

‘CO-CREATION’ IS ON EVERYONE’S LIPS – DESIGNERS’ PERCEPTION OF OPPORTUNITIES FOR AND BARRIERS TO CO-CREATION IN PRODUCT DEVELOPMENT ORGANIZATIONS

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ABSTRACT

Co-creation, aimed at encouraging users to become active partners throughout the development process, has been widely discussed in academia for the last 10-15 years as a strategy for sustainable design of products that fulfil users’ needs and enhance users’ experience of future products. However, despite the fact that universities have undertaken to educate future designers on methods and tools for co-creation with users, we emphasize that there is still a noticeable gap between theory and practice, as designers’ opportunities for incorporating co-creation activities in product development organizations remain limited. The aim of this study, consisting of twelve semi-structured, in-depth interviews with design practitioners from Swedish industry, was to create a deeper understanding of the extent to which designers can and do actively involve users in the design process in industrial organizations. While we found that designers were interested and willing to work in a more user-centered way, there was no evidence of co-creation with users. The companies’ marketing departments were mainly responsible for customer/user contact, identifying and communicating user/customer requirements by means of traditional marketing methods. Hence direct communication between designers and users was rarely supported. Moreover, the informants often experienced a strong reluctance from the marketing department to provide them with necessary contacts, as this might interfere with their relationship with the customer. The barriers to accessing users were even more pronounced for designers in consultancy firms, where the customer functioned as the link to the market and frequently declined to allocate resources to user studies, arguing that they already possessed the necessary knowledge or that such studies were too costly. Consequently, irrespective of intra- or inter-organizational settings, designers’ ability to access users often depended on individual motivation and initiatives rather than organizational factors.

KEY WORDS: co-creation; user participation; design practitioner; design method; new product development

INTRODUCTION

New product development (NPD) has traditionally concerned increasingly complex technology and functionality, coupled with demands for reduced lead times to the market and increased cost efficiency to obtain new, or maintain current, market shares (Cooper, 1999; Crawford and Di Benedetto, 2011).

Today, we see a shift from this traditional technology push in new products (or services) towards a greater conviction that users not only require products that fulfil their needs and requirements at a functional level, but also that the products (or services) are in accordance with their values and beliefs and contribute to creating a pleasant experience when used in daily life (Fokkinga, Desmet et al., 2020; Norman, 2004). This shift requires new ways of working, which necessitate a close customer/user involvement in the product development process.

It should be noted that while management literature (and often NPD literature) tends to focus on the 'customer', user centered design mainly refers to the 'user'. However, the terms are often employed interchangeably and synonymously and do not always have a clear definition. To eliminate potential confusion, in the following we present our interpretation and use of the terms. In line with Kujala (2002), we refer to 'customer' as the person who buys and pays for the product. This representative often selects and communicates the requirements of the product (or service) (IEEE Std 830:1998). On the other hand, a 'user' is defined as the individual who interacts with a system, product, or service, i.e., the person who will actually use the product or service within or separated from its use context (Karlsson, 1996; Kujala, 2002). In many situations though, 'user' and 'customer' is the same person.

'Co-creation' as an approach to actively involving customers/users in the development processes has been widely discussed from different academic perspectives such as NPD innovation management, service, marketing and consumer research (Cui and Wu, 2017; Galvagno and Dalli, 2014; Prahalad and Ramaswamy, 2004; Ramaswamy and Ozcan, 2018; Vargo and Lusch, 2004) as well as from design research perspective over the past 10 to 15 years exemplified by healthcare, experience and service design (Craig and Chamberlain, 2017; Fokkinga, Desmet and Hekkert, 2020; Norman, 2004; Steen, Manschot et al., 2011).

From a management and business perspective, the nature of co-creation implies that companies and their customers interact through engagement platforms with the aim of developing new business opportunities with the resources provided by the company (Galvagno and Dalli, 2014; Leavy, 2013; Vargo and Lusch, 2004). So far, such activities have mainly been pursued through crowdsourcing, mass collaboration, or open innovation for marketing or sales activities aimed at creating a broader variety of customized products and services (Leavy, 2013).

From a design perspective, 'co-creation' takes user engagement one step further, due to the aim of inviting users to become active partners throughout the development process. This approach is argued to be a successful strategy for the sustainable design of products based on user input rather than user feedback (Brandt, 2001; Ehn, 1988; Sanders and Stappers, 2008).

The arguments in favour of co-creation include deepening the understanding of users' needs and requirements in relation to the use of products; identifying conceptual shortcomings in current or forthcoming products; and identifying potential innovative ideas and changes leading to improved products (Bødker and Iversen, 2002; Engelbrektsson, 2004; von Hippel and Katz, 2002; Wilkinson and De Angeli, 2014). Another argument in favour of co-creation is that user engagement may facilitate user acceptance and adoption of new products (Park, Gunn et al., 2015; Schreier, Oberhauser et al., 2007; von Hippel, 1986; Wilkinson and De Angeli, 2014).

User-centered design (UCD) is a long established central approach to explicitly understanding users and the use context of the forthcoming product by involving users

throughout the design process with the aim of designing products that are of value to the user. The wealth of UCD-research (Bødker, 1987; Norman and Draper, 1986; Simonsen and Robertson, 2012) together with the ISO standard (ISO 9241-210) underlines five pillars on which UCD is based: 1) The need for active user involvement to collect information about user needs and requirements; 2) users should primarily be represented directly by the user her/himself or, if not possible, indirectly by trustees of the potential user groups; 3) the involvement should take place early in the project to collect fundamental information about user needs and requirements; 4) when evaluating and testing the design solutions; and 5) a follow-up usage evaluation of the final design solution should take place in the intended use context.

From design for to co-creation with users

However, the degree of user *participation* in the design process can vary and Eason (1995) characterized the variations as design *for* users, *with* users or *by* users.

Users may be invited as informants, answering questions in surveys, interviews or focus groups as well as giving their consent to being observed by a designer early in the design process. The users may also be invited to evaluate a design solution typically late in the process to confirm that it fulfils requirements (Bødker and Buur, 2002; Henninger, Elbaum et al., 2005). These tactics (user as informant and evaluator) place the user in a fairly passive role and correspond to Eason (1995) design *for* users. Design *by* users typically involves people ‘identified as lead users’ (Schreier, Oberhauser and Prügl, 2007; von Hippel, 1986; 2005). Lead users are recognized as having the capability to play an active role in identifying innovative improvements to existing products or conceiving new products that meet their (or other users’) needs months or even years before the bulk of the competing products are launched on the market (Morrison, Roberts et al., 2004; Urban and von Hippel, 1988). Designing *with* users, corresponds to a participatory design or co-creation approach where users are invited and empowered as an active partner in the design team (Ehn, 1988; Halskov and Hansen, 2015; Sanders and Stappers, 2008; Steen, Kuijt-Evers et al., 2007). The characterization of co-creation includes users contributing their specific domain knowledge and expertise regarding the usage and the use context, while the designers contribute their specific competence regarding the design process, methods used or technical opportunities and limitations (Bødker and Iversen, 2002; Druin, 2002; Sanders and Stappers, 2008).

However, the degree of user participation in co-creation is not without its challenges. Jansen and Pieters (2017) have identified seven principles that organizations need to take into consideration to achieve what they labelled ‘complete co-creation’. In line with earlier co-creation research e.g. (Robertson and Simonsen, 2012; Sanders and Stappers, 2008), Jansen and Pieters emphasize the need for equal collaboration between all relevant internal and external parties, including users. Moreover, their seven principles for complete co-creation also recommend that relevant information should be transparent and accessible to all participants; is productive as it leads to implementation of a co-created solution; is supported by all parties involved; and that it *results* in value creation for users, the organization and society. Jansen and Pieters’ concept of complete co-creation stresses the establishment of a transparent process to create value, including collaborative and direct involvement in which users play a central role and are given the power to influence the product design. Their definition of ‘complete co-creation’ does not include activities that focus on value creation without involving users.

From the initial contact to gathering users’ knowledge and understanding and moving on to inspiration and insights that guide further development, Jansen and Pieters’ (2017) ‘Co-Creation Pyramid’ (Figure 1) describes the hierarchical steps to be taken before one or more of their three levels of co-creation can be attained. Taking these levels into account, the first

level represents co-creation of products or services, the second level concerns co-creation of organizational strategies and tactics, while the third level represents co-ownership of the outcome of the co-creation process.

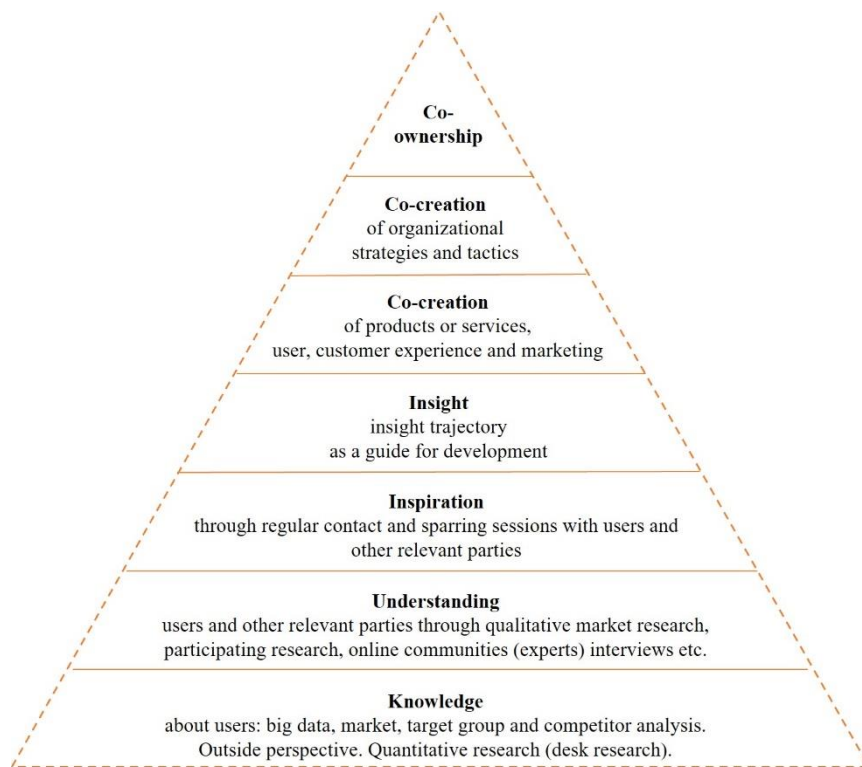


Figure 1. Reproduction of Jansen and Pieters' (2017) connection pyramid, illustrating the hierarchical steps to achieving complete co-creation.

However, regardless of management, business or design perspectives, a gap still exists between theory and practice. While crowdsourcing and open innovation have certainly proven their worth, such practices represent only a fraction of the potential opportunities that inside-out co-creation can offer companies that are imaginative and courageous enough to experiment with and shape new business models (Leavy, 2013).

For quite some time, universities have assumed the role of teaching UCD to future designers in order to meet the new challenges and consequently the need for active user involvement in product development. More specifically, in recent years there has been increased focus on tools and methods for co-design and co-creation to provide future designers with a stable foundation when starting their professional career (Predan, 2021; Sanders, Brandt et al., 2010; Sanders and Stappers, 2014). Nevertheless, over the years we have become aware of the challenges that students have to overcome when trying to implement various co-creative activities during project courses in collaboration with industry.

While part of a university's role is to introduce new methods into society, one can question why the implementation of co-creation seems to be so slow and faces so many obstacles. This lack of implemented co-creation processes (and user involvement in general) within industry has also been recognised by researchers such as Predan (2021) and Pirinen (2016). Pirinen states that co-creation is a university-led project that remains a superimposed activity with little impact on actual design decisions or core activities in the client organizations. The author also underlines the fact that the utilisation of co-creation is strongly dependent on individual, committed participants. Moreover, Predan (2021) noted that 'Despite the tangible benefits of incorporating active co-design into design processes, there are still noticeable gaps and deficiencies in the knowledge of how to implement co-creation processes...' (Predan,

2021). Her interpretation is that there is also a need to educate practitioners in co-design as they have difficulties knowing how to perform it, but more importantly, they need support to disseminate the knowledge generated through such a process in their professional environment.

Considering that future designers have knowledge of relevant methods and tools that prepare them for co-creation with users, we asked ourselves what other factors may contribute to the potential barriers that limit the implementation of co-creation in new product development processes.

Aim and structure of paper

The aim of the study presented in this paper was to create a deeper understanding of the extent to which designers *can* and *do* actively involve and co-create with users in the design of new products (or services). More specifically, the research questions were: How and to what degree are users involved in the design process?; What intra- and inter-organizational drivers and barriers to co-creation with users are perceived by designers?; How are users' needs and requirements captured?; What methods and tools are used in that process?; and How are users' needs and requirements communicated across organization(s)?.

RESEARCH DESIGN

This section describes the research design, including participant information, empirical data collection and analysis methods.

Participants

The study consisted of twelve semi-structured, in-depth interviews with design practitioners representing a variety of Swedish industries.

The strategy for the selection of respondents comprised a theoretically representative sample, where the inclusion criteria were; size of company, type of product and type of company (manufacturing company or design bureau/consultancy) in order to reflect the Swedish context.

The informants' domains spanned a wide range of industries, including: products for medical applications, products for human protection in extreme environments, subcontractors to the automotive industry, furniture and interior industry or design firms undertaking assignments for a diverse range of both retail/consumer and wholesale/professional products. The companies' size and business market varied. Some represented 'Large' enterprises with 1,500-7,500 employees (five of the respondents), others were SMEs (EU definition¹). In the latter category, five respondents represented small enterprises with 12-55 employees and two respondents represented micro companies with 2-5 employees. The 'large' companies operated in global markets and had international offices, while some of SMEs had domestic offices but operated in both global and domestic markets or only in the domestic market.

The informants' education also differed and while some were trained in industrial design engineering with a specialization in design and human factors from different universities, others had a university degree in product industrial design, product development or fine art. One respondent was qualified as a result of long industrial experience with complementary training in specific courses such as manufacturing processes, project development, design engineering and project management (Table 1).

¹ <https://ec.europa.eu/growth/smes/sme-definition> EUs' SME definition includes micro enterprise with 1-10 employees and small to medium enterprise with 11-249 employees.

Table 1. Description of the respondents' education, speciality, industrial affiliation and of experience.

Resp. Code	Education	Speciality	Industrial affiliation	Exp.Yr.
R1	CTE ² Relevant educational courses within industry	Product Development; Project Management; Industrial Engineering	Speciality in development of prototypes and (minor) manufacturing series for diverse industries, e.g. automotive, truck or shipping. R1 is involved in ideation/ concept development and production of small series for the above-mentioned industry.	20
R2	Bachelor Degree	Industrial Design	Global flooring producer. The firm develops and sells a range of flooring products for public environment and the industrial and office environment. R2 is mainly involved as an industrial designer in the ideation and concept development phases of new flooring products.	35
R3	Master Degree	Industrial Design Engineering	Industrial design consultancy firm with assignments in, e.g. tram design, forklifts and microwave system products. R3 is involved in all stages from ideation to the final concept design.	35
R4	PhD Degree	Industrial Design/ Fine Art	R4 is an industrial designer and develops innovative solutions for the textile and furniture industry where Information and Communications Technology (ICT) interact with familiar products such as textiles or seats. The products are for both the public environment and consumer product/ R4 also teaches students in this subject.	15
R5	Master's degree	Industrial Design Engineering (D&HF ³)	Design consultancy firm developing a diverse range of engineering products, e.g. robots, 3D printers, energy management systems, interactive presentations and health care devices, from ideation to final product solutions. R5 is involved from ideation to product testing and evaluation.	4
R6	Master's degree	Industrial Design Engineering (D&HF)	Industrial Engineering consultancy firm. Develops products for e.g., the automotive, ICT and medical devices industry as well as consumer products. R6 is involved in the early ideation phases, concept development and product evaluation, mainly for electronic products, medical technology devices and ICT products.	20
R7	PhD Degree	Industrial Design Engineering (D&HF)	Interior and furniture development enterprise for the public and office environment. R7 is an industrial designer from the early concept phase to the final design for production.	10
R8	Master's degree	Industrial Design Engineering (D&HF)	Company develops diverse products for medical ICT alarms for clinical staff integrated in clinical workflow. R8 is involved from ideation, concept development to product tests and approval regularity evaluation	4
R9	Master's degree	Industrial Design Engineering (D&HF)	Company develops diverse products for medical ICT alarms for clinical staff integrated in clinical workflow. R8 is involved from ideation, concept development to product tests and approval regularity evaluation	4
R10	Master's degree	Industrial Design Engineering (D&HF)	Healthcare industry. Develops protective clothing for clinical staff (mainly for surgical contexts) e.g., mouth guards, gloves, full protective clothing. R10 is involved from ideation and concept development to product testing and approval regulatory evaluation.	4
R11	University Degree	Product Development; Project Management; Industrial Engineering	The enterprise develops and manufactures its own personal protective equipment for extreme environments such as the steel industry (extreme heat), fire protection and chemical protection. R11 is involved in all engineering design steps – from ideation to production.	30
R12	University Degree	Product Development; Project Management	The firm develops compression products for medical, sport and veterinary medicine applications. R12 is involved in all phases of product development from ideation to final product evaluation and launch.	5

Procedure

The interviews followed the same semi-structured interview guide and lasted between 40 and 75 minutes. Prior to the interview, the informants received written information about the topic of the study to make them aware of the subject. During the interviews the informants were asked to narrate about their role at the company, tasks performed on a daily basis and their

² CTE (Career and Technical Education) known as Vocational Training and described as training that emphasizes knowledge and skills needed for a specific trade, craft or job function.

³ D&HF: Design and Human Factor specialization.

experience of the company's design process. Key questions were then posed to explore in depth how they capture users' needs and requirements, what methods and tools they employ, the extent to which users are involved in the process and whether they apply any specific user-centered process, including co-creation, in the company's NPD-process.

As the informants varied in terms of domain and experience, all interviews initially included a clarification of the terminology, e.g., 'user', 'customer' and 'co-creation', to reduce the risk of misunderstanding between the interviewer and informant.

A majority of the interviews took place face-to-face in the informants' work environment, while two were conducted by Skype video calls. In accordance with the regulations of the Swedish Ethical Review Authority, this study did not require any specific ethical approval but adhered to good practice in that all respondents formally gave their consent to participate in the study and for the interview to be recorded. All recordings were transcribed verbatim for analysis.

Analysis

A thematic qualitative content analysis was conducted with an inductive approach. In accordance with the recommended process for qualitative content analysis (Elo and Kyngäs, 2008; Granskär and Höglund-Nielsen, 2008; Miles, Huberman et al., 2014), the exploration of the empirical data was carried out in several steps. This included investigating the transcripts by constantly moving back and forth between the parts and the whole to identify matters of particular interest and further abstract them into meaningful themes (Elo and Kyngäs, 2008; Hsieh and Shannon, 2005).

Guided by the research questions, themes emerged concerning the methods and tools employed, in addition to intra- and inter-organizational barriers and enablers of user involvement. Additional themes emerged such as 'How needs and requirements were captured and communicated across organisation(s)', and 'The degree to which users were involved in the design process'. Other important themes that arose during the analysis process related to cross intra- and interorganizational communication among different disciplines and competences involved in the company's NDP-process.

The analysis was mainly performed by the first author but regularly reviewed in extensive discussions with the co-authors.

FINDINGS AND DISCUSSION

In the following section, our findings from the analysis will be presented and discussed with reference to the themes that emerged, i.e.: 'User involvement in the development process – methods used and degree of involvement' as well as 'Intra- and inter-organizational drivers and barriers'.

User involvement in the development process — methods used and degree of involvement

As described earlier, the definition of the terms 'user', 'customer' and 'co-creation' was discussed at the start of the interviews. All informants had a fairly definite view of the meaning of the definitions, although their opinion on the importance of the different stakeholders varied. While some informants acknowledged the importance of capturing users' needs and requirements in the product design process, others stated that users' experiences were important, but (in line with the company perspective) focused more on their customers' needs and the requirements of the forthcoming product.

Although ten out of the twelve informants were familiar with the concept of co-creation, some understood it as that it concerned the creation of 'things' together with other design competencies.

Collecting user information

The analysis revealed various organizational prerequisites to enable the designers to work according to a UCD process. Only a few informants (three out of twelve) represented organizations where it was accepted for designers to collect user information by means of UCD methods and tools. Two of those three informants represented large and medium-sized organizations, while the third worked for a small company where tasks in the product development process overlapped between a few employees. However, regardless of these different prerequisites, the most common process identified in this study by which designers obtained information about users' (or customers') needs and requirements pertaining to a forthcoming product was to receive some kind of specification of requirements compiled by the marketing department. The specification was generally passed on to the designers in written (a short report or email) or verbal form by the marketing department or, in some cases, by a customer company via the internal marketing department (this will be further elaborated on in the following sections). Nevertheless, this kind of 'relay-process' only provides the designers with *second-hand information*, giving them little or no opportunity to further examine the information or gain a deeper understanding of users' needs and their use context. Furthermore, the designers in this study often perceived that the information they received was incomplete and inadequate to perform satisfactory design work. This experience was described by one of the informants as follows:

...so, you listen to their... (i.e., customer or internal marketing department [authors' comment]) of what their view about the user is... hmmm... they often think they have a good grasp of it... but um...if you *can* get out there you notice important nuances that they have not identified...(R6).

From a methodological perspective, methods to capture customer/user needs applied by marketing or design departments can appear similar at a superficial level and consequently be expected to provide comparable outcomes, due to containing relevant information for both marketing and design professionals. However, the methods used often differ in approach, purpose and desired outcomes. Although the marketing department focuses on important parameters such as market and brand requirements; market size; target groups; evaluating competition; and identifying what should be designed and how it will increase customer satisfaction, this information does not seem to be sufficient for the designer's work.

This issue has been recognized by von Koskull (2009), who found that customer information collected by marketing departments is often rejected and remains unused by design professionals in the development process. Moreover, Balzan, Farrugia et al. (2021) stress that such relay-process is superficial since requirement interpretation is not 'black and white' and there is no recipe for converting requirements into design solutions. An interpretation of this is that designers require answers to other kinds of question related to the future product, but also that this relay information process differs from the UCD process, where "knowing" the user and the use context by means of first-hand information is central.

Kujala (2003) underlines the fact that involving users in the design process is a path to deepening the understanding of users' needs and that their contribution provides designers with more accurate requirements. This means that to incorporate users' needs in the design of the product, the designers need first-hand information about the users' daily life, what they do, how they perform a task and how various situations in the use context affect their experiences of the product. More specifically, Karlsson (1996) emphasizes that users' needs must also be understood from the use situation as a whole (by observing their activities and the tools used to achieve their goals) before they can be addressed and transformed into design solutions. This is something that the designers in the present study were generally unable to achieve due to the common use of second-hand information.

How can user needs be captured?

In accordance with von Koskull's (2009) findings, the informants in this study perceived the information collected by and received from the marketing department as deficient. When discussing this issue with the informants, they emphasized not only their willingness to work in a more user-centered way in the design process but also the necessity of doing so in order to design products that genuinely fulfil users' needs. Because of the designers' experience of this lack of information, they felt a need to compensate by finding ways to organize and compile first-hand information from users during the design process, emphasizing the importance of users' knowledge in the design process as '*goldmines of knowledge*' (R10) and expressing that '*it is the best way to get knowledge for new products based on their needs*' (R11).

Our study confirm previous studies by Kaulio, Karlsson et al. (1996) and Privitera, Evans et al. (2017), that user studies often seems to be accomplished *ad hoc*. Moreover, the conducted studies depended on the designers' own motivation to gather deeper and more relevant information for their design work than that received from the marketing department. The user studies typically took place early in the design process with limited iterations throughout the process and were not formally or explicitly incorporated into the company's product development process. In rare cases users were invited to evaluate the product design (e.g., usability testing). However, the driving force behind such evaluation activities was based on external issues such as legal requirements rather than internal needs. The following quotation from one of the informants illustrates the difficulties faced by designers when it comes to meeting users in general and that regulatory validation as a way to open doors and actually obtain formal access to users:

Unfortunately, our easiest way to get out and meet the user is that we must perform a regulatory validation, which must be with real users in our intended market and with a final product... but that is the last thing you do in the process. (R9)

Methods and tools used

If and when the designers were able to organize any kind of user studies to meet their need for supplementary and specific information on contextual usage issues from the user perspective, they used well-known methods such as interviews, surveys, focus groups or observations. Although questionnaires seemed to be the method that met least resistance for the designers, the preferred methods included interviews, focus groups or ethnographic studies such as observations and, very rarely, contextual enquires.

Nevertheless, the designers were keen to gather information about the potential users and showed varying levels of awareness as well as knowledge about what kind of information they could actually obtain by applying specific methods:

...we do not have super-sophisticated methods, but it is all about getting input to us as designers, so we get a sense of... [what the user wants] (R6).

Perhaps this is the reason that they did not specifically describe what could be accomplished through specific methods or how a combination of various methods might complement each other to provide more comprehensive results.

In a few cases, the designers described that they managed to organize focus groups. However, when scrutinizing how the methods turned out in reality, several shortcomings were identified. First and foremost, focus groups were conducted almost exclusively with customers rather than users. The reason given was that it was far easier to access customers as the company already had their contact information. Other findings revealed that even when the designers were able to recruit users for focus groups, they were often found through the designers' own contacts. Several designers described that when organizing focus groups with

professional users such as nurses, they often had to rely on their private contacts, e.g., someone in their private sphere who worked as a nurse agreed to contribute to the focus groups and acted as an ambassador by inviting colleagues to participate. However, the designers realized that such a process is not sustainable, as they experienced that users' willingness to contribute had limits and that the amount of knowledge gained decreased if the same users participated repeatedly.

Although some difficulties with the organization of focus groups were identified, the designers expressed that their overall experience was that meeting and talking with users (e.g., in interviews or focus groups) is particularly fruitful for achieving the various goals of the design process. However, while interviews and focus groups contribute to gaining an overall understanding of users' future product (or service) needs, the methods do not contribute to any great extent to understanding the context in which the product will be used. According to the informants, they found significant value in gaining knowledge about the users and their use context by means of observations. They explained that they created opportunities for discrete natural observations, such as 'shadowing' or more interactive observation, such as 'contextual inquiry', in the users' own environment. The informants described how the observations helped them to reveal hidden needs and requirements, which did not always become obvious with methods such as questionnaires, interviews or focus groups. Observations created valuable knowledge as the informant learned how users performed specific tasks, what the use environment looked like and how the product should be designed to fully interact as part of the user product context system. This was expressed by one of the informants as:

'...it has given us a very important understanding... when you sit and have to make design decisions, then you know at the back of your mind and...wait a bit now... what is it like to be a nurse... what do they do... how is it with that...?' (R8).

In line with Karlsson's (1996) and Engelbrektsson's (2004) previous findings, the observations enabled our informants to become more familiar with the potential use of the forthcoming product and its use context in a complementary way that interviews, or surveys, could not contribute. Additionally, it is important to emphasize that the observations also provided the informants with 'something to reflect on' and 'something to think about afterwards' if they encountered uncertainty or difficulties in solving the design problem from a UCD perspective.

Degree of user involvement

In this study, the informants seemed to embrace and value the positive effect of user involvement in the design process as useful for their understanding of user needs, which complemented the customer requirements they generally received as input for their design work. They emphasized their willingness and efforts to adopt an open and collaborative approach to users. However, the methods and techniques employed appear to indicate more unidirectional communication, where users are requested to provide answers to specific questions on one specific occasion at an early stage of the design process. It is noteworthy that users were only invited to participate in additional activities to evaluate and provide feedback on the final design to meet regulatory requirements for the company rather than to provide input for further development of the product.

Thus, although the literature stresses the benefits of co-creation where the user is an active partner in the design team, contributing expertise and knowledge by means of continuous iterative collaboration throughout the design process (Brandt, 2001; Ehn, 1988; Sanders and Stappers, 2008; Wilkinson and De Angeli, 2014), we found no evidence of co-creation in the present study.

Intra- and inter-organizational drivers and barriers

In general, most of the companies in the study followed a sequential development process such as *Stage-Gate*® (Cooper, 1990; Cooper, 1999). The Stage-Gate process is considered a response to the fact that new products were developed with a strong technology push, without much market orientation, which often resulted in not only lengthy and costly processes but failure to take account of market needs. The process is based on management methodologies for product innovation aimed at developing new products from idea to launch. This includes operational sequences for specific activities with time and goal-oriented milestones, which are managed by gatekeepers, who are responsible for assessing and deciding whether or not the project should be allowed to continue.

According to informants, some companies developed their own process, but nevertheless followed a sequential 'from idea to launch' pattern, where various competences employed by the company were included in the different phases of the NPD process. A small number of informants, typically representing micro-enterprises, claimed to have no formal development process; instead, tasks were addressed as needed and distributed to a few individuals or one individual within the organization.

As previously described, most of the companies represented in this study had an NPD process in which the marketing department identified the next possible product, collected data about target groups and determined what customers want and require. Nevertheless, when it came to identifying user needs in order to support the designers with necessary information, it became apparent that the informants did not have an established organizational process for obtaining user insights, nor did management or any representative from the organization enquire whether any user studies had been conducted, except when external (and most often legal) matters required user input. In contrast, a few (2-3) informants described a well-established and accepted access to customers and users in the firm's design process. A significant factor in those companies was awareness of the importance of designing the product with the user and usage in mind from the very start. This enabled close collaboration with users, based on arguments that otherwise the product development process would be more expensive, as each re-design and correction would require more of the company's time and resources.

Who accesses who?

Although the informants acknowledged that users have valuable knowledge for the design of products and the related use context, there appeared to be both internal and external barriers to user involvement in the design process. The typical intra-organizational process in most of the companies was that the marketing department compiled information about the customer's requirements, where the marketing and sales departments 'own' the contact with the customer, who in turn (in a best case scenario) also possess access to the user. Consequently, this forced the designers to rely on colleagues in the marketing or sales department who were willing to "open the door" to users. To do so, the marketing or salespersons must relinquish their power and authority as gatekeepers and support the designers' access to users. This can be seen as an additional process that is not incorporated in the marketing department's assignment or business relationship between the customer and marketing/sales representatives. To exemplify such a gatekeeper process, the customer could, for instance, be a purchaser at a hospital or represent purchase strategies for healthcare regions. In contrast, the informants needed access to users such as nurses or medical doctors who were going to employ the forthcoming product in their daily work at the hospital. *If* the marketing or salesperson agrees to provide access to the customer, the process will include: 1) convincing the customer's purchaser (or manager representing the customer) that the designers at their company need to meet the actual user to obtain information and gather

necessary knowledge for the design process; 2) if the customer is able and willing to support access to the users — she/he in turn will have to approach the users' management in order to have time allocated for their input.

This could result in customers questioning why relevant information is lacking, which has the potential to evolve into a source of mistrust between the company and customer. The informants often perceived it as a significant barrier to the marketing/sales representatives agreeing to this process. They also often experienced a fairly strong reluctance on the part of marketing or salespersons to inconvenience their contacts (i.e., customers) with matters that would not immediately generate a value to the customer, arguing that it might 'erode the relationship with the customer' (R2; R6; R8; R9).

To overcome such barriers, the informants described their dependency on building a positive relationship with the marketing/sales representatives rather than relying on organizational processes to ensure their contact with users. Such contact is of paramount importance if the designers are to develop a product that not only fulfils the customers' requirements but likewise the users' needs. Importantly, collecting user information about the forthcoming product by means of user studies is often hampered by economical constraints and in our study was rare within the organisation's NPD budget, a finding that Eshet and Bouwman (2017) also made in their study.

Experiences from consultancy firms

Several of the informants represented consultancy companies operating inter-organizationally, where the customer is the paying client and thus the driving force in the choice of solution. The common process was that the customer included both design and market requirements in the specification of the assignment for the consultancy company.

In general, when comparing informants employed as in-house practitioners and those employed in consultancy firms, there was very little difference in their experiences regarding their ability to perform adequate user studies. Nevertheless, in a few cases it seems as if clients may initially have a more positive approach to user studies. However, the informants described that even when the client had a positive approach to performing user studies to capture the necessary information for the designers in the project, such activities were often the first target for budget cuts, which resulted in no, or a significantly smaller, budget for such studies. *If* any budget remained, it was in most cases to cover the costs of distributing a survey to users.

The informants also described difficulties in obtaining paying customers to improve and deepen user studies i.e. expand studies such as surveys to also, at least, include interviews and observations. Furthermore, the informants experienced difficulties persuading paying customers to incorporate proper user studies in the business assignment if they did not initially have any awareness of the benefits of capturing users' needs.

Counterarguments against such user studies have been that customers 'already know the users' needs' (R2; R5; R6). This claimed familiarity with potential users' needs resulted in further neglect as user studies were deemed unnecessary and/or too expensive. Similar to in-house barriers, the fact that 'there was no set budget for such studies' was argued from a management perspective.

A process based on designers' own motivation

The importance of eliciting customers' needs and requirements pertaining to the forthcoming product by means of specific methods (e.g., surveys, interviews) throughout the NDP process has been stressed in the marketing literature. This study confirms that marketing departments seem to access future customers' requirements by their domain specific methods, which are incorporated and expected to be applied in the organization's NPD process. Likewise, the

UCD literature emphasizes the need for appropriate methods and tools to capture *users'* needs and requirements. Additionally, it has been stressed that it is essential for an organization to have efficient and reliable processes focusing on users' involvement in the design process (Engelbrektsson and Söderman, 2004; Kaulio, 1997; Shah and Robinson, 2007). However, this study shows that many organizations lack reliable processes for their designers to conduct appropriate user studies. Consequently, it leaves the designers in limbo with little space to fulfil their design task satisfactorily and communicate how the organization should support such process. To remove the above-mentioned organizational barriers, the designers often had to rely on their own motivation and contacts to gather user information for design solutions based on users' needs, rather than on organizational support.

Who evaluates the design solution?

As described earlier, the value of designers having face-to-face meetings with users to gain first-hand information and feedback about design solutions has been emphasized in several studies (Sanders et al., 2010; Engelbrektsson, 2004; Bødker, 1998). Previous UCD research has demonstrated that when users have a say in the development process, the design outcome may not only address crucial attributes for users to understand the product, but more importantly, the users may also be keener to adopt and purchase the product when it enters the market (Park, Gunn, Lee and Shim, 2015; Veryzer and Borja de Mozota, 2005). Moreover, Christiansen, Gasparin et al. (2013) stress that the outcome of the design process is not only that of a design brief or technical factors, but the result of a sociotechnical connection between the human and the non-human, framed and assembled by the designers. The importance of designers' understanding of users' needs have been further underlined by Veryzer and Borja de Mozota (2005) who emphasize that the success in designing outcomes that contain important and relevant attributes is dependent on a deep understanding and sensitive concern of the users' which can probably only be achieved if people meet.

Overall, there are profound arguments derived from research pertaining to the need for companies to organise and mobilise designers and users to meet face-to face in the NPD process. However, the present study exposed several barriers that prevented the designers from obtaining the necessary feedback on their designs from users. A majority of the informants stated that the designer was generally not involved in such iterative evaluations of the design. Instead, the manager, marketing or sales representative conducted the consultations with (most often) customers (rarely with actual users) by means of prototypes (with various levels of fidelity) or presentations including descriptions and illustrations produced by the designer to gain as much relevant feedback as possible. The sales/marketing representative subsequently provided the designer with feedback derived from emails or telephone calls with the customer, thus allowing little opportunity for any deeper insights into the potential for changes to fulfil user needs in the design of the product.

Shortcomings despite an accepted UCD process

It is important to mention that a few informants represented companies that had a more accepted and explicit UCD process as part of the NPD process. Common to those companies was the fact that the management accepted and understood that those designers who were responsible for designing the product needed first-hand information from the future users. In those companies, the designers were encouraged to contact users through interviews, arrange focus groups or visit the users at their workplace to gain a thorough insight into the use context.

In rare cases, special tutorials were arranged where all newly hired designers were required to participate in an introductory course at the users' workplace. The purpose was to provide

the designers with deeper understanding of the users' daily working life as well as induce empathy of users' potential challenges.

Nevertheless, even within companies that had a more explicit and positive user involvement approach to the design process, this did not necessarily correlate with more user contacts or iterations. The informants explained that they still had difficulty finding time to actually conduct new user studies that were not explicitly scheduled in the project plan: '*...it is so easy to get stuck in front of the computer...*' (R10).

Despite user involvement being encouraged by management, the informants explained that identifying relevant users and obtaining access to their time for interviews or observations was a major and time-consuming process. Time constraints made the designers repeatedly utilize the same users in various user study activities, which led to a similar outcome as that previously described by informants who had to rely on their own contact when organizing e.g., focus groups, i.e., that eventually not much new information emerges'.

The barriers described often resulted in user studies not being conducted in the way designers wished for, despite the company's intention to provide them with easy access to users and their use context. Hence the design of the product was based on prior knowledge of users, recalled from the designers' memory of an introductory course or previous projects.

Another informant represented a company with what appeared to be an excellent UCD process. The informant described how users' needs were placed at the forefront of all design decisions – from material selection for certain purposes to how the product would operate in a variety of use scenarios requiring special consideration. The process included ideas that arose from discussions and interactions with users as well as from iterative evaluations of prototypes by users in the use context. However, the company discussed initiatives to make the process more time efficient by establishing evaluation protocols as a kind of contextual inquiry for testing prototypes without the need for the designers to participate. On the one hand, this shift may contribute to time efficiency in the design process but, on the other hand, will probably contribute to more shallow knowledge of the user's needs. This example may illustrate the lack of a deep insight within industry into how various methods contribute to the success or failure of the forthcoming product, something which Karlsson (1996) described as companies' beliefs that methods such as surveys are more effective and can give the same answer as interviews with users".

From a pilot project to an established UCD process

According to other informants, one company sought to externally communicate the fact that it was user-centered and that the end-users were focused on in the NPD process. The company seemed to acknowledge being user-centered but had not grasped *how* a UCD-process should be implemented, with the result that it was not yet fully accepted or established as part of the company's NPD process.

The informants described how they had conducted and contributed to a successful pilot project at the company, where the product was developed by means of UCD methods. In the pilot project, the informants' competence as UCD designers was utilized and a wide range of user study methods such as face-to face interviews, observations (e.g., contextual inquiry and shadowing), focus group interviews and workshops were employed. The pilot project ran throughout the entire design process, i.e., from the initial phase of understanding and capturing users' needs to ascertaining that the design solution fulfilled them. The outcome was described as 'very successful' and the pilot project as well as the designers responsible for it received significant positive attention from management. The positive outcome also led to the marketing department developing strategies to exploit the result, thus communicating the company's user-centered approach as sales arguments to existing and potential new customers. However, even though the pilot project clearly showed the benefits of UCD-

methods, it seems that it became more of an isolated intervention than an integrated process and the informants expressed how they struggled to gain approval to continue working with the UCD-process.

‘...it is not the normal approach at the company and it was a bit of a sensation and it has been the biggest project the company has invested UCD in...they [management] are using the project for marketing benefits by claiming that we work with UCD ... but this knowledge ... we in our profession have fought to continue with this mode of operation [user-centered design approach] ... but now we are drowning in validation work and have little opportunity and support to perform this important work ...’ (R8).

Moreover, the informants reported that UCD as an implemented process is not only a matter of management’s understanding and motivation to implement the process, but that colleagues, often with a long employment history, questioned why such a user centered process should be conducted repeatedly, as the designers had already ‘learned about the users’ (R9). Similar to Predan’s (2021) findings, the informants experienced that their colleagues did not support the introduction of new methods in the organization’s NPD process. The colleagues not only misunderstood the process but also exhibited reluctance to change existing, more traditional customer and technically-oriented processes. Consequently, these attitudes contributed to the situation where the designers had limited possibilities to interact with real users during the design process.

Sharing the design ideas

The fundamental principle in co-creation is participation. Simonsen and Robertson (2012), among others, describe this as a process through which users go from merely being informants who answer the questions put to them, to being legitimate and acknowledged participants in the design process, thus contributing their perspective on how the problem could be solved.

This process requires equal interaction between users and designers to learn, develop and evaluate their collective design ideas in a shared reflection between the participants’ pluralistic perspectives (Eriksson, Wallgren et al., 2021; Jansen and Pieters, 2017; Robertson and Simonsen, 2012)). As a result, the user and designer roles become mixed up, as the users, who will ultimately benefit from the results of the design process, are considered the experts (Sanders & Stappers, 2008). To achieve this, Lee (2008) argues that designers need to shift their approach from their traditional role as representing the creative competence at the company, which is often an integral part of their training. One such role shift entails moving from being the expert generating innovative ideas and taking design decisions to facilitating and enabling other participants’ creativity (Druin, 2002; Eriksson, Wallgren, Sandsjö and Karlsson, 2021; Sanders and Stappers, 2008). However, in contrast to our findings presented earlier, where informants emphasized their willingness to embrace deeper collaboration with users in the design process, we also revealed that designers may be reluctant to share their ideas until they feel confident that they fulfil their own (and the organization’s) design requirements placed on the product. This was expressed by a few informants as:

‘Designers often hold on to their own design for too long and do not show it until it is finished,’ (R1); ‘if I am sketching out an idea, I do not want to show it until I know that it is completely sound’ (R3); or ‘I always say I do not want to have any feedback or criticism at the start’ (R2).

Remarkably, despite a great deal of research emphasizing the benefits of co-creation, these findings support earlier research by, for example, Engellbrektsson (2004) and (Eriksson, 2014), who identified designers’ inability and unwillingness to elicit users’ needs by means of espouse knowledge and ideas from users or other external sources. This shows that there

are still barriers to overcome in order to utilize the potential of co-creation in NPD. Nevertheless, the reluctance to share their ideas with others until the design idea is completed from the designer's perspective is a true barrier to co-creation with users.

A possible explanation is that embracing co-creation with users might threaten the existing power structure and also flies in the face of the expert mindset that is prevalent in business today (Antons and Piller, 2015; Sanders and Stappers, 2008).

In addition, Predan (2021) identified a significant knowledge gap on *how* to implement co-creation in professional design teams. Predan underlines the need for education in the organizations on how to facilitate such a process and successfully unite different participants' perspectives to achieve co-creation in their organization. Moreover, Pirinen (2016) identified that unfamiliarity with co-design processes in the organization can create resistance and emphasized that organizational operations and structure affect how mutual value is realised by means of co-creation. Kleinsmann and Valkenburg (2008) state that the generation of a shared understanding among different participants in co-design projects is not only influenced by face-to-face communication but also by management and organizational matters. Hence, only tackling barriers on an individual level will not solve the problem, as the solution lies in organizational factors (Kleinsmann and Valkenburg, 2008).

CONCLUDING REMARKS

As a successful organizational strategy to fulfil the needs of customers and/or users in the development of new products or services, co-creation has been vigorously advocated from various academic perspectives over the past decades (cf. (Ehn, 2008; Prahalad and Ramaswamy, 2004; Sanders and Stappers, 2008; Vargo and Lusch, 2004).

By means of interviews, we scrutinized the extent to which design practitioners in the Swedish product development industry can and do involve users as co-creators in the design process. While we found that designers showed ambition towards and were willing to work in a user-centered way, there was no evidence of co-creation with users.

Whereas Pirinen's study (2016) focused specifically on service design, our study was conducted within companies operating in a broader physical product development segment. Nevertheless, our study supports Pirinen's observation that co-creation is still rare and seems to have little impact on an organization's core activities. We found that when users were involved in the design process, it was mainly on an ad hoc basis as informants or evaluators of design solutions.

Previous studies (Engelbrektsson, 2004; Karlsson, 1996; Sanders, Brandt and Binder, 2010; Sanders and Stappers, 2008) have stressed the importance of first-hand information for designers to gain a deeper understanding of users' needs and an explicit understanding of the use context of the forthcoming product.

As our study includes a wider range of diverse product development companies, it complements the findings of Eshet and Bouwman (2017) (research on mobile system design) and Balzan, Farrugia and Casha (2021) (toy as aids for children's language development) that requirements (usually customer as opposed to user requirements) are generally passed on as second-hand information in written reports or orally at meetings from the organisations marketing department or in consultancy firms, provided by customers. In line with Eshet and Bouwman (2017) and Balzan, Farrugia and Casha (2021), we emphasize that the organizational conditions to enable designers to access users are still not evident and that the organizational conditions of companies seem to focus on design practitioners receiving second-hand information. Furthermore, in projects in which the customer is involved, these approaches lead to designers obtaining only a third-hand understanding of users' needs and contexts.

Irrespective of the organization, the difficulties for designers in accessing users and involving them in co-creation activities have also been identified by Jansen and Pieters (2017), who state that value creation activities without user participation cannot be considered 'complete co-creation'. Instead, they emphasize the importance of maintaining a sufficiently transparent process for all participating stakeholders, with focus on giving users a central role with power to influence the product design. This leads to the implementation of co-created solutions, thereby creating value for users and the organization involved. For a better understanding of the complexity of such a process, the researchers proposed a 'connection pyramid' where various steps to connect with users (or customers) are identified and must be taken into account and implemented to achieve successful co-creation. The pyramid illustrates the importance of a solid base for user connection, after which insights into their motives can be gained to facilitate the creation of the necessary trust to fully embrace complete co-creation.

The designers in our study rarely had the opportunity to reach the upper level of the pyramid, i.e., 'insight'. 'Insight' is considered the highest level of user connection, without which no co-creation can take place. It aims to create a deeper awareness of users by analysing the information gathered in previous steps in order to identify the problem to be solved. However, when our informants obtained their information from the marketing department, 'the problem to be solved' was already identified without any involvement on the part of the designers. Instead, our informants described activities corresponding to the lower level of user connection, i.e., 'knowledge of' by means of quantitative information to supplement the information they had received from the marketing department. The informants also described activities that enabled them to reach the levels of 'understanding' and 'inspiration'. In such cases 'understanding' covers a deeper foundation of user needs and requirements than the 'knowledge' level and was achieved by interviews or observations. The purpose of 'inspiration' is to create trust between participants before the co-creation activity begins by means of regular sparring sessions in different group activities.

However, as we found no evidence of co-creation in this study, we are obliged to accept that this level was not represented by any of our informants. However, a few companies of the designers in our study successfully performed focus group activities and achieved a deeper awareness of users' motives and needs related to the forthcoming product but with limited possibilities to meet the same users in more than one session.

IMPLICATIONS

This study highlights the fact that organizational initiatives are needed to support designers to engage in closer collaboration with users and overcome identified barriers, for example, when marketing or sales departments 'own' the customer relationship and thus act as gatekeepers who regulate the designers' access to users. In addition, the organizational barriers identified indicate a lack of understanding about why user studies in general and co-creation in particular contribute to a successful product development process, often leading to them being questioned by paying customers and management.

Overall, this places designers in a position where they are dependent on both internal and external contacts as well as their own motivation for involving users in the design process rather than organizational factors that support their needs. This indicates that efforts to bridge the gap between co-creation research and practice are essential.

Thus, releasing the suggested value-generating power of co-creation with users becomes a managerial issue that requires:

- The dissolvment of intra- and inter-organizational boundaries by encouraging and endorsing collaboration between the marketing and design departments in the NPD process as well as between the organization and users.

- Allocating the necessary time and resources to conduct user studies in a process that not only provides the marketing department with customer insights but also enables designers to team up with users and other relevant intra- or inter-organizational stakeholders to incorporate the necessary insights into the design of products that fulfil or even exceed user needs and requirements.

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