backgrounds in order to coordinate the investigation of problems and the creation of relevant, inclusive, and sustainable solutions. The way to accomplish this feat in this new world is the subject of this book.

Humans can be described as meaning making machines. From toddlers that pick up pieces of objects in their environment in order to learn more about them by tasting them, much to their parents horror, to adults asking purpose-driven questions about theirs and others desires and intentions, humans are constant seekers and makers of meaning. Yet given the natural differences in age, location, and life experiences of the members of a team, the common words we use often carry with them different degrees of meaning. This increases the risk of interpersonal misunderstandings and consequently could lead to situations of conflict. In this groundbreaking work, Louise and Christian have given us three interrelated tools to break out of this potential conundrum. First, the use of a tangible media in the form of LEGO® blocks to complement the spoken language. Second, the provision of a facilitation guide to help cope with ambiguous situations and resolve them creatively. Third, the description of a meta-cognitive framework that enables us to better understand such situations while experiencing them.

This last point is perhaps the most important. For people familiar with Mihály Csíkszentmihályi's concept of flow, *Creating Shared Understanding in Product Development Teams* can be seen as guidebook to achieve collective flow in teams. This is because it helps meet the conditions for flow by facilitating novel and creative interactions between members of a team, and providing the meta-cognitive framework to assure them that they are capable of meeting the challenges of the task at hand. This is ultimately a book on ways to create coherence among team members and enhance their ability to discover and develop effective solutions,

while making sure that the experience of working in a team is a positive one. I highly recommend it for leaders, managers, and team members seeking to enhance their collective experience and shared understanding.

Stanford University, California, 5 March 2012 Ade Mabogunje

Preface

It is the first meeting in a new promising project. Everyone around the table is enthusiastic about the project and excited to get going. There is a good atmosphere and the discussion travels back and forth. Everyone tries to present their point of view, which results in a broad discussion on very different aspects of the project.

It is discussed how the project should be understood, approached, and developed. At the end of the meeting, some decisions are made in relation to the project. Many decisions are related to the different deliverables for the next meeting. At some point someone asks if they have reached an agreement and everyone nods their approval. Everyone leaves the meeting, confident that they know what to do.

A few weeks later, it is time for the second meeting. The team spirit is still high and there is a nice buzz in the meeting room, before the meeting starts. The introduction proceeds without problems, and it is time to recap what has been done in the project since the last meeting. The different participants start presenting their promised deliverables.

In the beginning everything seems fine; however, after a few presentations it is clear that there are very different understandings of the project as well as the assignments for the meeting. In fact it seems as if the participants have been working in different directions and with different aims.

More and more questions are asked and soon the presentations turn into a discussion about understanding the deliverables, the project, and its aim.

The positive and enthusiastic atmosphere is soon taken over by mild frustration and a slight disappointment.

What happened? A few weeks ago everyone nodded their approval, and seemed confident that they knew what to do. Now, it seems as if everyone is pursuing different goals and that nobody really understands each other.

The situation described above could perhaps be taken out of several different contexts and scenarios. Most people, who have been working in teams, probably recognize it, and especially people with experiences from interdisciplinary teams can confirm that this situation is part of many projects.

Lack of shared understanding or frames is just one of the difficulties facing interdisciplinary design teams working in pre-development projects. Besides managing their different values, perspectives, and interests that make them see

different things as important, they also have to figure out what their users and stakeholders find important.

In other words, the team has to frame their project around real user needs, problems or opportunities—and figure out what people really want, and at the same time come to an agreement about this framing within the team.

This is quite a challenge—both in terms of enabling the team members to express their personal framing of the project, but also in terms of making users and stakeholders communicate what kind of needs or problems they have, as well as the potential opportunities they see. And finally it is a challenge in terms of creating a shared frame within the team.

In this book, this challenge is approached from a 'designerly' perspective , based on the initial assumption that the creation of physical artifacts can help both team members, users, and stakeholders overcome the boundary of not being able to define, express, and communicate how they frame a given project or make meaning in relation to their everyday life. And that this clarity will help the creation of a shared frame.

Based on empirical evidence, it was found that not all physical artifacts were able to do so, but that a small group of physical artifacts in a special setting and with a specific set of characteristics was the physical artifacts were named Personal and Shared Experiential Concepts.

The objective of this book is to review how these physical artifacts enabled and stimulated the communication between team members, users, and stakeholders in interdisciplinary teams working on pre-development projects. And also how they enabled and supported the creation of shared frames within these teams.

Finally, this book will show how to facilitate the creation of personal and shared experiential concepts in your team.

A Thesis-Based Book

This book is a re-write of Lousie Møller's PhD thesis from 2010, now adding emphasis on how to stage the creation of Personal and Shared Experiential Concepts in a workshop setting.

From 2008 to 2010 Louise Møller was a PhD fellow at the Department of Architecture and Design at Aalborg University. During this period Louise Møller had a 6 month stay at the Center for Design Research, Stanford University that helped develop central parts of the findings in the PhD Thesis.

The findings of Personal and Shared Experiential Concepts seemed to have a lot of merit for further understanding the construction of shared frames and shared understanding in pre-development projects. At the same time the facilitation of the workshop was left unexplained and uninvestigated in the thesis, but the extensive use of the facilitated workshops throughout the PhD project has generated very hands-on practical knowledge, useful for many project managers struggling with alignment and shared understanding. Thus it seemed very appropriate to restructure the thesis into this book including the facilitation aspects, used with great success in the cases of this project.

Acknowledgments

A research project based on active research activities is not a task done by one person. The research behind this book has taken a lot of effort and strong, open cooperation with many parties. And we are very grateful for this.

First and foremost, we would like to thank Professor Larry Leifer and Dr. Ade Mabogunje from Stanford Centre for Design Research, who provided the opportunity to Louise Møller to become a 'visiting scholar' at Stanford. Their fireworks of ideas, intense presence, interest, and encouragement have been amazing and they truly are the role models for western academia. The contribution of this input and sparring on the research problems and analysis of data cannot be underestimated.

Second, the open-minded attitudes and warm welcome by the participating companies and workshop participants have played a vital role in generating the empirical data and foundation for this work. So thank you very much to the participants from: TC Electronic, Red Cross, Daimler AG, Region Northern Jutland and the "Good Elderly Life" project with Copenhagen Living Lab. In Copenhagen Living Lab, special thanks to Thomas Hammer-Jakobsen. Your interest and encouragement have been more than we could be expected, and your expectations have made us work even harder.

Third, starting out a research project looking for the right direction, the new and interesting "hole" which needs to be filled, is crucial to any PhD project. The direction and tool for generating empirical data was immensely important in the forming of the research behind this book. Therefore, special thanks go to co-supervisor Poul Kyvsgaard Hansen, Center for Industrial Production, Aalborg University.

Finally, writing a thesis and a book and doing the research takes a lot of mental attention and time. So we thank Anders, August, Anne, Jacob, and Simon for bearing with us during this period.

Contents

Chapter 1
Introduction

This chapter holds the introduction to the book. It identifies the context of the study in terms of interdisciplinary teams working in the early phases of innovation and identifies the challenges, which are facing these teams as well as present approaches toward these. It shows how this study approaches these challenges in a different way, unfolds the research questions, and outlines the structure of the book.

1.1 Managing Large Pre-development Projects

Before a pre-development project becomes a development project, uncertainty and chaos may rule and the project may not be anchored very well in the organization. At the same time, it is an opportunity to explore project directions, before all criteria are defined and decisions on directions are made.

This book is concerned with large projects or project partnerships, which are positioned in the period of time before the choice of direction and anchoring in the organization has taken place. This period of time can be very long or fairly short depending on the project—but what defines it is that no strategic plans have been made, no final goals have been set, and no concept has been developed [8]. In retrospect, the process may look very linear, but when you are in the midst of it, it may seem more chaotic, and the project may take any number of directions with very different scopes (See Fig. 1.1).

In 'Innovation Management and Engineering Design', this period of time is called The Fuzzy Front End of Innovation [14], Innovation in the making [8], or Design of Business [21].

In creative design, the activities in this period of time are called Strategic Design [11], Transformation Design [3], or Concept Design [26]. However, since this book is directed toward an interdisciplinary audience, it is considered appropriate to use the general term 'The early phases of Innovation'.

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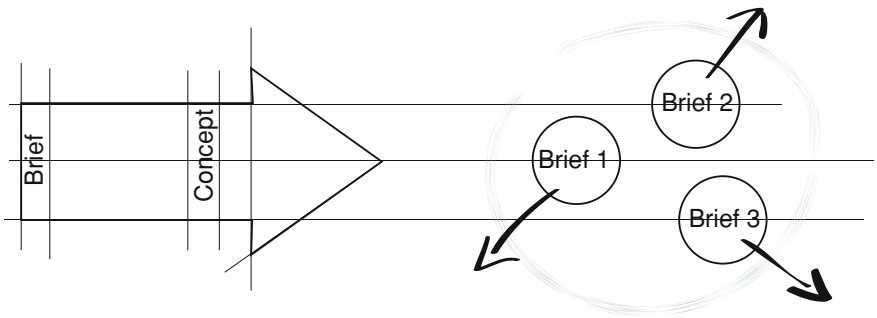

Fig. 1.1 Pre-development projects may look linear in retrospect, but signify a period where a project may take many directions

1.2 Characteristics of the Early Phases of Innovation

One of the greatest challenges in the early phases of innovation is to understand the scope of the issue and to find the right need, problem, or opportunity to approach [12]. It does not matter how well the rest of the process is managed or how well the project is accomplished, if it is based on the wrong problem or subordinate need [6]. Therefore, a great part of the effort in the early phases of innovation is used on researching and investigating the project context and interacting with users and stakeholders, in order to incorporate as well as build upon their insights and perspectives.

The early phases of innovation are further characterized by direct confrontation with abstract and strategic questions like:

> Where do we go from here? What do we want to create? For whom? And why? [16].

Accordingly, the early phases of innovation require a different way of engaging with the problem context compared to traditional problem solving. As Silje Friis describes it:

> (…) (they) do not just fix problems—they enter projects at a much earlier stage, generating new opportunities and mastering unframed problem solving ([11], p. 71).

The early phases of innovation can be organized in different ways and are of course adjusted to the nature of the specific project. However, most early phase projects include activities such as information collection/exploration [20], opportunity identification, idea generation and enrichment, opportunity analysis, idea selection, and concept definition [14].

Alternatively, the early phase of innovation has been described as a balance between exploring and framing [8] or as an iterative process of divergence and convergence [31].

In practice, it may be identified as a constant shift between exploring and unfolding the project context and combining the insights into a meaningful

problem framing or design brief. In contrast to traditional design projects, a large part of the early phases is used on designing the brief:

> (…) the groups in this community of practice work 'upstream' of the traditional brief. Their involvement begins before the design brief is formulated, working with user groups and organizations to understand the scope of the issue and define the right problem to tackle ([3], p. 20).

The early phases are also characterized by an extended interaction with stakeholders. This is done to capture the different interests and perspectives in relation to the project, and to assure the stakeholders' commitment to and ownership of the project outcome [3].

The outcome of an early phase project is the problem framing in terms of a design brief or, in some cases, a number of design briefs, depending on the size of the project and the number of participants. Since design briefs come in many forms and are used in many different connections, the following definition created by Max Munnecke is found useful. The design brief consists of at least three elements:

1. A framing of the project context.
2. An understanding of the values and meanings, which users apply.
3. Insights into the dilemmas or problems, which are central to the project.

1.3 Interdisciplinary Teams

Projects in the early phases of innovation are often run and managed by teams in order to handle their size and complexity. The teams are working with open-ended and unframed objectives, and engage in different types of activities. This calls for different competences, understandings, and perspectives, and therefore the project teams are often interdisciplinary [11]. Typically, the teams include professionals like designers, managers, engineers, ethnographers, sociologists, psychologists, economists, etc.

The interdisciplinary team ensures the necessary diversity in the perspective, body of knowledge, values, and goals as well as different professional skills [26] and helps the team in their pursuit of the right need, problem, or opportunity to approach. However, the different frames and assumptions which each team member brings to the interdisciplinary team also represent a challenge [12]. It may result in misunderstandings, contradictory interpretations in worst-case conflicts, which mean that the cohesion in the team is challenged. Another possibility is that the team members end up pursuing different goals, and that the team therefore has to spend a lot of time synchronizing the different efforts.

1.4 Key Finding: Prototyping the Point of Departure

The key finding presented in this book is that the creation of physical artifacts in a specific setting, and with a specific set of characteristics can function as important drivers for communicating personal meaning making and creating shared frames in

project teams. Further, it is found that these physical artifacts enable users and other stakeholders to overcome the boundary of not being able to communicate how they make meaning of their everyday life, as well as enable team members to communicate their personal framing of the project. In other words, the physical artifacts with this set of specific characteristics, reduce some of the boundaries experienced by the interdisciplinary teams, both when it comes to their internal collaboration as well as in their interaction with the users or stakeholders.

In the research process, it was further found that physical artifacts with these specific characteristics were not described in any previous research. It was therefore relevant to unfold them in this project, and give them the names Personal- and Shared Experiential Concepts. This means that Personal- and Shared Experiential Concepts are conceptualized as part of this book and represent part of the 'new knowledge' created in this research project.

Accordingly, the claims of this book is that Personal- and Shared Experiential Concepts are important drivers for communicating individual meaning and creating shared frames in interdisciplinary teams, working in the early phases of innovation. And that, Personal Experiential Concepts enable users and other stakeholders to overcome the boundary of not being able to define, express, and communicate how they make meaning of their everyday life.

The vehicle for examining and unfolding these claims is a selection of video documented workshops in real time, interdisciplinary team projects with organizations including TC Electronic, Red Cross, Daimler AG, and Region Northern Jutland. Besides these, a longitudinal study of the user-driven innovation project: 'The Good Elderly Life' has also been made, which included two sequential workshops and a more in-depth analysis of the project progress.

1.5 Focus of the Book: Creating Shared Frames in Teams and Involving Stakeholders

The early phases of innovation represent the larger boundaries of this book along with large projects or project partnerships, in which interdisciplinary teams can be found. In smaller projects, it is often not possible to find interdisciplinary teams, and they are therefore outside the scope of this project.

Inside this boundary, the book focuses on two situations in particular, the first being the creation of a shared project framing of the interdisciplinary team, and the second being the interaction with stakeholders and users of the interdisciplinary team, in order to understand their insights and perspectives regarding the design context as well as the problem framing.

The first situation is the internal challenges in the interdisciplinary teams, as they try to understand the design context and create a shared problem framing. The second is the external challenges—i.e., the interdisciplinary team's analysis, observation, and interaction with stakeholders and users, in order to understand

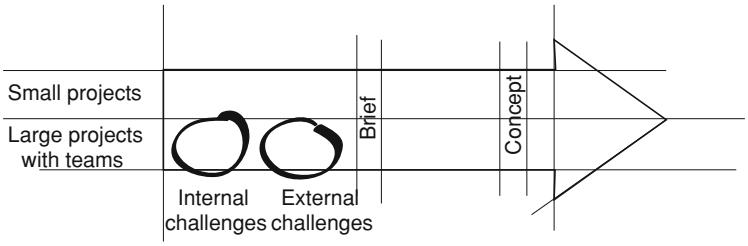

Fig. 1.2 The boundaries and focus points in this book

their insights and perspectives regarding the design context as well as the problem framing. This is also illustrated in Fig. 1.2. In the rest of the introduction, the intention is to zoom in on the two focus areas shown in Fig. 1.2.

First, the review will examine the internal and then the external challenges facing the interdisciplinary team. This will be followed by a short review of the present approaches toward these, along with a description of the gap in the present knowledge, which this book approaches.

1.6 The Challenges

Based on the literature review, it is found that there are at least three types of challenges, which interdisciplinary teams working in the early phases of innovation have to overcome. These challenges are: (1) *Diversity,* (2) *Complexity and Ambiguity, and* (3) *Asymmetry or Stickiness of information.* In the section below, a brief review of each of these follows:

1.6.1 Diversity

When a newly formed interdisciplinary team initiates an early phase project, each of its members will have an already existing set of perspectives, values, and assumptions about what is important in the given project as well as different understandings, which will direct how they think the project should be addressed [12]. Their different backgrounds, bodies of knowledge, approaches, and perspectives are enabling them to approach this project. However, along with these comes the possibility of misunderstandings, conflict, and disagreements, which can slow down the process, or even have a negative impact on performance [1, 24]. As Sessa and Jackson [28] have observed:

> Although research and theory (…) suggest that diversity have a positive impact on performance, diversity is hypothesized to have the opposite effect on cohesion' (p.140).

1.6.2 Complexity and Ambiguity

Interdisciplinary teams working in the early phases of innovation are not only challenged by their internal diversity; they also have to manage the fact that the information available in the early phases is not always complete. As mentioned earlier, one of the main objectives in the early phases of innovation is to find the right problem, need, or opportunity to approach and to identify the scope of the issue. This requires a wide divergence compared to later parts of the innovation process, and hence there will be a large set of incomplete and contradictory information, which has to be distilled into a brief. Therefore, this process can lead to both ambiguity and uncertainty within the team and potentially reduce the cohesion of the team [10].

The challenges in the early phases of innovation can be categorized as complex, because of its many 'unknown unknowns'. The team does not know the unknown information, which needs to be found, and the process/decisions only make sense in retrospect. This also means that modes of actions are limited to probing, sensing, and responding [29].

1.6.3 Asymmetry or Stickiness of Information

As already mentioned a few times, interdisciplinary teams are not only challenged internally, they are also faced with great external challenges in terms of understanding the scope of the issue and finding the right need, problem, or opportunity to approach [12].

One of the main external challenges, which the team working in the early phases of design and innovation has to approach, is the asymmetry or stickiness of information. As Von Hippel [32] argues:

> (…) each innovator will tend to develop innovations that draw on the sticky information it already has, because that is the cheapest course of action (…) this means that users as a class will tend to develop innovations that draw heavily on their own information about need and context of use. Similarly, manufacturers as a class will tend to develop innovations that draw heavily on the types of solution information in which they specialize. (p. 70).

Accordingly, the design team must be careful not to focus only on its solution capacity, but also on gaining the information about needs and context of use, which enables them to find the right problem, need, or opportunity to approach [12]. However, this is not an easy task. For many users or stakeholders, it is simply impossible to explain how they apply meaning to a situation or activity, either because they have done it so many times that they do not think about it anymore, or because they find it hard to define or articulate [15].

1.6.4 Delimitation

Apart from the challenges named above, several organizational or political challenges are also present, which might have an impact on teams working in the early phases of innovation, such as organizational resistance when it comes to implementing radical new solutions, or difficulties when initiating collaboration between different departments and so forth. But since the focus of this dissertation is on the interdisciplinary team, the organizational and political challenges are not within the scope of the research and will therefore not be described further.

Another set of challenges, which also falls outside the scope of this dissertation, are the challenges related to underlying emotions [27] and interpersonal dynamics [2].

1.7 Approaches Toward the Challenges

This section will provide an overview of the present approaches and recommendations in relation to the challenges in the early phases of innovation based on previous research within the respective fields.

1.7.1 Diversity

A theme, which seems to reappear in relation to handling diversity in teams, is *'sharing'*; especially, shared task commitment has been praised as an essential driver for collaboration and cohesion in teams. In a study from 2000, Carless and Depaola [4] found that task cohesion was a much stronger indicator for performance, compared to both social cohesion and individual attraction to the team. In other words, if team members have a shared task, they often feel more united compared to teams bound by friendship or personal interest.

Clarity of and commitment to a shared purpose or goal is another factor, which is mentioned as essential to successful team interaction [13]. Takeuchi and Nonaka [30] further observed the importance of creating a shared goal within the team itself, without interference of outside objectives and agendas.

Cohen and Bailey [5] also point to the positive association between team cohesion and team performance, implying that if the team is performing well, it is more likely to remain connected. Lipman-Blumen and Leavitt [19] further highlight the creation of a shared vision or mission to be important to the team cohesion, especially if all team members find it both vital for the project and personally ennobling.

1.7.2 Complexity and Ambiguity

'Sharing' and *'collective'* are also some of the keywords, which can be found in the recommendations on how to approach complexity and ambiguity. For instance, Darsø [8] emphasized the need for *'shared uncertainty'* in the early phases of innovation, due to the complexity of the problem. And in her study of management teams, Eisenhardt [9] observed that effective teams handled the challenge of uncertainty and incomplete information by building a *'collective intuition'*. This is supported by Leonard and Swap [17], who further acknowledge and discuss the management challenges, in terms of diffusing interpersonal conflicts, protecting challenging insights and perspectives, and the fostering of the necessary divergence without losing any perspectives.

1.7.3 Asymmetry or Stickiness of Information

The challenges in relation to asymmetry or stickiness of information are often approached by some kind of investigations and explorations of the market, the potential users or the context of use, as a basis for the problem scoping and the brief [31, 15, 18].

In the Innovation Management and Product Development communities, this kind of research is known as market research or generative research [22]. In the design community, these investigations carry names like design research, user research, or need finding [16, 22].

In general, research in the early phases of innovation can be divided into two broad categories—quantitative research and qualitative research [22].

Quantitative research represents a macro level analysis and is for instance able to identify political, environmental, social, technological, economic, and demographic changes. Quantitative market research can further provide information about market size, costumer profile, market gaps, as well as forecast trends in the marketplace. The quantitative research is useful, when it comes to understanding and identifying trends and changes in the market. It can provide an insight into *what* is going on and perhaps *how* things are changing, but unfortunately it is very limited, when it comes to understanding *why* changes occur [7].

Qualitative research, on the other hand, is useful when it comes to identifying *why* changes occur, as it is able to provide micro level contextual insights into, for instance user context, lifestyles, behavior, and values. Qualitative research is a tool for understanding user behavior, as well as for discovering unmet and unarticulated user needs [7].

Another difference between the quantitative and qualitative research approach is that the former investigates a broad and overall sample, searching for explicit and quantifiable information, whereas the latter investigates a very narrow sample, searching for tacit and emerging insights [23]. Even if the quantitative approach and qualitative approach are quite different, most researchers agree that they must be seen