

Experience Goals in Designing Professional Tools

*Evoking meaningful
experiences at work*

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Yichen Lu
Department of Design
Aalto University
School of Arts,
Design and Architecture

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Abstract

For most adults, work is an important part of life. Experiences at work are shaped considerably by the workplace context wherein professional tools often play a crucial role. Given this significance, this doctoral research is concerned with human flourishing at work as mediated by professional tools and work-related service touchpoints. This dissertation concentrates on prioritising meaningful experiences as high-level design goals in the early phase of the design process, which enables a creative approach to professional tool innovation.

In the last three decades, the societal change from the materialistic to the experiential has boosted business-to-consumer design practices with a focus on experiential quality. Compelling consumer experiences in daily life have raised the bar of people's expectations for desirable experiences at work. In contrast, current work tool design in the business-to-business setting is mainly driven by product performance criteria, system productivity, and cost efficiency. The value of meaningful experiences at work as a catalyst for employee flourishing seems largely neglected in work tool design. This dissertation therefore proposes to shift the orientation of work tool design from product-centred problem solving towards experience-focused possibility seeking.

This research follows Hassenzahl's proposition of experience design, to think intended experiences before concrete design outcome. To maintain the designers' focus on experiential objectives throughout the design process, this dissertation introduces a key conceptual instrument of inquiry into design practice, namely, the experience goal (Xgoal). This dissertation defines Xgoals as high-level design objectives that concretise the intended momentary emotion or lasting meaning that a person feels about a product or service to be designed. The main challenges of Xgoal setting and realisation correspond to a design abduction process in which designers constantly experiment with tentative Xgoals until a preferable match between the two emerges. Thus, this research investigates Xgoal setting and utilisation for work tool design in the specific context of the Finnish metals and engineering industry where traditional problem-solving engineering design dominates.

Theoretically, this research utilises the multidisciplinary lenses of positive psychology, organisational management, and possibility-driven design thinking to study Xgoals in creative design practice. Methodologically, this dissertation extracts data from 20 master student projects that collaborated with heavy industry companies. These projects were deliberately designed for meaningful experiences at work in relation

to professional tool innovation. The analysis of these project reports emphasises design reasoning for Xgoal setting and utilisation in design activities. Finally, Xgoals as designerly instruments were evaluated in expert interviews.

The findings of this research first indicate that Xgoals with in-depth meaning can lead a possibility-driven design process because Xgoals define the in-depth reason for design opportunities rather than a means to a solution. Xgoals can facilitate the considered design space expansion from the main product towards a product-service system and from styling towards human-product interaction, face-to-face communication, and organisational strategy. Second, the findings suggest that the mechanisms of meaningful work can complement a Positive Design Framework, and further propose Xgoals in terms of design for virtue, personal significance and pleasure intertwined with the meaningfulness of work. Third, this research uncovers design strategies for experiences of pride at work along social and temporal dimensions. Finally, this dissertation suggests the generative, reflective, and communicative functions of Xgoals in design practice.

This research contributes a theory-inspired and design case-based approach to tool design for evoking meaningful experiences at work. Future studies on this could concentrate on applying the proposed framework and design strategies to other domains, and further develop context-dependent Xgoal setting and utilisation methods for possibility-driven design.

Keywords: *experience-focused design; possibility-driven design; experience goal; meaningful experiences at work; work tool; design strategies; pride.*

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Goodbye Arabia and look forward to experiences at Väre.

8110, 8th floor, Arabia, Helsinki, June
Yichen Lu

List of publications

The dissertation includes the following original research papers.

PAPER 1.

Lu, Yichen, and Virpi Roto. 2014. "Towards meaning change: experience goals driving design space expansion." In *Proceedings of the 8th Nordic Conference on Human- Computer Interaction: Fun, Fast, Foundational*, 717-726. Helsinki: ACM.

PAPER 2.

Lu, Yichen, and Virpi Roto. 2015. "Evoking meaningful experiences at work – a positive design framework for work tools." *Journal of Engineering Design*, 26(4-6), 99-120.

PAPER 3.

Lu, Yichen, and Virpi Roto. 2016. "Design for Pride in the Workplace." *Psychology of well-being*, 6(1), 1-18.

PAPER 4.

Lu, Yichen, and Virpi Roto. (n.d.). "Experience goal as a designerly instrument to guide experience-focused design." *International Journal of Design*. (submitted).

Authors' contributions

PAPER 1: MAIN AUTHOR

This paper investigates that experience goals (Xgoals) enable the expansion of the considered design space by renewing the meaning of the original design brief. As the first author, I was mainly responsible for the literature review, the data collection, the data analysis, writing up the empirical sections, and summarising the key findings and their implications. The second author contributed to the literature review, the theoretical background, the data analysis, and the manuscript revision.

PAPER 2: MAIN AUTHOR

This paper conceptualises the positive design framework for meaningful experiences at work. As the first author, I was responsible for assembling the integrated literature review on the theories of creative design and the meaning of work, collecting the design cases, analysing the Xgoals, and identifying the key findings and their implications. The second author contributed to the data collection and analysis as well as polishing the manuscripts.

PAPER 3: MAIN AUTHOR

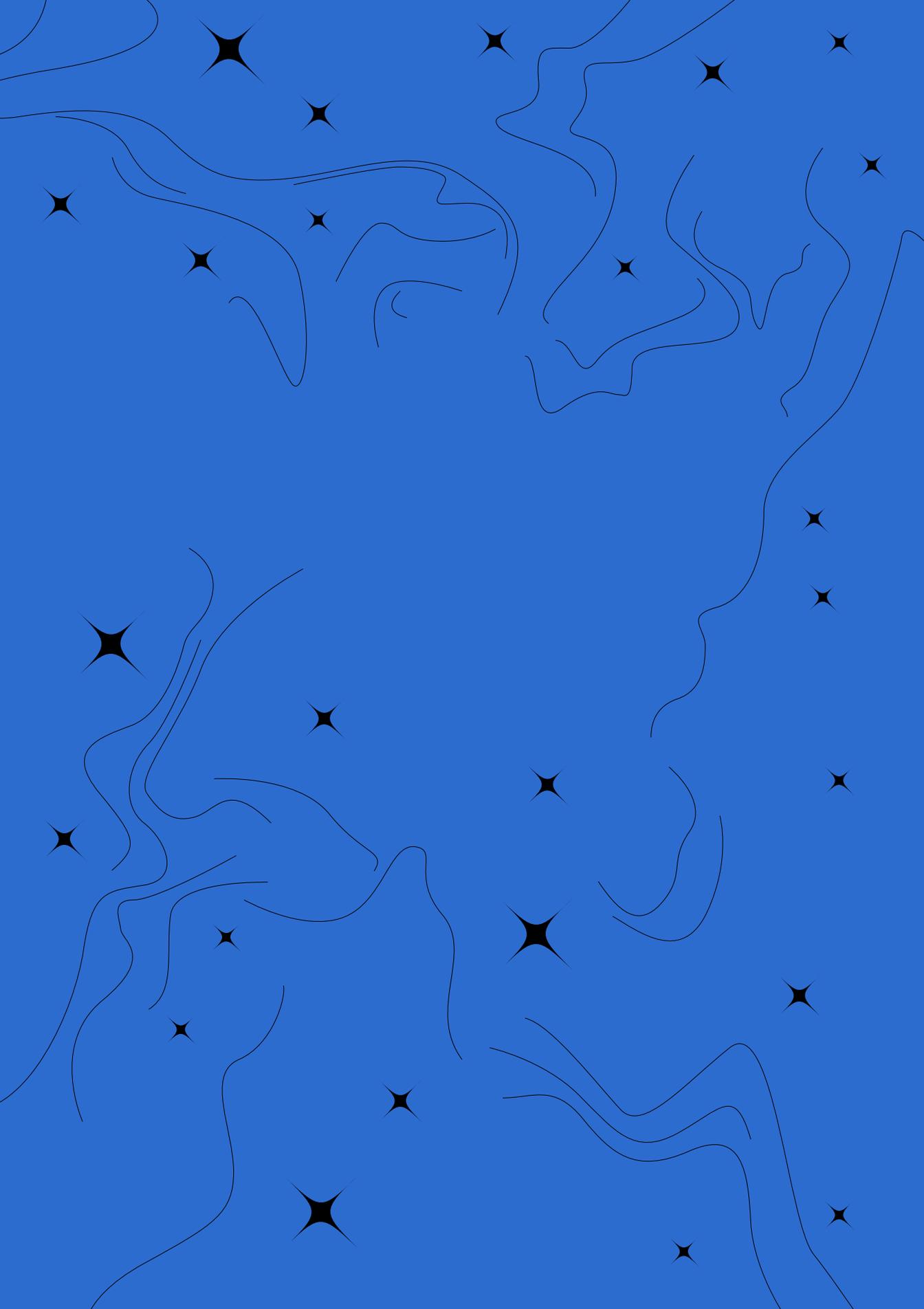
The paper presents the design strategies for the different types of pride experiences at work. As the first author, I conducted and reported the integrated literature review on pride experiences and experience-focused design, collected the design cases, analysed the pride-related Xgoals, extracted the design strategies, summarised the key findings and their implications, and composed the manuscripts. The second author contributed to collecting the design cases, analysing the data, developing the framework, and revising the manuscript.

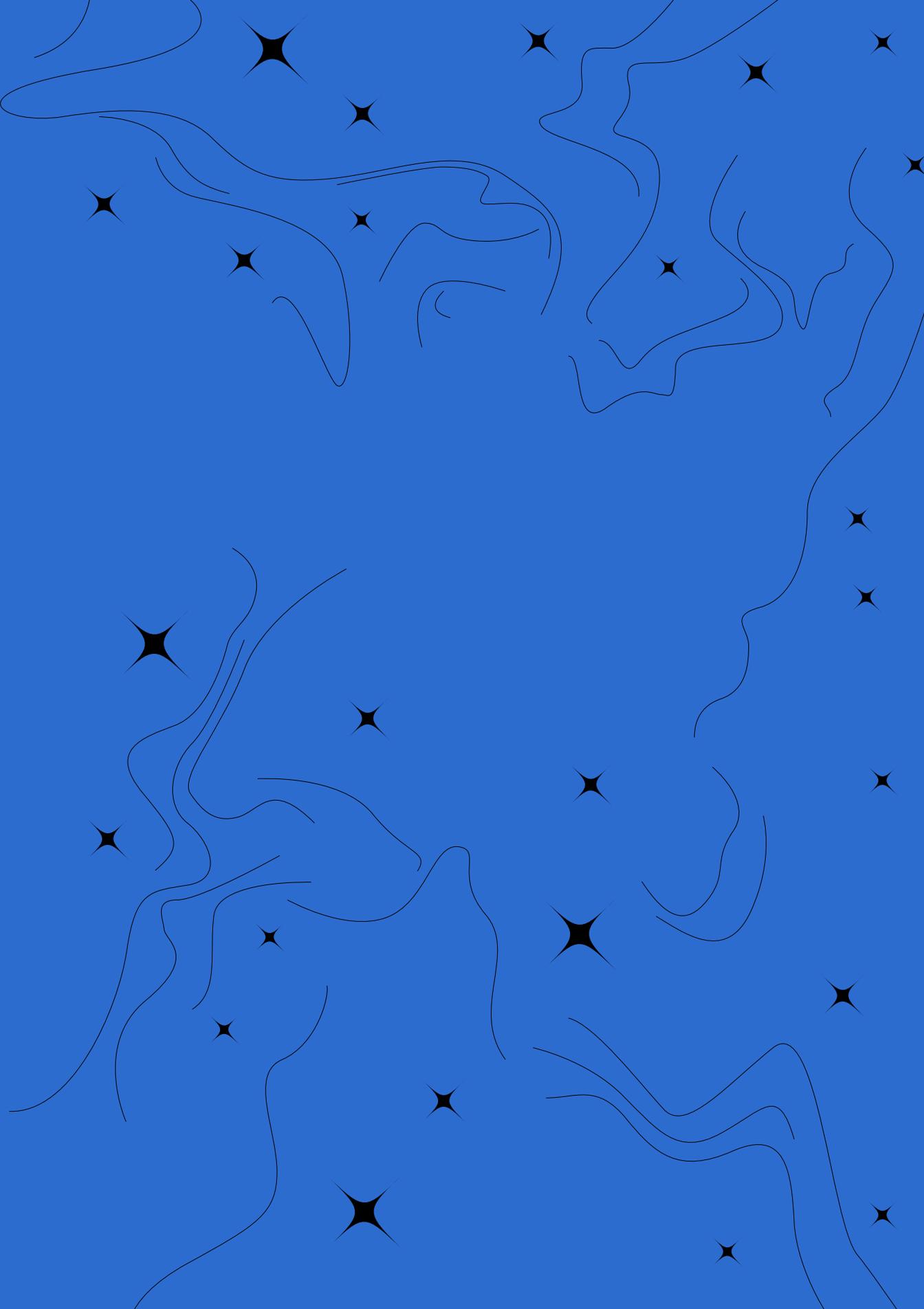
PAPER 4: MAIN AUTHOR

The paper identifies the possible functions of Xgoals in experience-focused design practices. As the first author, I reviewed the literature on the theories of design goals, conducted expert interviews, analysed the interview data, presented the key findings on the role of Xgoals in the design process, discussed the implications, and wrote the manuscript. The second author contributed to analysing the data and revising the manuscript.

Abbreviations

B2B	business-to-business
B2C	business-to-consumer
BX	brand experience
CX	customer experience
XFD	experience-focused design
HCI	human computer interaction
ISO	international organization for standardization
MMW	the mechanisms of meaning of work
PDF	positive design framework
PDFWORK	positive design framework for work tools
RQ	research question
SC	student case
UI	user interface
UX	user experience
VIP	vision in product design approach
XD	experience design
Xgoal	experience goal
UXgoal	user experience goal





1

Introduction

The vast majority of adults spend a considerable part of their waking life in working. The negative aspects of work, such as stress and burnout, workplace violence, job insecurity, and downsizing, remain the most popular topics for psychological study (Turner, Barling, and Zacharatos 2002). On the other hand, work can potentially provide people with positive experiences, e.g., excitement of achievement, enjoyment of belongingness, and balance of pleasure with self-regulation. These profound experiences boost human flourishing (Seligman 2011) at work and thus positively influence enterprise performance (Lips-Wiersma and Morris 2011, 129). The means to evoke these positive workplace experiences have been studied from the perspectives of psychology and organisational behaviour since the last century, e.g., work motivation (Herzberg, Mausner, and Snyderman 1959) and job satisfaction (Locke 1976). These studies have contributed to designing the specifications of solid contents, methods, and structures of work tasks. However, little attention has been paid to the impact of tools utilised for work on shaping positive workplace experiences: how satisfying, exciting, and meaningful the whole activity is portrayed to the employees by the particular kinds of features and attributes of tools (Savioja, Liinasuo, and Koskinen 2014). Therefore, new methods are required for tool design, especially as it concerns employees' desirable experiences at work.

Work tools are artefacts that industrial workers most frequently interact with in their professional lives (Kaasinen et al. 2015b). They include machines for producing the actual work outcome, devices for planning, controlling and reporting the work, and mediums for work-related communication. Work tools largely mediate experiences at work and therefore inevitably influence users' day-to-day well-being (Harbich and Hassenzahl 2017). In the business-to-business (B2B) heavy engineering industry, the functionality and usability of work tools are prioritised criteria when decision makers select tools for their employees (Nuutinen et al. 2011). Work tool design has thus focused on solving problems related to, e.g., safety, ergonomics, efficiency, ease of learning, and ease of use. This problem-led approach tries to prevent the potential negative effects, e.g., by removing those factors which are associated with worker discomfort or distractions and by lowering health risks which interfere with workers' capability to accomplish their work.

However, according to Herzberg's motivation-hygiene theory (Herzberg, Mausner, and Snyderman 1959), eliminating the existing problems of work tools can merely help in reaching a neutral "no trouble" status, whereas evoking desirable workplace experiences moves beyond neutralising the negative. Instead of immediately indulging in identifying and

solving problems, work tool design for meaningful experiences requires a possibility-driven approach that starts with new opportunity exploration for high-level goals (Hekkert and van Dijk 2011; Desmet and Hassenzahl 2012). The recent emerging field of experience-focused design (XFD), e.g., emotional design (Desmet, Porcelijn, and van Dijk 2007), experience design (Hassenzahl 2010), happiness design (Desmet and Hassenzahl 2012), positive design (Desmet and Pohlmeier 2013) and design for meaningful experiences (Jensen 2014), opens a new design landscape by prioritising profoundly experiential design objectives over utilitarian requirements. These approaches have advanced in design within the consumer product domain, especially in the field of leisure and entertainment (Bargas-Avila and Hornbæk 2011; Gruber et al. 2015).

The concept of the experience economy (Pine and Gilmore 1998) inspired companies to strengthen their brand competitiveness by offering compelling customer experiences. In recent years, digitalised service has expanded business competition from the quality and features of main products towards the overall experiential aspects of a company. This new trend brings out a new design orientation: to differentiate by designing for a distinct brand experience, customer experience, and end-user experience. In this sense, meaningful experiences at work provide work tool manufacturers with a valuable source for product and service innovation. In the work domain, design tool and tool-related service should systematically consider the experiences of customers who purchase the tool, the experiences of end-users who operate the tool, and that of other stakeholders who provide tool-related services.

This doctoral research is inspired by these movements and aims to transfer experience-focused design (XFD) from the business-to-consumer (B2C) world to the B2B world and from leisure products to industrial work tools. This doctoral research is situated in the field of design research and aims to take XFD ideology and practice as the foundation for new design knowledge creation. In the particular context of the Finnish B2B heavy engineering industry, this doctoral research emphasises the two main challenges of XFD: what kind of meaningful workplace experiences to aim for, and how to realise targeted experiences by designing work tools or work-related services. To address these two challenges, this dissertation primarily defines an experience goal (Xgoal) as the intended momentary emotional experience or the meaningful relationship/bond that a person has towards the designed product or service. An Xgoal describes the hedonic and eudaimonic attributes of the design outcome (Desmet and Hassenzahl 2012; Mekler and Hornbæk 2016). Ideally, a well-defined Xgoal is expected to evolve into concrete

design features that can evoke the targeted experience. Xgoals should communicate the targeted feelings to the whole design team so that the team can commit to the goals (Kaasinen et al. 2015b). Furthermore, this dissertation defines Xgoal realisation as the evolution from an Xgoal to a concrete concept expression in the design process.

In the setting of a hybrid academy-industry collaboration, the author of this dissertation has participated in the earlier design case studies that identify the key sources of setting Xgoals (Kaasinen et al. 2015b) and Xgoal utilisation in designing industrial systems (Roto et al. 2017). Most of the design cases reported in the study of Kaasinen et al. (2015b) and in that of Roto et al. (2017) commonly relate to new technologies for the complex industrial work domain. They rely heavily on an interplay between the rigorous analysis of user studies against psychological or social scientific theories. These theories, such as systems usability and core-task analysis (Savioja and Norros 2013), serve not only as scientific sources for proposing and evaluating Xgoals, but also as principles of structuring data analysis and translating Xgoals into specific design guidance (e.g., Karvonen, Koskinen, and Haggren 2012). These design cases underwent intensive and rigorous long-term research through the design journey; however, the design concepts seem to revolve around the existing core products and new technologies. Distinct from the studies above, this dissertation builds on design research and seeks designerly ways of evoking meaningful experiences at work. The proposed creative design approach aims to embrace all possible design outcomes, to welcome out-of-the-box ideas beyond the main products, and to start with meaningful experiences rather than a tool, a technology, or an existing problem (Jensen 2014).

This dissertation investigates Xgoal setting and realisation as a possibility-driven approach to designing for meaningful experiences at work. To be more specific, this research enquires into 1) the potential of Xgoals expanding the considered design space, 2) the means to setting meaningful work-related Xgoals, 3) the design strategies for evoking pride experiences at work, 4) the functions of Xgoals in the different design activities, and 5) Xgoals as designerly instruments. The first three research questions (RQ) are concerned with the context where an Experience-Driven Design course collaborated with the heavy engineering industrial companies, whereas the fourth is context-independent and the last is a cross-cutting RQ. The five RQs are formulated as follows:

RQ1: How can meaningful Xgoals expand the considered design space of professional tools?

RQ2: How can Xgoals be set in an experience-focused approach to designing for meaningful experiences at work?

RQ3: How can designers be helped in order to proceed from abstract Xgoals to design expression?

RQ4: How can Xgoals help designers in the different phases of the XFD?

Cross-cutting RQ5: Why and how do Xgoals work as designerly instruments?

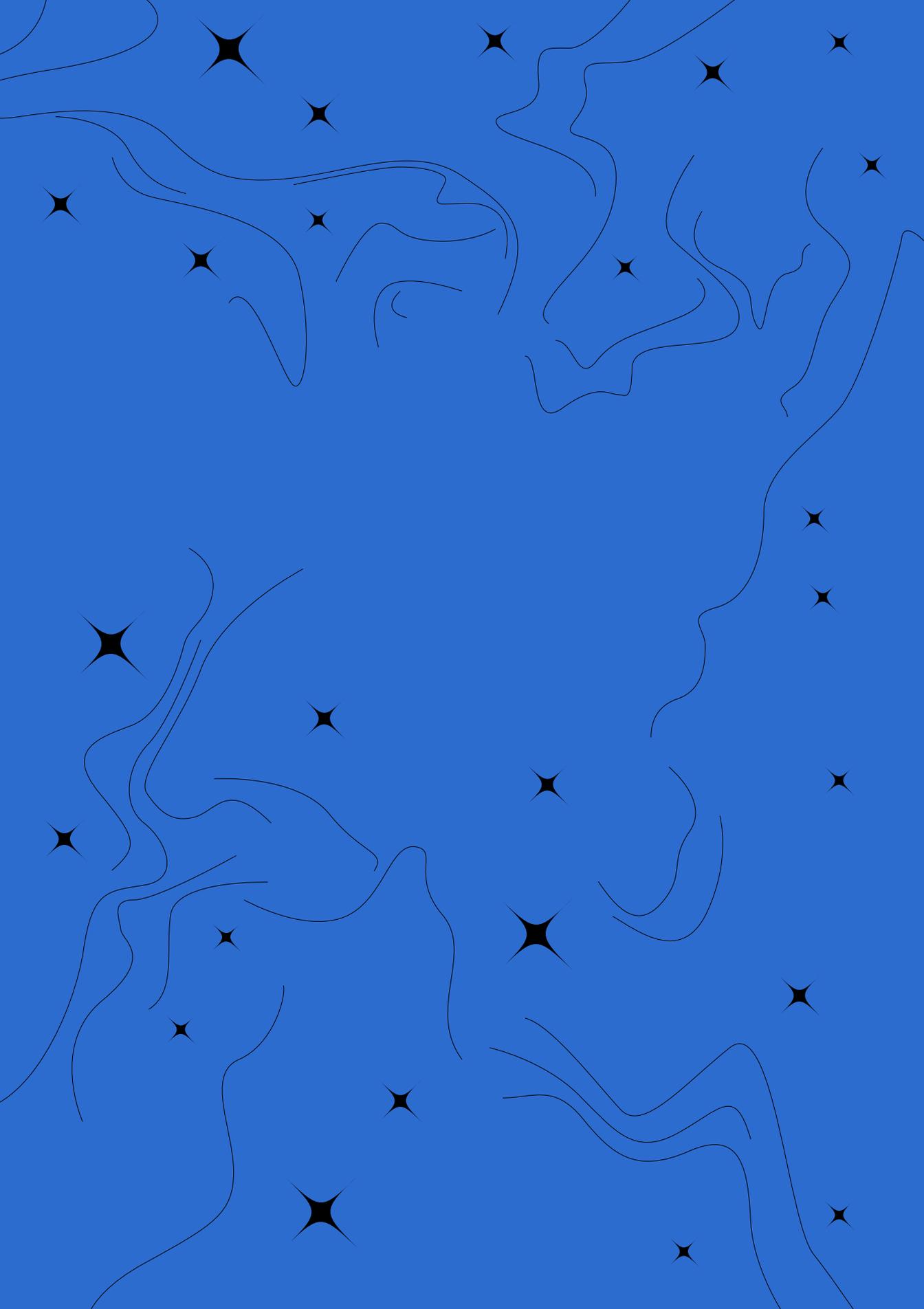
This doctoral dissertation is composed of four studies. **Studies I, II, and III** are based on data collected from the master's level course, Experience-Driven Design, that experimented with an Xgoal-directed design approach. This course lasted about six to eight weeks yearly during the years 2012–2015. In this course, the master's design students collaborated with heavy engineering companies on work tool design. The main source of data, the design reports, were considered to be a sort of solicited semi-structured document. The data source for **Study IV** were the researcher interviews on the function of Xgoal in the design process. This doctoral research focused on the data that addressed the challenges of Xgoal setting and utilisation in the design activities. Data analysis was executed by coding and categorising data on Xgoal setting and utilisation as reported in the design reports and the interview transcripts.

Study I presents three case studies and addresses why designers need to set Xgoals, and suggests Xgoal setting can elicit the in-depth reasons for design and therefore reframe and expand the considered design space. **Study II** tackles what profound workplace experiences are and how to concretise experience goals, resulting in a positive design framework for work tools. **Study III** focuses on designing for pride in the workplace, and extracts the specific design strategies from the theoretical and practical findings. **Study IV** presents the experts' insight into the use of Xgoal in design. From the top to bottom perspective, this study provides designers with interdisciplinary theoretical insights on meaningful workplace experiences and uncovers which experiences can be designed for. Meanwhile, from the bottom to top perspective, this study presents design strategies and implications that are identified from

the Xgoal-directed design projects. By combining these two perspectives as the research strategy, this dissertation builds on the knowledge of design for meaningful workplace experiences.

To sum up, this dissertation aims to contribute to design for human flourishing in the workplace by introducing XFD orientation into the Finnish heavy engineering industry. This doctoral research recognises that solving problems and offering a no-error state of neutrality can hardly trigger employees' intrinsic motivation and flourishing at work. Hence, this dissertation proposes a possibility-driven Xgoal-directed design approach and facilitates the change of design orientation from traditional problem solving towards possibility seeking, and therefore uplifts design vision from tool utility towards meaningful experiences at work.

This article-based dissertation contains six chapters. Chapter One identifies the research gap, introduces the research aims, research questions, and research strategy, and summarises the main contribution of this dissertation. Chapter Two establishes the theoretical framework for Xgoal definition and realisation in design. Chapter Three describes the approach and methods utilised in this research, followed by Chapter Four that presents the results of the four studies. Chapter Five provides the answers to the research questions, discusses the insights from the literature and the results. The last chapter outlines the conclusion and points out the possible paths for future research.





2

Related work

This chapter presents the basic theories that underpin experience goal (Xgoal) setting and utilisation in experience-focused design practice. First, it introduces meaningful experience as the prioritised goal which enables possibility-driven design. Then, it summarises the existing approaches to designing for experiences. Finally, it narrows down the focus to XFD for professional tools in the heavy engineering industry.

2.1 Experience as the prioritised design goal

In recent years, design has shifted the focus from pragmatic goals towards experiential goals. Exploring the history of the design method movement may uncover various approaches to design goal setting and utilisation in the design process.

2.1.1 DESIGN AS A GOAL-ORIENTED PROCESS

Design is generally regarded as a set of purposeful, creative, and complex human activities. In contrast to a design as “a representation of the state of the product being designed” (Reymen 2001, 46), Reymen specifies designing as “the activity of transforming the state of the product being designed or of the design process into another state towards the design goal” (ibid.). Designing has been recognised as a process in terms of, for example, exploration, learning, reasoning, making decisions, solving problems, creating possibilities, and transforming situations. Despite these different perspectives on designing, they share the viewpoint that design primarily refers to a goal-oriented process (Simon 1996; Friedman 2003). Indeed, the purpose and planning towards desired outcomes are at the core of the design process (Friedman and Stolterman 2015).

Design goals provide the focus for design practice. On this point, Erbuomwan et al. (1996) define design goals as the purposes for design actions and decisions taken in each design step. Design goals are commonly not explicit in the beginning, and they can evolve through conceiving, planning, and making in the design process (Buchanan 2001). In turn, the progressive goals guide the situated choice of design activities and push forward the design progress (Mostow 1985). Regardless of the goal-related issues, e.g., how to handle the interaction between different goals in the design process (ibid.), discerning desirable goals and creating conditions to reach the goals are an essential demand for the success of design (Friedman 2003).

For designers, it is commonly challenging to maintain a balance between radical openness and goal-directedness in the goal transformation from the abstract and vague into the concrete and explicit. As Dorst (2015b, 43) points out, “*an essential part of the design process is making educated guesses when proposing solutions*”, but “*design ultimately needs to be rigorous in its approach if it is to deliver results for the real world.*”

According to Dorst (1997), to maintain this balance addresses a *method* in the designers’ madness (Cross 1996), and it implies two fundamentally different paradigms of design methodology. Respectively, the *method* refers to the paradigm of goal-directed rational problem solving, whereas the madness can be explained by the paradigm of reflective “knowing-in-action” practice (Schön 1983).

2.1.2 DESIGN GOALS IN THE DESIGN METHODS MOVEMENT

Design goals play the primary role in design method selection and utilisation. The key movements in the historical development of design methodology may shed light on the significance of design goals in design approaches. In the last fifty years of design research, three major intellectual waves can be identified: from technical-rational problem solving to reflective practice and second-generation design methods, and then to designerly ways of knowing (Rodgers and Yee 2016).

The first wave of design research started in the 1960s and was labelled the “First Generation Design Methods” movement by Rittel (1984). This movement originated from the scientific techniques and approaches to problem solving, management and operational research in 1950s, and aimed at developing scientific design knowledge as well as a systematic approach to the management of the design process (Bayazit 2004; Cross 2001). Many linear, step-by-step models of the design process were explored in this movement, and they share the common notion that the design process is comprised of two distinct phases: problem definition and problem solution (Buchanan 1992, 15). In the phase of problem definition, designers analyse the problem, determine all of its elements, and specify all of the necessary requirements for a successful design solution (ibid.). In contrast, problem solution is a synthetic sequence in which designers combine and balance the various requirements against each other, yielding a final plan to be carried into production (ibid.). This technical-rational design process was involved in the development of computer programs for problem solving in the 1960s (Cross 2007). According to Dorst (1997; 2015b), Herbert Simon’s work *The Science of*

the Artificial forged a link between classic design methodology and the problem-solving theories from computer science and psychology. From the positivistic view of science, Simon regards design as a goal-directed and information searching course for achieving a satisfactory solution through structured means-ends analysis (Simon 1996, 121). Furthermore, Dorst (2015b, 185) points out that rational problem solving as one of the fundamental design methodology paradigms allows for a structured working process to achieve preconceived goals in the most efficient manner.

Although the first-generation design methods suggest a methodological precision and logical consistency in the design process, the first wave was criticised as an oversimplification of the actual design sequence and immature consideration of real-life design problems (Buchanan 1992). The second wave of design research dating from the 1970s reacted against the prescriptive nature of the first-generation design methods (Rodgers and Yee 2016). Two notable streams emerged out of the second wave of design research: one is Donald Schön's pragmatist theory of reflective practice, and the other is Horst Rittel's post-positivist second-generation design methods (Feast 2015; Rodgers and Yee 2016). From the perspective of pragmatism, Schön (1983) depicted design as a reflective conversation with the situation, where "design knowledge is knowing in action, revealed in and by actual designing" (Schön 1992, 3). Schön criticised Simon's approach in that it only fit to well-defined and conventional problems whereas designers are often faced with uncertain, ill-defined, complex, and incoherent problems (Schön 1987). Furthermore, Schön (1983) proposed to establish "an epistemology of practice implicit in the artistic, intuitive processes which [design and other] practitioners bring to situations of uncertainty, instability, uniqueness and value conflict." Similarly, Rittel rejects the step-by-step model of the design process. He understands designing as an argumentative process that is driven by debate among participants, and their different world-views and judgement contribute to a comprehensive understanding of design issues (Rittel 1984).

The third wave of design research moves away from positivistic models and scientific approaches and acknowledges design as a distinct discipline (Rodgers and Yee 2016). Faced with contemporary global issues, state-of-the-art design research adopts a wide range of conceptual, methodological, technological, and theoretical approaches in various forms, which contribute to the development of "designerly ways of knowing" (Cross 2006; Rodgers and Yee 2016).

These waves of design research indicate different approaches to design goal setting and utilisation in design practices for the various

subjects of design. The design methods of the first generation are influenced by engineering design orientation. They suggest that design goals are equivalent to specific requirements and should be clarified at the starting point of the design process. The second wave of design research starts to pay attention to those who are involved in the design. The design methods of the second wave reveal that design goals are engaged with both individual cognition and collaborative intelligence, and that goals develop with designers' growing knowledge of design issues. The third wave of design research suggests a plural and balanced view on setting design goals that can facilitate a creative and transformative intervention for a meaningful life.

2.1.3 WHAT IS EXPERIENCE

Experience as a concept has been investigated from many perspectives. From the perspective of a naturalistic pragmatism, Dewey (1934, 256) views experience as the intertwining of “subject” and “object”:

“Experience is a matter of the interaction of organism with its environment, an environment that is human as well as physical, [...] The organism brings with it through its own structure, native and acquired, forces that play a part in the interaction.”

Inspired by Dewey's holistic approach to experience, applied disciplines strive to define specific cases of experience regarding the interaction between human beings and their environments, although experience is rarely defined in a systematic way (Skeggs 2011). Cupchik and Hilscher (2008, 244) study the contributions of phenomenology to experience, and indicate that

“...experiences have a holistic property, take place in real time, involve an interaction between person and object, and result in the objectification of expressive meaning into an aesthetically structured artefact.”

In the research field of human-computer interaction, the early work (Law et al. 2009; Hassenzahl 2010) discusses the crucial properties of experience with interactive products: it is subjective but traceable via the psychological process; it is holistic in the integration of perception, action, motivation, and cognition; it is situated due to the particularity of place and time; it is dynamic and influenced by order and timing. According to ISO 9241-210, user experience is defined as “a person's perceptions and responses that result from the use or anticipated use of a product, system or service.” User experience embraces “all the users' emotions, beliefs, preferences, perceptions, physical

and psychological responses, behaviors and accomplishments that occur before, during and after use" (ibid.).

In marketing research, Meyer and Schwager (2007, 2) define customer experience (CX) as *"the internal and subjective response customers have to any direct and indirect contact with a company."* CXs are evoked at "touch points" that are "instances of direct contact either with the product or service itself or with representations of it by the company or some third party" (ibid.). Similarly, Brakus, Schmitt, and Zarantonello (2009) conceptualise brand experience (BX) as subjective consumer responses that are evoked by specific brand-related experiential attributes.

In design research, Schifferstein and Hekkert (2008, 2) draw on psychology and define product experience as "the awareness of the psychological effects elicited by the interaction with a product, including the degree to which all our senses are stimulated, the meanings and values we attach to the product, and the feelings and emotions that are elicited." Furthermore, Battarbee (2004, 109) expands the concept of product experience and user experience from the interaction of a single person and a product towards co- experience that is "the seamless blend of user experience of products and social interaction."

Experience remains a complex, elusive but open and rich concept, and hardly fits into a framework of any discipline completely and exhaustively (Battarbee and Koskinen 2008). Thus, this dissertation aims at the contributing to creative possibility-driven design and embraces holistic and open-minded perspectives on experience. This dissertation follows the definition of experience from Merriam-Webster Dictionary: *"something personally encountered, undergone, or lived through."*

The holistic and complex nature of experience makes it tricky to operationalise and guarantee a certain experience as a design outcome (Sanders and Dandavate, 1999; Wright, McCarthy, and Meekison 2003; Preece, Rogers, and Sharp 2015). Hence, experience cannot be directly designed. However, designers can create the conditions to evoke a certain experience (Preece, Rogers, and Sharp 2015, 12). Experiences can be conceptually categorised and analysed according to different theories. The elements that contribute to certain type of experiences can be identified and made reproducible, thus experience can be designable by creating the optimal conditions for the key elements (Shedroff 2001).

2.1.4 THINK EXPERIENCE FIRST

The concept of a product to be designed has been enormously expanded towards the full range of domains through the twentieth century: from

physical artefacts, e.g., the outcome of engineering, industrial design, and architecture, to any result of creative work (Buchanan 2009, 409), e.g., complex sociotechnical systems (Norman and Stappers 2015). Correspondingly, the concept of designer has expanded to “any individual whose work involved forethought in the conception and planning of any aspect of the human-made world” (ibid., 409-410). Buchanan (2009) identifies the Four Orders of Design that reflects the fundamental problems addressed in designers’ work (410):

“... communication through signs and symbols; construction and fabrication of artefacts at any scale; deliberation in planning actions, activities, services, and processes; and integration or systematization in encompassing wholes, e.g., social organizations, physical, human, and symbolic environments, and cultures.”

Exploration of the Four Orders of Design suggests an increasing complexity in the subject matters of design because signs, artefacts, actions, and organisation are “not only interconnected, but also interpenetrate and merge in contemporary design thinking” (Buchanan 1992, 10). This understanding expands the traditional view of design as focused on one single order, and therefore calls for a holistic approach to design. For example, when designing for a mobile phone, designers need to explore the ecology and culture of a company brand (organisation), the interactive means to the usage of the mobile phone (action), the integration of aesthetics and engineering for the mobile phone form (artefact), and the information communication for icons of the interface (sign). The expansion of opportunity for design concerns “design right things” rather than “design things right” (Suri 2003). Importantly, each order of design provides a channel between the designed world and human experience, and results in experiential outcome. Experience is the common element within all Four Orders of Design. It makes sense that conceptually putting people and their experience at the core of the designers’ attention is a simple way for idea organisation and integration (ibid.).

Design for evoking a certain type of experience is an ancient practice; rituals, ceremonies, dramas, architecture, and media share the importance of experiential expression with design (McLellan 2000). The value of experience in relation to design first attracted marketing studies in terms of customer experience and brand experience, e.g., how to get customers to sense, feel, think, act, and relate to a company and brand (Holbrook and Hirschman 1982; Schmitt 2000). Pine and Gilmore (1998) recognise compelling experiences as a competitive offering for connecting customers, consumers, and employees, and also for securing their loyalty.

The emergence of the computer as a consumer product echoed the experience economy (ibid.), and experience has been the keyword in the third wave of HCI that is after the first wave of designing for human factors and the second of designing for human actors (Bødker 2006; 2015). The focus on experience has been recognised as a new design perspective and a new type of design content in interaction design practice that changes the task-oriented and problem-solving approach in traditional HCI (e.g., Preece, Rogers, and Sharp 2015). Besides, many companies, e.g., IBM, Microsoft, Apple, and many design consultancies have adopted the language of experience in the last twenty years (Blythe et al. 2006). Companies have started to utilise designerly approaches to developing consistent expressions of their brand through customer experiences of the multiple touchpoint interactions in the designed world (Suri 2003).

From a psychological perspective, Hassenzahl identifies several key reasons to consider experience as a design objective. First, experiences make people happier than material possessions because experiences are closer to the Self and can be positively reinterpreted as retrospective summaries of the past (Van Boven and Gilovich 2003). Second, experiences provide meaning to actions and situations, thus motivate future activities (Hassenzahl 2010; 2013).

Recently, inspired by the theory of positive psychology (Seligman and Csikszentmihalyi 2000), the orientation of design has shifted from preventing pain towards promoting human flourishing (Desmet and Pohlmeier 2013), from material sufficiency towards experiential value (Pohlmeier 2012), from utility and usability towards hedonic and eudemonic aspects of use (Mekler and Hornbæk 2016), from immediate response towards long-term impact (Roto et al. 2011), and from designing solutions towards designing possibilities (Desmet and Hassenzahl 2012; Jensen 2014). In line with this new design orientation, the arguments, e.g., “take an intended user experience as the primary objective of a design process” (Hekkert, Mostert, and Stompff 2003), “think experience before product” (Hassenzahl 2010), make experience a prioritised goal of design and uplift the design mission towards experiential vision.

2.2

The approaches to experience-focused design

Nathan Shedroff (2001) perhaps first introduced the term experience design as an approach to all design, including products, services, environment, and events. Experience design can therefore be assumed as “a blanket term describing the collective activities of multiple design practices including, but not limited to, design research, interaction design, visual design, industrial design, interface design, (information) architecture, and many more” (Wendt 2015). Experience design focuses on the quality and enjoyment of the total experience (Norman 2013). Experience is of significance in design goal setting in the early stage of design.

Design approaches, e.g., emotional design (Desmet, Porcelijn, and van Dijk 2007), experience-based design (Bate and Robert 2007), experience-centred design (Wright and McCarthy 2010), experience-driven design (Desmet and Schifferstein 2011), positive design (Desmet and Pohlmeier 2013), experience design (Hassenzahl 2010), and design for meaningful experiences (Jensen 2014), prioritise worthwhile experience goals over material-level requirements. This dissertation defines experience-focused design (XFD) as an umbrella term to refer to all above design approaches that uplift and centralize the targeted experiences in the design process and in the design outcome.

During the past two decades, a variety of frameworks from different disciplines (e.g., psychology, sociology, engineering, and HCI) contribute to a fundamental and broad understanding of experience and provide tools for XFD. Shifferstein and Hekkert (2008) make a first attempt to integrate several different areas of experience research with a focus on product and service, excluding artistic work (Figure 2.2.1). They point out three perspectives of existing experience research: human-oriented (e.g., senses, capacities, and skills), interaction-oriented (e.g., the aesthetic experience, the experience of meaning, and the emotional experience), and product-oriented (e.g., experiences of digital products, non-durables, and environments) (*ibid.*). The design implications and guidance addressed in the scientific evidence of the experience research provide rational approaches to theory-inspired design for experiences. They increase the possibility that a deliberately shaped intervention will trigger the targeted experience.

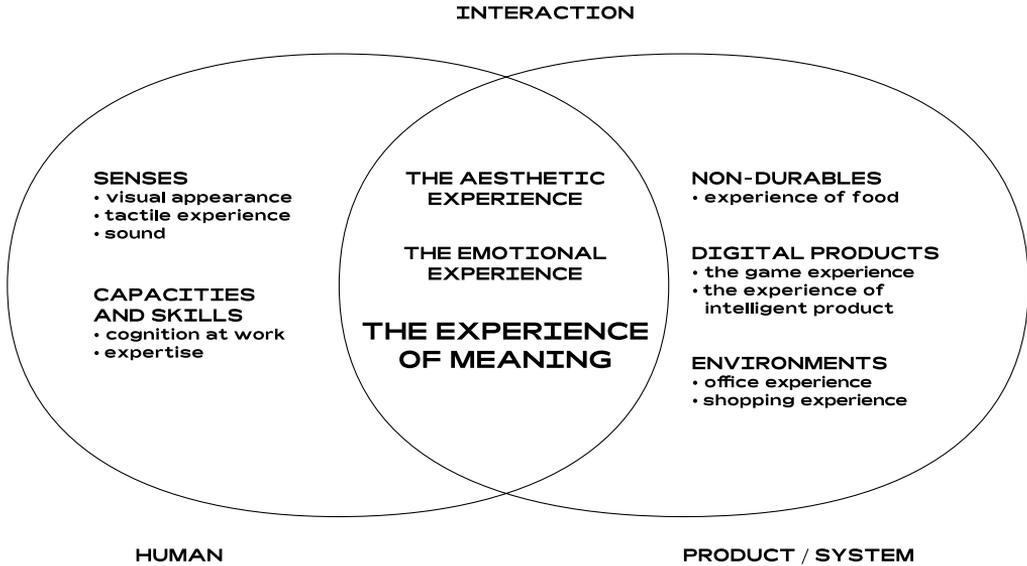


Figure 2.2.1 The scope of experience research according to Schifferstein and Hekkert (2008)

Human-oriented experience research emphasises and product-oriented experience research narrows the starting point of design to either a specific type or aspect of user/product; therefore, it may limit the possibilities of the design outcome. The uniqueness and challenge of XFD approaches is to think experience first and then the means to such an experience (Desmet and Schifferstein 2011). XFD places experience before functionality and technology, leaving behind oversimplified calls for ease of use, usability, or shallow beautification (Hassenzahl 2010). In other words, it ideally opens the final design results for anything and for anyone related to the design context and the targeted experience. It makes sense that XFD has a stronger connection with interaction-oriented experience research theories that directly pinpoint experience throughout the interaction (Forlizzi and Battarbee 2004).

Based on Dewey's work (1934), Forlizzi and Ford (2000) propose the building blocks of experience for interaction designers to explore the dimensions of experience: sub-conscious, cognitive, narrative, storytelling experiences, and the shifts between them in relation to the state of the experience, encounter of an experience, and experience as story. Forlizzi and Battarbee (2004) further specify three types of experience: experience (i.e., the constant stream of "self-talk"), an experience (i.e., it is about a coalesced, memorable, and completed story), and co-experience

(i.e., it is about shared experiences in social contexts). Their clarification of experience paves the way for several UX framework developments based on the process, sequences, or temporality of experience. Mäkelä and Fulton-Suri (2001) provide a conceptual model of user experience, highlighting that the present experience is influenced by the user's previous experiences and expectations, and the present experience influences future experiences and modified expectations. Hiltunen et al. (2002) present the user experience cycle in which expectation is an important building block. From the perspective of continuous user experience, Pohlmeier (2011) propose the Continuous User Experience Lifecycle Model with an emphasis on the usage situation, which shares the ideology with the Time Spans of User Experience (Roto et al. 2011). Karapanos et al. (2009) investigate user experience over time and identify the three phases of product adoption: an initial orientation driven by the qualities of stimulation and learnability, a subsequent incorporation of the product into daily routines, and finally a phase of increased identification with the product. These temporality-based experience frameworks extend the designers' focus from in-use phase towards the whole experience time span and product lifecycle.

Besides temporality-based experience frameworks, there are also an increasing number of studies focused on the meaning of experience as the starting point of design. The inquiry into the in-depth meaning of experience explores what really matters to humans, deliberates for a definition of a design vision, and directs designers to a possibility-driven experiential outcome (Desmet and Hassenzahl 2012). Similarly, Jensen (2014, 39) argues that the possibility-driven approach “starts—and ends—with human experiences” and design for experience at a more profound level can lead to a new opportunity design area where a problem-driven approach can hardly reach.

2.2.1 BE-GOALS, DO-GOALS, AND MOTOR-GOALS

Inspired by self-regulation theory and activity theory, Hassenzahl (2010, 44) offers a model of user experience, a three-level hierarchy of goals, which facilitates goal setting in experience design (Figure 2.2.1.1). Experience design should start with “why”, namely, be-goals, which are on the top level of the hierarchy and address the motives of activity as well as in-depth meaning. The study by Hassenzahl, Diefenbach, and Göritz (2010) indicates that universal psychological needs are sources of be-goals, e.g., competence, stimulation, relatedness, autonomy, popularity, meaning, security, and physical striving. Need fulfilment contributes to

the profoundness of experience and happiness (ibid.). Similarly, inspired by Heidegger's thoughts on phenomenology, Wendt (2015) understands design of experiences as design for Dasein, which means maintaining the sense of situatedness of Being. Wendt (2015, 18) further points out that people are constantly acting towards a future goal driven by Being, and thereby designers should have the end users' future goals in mind. After defining top-level be-goals, designers move to the middle level of the hierarchy, setting pragmatic do-goals for "what" action that address a concrete outcome, e.g., cook a meal. On the lowest level is motor-goals that refer to the "how" of operation, e.g., touch a button on an oven.

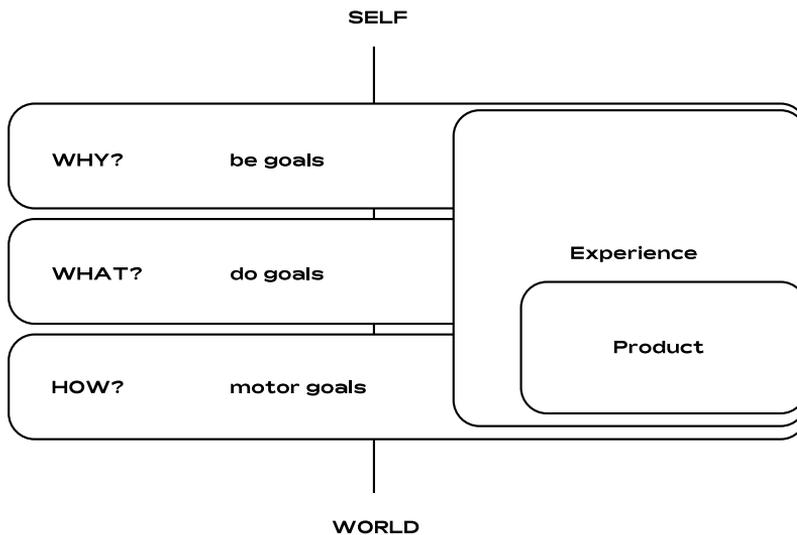


Figure. 2.2.1.1 A three-level hierarchy of goals (Hassenzahl 2010, 12)

Experience permeates these three levels of goals. Traditionally, interaction design emphasises much on the *motor-goals*, e.g., how to operate an oven, and accordingly the experiential objectives of this level is commonly like feeling safe and easy to use. *Motor-goals* are highly related to usability. Experience of this level is close to aesthetic experience (Desmet and Hekkert 2007) that results from multi-sensory impressions and interaction quality. Product design normally starts with *do-goals*, which relates to the defined activity and functionality, e.g., baking a cake in a microwave oven. Experience of the *do-goal* level can be desirably useful or convenient.

Experience design first thinks about the meaning or impact of an experience, which relates to value, need, or in-depth reason for having such an experience, e.g., being healthy (the reason to make a salad).

Designing with *motor-goals* and *do-goals* normally results in experiences of the pragmatic attributes of a product whereas designing with *be-goals* underscores experiences of profound meaning elicited from an activity. The three-level hierarchy of goals provides a structured approach to designing for experiences at different levels. Similar theories to the different dimensions of experience can be seen in other design theories. For example, Norman (2004) provides an emotional design framework including the level of viscera, behaviour, and reflection. Jordan (2000) identifies four pleasures, i.e., physio-pleasure, psycho-pleasure, socio-pleasure, and ideo-pleasure. McCarthy and Wright (2004) uncover four threads of experience, i.e., sensorial, emotional, spatio-temporal, and compositional. Jensen (2014) shows three dimensions of an experience: product, action/relations, and meaning. These theories commonly address both pragmatic aspects and meaningful aspects of experience.

The notion to prioritise “why” as an experience design goal corresponds to the Vision in Product design approach (ViP) that shifts away from thinking about what product to design towards unearthing the underlying reasons for product existence (Hekkert and van Dijk 2011). This approach first deconstructs the expression, interaction, and context of the existing product by questioning “why is this design the way it is” (ibid., 135) and then envisions the future context, human-product interaction, and lastly new product.

2.2.2 POSITIVE DESIGN

To address the high-level design goal, *happiness*, Desmet and Hassenzahl (2012) propose possibility-driven design with two strategies: one is designing for “pleasurable-life/hedonism” while the other is designing for “good-life/eudaimonia.” This is an alternative to the traditional problem-driven approach. Problem-driven design primarily focuses on avoiding, removing, or neutralising the negative rather than directly focusing on positive experiences (ibid.). Instead, possibility-driven design targets the transition from neutral to positive.

Furthermore, Desmet and Pohlmeier (2013) drew inspiration from positive psychology and developed the positive design approach. Positive psychology shifted the research focus from preoccupation with healing towards optimal human function and flourishing (Seligman and Csikszentmihalyi 2000). Flourishing is the ultimate goal of positive psychology

in well-being theory. Five fundamental and distinguishable elements of well-being (PERMA) can be considered as the indicators for human flourishing: Positive emotion, Engagement, Relationships, Meaning and Accomplishment (Seligman 2011). Accordingly, the positive design approach uplifts the design goal towards human flourishing (ibid.). Thus, the Positive Design Framework contains the three main components of subjective well-being: pleasure, personal significance, and virtue.

Design for **virtue** is to design for virtuous behaviour. It implies a normative distinction between what is good and what is bad, which is independent of what we might enjoy or strive for. Design for **personal significance** is focused on one's personal goals and aspirations that last for a period; it can also be derived from the awareness of one's past achievement or from a sense of progress towards a future goal. Design for **pleasure** is to design for momentary enjoyment, with a focus on the here and now, the presence of positive affect and the absence of negative affect. Subjective well-being can be independently stimulated by each of them; design for flourishing is at the intersection of all three ingredients (see Figure 2.2.2.1).

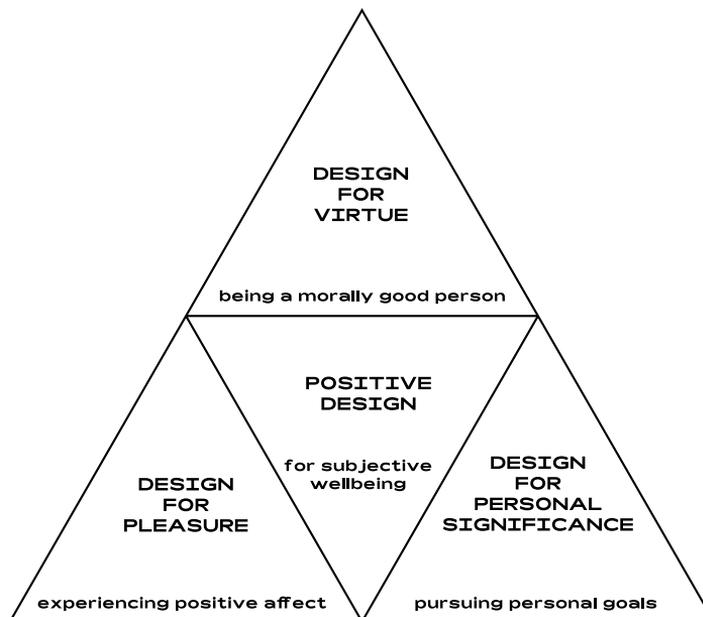


Figure 2.2.2.1 Positive Design Framework (Desmet and Pohlmeier 2013, 7)

Taking a similar position as Positive design, the Positive computing framework (Calvo and Peters 2014) provides theories, strategies, methods, and measures according to three types of well-being factors: self-factors (e.g., positive emotions, motivation and engagement, self-awareness, mindfulness, and resilience), social-factor (e.g., gratitude and empathy), and transcendent (e.g., compassion and altruism).

2.2.3 EXPERIENCE PATTERN

The presented multi-disciplinary theories support the understanding of the multiple facets of experience, and highlight sources for setting profoundly experiential goals. However, the second challenge of XFD, namely, how to create conditions for a targeted experiencer to hold an intended experience remains to be demystified. More specific and easily understood design guidance is required for directly supporting XFD practice. Shedroff (2001, 9) proposes to build taxonomies of experiences and to encourage designers to explore what makes various experiences distinct and special. Hassenzahl shares the notion of experience categorisation and asserts that although experiences vary in different situations, the core of the experience remains the same (Hassenzahl 2010). Hassenzahl et al. (2013) suggest using the psychological needs for understanding and categorising experiences, and introduce "experience patterns" as a conceptual tool to distil the core of an experience for inscribing it into artefacts (Hassenzahl 2010):

"Experience patterns attempt to condense seemingly complex positive experiences into a minimal set of crucial insights. This set is then sufficient to explain why people enjoy experiences of this type. By that, it becomes a blueprint of various positive experiences and serves as a 'moulding form' for shaping an experience."

Patterns can be derived from analytical summaries of empirically gathered positive experiences or a few autobiographical experiences or taken from fiction (Hassenzahl et al. 2013). Bate and Robert (2007) consider patterns as design principles, i.e., "immediate feedback" is a key pattern for entry and exit experiences in the healthcare environment. The minimum requirement for a quality experience pattern is to have a clear scope, to face validity, and to be recognised and affirmed by the user of the pattern (Hassenzahl 2010, 71). Experience pattern awareness, abstraction, and application lie at heart of experience design (ibid., 19).

Inspired by the creation and application of experience patterns (Hassenzahl 2010; 2013), Zeiner et al. (2016) present experience categories as

a UX approach towards designing for positive experiences with technology at work. Experience categories were extracted from the experience interview data and afterwards facilitate design for new experiences (ibid.). Similarly, Väänänen-Vainio-Mattila et al. (2015) call for matured understanding of the types of experiences and means to enabling experiential design objectives with ubiquitous computing systems. They propose a framework for designing and evaluating ubicomp systems with a desirable set of target experiences. They pinpoint the need of establishing the relationships between UX-related designable factors and features and that of linking them with the design process (ibid.)

2.3 Experience goal in designing for meaningful experiences at work

Experience-focused design (XFD) aims to prioritise experiential objectives in the design process. Hartson and Pyla (2012) list "goal-directed" as the first guiding principle for UX practitioners. More importantly, designers should keep focused on the intended experience and experiential translation in concept development. However, the elusive and complex nature of experience makes it difficult to consistently address the experiential goals and requirements in design practice. The problem of omission or poor formalisation of UX requirements limits the success of projects (Convertino et al. 2015). Hence, explicit formalisation and communication of experiential knowledge are needed to facilitate experiential goal realisation in design outcomes. To elucidate this, this section introduces experience goal (Xgoal) as a conceptual tool in design practice.

2.3.1 USER EXPERIENCE GOAL

The first challenge and key prerequisite of XFD is to clarify what kind of experience to design for (Desmet and Schifferstein 2011). The intended experience is the primary design goal in the XFD (Hassenzahl 2010). The user experience goal was first mentioned in the statement by Forlizzi and Ford (2000, 419) "designers need to demystify how we design for user experience and how the products we design achieve specific user experience goals." Karvonen et al. (2012b) argue that user experience goals (UXgoals) describe the experiential qualities which the product design should aim at. UXgoals and their associated design implications

should be meticulously defined in the early stage of design, then guide product development in different phases, and establish traceable and inherent links with each design solution (*ibid.*). Hartson and Pyla (2012, 362) define UXgoals as high-level objectives for interaction design which are expressed as desired effects to be experienced in usage. To make UX evaluation convenient, they developed a UX target table from a usability specification table (Whiteside et al. 1988). Their table specifies the UX measure, measuring instrument, and UX metric for each UXgoal (Hartson and Pyla 2012, 363). Although they exemplify engagement and attraction as UXgoals, most of their listed UXgoals seem usability-oriented, e.g., ease-of-use, power performance for experts, and learnability for new users (*ibid.*).

Preece, Rogers, and Sharp (2015, 23) differentiate between UXgoals and usability goals: “[User experience goals] differ from the more objective usability goals in that they are concerned with how users experience an interactive product from their perspective, rather than assessing how useful or productive a system is from its own perspective.” Usability goals can be derived from at least the following three aspects: effectiveness, efficiency, and satisfaction (ISO 9241-210). These goals guide designers to define precise user requirements for functionalities accordingly (Kaasinen et al. 2015b). In contrast, UXgoals are subjective qualities and are concerned with how a system overall feels to a user (Preece, Rogers, and Sharp 2015).

There seems to be no universally applicable framework for UXgoal setting (Kaasinen et al. 2015b). On the other hand, it is also somewhat risky to merely rely on one single UX framework because any framework includes its theoretical backing that potentially limits the plurality of experience. To support the multidisciplinary character of UX, Kaasinen et al. (2015b, 983) propose five different approaches to acquiring insight and inspiration for UXgoal setting: “1) company or brand image, 2) scientific understanding of human beings, 3) empathic understanding of the users’ world, 4) possibilities and challenges of a new technology, 5) reasons for product existence and envision of renewal.” To combine multiple UXgoal-setting approaches together embraces all the viewpoints of different stakeholders, thus committing them to UXgoal setting and utilisation in design practice, and emphasising UX as a strategic design decision (*ibid.*). According to the results of the two UXgoal workshops (NordiCHI 2012, 2014), the most utilised source of insight and inspiration in defining experience goals is empathic understanding of the users’ world. Furthermore, Varsaluoma et al. (2015) propose a model for an Experience Goal Elicitation Process to clarify the fuzzy front end of

XFD as well as instructions to support designers in defining and evaluating experience goals.

2.3.2 EXPERIENCE GOAL

The open definition and multiple facets of experience qualifies experience as a goal to start with in a possibility-driven design approach. To reach the utmost openness of XFD, this dissertation argues for expanding the scope of the end user-product interaction in the existing context by questioning the “why” of an experience. The profound “why” should direct the sub-goal setting and utilisation in the design process. For example, when designing for a coffee-related experience, designers should not immediately fix the interaction between one person and coffee machine in terms of good taste, convenience, and effectiveness. Rather, they need to think about why people need coffee, to have a refreshing beverage before work or to have a relaxing moment with families. They are two distinct reasons and hence result in two different experiences. If targeting the latter, then the experience to design for is a family co-experience of coffee time, which may be highlighted by manually brewing coffee together. Consequently, the design outcome for making coffee together can be totally different from that of design for automation coffee-making in a rushed morning. Starting with the “why” of an experience prevents designers from predefining whom and what to design for in the first place and releases the preconceived concepts of user and product. The high-level “why” shifts the original design focus from single user-product interaction towards the systematic consideration of multiple stakeholders in the entire product-service system. Therefore, XFD includes not only the end-user experience (UX) of the main product, but also the customer experience (CX) of service touch-points and the overall experience of a brand (BX).

This dissertation introduces the experience goal (Xgoal) as the intended momentary emotion or the meaningful relationship/bond that a person has with the designed product or service. It not only refers to momentary “experiencing” in operation and action levels from a hedonic perspective but also stresses the long-term experience that addresses in-depth meaning from a eudaimonic perspective (Mekler and Hornbæk 2016). Traditionally, the design goal of broad UX approaches (e.g., Preece, Rogers, and Sharp 2015; Hartson and Pyla 2012) is to remove the negative experiences (e.g., usability, security, reliability problems), whereas Xgoal aims to focus design on creating specific positive experiences.

Xgoal turns intended experience into an articulated and formalised design aim. Xgoal sheds light on two sides of the coin in design: rationale and creativity relevant to rigorousness and openness of a design approach (Carroll 2013). “Goal” implies a directed approach to “things get done” whereas “experience” addresses freedom in choosing the format of the design outcome. Xgoal functions to communicate and express design purposes in terms of experiential quality. Xgoal utilisation in design submits to an internal logic of design reasoning that characterises experience design rationale. Xgoal serves as a backbone for query, explanation, and evaluation, adapting to a semi-structured approach to experience embodiment. On the other hand, Xgoal particularly concentrates on experience, an open concept; hence, Xgoal provokes critical thinking and engages human sense making.

As the starting point and conceptual tool of design, the nature of an experience goal is close to that of a design driver as defined by Lindholm and Keinonen (2003, 144) for vision-driven user interface creation:

“A design driver may be defined as a design objective that (1) has a very high priority in concept creation; (2) characterizes the concept in a way that underlines its distinctive properties; (3) is comprehensive by nature, affecting several aspects of the design; and (4) can be presented with one simple, clear sentence or phrase.”

Similarly, an experience goal is also a key, compactly crystallised goal for novel opportunities and helps to avoid an in-depth analysis of requirements (Wikberg and Keinonen 2002). Wikberg and Keinonen (2002) suggest having a handful of design drivers can prevent a diluted and vague concept. However, an experience goal can advance a concrete concept further than a design driver, which can be seen from the following two examples. Lindholm and Keinonen (2003, 144) take “one-hand use” as an example of a design driver in mobile phone user interface design. Such a design driver reaches a certain concreteness that can directly influence the decision on mobile phone form, key layout, and so on. In contrast, Kaasinen et al. (2015b, 979) provide an experience goal “using the system feels like magic” for gesture-based interaction in a metal workshop. Although these two goals originate from two totally different design contexts, it is easy to tell “one-hand use” could be a sub-goal of “using the system feels like magic.” Ideally, compared with a design driver, an experience goal leans towards a higher-level vision because the richness of experiential properties brings more exploration space whereas a design driver seems to fix a core design feature of a product.

An experience goal also has similarities with a value proposition in business planning. Webster (1994, 25) defines a value proposition as:

“... the verbal statement that matches up the firm’s distinctive competencies with the needs and preferences of a carefully defined set of potential customers. It’s a communication device that links the people in an organization with its customers, concentrating employee efforts and customer expectations on things that the company does best in a system for delivering superior value. The value proposition creates a shared understanding needed to form a long-term relationship that meets the goals of both the company and its customers.”

In common with a value proposition, a set of Xgoals function as a communication instrument between designers and other stakeholders, and aims for long-term benefits for both the company and its customers. Specifically, Sheth et al. (1991, 161) define emotional value as the “perceived utility derived from an alternative’s capacity to arouse feelings or affective states.” Rintamäki et al. (2007, 629) define symbolic value as “positive consumption meanings that are attached to self and/or communicated to others.” An Xgoal is apparently close to emotional and symbolic value propositions regarding customer engagement through emotion and identity. However, Xgoals operate more frequently in a specific product design process whereas value propositions are borne in strategic business planning. Additionally, an Xgoal differs from a value proposition mainly by leaving the cost-benefit thinking behind.

An Xgoal is also easily associated with user requirements, one type of objective in traditional human-centred design. The specification of user requirements includes the intended context of use; requirements arising from existing knowledge, standards, and guidelines; usability objectives; and organisational requirements (ISO 9241-210:2010). Experience goals are higher design objectives and generative design tools, and address designers’ initiative input and experiential aspects of design. In contrast, user requirements tend to be derived from objective information and to serve as design constraints.

Xgoal is distinct from other starting points of design mainly by concretising intended hedonic and eudaimonic experiences as a high-level design objective. An Xgoal embraces both the openness for any forms that enable a targeted experience and the directness of goal setting and striving for experience realisation in the design outcome. The primary purpose for setting Xgoals is to ease the switch from usability-oriented design to design for positive user experience, and from problem-driven

design to possibility-driven design. Several researchers have developed XFD tools to support this switch by offering theory-driven sources for Xgoal setting, e.g., need cards (Hassenzahl 2014), emotion cards (Yoon, Desmet and Pohlmeier 2013), well-being determinant cards (Calvo and Peters 2015), and experience cards (Zeiner et al. 2018 in print; Zeiner et al. 2016) (see table 2.3.2). These XFD tools rely heavily on psychological theories and drive the ideation process with the help of related theoretical models.

TOOLS FOR XFD	SOURCES FOR XGOALS	RELATED THEORETICAL MODELS
NEED CARDS	The seven psychological needs to categorise experiences (Hassenzahl 2014)	The three-level hierarchy of goals (Hassenzahl 2010, 44)
EMOTION CARDS	The 25 different positive emotions (Yoon, Desmet and Pohlmeier 2013)	Positive Design Framework (Desmet and Pohlmeier 2013)
WELL-BEING DETERMINANT CARDS	The six factors known to increase well-being based on research (Calvo and Peters 2015)	A framework for positive computing (Calvo and Peters 2015)
EXPERIENCE CARDS	The 17 Experience Categories for positive experience in work contexts (Zeiner et al. 2016; Zeiner et al. 2018 in print)	The Experience Category approach (Zeiner et al. 2016; Zeiner et al. 2018 in print)
PLEX CARDS	The 22 categories of Playful Experiences (Lucero and Arrasvuori 2010)	PLEX framework (Korhonen et al. 2009; Lucero and Arrasvuori 2010)

Table 2.3.2 Tools for XFD

2.3.3 EXPERIENCE AT WORK

Work has seemingly always been a substantial part of human life, although its nature continues to evolve as historical, technical, and economic circumstances change (Klein 2008). Work is about a search for daily meaning (Terkel 1974). Haworth and Lewis (2005) provide a brief literature overview on what is work. Studies from psychology, sociology or political sciences offer different framework or definition of work, however, work is commonly understood to be paid employment and it is important to human function (ibid.). This dissertation follows Haworth and Lewis’ (2005) understanding on work and frames the concept of work as a professional means to make a living and to achieve satisfaction.

Generally, most adults spend most of their waking hours at work. In return, work provides rich meaningful experiences for them. Work results in the feeling of achievement, attributable to two aspects: a primary biological drive to master the environment and a more sociocultural force, the pleasure gained from achievement (Klein 2008). According to an earlier view on the psychological aspects of work, work was seen as one of humanity's main links with reality (Freud 1930/1961). Jahoda (1966) suggests several dimensions concerning the link with reality, e.g., a strong sense of time, experiences of objective and subjective knowledge, enjoyment of competence, and balance of pleasure and self-regulation.

The most commonly studied affective quality at work remains the concept of job satisfaction. According to the most widely cited definition, job satisfaction is 'a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences' (Locke 1976, 1300). Others define it as an attitude that indicates the extent to which a person likes or dislikes his or her job (Spector 1997; Brief 1998).

One of the most influential theories of job satisfaction continues to be the Job Characteristics Model (Hackman and Oldham 1976). It comprises the five core job dimensions: skill variety, task identity, task significance, task autonomy, and task feedback. They in turn lead to three psychological states: the perceived meaningfulness of work, felt responsibility for outcomes, and knowledge of results.

Herzberg (1966) discovered that the factors that lead to satisfaction (i.e., 'motivators': achievement, recognition of achievement, responsibility, and the work itself) are not often the same as those that lead to dissatisfaction (i.e., 'hygiene factors': company policy and administration, supervision (technical), salary, interpersonal relations (supervisory), and working conditions). Furthermore, Herzberg argues that eliminating hygiene factors from a job would prevent dissatisfaction but hardly bring about satisfaction; job satisfaction results from motivator factors, e.g., increasing work enrichment, challenge, and personal reward. Excluding 'motivator factors' (Herzberg, Mausner, and Snyderman 1959), Sandelands and Buckner (1989) investigated other work feelings associated with aesthetic experience in the literature, e.g., 'intrinsic satisfaction' (Koch 1956; Staw 1977), 'flow' (Csikszentmihalyi 1975), and 'peak experiences' (Maslow 1971).

Sandelands and Boudens (2000) noticed that when people refer to their feelings about work, they rarely mention the feeling embedded in the job task or rewards, e.g., work affect and emotion; instead, they talk primarily about their involvement in the life of the group, e.g., the experience of relationships with others. Sandelands and Boudens (2000)

call attention to the social dimensions of feeling at work, which is in line with the recent suggestion regarding the social characteristics of jobs for the future of job design (Oldham and Hackman 2010).

In work organisations, social interaction is much more pervasive and prominent than before. Oldham and Hackman (2010), for instance, point out that the social attributes of jobs have revived researchers' attention, e.g., dealing with others and feedback from agents, required interaction, and interaction opportunities. New social dimensions, e.g., interaction outside the organisation, social support, and interdependence, are supposed to contribute to employee's motivation and well-being (Morgeson and Humphrey 2006). To this extent, Humphrey, Nahrgang, and Morgeson (2007) suggest that four social characteristics (interdependence, feedback from others, social support, and interaction outside the organisation) would contribute to subjective performance assessments, turnover intentions, and satisfaction.

According to Wrzesniewski (2003), the traditional studies of experience at work follow a top-down approach from the perspective of the manager, which limits the potential of the employee to actively shape tasks and social relationships at work. To alleviate this, Wrzesniewski (2003) suggests a relatively new concept, job crafting, wherein the employee can reframe job designs in personally meaningful ways. It allows employees to cultivate a positive sense of meaning and identity in their work. Job crafting changes the meaning of work to one that is at the core of the employees' experience of their jobs (Wrzesniewski 2003).

Rosso, Dekas, and Wrzesniewski (2010) categorise seven MMW that emphasise the psychological processes underlying the experience of meaningfulness. The meaning of work that these mechanisms drive ranges from the fulfilment of the self to the transcendence of the self entirely. The definition and explanation of high-level mechanisms and sub-mechanisms are excerpted in Table 2.3.3.1. (Rosso, Dekas, and Wrzesniewski 2010). Rosso, Dekas, and Wrzesniewski (2010) classify the mechanisms along the dimension of self-oriented and other-oriented. The self-oriented dimension contains control/autonomy, competence and self-esteem, self-concordance, identity affirmation, and personal engagement. The other end is oriented towards those aspects beyond oneself, e.g., other individuals, groups, collectives, organisations, and higher powers, which include *perceived impact, significance of work, interconnection, self-abnegation, value systems, social identification, and interpersonal connectedness*.

HIGH-LEVEL MECHANISM	EXPLANATION OF MECHANISM	MECHANISM
AUTHENTICITY	I.e. 'a sense of coherence or alignment between one's behaviour and perceptions of the "true" self' (Markus 1977; Ryan, Deci, and Grolnick 1995; Sheldon et al. 1997)	Self-concordance Identity affirmation Personal engagement
SELF-EFFICACY	I.e. 'individuals' beliefs that they have the power and ability to produce an intended effect or to make a difference' (Bandura 1977; Baumeister and Vohs 2002)	Control or autonomy Competence Perceived impact
SELF-ESTEEM	I.e. 'an individual's assessment or evaluation of his or her own self-worth' (Baumeister 1998)	Self-esteem
PURPOSE	I.e. 'a sense of directedness and intentionality in life' (Ryff 1989)	Significance of work Value systems
BELONGINGNESS	I.e. 'a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships' (Baumeister and Leary 1995)	Social identification Interpersonal connectedness
TRANSCENDENCE	I.e. 'connecting or superseding the ego to an entity greater than the self or beyond the material world; subordinating the self to groups, experiences, or entities that transcend the self' (Maslow 1971)	Interconnection Self-abnegation
CULTURAL AND INTERPERSONAL SENSEMAKING	I.e. 'understanding how different types of work meaning are constructed in the sociocultural context' (Wrzesniewski, Dutton, and Debebe 2003)	Social/cultural construction Interpersonal sensemaking

Table 2.3.3.1 Mechanisms of meaningful work (Rosso, Dekas, and Wrzesniewski 2010)

2.3.4 EXPERIENCE-FOCUSED DESIGN IN HEAVY ENGINEERING INDUSTRY

The UX movements from usability towards experiential quality seem to shift the research domain from work to leisure and from professional tasks to consumer products and art (Bargas-Avila and Hornbæk 2011; Law, Van Schaik, and Roto 2014). XFD for the work domain is at a less mature stage than that for the context of leisure products. Tuch et al. (2016) address the lack of UX research in the work domain by contrasting user-generated descriptions of experiences in work with those in leisure. They analysed almost 600 users' experiences with technology and successfully tested Hassenzahl et al.'s need-oriented UX model (2010) for types of experience (negative vs. positive) and activity domain (work vs. leisure). Their study shows that high-level fulfilment of needs competence, popularity, and security are associated with positive experiences at work, whereas high-level fulfilment of needs pleasure/stimulation and relatedness indicate positive leisure experiences.

The value of experience has been recently recognised by industry pioneers, e.g., Kone, Rolls-Royce, and Valmet Automation (FIMECC UXUS 2015). One main reason might be that the end-users who directly interact with the work tools are normally not the customers who make the purchase decisions (Väätäjä, Seppänen, and Paananen 2014). The customers care more about “jobs to be done” which is related to measurable performance criteria, productivity of the systems, and cost efficiency than their employees’ experiences (Nuutinen et al. 2011). It is challenging to reliably communicate the value of UX from the customer’s point of view through traditional sales channels (Sundberg and Seppänen 2014). However, this challenge has not prevented the researchers and the industrial practitioners from seeing XFD as an opportunity for company innovation and market differentiation (FIMECC UXUS 2015).

There are only a few studies on XFD for the work domain. Harbich and Hassenzahl (2008) formulate a model of user experience for work environments based on motivation in relation to desired behavioural outcomes: a work tool should not only facilitate task completion (execute) but also support modification of tasks (evolve), creation of novel tasks (expand), and persistence in task execution (engage). This model aims for not only an enjoyable working experience but also desired behaviours that take human capabilities seriously (ibid.) Recently, their longitudinal field study in the work domain confirms UX changes all the time while product attributes influence change (Harbich and Hassenzahl 2017). In particular, their findings reveal that playfulness influenced engaging behaviour in the sense that more playful participants lost interest even faster (ibid.).

Burmester et al. (2015) consider Experience Design and Positive Design as an alternative to the classical human factors approaches for a demanding work environment. They present a design approach consisting of the following activities: understanding the work context, interviewing for existing positive experiences collection, designing for positive experiences based on Experience Design and Positive Design approaches, prototyping of experiential concepts, and evaluating concepts with a focus on analysing experiences. The demonstrated design concepts show that supporting the fulfilment of psychological needs and using strategies for well-being make it possible to design for positive experience even in a demanding work environment (ibid.).

Kaasinen et al. (2015b) present four design cases of industry systems that explored setting UXgoals in the early stage of the design process. First, the case study shows that new technology-mediated UXgoal setting for worker-tool interaction plays a common and key role in the

heavy engineering industry. Technology for mobile interaction, gesture-based interaction, remote operation, and automated and smart features provides the sources of novel experiences at work (ibid.). UXgoal articulation underlines the compelling feature of new experience, e.g., “feels like magic” as a UXgoal for gesture-based interaction. Second, the complexity of the heavy engineering environment demands designers’ empathic understanding of the workers’ world through activities, e.g., field observation, a user interview, and a co-design workshop with experts. The knowledge gained from domain and work analysis of the actual user helps designers to elaborate on what a UXgoal really means to a worker in the targeted context. Third, scientific theories of human beings provide alternative sources for UXgoal setting, i.e., emotional UX (Saariluoma and Jokinen 2014), systems usability, and core-task analysis (Karvonen, Koskinen, and Haggrén 2012b; Savioja and Norros 2013). These theoretical frameworks may help to establish a structured approach for UXgoal setting and evaluation based on scientific knowledge. Fourth, inspired by ViP (Hekkert, Mostert, and Stomppf 2003), Kaasinen et al. (2015b) point out that investigating the deep reasons for product existence along with envisioning renewal can inspire high-level UXgoal setting. This is a highly designer-oriented approach to instilling in-depth meaning into a UXgoal by creatively interpreting the future (Verganti 2009). The last approach is to derive high-level UXgoals from the brand element, brand identity, brand image, or brand slogan (Kaasinen et al. 2015b). This is also a designerly approach to crafting UXgoals inspired by the unique meaning of a brand and culture of a company. The approaches of vision, brand, and theory are more towards a designer-oriented approach, whereas the approach of empathy tends to be user-oriented and that of technology seems more driven by the market.

Karvonen, Koskinen, and Haggrén (2012a) present a systematic procedure to set UXgoals based on the results of an analysis of the work domain environment and the users’ work activity data. The proposed procedure includes: “1) utilisation of appropriate theoretical underpinnings, 2) familiarization with the domain environment and the work activity in question, 3) carrying out field studies and collecting operating experiences of expert users, 4) work domain and user data analysis and final UXgoals’ identification” (ibid.). Furthermore, they address UXgoals with context-specific and high-level design implications in different stages of development, i.e., to conduct user evaluation with a semi-functioning prototype can validate whether the targeted UXgoals have been realised in the implemented solution. Alkali and Mannonen (2014) provide a study on defining the UXgoal for a paper quality control system and

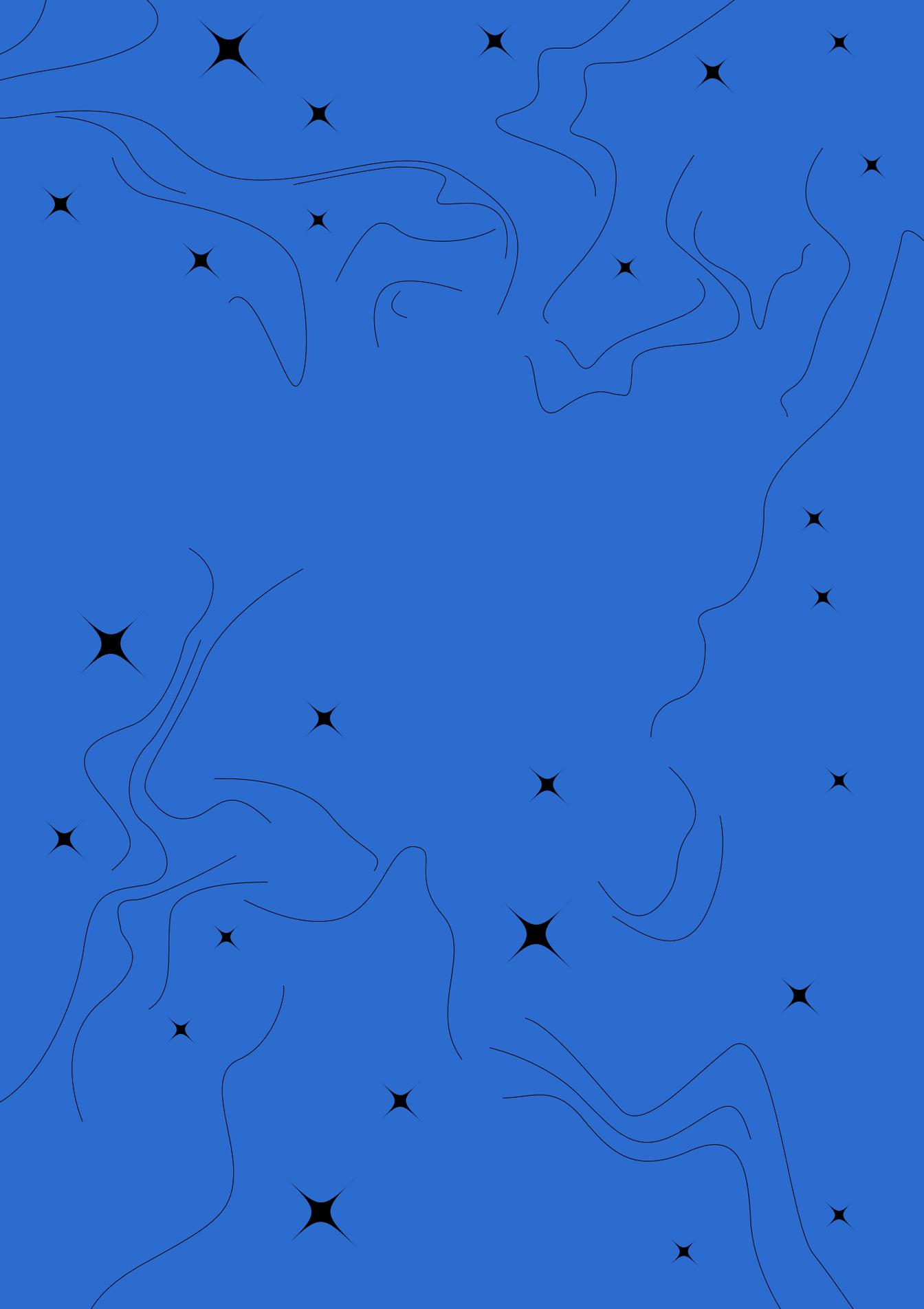
point out that work content, organisational cultures, and even business models may impact what are meaningful UXgoals for a product or service. Besides this, they also present examples of design guidelines and evaluation heuristics and instruments derived from the UXgoals (ibid.). Kymäläinen et al. (2017) utilise UXgoals to evaluate future automation work in processing plants with an experience-driven science fiction prototype. Concerning radical concept design for industrial work, Wahlström et al. (2016) highlight the importance of the study on professional work activity, and present a user-oriented approach that encompasses an analysis of domain-specific work activity, UXgoal-setting, and work-domain and technology-trend foresight. They suggest one mean of creating radical design ideas is to focus on the UX, more precisely, to reformulate UXgoals into themes, stories, or personas (ibid.).

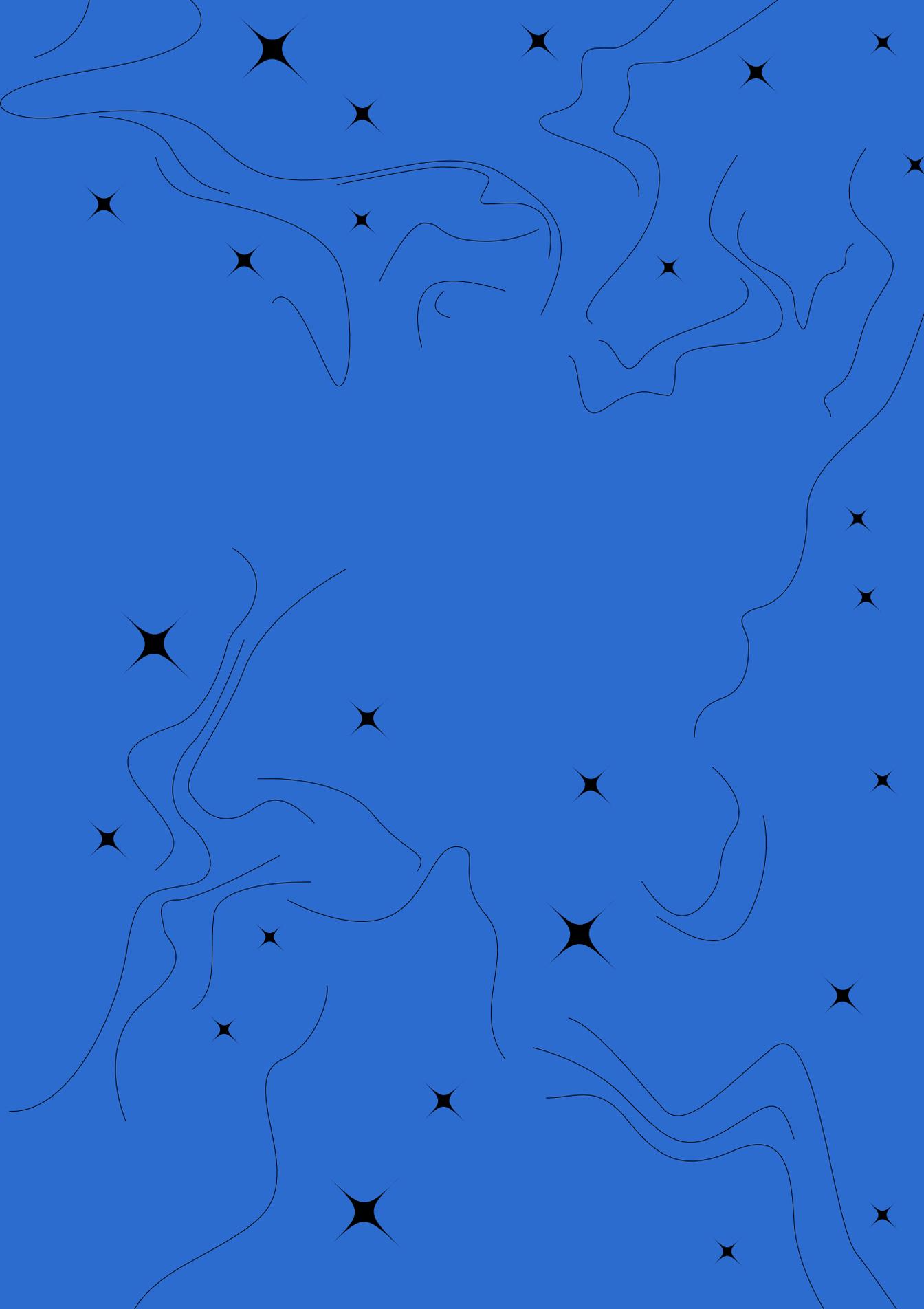
2.4 Conclusion

The literature review presents several studies that address the significance of in-depth meaningful experience as the prioritised high-level design goal to enable a possibility-driven approach. In particular, Hassenzahl's three-level hierarchy of goals and Positive Design Framework concentrate on experiential goal setting with in-depth meaning for new design opportunities. However, there are few design literatures on the principles and guidance of designing for experiences, although abundant studies contribute to experience research. To keep designers' focus on experiential goals and associated goal translation into design expression, this dissertation proposes Xgoal setting and Xgoal realisation as a conceptualised design framework for XFD.

The literature also shows the existing XFD for the work domain has a strong association with the purpose for positive work results. This purpose perhaps leads to Xgoal setting concentrated on the performance-related experience of a task, feeling of control, feeling of presence (Roto et al. 2017). Indeed, these Xgoals may bring in novelty features of work-tool interaction, optimise working experience, and support competence, especially mediated by new technology. However, human flourishing at work is far more than the satisfaction of good performance. Beyond the flow of worker-tool interaction, meaningful experiences at work also include enjoyment of the entire work environment, quality relationships with colleagues, and loyalty towards the work community. In business-to-business settings, workers are both service providers of one

organisation and service recipients of another, which indicates that the service employee experience and customers' experience are two sides of the same coin (Vaajakallio et al. 2016). To design for positive experiences at work, this dissertation proposes that the profound meaning of work in relation to human flourishing underpins the guidance for Xgoal setting and utilisation in design practice.





3

Methodology

Situated in the field of design research, this dissertation aims to contribute to the principles and practice of XFD. Altogether four studies in this dissertation concentrated on the two main challenges of XFD (Desmet and Schifferstein 2011) namely, experience goal (Xgoal) setting and Xgoal realisation. The main research methods for gathering data were collecting design cases and interviewing experts, and the main approaches to analysing data were coding and categorising. As a conceptual tool, Xgoal not only played a critical role as a common element in all the collected projects, but it was strategically utilised as an interpretive and analytical instrument for investigation within and across the cases.

3.1 Research position

This dissertation focuses on the development of support for XFD. Therefore, it is situated in the fast-growing area of design research (Bayazit 2004; Cross 2007; Dorst 2016; Lloyd 2017). Design research has been recognised as being proactive, exploratory, and diverse in nature. According to Blessing and Chakrabarti (2009), a common set of well-established design research methodologies is still missing due to at least the following three issues: a lack of an overview of existing research, a lack of using results in practice, and a lack of scientific rigour (6). This doctoral design research explored in the methodological mire (Matthews and Brereton 2014) and constantly sought for a practical epistemology. However, on the other hand, doctoral-level research into design “does not typically follow a specific research tradition” (Mattelmäki and Mathews 2009, 2). Rather than follow methodological paradigms of other disciplines, it seems more sensible to first clarify the research position.

Blessing and Chakrabarti (2009, 5) classify two main strands of design research based on two objectives: the development of understanding the phenomenon of design and the development of *support* for design practice. Similarly, according to Frayling’s characterisations of design research (Frayling 1993) and interview studies, Zimmerman, Stolterman, and Forlizzi (2010) identify two types of design theory: *theory on design* (i.e., uncovering the actual design process as a human activity) and *theory for design* (i.e., improving the practice of design). This doctoral research sought possible design *support* for evoking meaningful experiences at work rather than ethnographically studying phenomena in the design process. As a primary objective, this dissertation aims at the development of facilitation for XFD and therefore contributes to the *theory for design*.

This dissertation responds to the call “think experience before product” (Hassenzahl 2010) and the recent critique on the traditional user-centred design that potentially imposes restrictions on radical innovation (Verganti 2016; Norman and Verganti 2014). This research hence shifts the orientation from problem-solving to possibility-seeking (Pohlmeyer 2012) and aims to support designers to actively identify, interpret, and actualise meaningful experiences of stakeholders in the target context.

In particular, this research tackles the two main challenges of XFD: what kind of experiences to design for and how to embody them in a concrete design concept (Desmet and Schifferstein 2011). Correspondingly, a procedural design approach is conceptualised in two steps: first to set Xgoals (i.e., understand and articulate aimed experiences) and then to realise the Xgoals (i.e., translate Xgoals into a specific context that may embody or express aimed experiences). Theoretically, this two-step approach first assumes that deciding on relevant experiential design goals is separate from shaping the targeted experiences in the produced design concepts. In addition, it also makes the assumption that the predictable separation and sequence of these two steps in design practice for experiences leads to out-of-the-box ideas.

Theoretical reflection and knowledge about real-life design processes are two sources of insight about the character and basic structure of design (Dorst 1997). Similarly, Friedman (2003) employs theory as a tool for circled transformation from tacit knowledge of practice into explicit knowledge of research. Therefore, it is worthwhile to examine how this two-step approach can guide possibility-driven design practice, particularly in the transition phase from an Xgoal into design concepts. In turn, it is also worthwhile to identify how the practical design cases can inform theory development; in other words, what kind of applicable design strategies have been applied in XFD.

3.2 Research context

This research was conducted as part of the FIMECC (Finnish Metals and Engineering Competence Clusters) UXUS program (User Experience and Usability in Complex Systems) between the years 2010 and 2015. FIMECC UXUS focused on the B2B metals and engineering industry where the product-service systems normally run a long and complex life cycle, involving an intricate network of various stakeholders

(Roto et al. 2016). The complexity of this domain may vary such that the human experience spectrum can include the momentary experience of a work tool by an end-user to the long-term experience of a service journey by a customer service journey, which can be labelled as “experiences at work.” In FIMECC UXUS, experiences at work have been studied from the viewpoints of experience design, business strategy, and organisational management (FIMECC UXUS 2015). From the perspective of XFD for the industrial context, the multidisciplinary groups of researchers from the fields of social psychology, cognitive science, and human-computer interaction collaborated with design practitioners from the companies. Due to the common interest regarding Xgoals, both the researchers and the designers practiced setting and utilising the Xgoal in the design cases. The FIMECC UXUS researchers and designers made an effort to articulate and represent the targeted experiences in various project activities, e.g., regular meetings, seminars, and workshops. Strategically, Xgoals were utilised as a shareable design element and as a conceptual tool for design process investigation across the different cases (Kaasinen et al. 2015b; Roto et al. 2017).

3.3 Author’s roles in the research

The way in which a researcher is involved in an empirical study can influence the result; hence, it is necessary to specify in detail the roles of a researcher here in this context (Blessing and Chakrabart 2009, 247). In the FIMECC UXUS programme, the author had three overlapping roles: practicing industrial cases as a designer, guiding students’ projects as a teacher, and developing design methods as a researcher. Importantly, these three distinct types of involvement provided me with three potential ways to new design knowledge with regards to XFD in the context of FIMECC UXUS (illustrated in Figure 3.3.1).

3.3.1 DESIGNER

During the first two years (2013-2014), the author worked as a designer in a multi-disciplinary design research team for two industrial cases: Future factory (Kymäläinen et al. 2017; Roto et al. 2017) and Interactive co-design environments (FIMECC UXUS 2015, 162-164). These two cases were similar in terms of designing for process remote control operators’ experience at work in the future. The Future

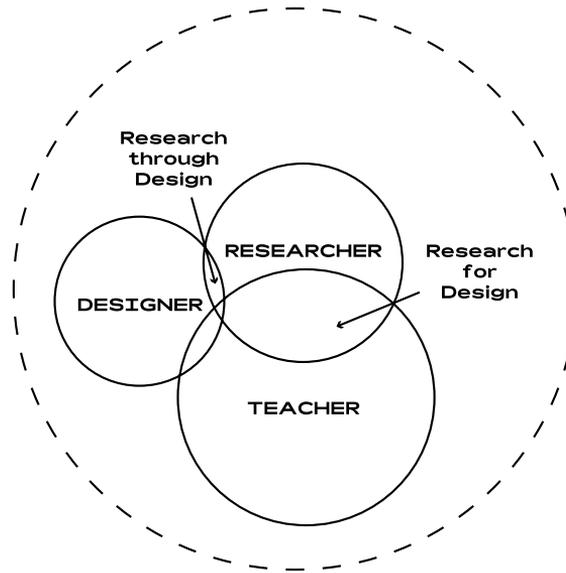


Figure 3.3.1 The author's roles in the FIMECC UXUS program

factory case emphasised more the Xgoal definition phase, namely, what would be the ideal experiences of an operator in a future control centre. The design research team utilised methods, e.g., trend studies, co-design workshops, expert interviews, personas, and storytelling for defining the Xgoals. The latter Interactive co-design environments case utilised the outcome of the Future factory case and explored experiential means to Xgoal realisation. The main methods utilised in the second case were scenario and video prototyping to embody and present the targeted experiences of a future operator to different stakeholders in a co-design space.

Due to lack of XFD methodology as a structured guidance, the design research team went through a rather tentative practice-led approach to the final solution in these two cases. Meanwhile, tailoring different methods suitable for this specific context contributed to the hands-on knowledge regarding XFD practice. Within the common design context, these two cases shed light on the problem of transferring Xgoals into a concept, implying the stakeholders need to reach a consensus about not only a set of targeted Xgoals but also a mean to Xgoal realisation. Although the lesson learned from the design practice was not explicit then, it directed the research through design (e.g., Zimmerman,

Stolterman, and Forlizzi 2010) expedition towards the two fundamental steps of XFD, namely, Xgoal setting and realisation.

3.3.2 RESEARCHER

As one of the FIMECC UXUS researchers from the year 2013 until 2016, the author obtained access to various channels of FIMECC UXUS research result dissemination activities, e.g., workshops, seminars, prototype exhibitions, and research papers. These channels brought about new scientific knowledge on diverse XFD research cases in the shared context. For example, the author was involved in FIMECC UXUS company case studies for identifying means to set Xgoals (Kaasinen et al. 2015b) and utilise Xgoals in different design activities (Roto et al. 2017). In particular, the author took part in organising the “Fuzzy Front End of Experience Design” workshop held in NordiCHI 2014 (Kaasinen et al. 2014; Kaasinen et al. 2015a). This workshop collected and investigated eight XFD cases from various domains. The topic of this workshop was about the sources of Xgoal setting, characteristics of Xgoals, and the means to concretise and communicate Xgoals (Kaasinen et al. 2015a; Varsaluoma et al. 2015).

3.3.3 TEACHER

The hands-on practice from the two FIMECC UXUS cases and the case studies of Xgoals in the design of industrial systems adequately equipped the author to be a secondary responsible teacher for a course called Experience-Driven Design (for Industry) which built the research context of this dissertation. This master’s level and project-based course collaborated with seven FIMECC UXUS companies from the metals and engineering industry on a yearly basis from 2012 to 2016. In this course, the author introduced experience-centred design approaches and tutored the design projects. During these five years, this course produced a corpus of final reports that stored the relevant information of each project. These documents functioned as the main empirical data of this dissertation. It is also worthwhile to mention that one of the collected cases became the introductory material for expert interviewees to comment on the functions of Xgoal in design activities.

3.4 Data collection

In industry, it is not common to utilise Xgoals in design, so it is hard to locate expert practitioners and real-life cases, let alone in metals and engineering companies. The current practitioners are familiar with design briefs or design goals; among which, most are not translated into communicable Xgoals. Setting Xgoals and keeping them on the table during the design process is a long-term journey, which is tricky to follow in an industry context. So far, Xgoal setting (Kaasinen et al. 2015b) and Xgoal utilisation (Roto et al. 2017) have only been studied in a hybrid academy-industry collaboration. Therefore, **Studies I, II, and III** in this dissertation lean on data collected from the reports of the master student projects that were conducted during Experience design (XD) courses in the different semesters from 2012-2015. Complementarily, **Study IV** is based on the data of the interviews with experience design researchers on Xgoals setting and utilisation. Table 3.4.1 provides an overview of data collection in this dissertation.

STUDY	PURPOSE	DATA COLLECTION	INFORMANTS	MAIN DATA SOURCE
I	To test the hypothesis whether Xgoal could enable design space to expand	XD course 2013 Fall	Three design teams	Six design project reports
II	To identify the sources of design goal setting for meaningful experiences at work	XD courses Spring 2012, Fall 2012, Fall 2013	Ten design teams	Ten design project reports
III	To identify the strategies of designing for pride at work	XD courses Spring 2012, Fall 2012, Fall 2013, and Spring 2015	Twenty design teams	Twenty design project reports
IV	To identify the possible contribution of Xgoals in different design activities	Three institutions abroad	Eight experts on experience design	The transcripts of eight expert interviews

Table 3.4.1 An overview of data collection in this dissertation

Studies I, II, and III studies acknowledge that design students in their first year of the master's programme are not highly skilful in the design process, compared to seasoned design practitioners. However, the specific XFD approach of this thesis, called Xgoal-directed design in which the designers identify in-depth Xgoals before deciding which product or service to design, was to the authors' knowledge not used by practitioners at the time of these studies. Therefore, it was not possible to study commercial design projects over time. It was also safer and more practical to run the first design projects in a master's class context than in commercial projects. With students, it is easier to verify that the instructions along the Xgoal-directed design process were actually followed. The collaboration between design students and FIMECC UXUS companies provided this dissertation a suitable context in testing if and how Xgoals affect the design process and the outcomes.

Generally, it is common to induce and abstract design principles through case analysis. Case study is one of the useful tools that focus on the transition between theory and practice. Hence, it can be utilised effectively in design research, i.e., in assembling empirical evidence for theory development (Breslin and Buchanan 2008). Therefore, it seems a plausible research strategy to create a data source first by experimenting with an Xgoal-directed design approach in multiple company-involved cases. To this end, this research took part in a project-based and company-involved design course where multiple Xgoal-directed design cases were produced. As a combination of a structured course and company involvement, this research is situated between a laboratory setting and an industrial setting (Blessing and Chakrabarti 2009, 255-256). To put it differently, the setting of a project-based and company-involved design course makes it relatively easy to plan, control, and observe design progress. In the meantime, it also takes care of the company needs, use context, design constraints, clients' feedback, and so on.

The author of this dissertation was a teaching assistant giving the Experience-Driven Design lecture where the concept of Xgoal was introduced. The advisor of this dissertation was the responsible teacher of this course. This course was conducted over 6-8 weeks each year during the period of 2012-2015. **Studies I, II, and III** in this dissertation lean on data collected from the student projects that were conducted in Spring 2012, Fall 2012, Fall 2013, and Spring 2015. Regarding the introduction of Xgoals to the students in different terms (see Table 3.4.2), the common aspect is that the teachers clearly distinguished Xgoals from usability and utility objectives. The main shared theoretical roots for understanding Xgoals are Jordan's hierarchy of consumer

needs (2000), pragmatic and hedonic aspects of UX (Hassenzahl 2003), the three-level hierarchy of goals and the psychological needs for categorising experiences (Hassenzahl 2010), timespans of UX (Roto et al. 2011), two challenges of experience-driven design (Desmet and Schifferstein 2011), and ViP (Hekkert and van Dijk 2011). After learning these underpinning theories for Xgoals, the students were generally able to differentiate between experience-driven design and traditional problem-driven design and to know the theoretical sources for Xgoal setting. In Fall 2013 and Spring 2015, additionally, five approaches to Xgoal setting (Kaasinen et al. 2015b) were introduced to the students. These approaches provided the students with different potential starting points for Xgoal exploration.

MAIN THEORIES FOR INTRODUCING XGOALS SEMESTER	SEMESTER
Jordan's hierarchy of consumer needs (2000); Pragmatic and hedonic aspects of UX (Hassenzahl 2003); Experience Design (Hassenzahl 2010); Experience-Driven Design (Desmet and Schifferstein 2011); Timespans of UX (Roto et al. 2011); ViP (Hekkert and van Dijk 2011);	Spring 2012, Fall 2012, Fall 2013, Spring 2015
Five approaches to Xgoal setting (Kaasinen et al. 2015b)	Spring 2015

Table 3.4.2 Main theories for introducing the Xgoal concept

In this course, two or three master's students formed a design team and worked full time on a seven-week design assignment from one of the FIMECC UXUS companies. More than half of the students were international students who could not speak Finnish; nevertheless, not all the clients and targeted users could speak English. There was at least one Finnish native-speaking student per team to ensure smooth communication with clients and users. To ensure that the teams could deliver the final results on time, this course introduced and prescribed Xgoal setting and realisation based on the Double Diamond design structure (Design Council 2007). The design structure (Figure 3.4) guided the planning of the design activities in the following procedures called the Xgoal-directed approach: 1) to familiarise oneself with the target context and users, 2) to define a set of profound Xgoals, 3) to derive concepts from the determined Xgoals, and 4) to evaluate design concepts against the Xgoals with relevant stakeholders. The design teams had the freedom to set up Xgoals that would fit their case briefs. The Xgoals were formatted

into a word or a short phrase for convenient communication among different stakeholders. There was no special rule regarding how many Xgoals the students should define, whereas the relations between a set of Xgoals and reasoning for Xgoal realisation were required for clarification. Throughout the whole project, the company personnel were available for information and comments. At least one of the researchers followed these cases by arranging weekly meetings with the design teams and reading their design diaries.

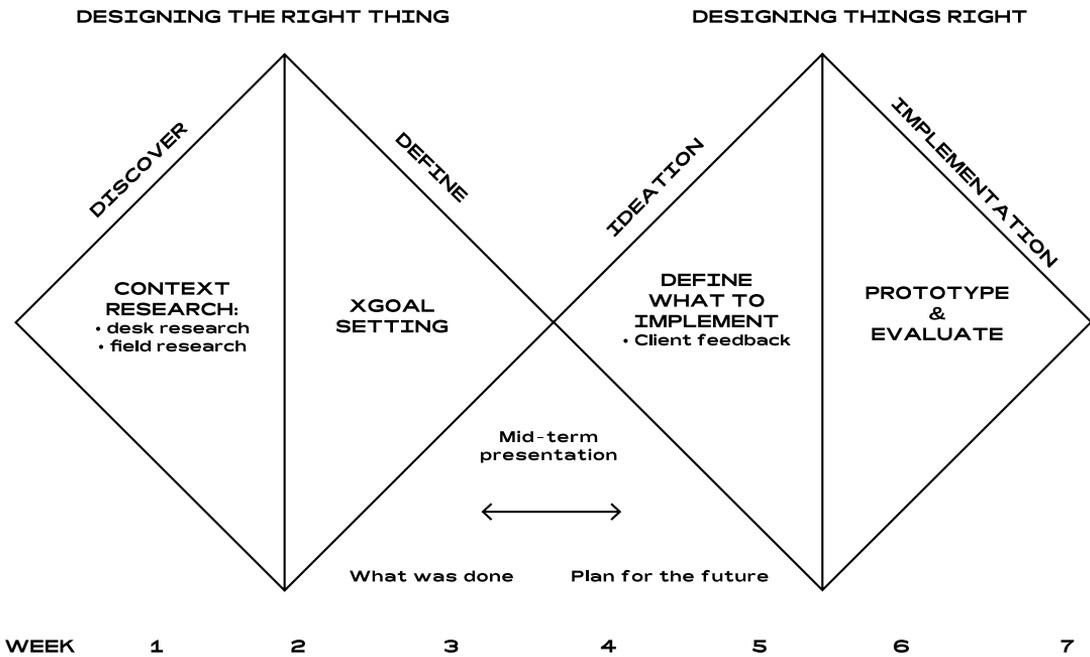


Figure 3.4 The double diamond Xgoal-directed design structure

The assignments from the different companies shared the same high-level objective, namely, evoking meaningful experiences at work in the heavy metals industry. The design contexts varied from heavy machine operation (e.g., crane remote control, tugboat console, and control room of an automation system) to the peripheral touchpoints for different stakeholders in the industrial system (e.g., a mobile application for factory automation customers, a mobile sales application for ship components, and a mobile crane monitoring application).

To examine the potential of Xgoals to expand the considered design space, this course required the students to produce not only ‘applicable’ but also ‘radical’ concepts. This doctoral research adopted the insight that radical innovation does not necessarily require new technology but can come from new interpretations of what could be meaningful to people (Norman and Verganti 2014). Radical design in this research means an out-of-box design concept that radically provides impressive experiences without predefining the design outcome. The ‘applicable’ concepts aimed to satisfy the company’s current needs whereas the ‘radical’ concepts targeted the meaningful experiences at work not necessarily addressing the existing problems or constraints.

Theory-wise, four important aspects of design activity need to be considered for constructing a design theory: the *content* of design regarding design goal and concept, the *designers* or design team, the context where design takes place, and the design process (Dorst 2008). Generally, all the projects in the Experience-driven design course were homogeneous in these four aspects of design. Due to the main research interest in Xgoals and the content-oriented nature of designing for experience (ibid.), *design content* was a critical and prioritised aspect in the data collection of the case studies.

This research provided several different means of access to the source of *design content*: *weekly team design diary*, *weekly tutoring meeting*, *milestone presentation*, *final presentation*, and *written report*. In general, the design teams submitted a design diary to the two tutors one day before a tutoring meeting. A design diary was concerned with the description and reflection on the Xgoal setting or utilisation in design during the past week as well as the weekly plan. In the weekly tutoring meeting, the tutors gave feedback on the weekly diary, discussed the potential challenges, provided practical support, and most importantly, kept the teamwork on the right track. The design teams articulated the Xgoals, sketched the initial concepts and proposed the concept evaluation plans in the milestone presentations. The final presentations and reports embodied the aimed experiences as both applicable and radical concepts.

The final reports were the most important deliverables of teamwork for the company clients and for the tutors of the course (for grading). The reports tell the full story of the exploration and introspection on the Xgoal-directed design approach in the sequential order based on the Double Diamond structure. Therefore, all the final reports are sort of semi-standardised solicited documents (Flick 2009, 256) with a shared focus in the evolution of Xgoals in design. Each report covers the following key information of each design project and were useful

for data collection and analysis: 1) design brief, 2) background studies, 3) Xgoal setting, 4) applicable and radical concepts, 5) concept evaluation, and 6) reflection.

This doctoral research primarily selected the final reports as the key source of design content. Compared with the other sources, the final reports are more stable in terms of changes in design decisions, more explicit in knowledge communication, and more complete in the description of the entire journey of a design project. In the final reports, the design students aimed to highlight the steps contributing to the final concepts and to strengthen the argumentation for critical decisions in design. On the one hand, because of the concise translation of the fuzzy design process into text, the final design reports filtered out unnecessary or unsuccessful attempts and efforts in dealing with challenges. It was also possible that the students would forget or omit essential information when they were busy writing their final reports, finalising the design outcome, and preparing a final presentation at the same time. On the other hand, the same missing points or trivial details might be recorded in the other communicative devices in this research, e.g., the weekly diaries and milestone presentations. Besides the formal channels to data collection, the informal conversations between researchers, students, and company contacts might complement and validate what was documented, and further strengthen the data triangulation for design content interpretation. In Table 3.4.3, the basic information is detailed for all the collected projects in **Study I**, **II**, and **III** of this dissertation.

EXPERIENCE GOALS IN DESIGNING PROFESSIONAL TOOLS

YEAR	COMPANY	ASSIGNMENT	EXPERIENCE GOALS	DESIGN RESULTS
2012 SC1	Konecranes	Hoist interaction design	Competence, Self-Esteem, Proudness	Interaction
2012 SC2	Metso Automation	New UI design for process control system	Competence, Enjoyment, Connectedness	UI Work career path
2012 SC3	Rocla	E-learning tool for beginner forklift drivers	Confidence, Security, Stimulation Competence, Autonomy	UI
2012 SC4	Fastems	Factory automation in 2042	Usefulness, Self-Esteem, Achievement	Factory; services
2012 SC5	Fastems	Factory automation in 2042	Self-Actualisation, Competence, Pleasure	A business model
2012 SC6	Kone	Touchless elevator user interface for office buildings	Disruption, Discovery, Control	UI
2012 SC7	Rolls-Royce	Thruster sales material	Trust, Engagement, Excitement	UI
2012 SC8	Rolls-Royce	Thruster cover	Trust, Influence, Stimulation	Product lifecycle
2013 SC9	Rolls-Royce	Monitors for information sharing	Connectivity, Engagement, Communication	UI
2013 SC10	Rolls-Royce	Tugboat console redesign	Applicable: Trust, Competence. Radical: Proudness, Being in the Spotlight, Connection, Enjoyment	Product form; Interaction system
2013 SC11	Fastems	Product identity	Wow, Proudness, Trust	Product style; Service touchpoint
2013 SC12	Ruukki	Promoting a new construction material for engineers	Stimulation, Trust	Package; Events
2013 SC13	Ruukki	Promoting a new construction material for architects	Stimulation, Delight, Ambition	Events
2013 SC14	Konecranes	Mobile UI design for crane monitoring service	Relational, Empowering, Dynamic	UI
2015 SC15	Kempfi	Mobile UI design for welding training	Pleasure, Self-Motivation, Pride	UI Events
2015 SC16	Konecranes	Service touchpoint	Worthiness, Engagement, Belongingness	Tangible interaction, Events
2015 SC17	Valmet	Remote control room	Pride, Inspiration	UI
2015 SC18	Rolls-Royce	Portable simulator	Sense of Direction, Expertise, Pride	UI, Events
2015 SC19	Rolls-Royce	Internal celebration	Confidence, Belongingness, Excellence and Pride	Tangible interface, Events
2015 SC20	VTT	UX tool for the research consultants	Connection, Empowerment, Sense of Usefulness, Discovery, and Excitement	UX card, Event

Table 3.4.3 The Xgoal-directed design cases collected for this dissertation

To evaluate the Xgoal-directed approach and to see the potential functions of Xgoals in design, **Study IV** conducted semi-structured expert interviews. The qualitative interviews started with presenting a student case (SC18) to an expert because this case was an illustrative example of the new approach and could serve as a reference for probing the interviewees (Flick 2009, 93). Then, the interview continued with getting the expert's comments on Xgoal-directed approach. Then, the expert was invited to introduce one of her/his cases related to XFD. The interview ended with the expert's suggestion on how to further develop the approach. In the interviews, there were three main questions: 1) what do you think of the Xgoal-directed approach?; 2) how did you set in-depth experiential goals and realise them in your project?; and 3) what kind of tools or techniques do you think can be developed for XFD? No existing theoretical models were introduced to them because **Study IV** aimed to collect feedback from different perspectives and to expand the author's understanding of the potential utilisation of Xgoals. Rather than being influenced by our theoretical models, they commented and suggested how to embed Xgoals into design practice based on their own backgrounds and theoretical understanding.

After being piloted with two internal design researchers first and then revised, the expert interviews were conducted in two universities, one in Sweden and the other in the UK. The main reason to choose these two universities is that the host professors were interested in Xgoals and willing to provide access to their institutions and help with interviewee recruitment. The interviews were conducted in a quiet room and started only after the interviewees signed the consent form. Altogether 15 design researchers with a lecturer position or above were interviewed.

The interview time varied from 20 to 60 minutes because of the participants' available time. The primary task here was to define who were experts in terms of possibility-driven XFD. Experts can be labelled as those "who are particularly competent as authorities in a certain matter of facts" (Flick 2009, 41). Expert knowledge is not only systematised and special but also substantially practical and influential in the professional field (*ibid.*). Due to the novelty of the Xgoal design approach, not all the participants claimed themselves to be experts in this topic. Eight out of 15 participants were relatively familiar with the orientation of Xgoal-directed design, had conducted XFD research before, and shared relevant cases in the interviews. Two of them were female and six were male; five held PhDs, two were PhD candidates and one had post graduate degree. Table 3.4.4 provides general overview of the interviewees' profiles, including their pseudonym, education background and position. The pseudonyms have no relation to real life. These eight interviews were transcribed and analysed.

PSEUDONYM	EDUCATION BACKGROUND	POSITION
ELENA	PhD candidate in HCI	Senior UX researcher
GEORGE	PhD in HCI and design	Professor in design theory
JAMES	Post graduate in learning and teaching	Educator in communication design
LUCY	PhD in design approaches	Senior researcher in practice-led design
MARK	PhD in HCI	Associate Professor in cognitive science
MAX	PhD in service design	Senior lecturer in design
PETER	PhD in HCI	Professor in service design
TOM	PhD candidate in design	Researcher in service design

Table 3.4.4 Interviewee profiles

3.5 Data analysis

The interpretation of the textual material, i.e., final reports and transcribed interviews, was at the core of conducting this qualitative research. A key data analysis method was qualitative analysis through coding and categorising the written text (Flick 2009). The technique utilised for data analysis was a constant comparative method in which every part of the data was constantly compared with all the other parts of the data to explore variations, similarities, and differences (Hallberg 2006, 143). The analysis of the textual material moved through five phases: 1) *compiling* data into a database, 2) *disassembling* the compiled data, 3) *reassembling* the disassembled data, 4) *interpreting* the reassembled data, and finally 5) *concluding* the entire study (Yin 2015). The phases of disassembling and reassembling were repeated in alternating fashion (ibid.) The software tools for data analysis in this research were Excel and XMind. Xgoal was highlighted and singled out as the most relevant information for answering the research questions. Xgoal was also defined as the unit of analysis in the four studies.

Study I (Lu and Roto 2014) aimed to test the hypothesis whether Xgoal could enable design space to expand. Six cases were experimented (SC9-14) with the Xgoal- directed approach. Three of them clearly demonstrated that the considered design space expanded from design for usability to design for meaningful interaction (SC13), from style design for aesthetics to service design for relationships (SC11), and from

information design to strategic design (S_{I2}). Five factors that are highly relevant to the explanation of design space expanding are the following: Motivation of the company, Experience goals, Applicable concepts, Radical concepts, and Meaning change from applicable design to radical design. SC₁₃, SC₁₁, and SC₁₂ were analysed according to these factors (See Table 3.5.1).

	MOTIVATION OF THE COMPANY	XGOALS	INCREMENTAL	RADICAL	MEANING CHANGE FROM INCREMENTAL DESIGN TOWARDS RADICAL DESIGN
SC ₁₃	Internal communication improvement	Relatedness (engagement through communication & connectivity)	GUI aesthetics and usability	Interaction with internal digital signage system via ID badge and screens	From company information to personal assistant & entertainer
SC ₁₁	Product detail design for brand recognition	Wow, Proudness and Trust	Design style guide to uniform product aesthetic and functional features	Service innovation via a mobile app	From high quality to trusted relationship
SC ₁₂	New construction material promotion	Stimulation (inspiration & appreciation) and Trust	Interaction with a gift (the package with USB stick inside)	Activities for innovative talent cultivation via toys, competition, etc.	From extra burden to personal growth

Table 3.5.1 Summary of the three experience design cases (Lu and Roto 2014)

Study II (Lu and Roto 2015) examined 31 X goals collected from 10 tool design cases (SC₁, SC₂, SC₃, SC₅, SC₆, SC₇, SC₉, SC₁₀, SC₁₁, and SC₁₄), and analysed them through the lens of two theories (Figure 3.5.1). First, the collected Xgoals were categorised against the components of Positive Design Framework (Desmet and Pohlmeier 2013). Then, the same Xgoals were categorised against the mechanisms of the meaning of work (MMW) (Rosso, Dekas, and Wrzesniewski 2010). Therefore, each Xgoal was positioned in two frameworks. Third, the links between the two sets of categories were examined. The MMWs were categorized under PDF components. One example case (SC₁₁) is seen in the Table 3.5.2.

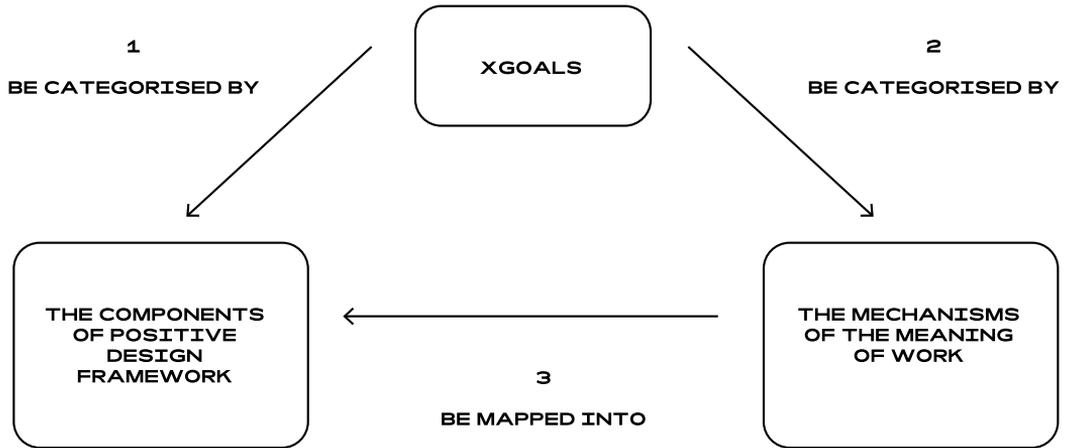


Figure 3.5.1 Xgoals categorised by two theories (Adapted from Lu and Roto 2015)

XGOAL	EXPLANATION	POSITIVE DESIGN COMPONENT	MECHANISM OF MEANINGFUL WORK
WOW	A momentary feeling that could be produced when the customer encountered something impressive in a particular way	Pleasure	Personal engagement
PROUDNESS	An episodic feeling of being proud that could surface and resurface at different times	Personal significance	Perceived impact
TRUST	A cumulative feeling that was mainly derived from current brand image efficiency and quality	Virtue	Self-subordinate

Table 3.5.2. Xgoals and their mapping to PDF and MMW frameworks (Lu & Roto 2015)

Study III (Lu and Roto 2016) narrowed down the focus from designing for meaningful experiences to designing for pride at work because pride-related Xgoals were frequently selected as the design goals in the collected twenty XFD cases (Table 3.4.3). This study adopted a broader and deeper understanding of pride based on the

literature study. Besides the Xgoals literally labelled with “pride”, those having the potential to elicit pride experience were also considered as pride-related Xgoals and their relevance to pride is indicated in Table 3.5.3. The researchers interpreted the implication of these goals situated in the design context rather than their original meaning. Thirty-three pride-related Xgoals were first singled out, analysed, and then categorised according to the social and temporal dimensions of pride that was distilled from the literature study: from self-focus to other-focus and from short-term to long-term. Design strategies for each pride-related goal were extracted from the final concepts and mapped into the two dimensions of pride.

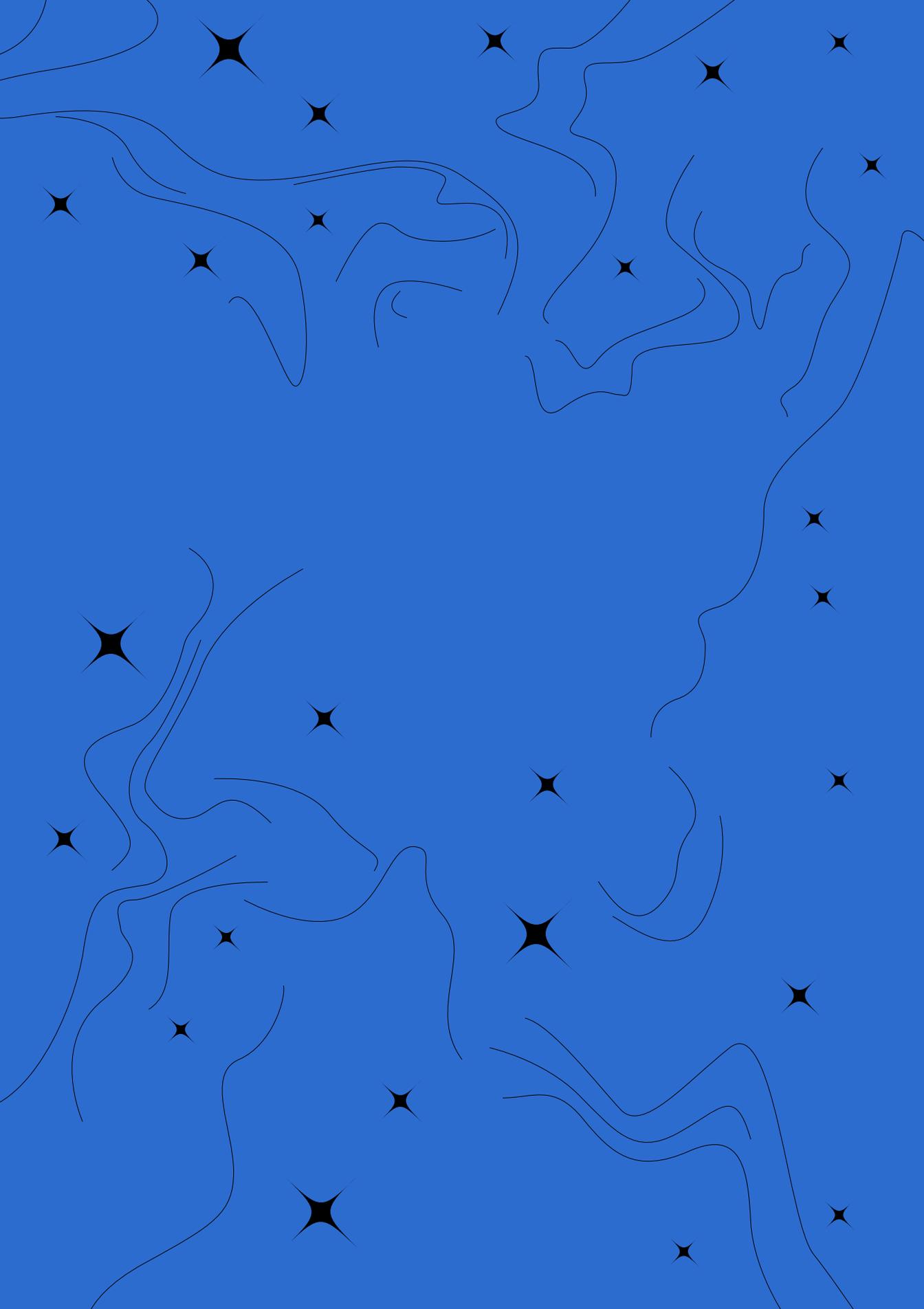
PRIDE-RELATED XGOALS	REFERENCES
Sense of directing, expertise, excellence, competence, empowering, confidence, appreciation, usefulness, achievement, pleasure	Pride as a reaction to experiencing ‘mastery and achievement’ (e.g., Tracy and Robins 2007b)
Worthiness, self-esteem, self-actualization, self-motivation, being in a spot light, ambition	Pride highly relates to a person’s self-evaluation and self-respect (e.g., Tracy and Robins 2007a)
Engagement, connectivity, communication	Pride elicited by prosocial conduct or action benefiting others (e.g., Nakamura 2013)
Belongingness	Pride evoked by being part of an organization or organizational events (e.g., Gouthier and Rhein 2011)

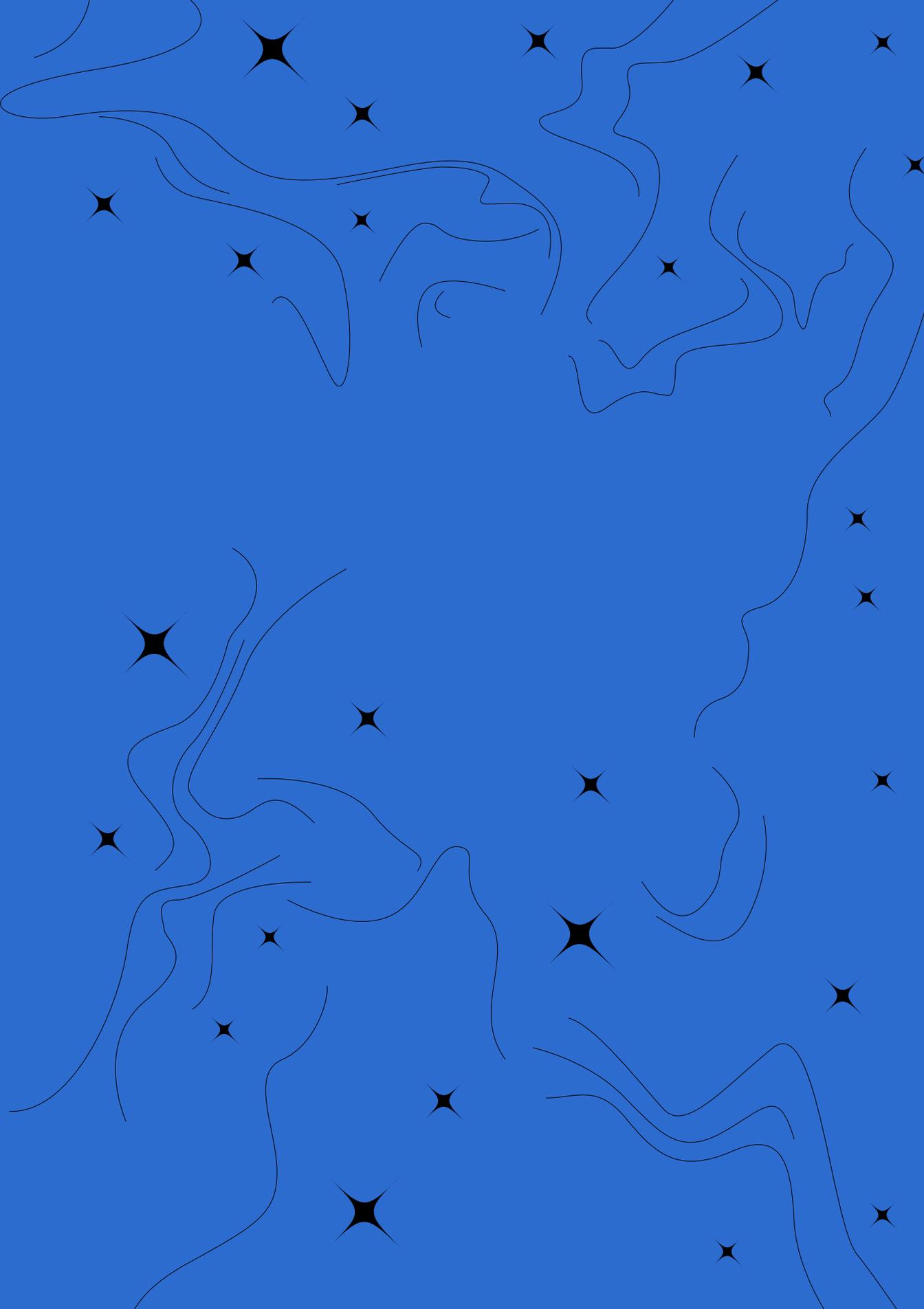
Table 3.5.3 The experience goals with high relevance to pride

Study IV analysed the transcripts of the eight expert interviews on the potential functions of Xgoals in creative design practice. The data was coded into groups against a set of generic and sequential concept design activities: background exploration, concept generation, concept evaluation (Takala, Keinonen, and Mantere 2006), and additionally including concept implementation. Then, the similar groups were sorted into the high-level categories in terms of Xgoals in different design activities. The representative quotations were marked and further interpreted in the given contexts of the interviewees. The key Xgoal-related themes were derived from the high-level categories. After several rounds of disassembling, reassembling, and interpreting (Yin 2015, 184), three distinct functions of Xgoals finally emerged from the key themes: springboard for radical ideas, guide the design process, and illuminate the design space.

3.6 Conclusion

This research started with an assumption that setting Xgoals first could enable a possibility-driven approach and expand the considered design space. To test this assumption and to further develop Xgoal-directed design approach, this research experimented with Xgoal setting and utilisation in a project-based and company-involved design course and collected design projects. Finally, the external design research experts evaluated the Xgoal-directed design approach. The main data collection methods were reviewing documents and expert interviews. The main data analysis methods were coding and categorising. The reflection on the methodology utilised in this dissertation will be discussed in the Discussion chapter.





4

Studies

This chapter presents the main results and implications of **Study I**, **II**, **III**, and **IV** as well as the author's latest reflection and updated knowledge. The chronological order of the studies is in accordance with the key research developments including both experience goal (Xgoal) setting and utilisation in the early phases of design. Therefore, the logical flow of these studies starts with the potential of Xgoals regarding design space expansion (**Study I**), then moves forward to Xgoal setting for meaningful experiences at work (**Study II**). **Study III** narrows this research down to the strategies of designing for one of the valuable experiences in the workplace, pride, and finishes with the implications of the expert interview findings on the possible functions of Xgoals in creative design practices (**Study IV**).

4.1

Study I: Experience goals potentially expand design space

Lu, Yichen, and Virpi Roto. 2014. "Towards meaning change: experience goals driving design space expansion." In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational*, 717-726. Helsinki: ACM.

Inspired by meaning-driven innovation (Norman and Verganti 2014; Verganti 2016; Verganti 2009) and XFD approaches (see section 2.2), **Study I** explores how in-depth design goals can bring out new design possibilities. First, the concept of design space is employed for studying design opportunities, which is generally understood as the territory of all possible solutions (McKerlie and MacLean 1994; Westerlund 2009). Design space can be changed if the design brief changes or a new constraining variable is introduced (Gero and Kumar 1993). Second, to further specify the core of the experience goal-directed design approach, we primarily defined an Xgoal as "the intended momentary emotion or the emotional relationship that a person has towards the designed product or service" (Lu and Roto 2014). This definition stresses both the present "experiencing" and experiences of in-depth meaning in the long run, thus setting Xgoals needs to cover both hedonic and eudaimonic happiness (Desmet and Hassenzahl 2012). According to the proposed design orientation of "think experience before product" (Hassenzahl 2010; 2013), Xgoals are primary high-level design objectives to bring new meaning into a design space.

Therefore, corresponding to a possibility-driven design approach (Desmet and Hassenzahl 2012), Xgoals shift the designers' focus from current constraints towards new opportunities, and therefore, facilitate a changing of the design perspectives and a reframing of the design brief.

Inspired by the experience-focused design approaches, possibility-driven design, and meaning-driven design, **Study I** aimed to test *the hypothesis whether setting meaningful Xgoals could expand the considered design space from routine solutions to applicable design and further to radical design*. In **Study I**, the applicable design focused on problem solving and pragmatic improvement for a company to apply quickly. In contrast, the radical design left off the existing solutions but started with exploring in-depth meaning that a company would convey to different stakeholders. **Study I** examines three student design projects in which the hypothesis was tested. These projects were proposed by three companies in the business-to-business metals and engineering industry. They all followed an Xgoal-directed design approach, including design orientation exploration, Xgoal setting, concept generation and evaluation, and final concept presentation. During the design process, the company representatives functioned as information providers and commentators thereby adequately supporting the students' teamwork. **Study I** zooms in on each case to investigate how the Xgoals expanded the design space. The cross-case analysis is presented from five perspectives: the motivation of the company, Xgoals, applicable concept, radical concept, and meaning change from applicable design towards radical design.

The findings of the case study (see Figure 4.1.1) first indicate that the original design brief can be a useful reference point for understanding a company's underlying concerns that inform the new meaning interpretation and Xgoal setting, e.g., the implication of a brand image. Second, Xgoal setting follows the design orientation change from user-centred to human-centred, which contributes to expanding the design focus from the users towards the stakeholders (ISO 9241-210 2010). Another reason for the expansion of the design target is that the brand functioning as a source of Xgoal setting relates to all the people connected to this company and therefore requires designers to take care of a broad set of the stakeholders. Consequently, Xgoal setting broadens the design outcome from the main products across the spectrum of all possible touchpoints, from the moment of use to the product-service life cycle. Therefore, Xgoals help designers expand the design scope from stylish design to interaction design to service design and even to strategic design. Third, the timespan of Xgoal setting addresses the long-term business-to-business positive relationship between the companies and

their customers. Although Norman and Verganti (2009) point out that intensive study of users contributes little to meaning-driven innovation, we find it necessary in these cases for external or junior designers to understand the heavy industry context and thus to avoid immature ideas. In conclusion, Xgoal setting helps to elicit designers' active interpretation of a meaningful design context. The designer-led Xgoal setting may potentially expand design space by focusing on more stakeholders than just the user and by looking at longer-term experiences.

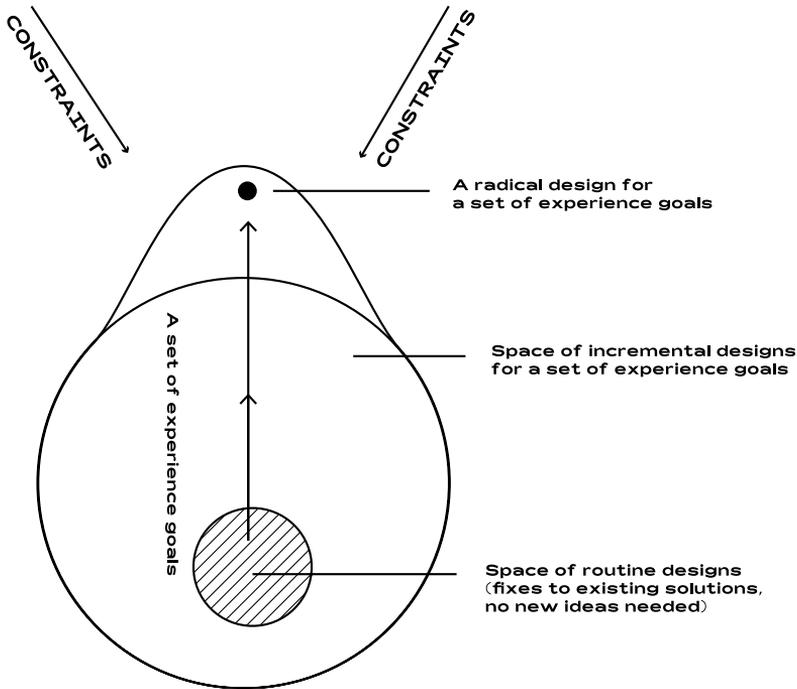


Figure 4.1.1 Xgoals can expand the considered Design space

4.2

Study II: Positive design framework for a work tool

Lu, Yichen, and Virpi Roto. 2015. “Evoking meaningful experiences at work – a positive design framework for work tools.” *Journal of Engineering Design*, 26(4-6), 99-120.

As a substantial part of human life, work is about a search for daily meaning (Terkel, 1974). Adults spend most of their waking lives at work; in return, work provides them with rich experiences, e.g., a sense of achievement, belongingness, balance of pleasure and self-regulation, stress of competition, and frustration of colleague relationships. Long-term meaningful experiences at work contribute to employees’ subjective well-being and positively impact organisations and their clients (Lips-Wiersma 2011). Many psychological and organisational studies have been devoted to this research direction, e.g., work motivation (e.g., Hackman and Oldham 1976), job satisfaction (Klein 2008), and job engagement (May, Gilson, and Harter 2010). Most of these studies are related to work design which is defined as “the content and organisation of one’s work tasks, activities, relationships, and responsibilities” (Parker 2014). Parker, Morgeson, and Johns (2017) identified five key perspectives from one hundred years of work design research: sociotechnical systems and autonomous work groups, job characteristics model, job demands-control model, job demands-resources model, and role theory.

However, in the research field of work design, an individual’s experience of using interactive tools (i.e., the instruments that are utilised for the work-related task) in an industrial workplace has not been sufficiently addressed from the viewpoint of meaningful experiences. In the work domain, tool design has traditionally focused on task-oriented issues (Harbich and Hassenzahl 2008; Savioja, Liinasuo, and Koskinen 2014) and highlighted pragmatic aspects, e.g., efficiency and productivity (Bødker and Palen 2008; Nuutinen et al. 2011). On the other hand, people who have daily pleasurable experiences of consumer products expect pleasant and meaningful experiences from their work tools (Gruber et al. 2015). Recently, in the third wave of human-computer interaction, the importance and potentiality of tools towards mediating workplace experiences has been noticed (Harbich and Hassenzahl 2008; Savioja, Liinasuo, and Koskinen 2014).

Following this wave, **Study II** specifies how to define meaningful Xgoals for work tool design. This study combines theories from the

disciplines of design and organisational behaviour to see how the knowledge of these two domains could complement each other. More precisely, the Positive Design Framework (PDF) for human flourishing was selected from the design field (Desmet and Pohlmeier 2013). The PDF includes three main components of subjective well-being: pleasure, personal significance, and virtue (ibid.) Compared with other design approaches, it is highly possibility-driven, can be applied universally, and takes long-term impact into account. From organisational behaviour theories, the Mechanisms of the Meaning of Work (MMW) were employed: self-concordance, identity affirmation, personal engagement, control or autonomy, competence, perceived impact, self-esteem, significance of work, value systems, social identification, interpersonal connectedness, interconnection, and self-abnegation (Rosso, Dekas, and Wrzesniewski 2010). These MMWs indicate the hows and whys of observed relationships of the identified sources of the meaning of work (ibid.).

This study collected all 14 cases from the course Experience-Driven Design for Industry that ran three times during the years 2012 and 2013. Ten out of the fourteen cases were selected because they were related to professional tools in the heavy metals industry. These cases include the interfaces or devices directly related to the production system, the peripheral touchpoints for the different stakeholders involved in the system, or the working environment. Thirty-One Xgoals were then collected from the final reports, and they were interpreted in the designed context by the authors. These Xgoals were respectively categorised by the three components of the PDF and then by the thirteen items of the MMWs.

The results indicate that personal significance is the most common component of the PDF, followed by virtue and pleasure. Personal significance with the MMW self-efficacy may enlighten designers on how to “promote the workers’ motivation, empower their capability, enhance their performance, and positively influence the work outcomes, and therefore create long-term value for the customers who invest in the tools” (Lu and Roto 2015). Usually, personal significance is considered to be a self-oriented design component, whereas the MMWs (e.g., belongingness) can infuse an other-oriented consideration into the Xgoal setting. Another frequently utilised component of the PDF, virtue, is highly related to the MMW interpersonal closeness in the workplace, contributing to a sense of belongingness and togetherness and therefore evoking feelings of comfort and support (Rosso, Dekas, and Wrzesniewski 2010). Design for virtue with the meaningfulness of belongingness expands self-oriented concern towards the social aspects of work. The

third component of the PDF, pleasure, relates to the MMW's personal engagement that emphasises an immersed and energetic state at work. Personal engagement can infuse those enjoyment ingredients into serious work tool design.

The main contribution of this study is a Positive Design Framework for Work Tools (PDFWork) (Figure 4.2.1), which aims to guide designers to define meaningful Xgoals as the starting point of the design of work tools. As this framework is not limited to work tools only, it can also inspire any other type of design for meaningful experiences at work, e.g., event design, service design, or job design. Furthermore, the PDFWork can potentially serve as an experience-oriented repository for guiding experience data collection and analysis, experiential business planning, and experiential portfolio design.

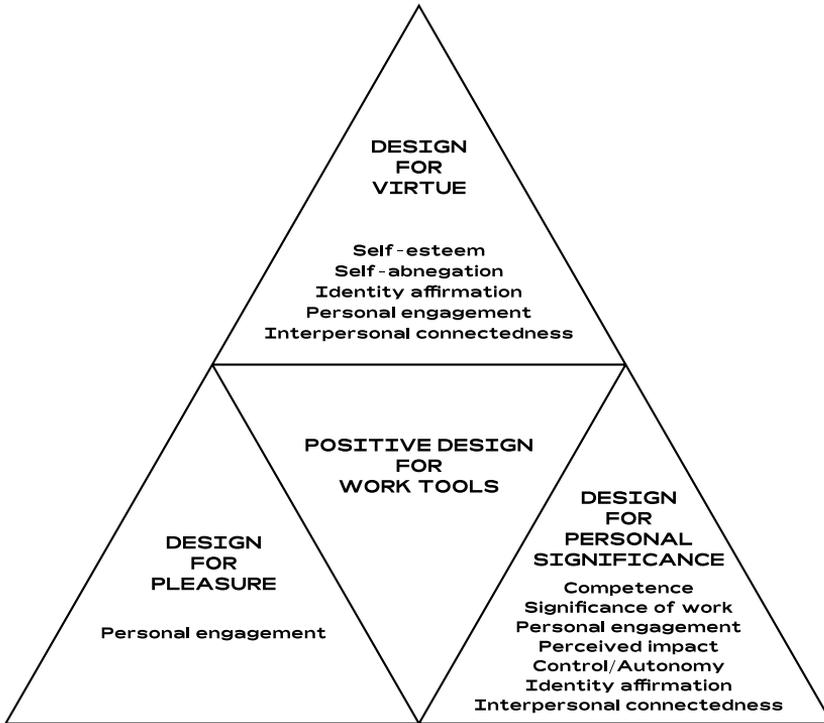


Figure 4.2.1 Positive Design Framework for Work Tools (PDFWork)

4.3

Study III: Pride as an Xgoal

Lu, Yichen, and Virpi Roto. 2016. "Design for Pride in the Workplace." *Psychology of well-being*, 6(1), 1-18.

Design researchers have been inspired with psychological theories and have developed various design frameworks for experience design, e.g., the Four Pleasures (Jordan 2000), three levels of design (Desmet, Porcelijn, and van Dijk 2007), and Positive Design Framework (Desmet and Pohlmeier 2013). These design theories address positive experiences as high-level goals of design but arguably appear too abstract and scarcely reach to the fine granularity required for pragmatic design practice (Yoon, Pohlmeier, and Desmet 2016).

In this regard, **Study III** concentrates on more specific design strategies for human flourishing, with a focus on one of the most positive experiences in the workplace, professional pride. Current design studies on pride have been constrained by the mere scope of product design and the narrow perspectives of self-achievement and distinct personal possession (Desmet 2012). In contrast, experience of pride at work is dynamic. Psychological studies identify self-oriented and event-based achievements as the main sources of pride (Tracy and Robins 2007), whereas work from organisational management considers pride as a collective attitude derived from other-focused activities and fostered by the sense of belongingness (Gouthier and Rhein 2011).

Study III aims to identify the design strategies for the richness of pride in the workplace. Taking the interdisciplinary aspects of pride into account, this research first introduces a framework of dynamic pride in the temporal and social dimensions distilled from literature studies (Figure 4.3.1). Because design strategies are required to be highly applicable and practice-driven, apart from the theoretical perspective, it is plausible to examine how different types of pride were designed for in the concrete cases. The empirical data include twenty experience design cases for positive experiences in the context of the Finnish metals and engineering industry. Master-level design students and the company representatives collaborated through the Xgoal-directed design process. Based on the interpretation of the final design reports, 33 pride-related Xgoals were analysed and grouped into four categories: self-focused short-term pride, self-focused long-term pride, other-focused short-term pride, and other-focused long-term pride. Accordingly, the design-for-pride strategies of each goal were extracted from design

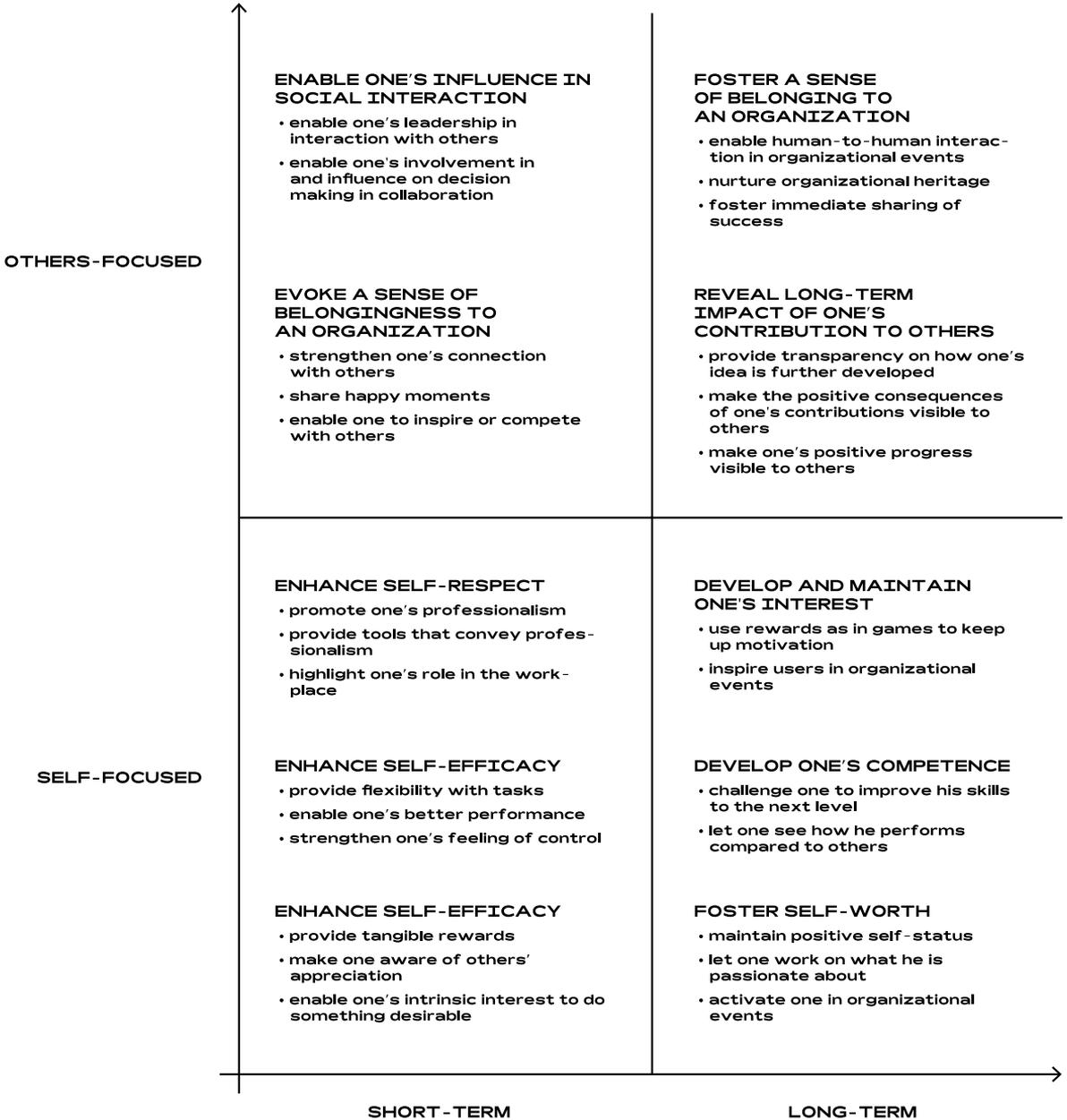


Figure 4.3.1 Design strategies sorted by two dimensions of pride (Lu and Roto 2016)

reasoning in the final concepts and then mapped to each type of pride along the social and temporal dimensions. The findings show that the design students were most aware of self-focused short-term pride and other-focused long-term pride. Enhancing self-respect and self-efficacy along with promoting one's goal achievement can elicit self-focused short-term pride. Fostering self-worth, developing one's competence, and maintaining one's interest can cultivate self-focused long-term pride. Enabling one's influence in social interaction and evoking a sense of belongingness to an organisation are keys to designing for other-focused short-term pride. Fostering a sense of belonging to an organisation and revealing the long-term impacts of one's contribution to others are design strategies of other-focused long-term pride. These four types of pride connect to each other, work together, and create synergy for a successful business.

These extracted design strategies (Figure 4.3.1) may help designers to discover profound sources of pride experience at work from the social and the temporal dimensions. Therefore, the design-for-pride space can be expanded from a self-focused and achievement-oriented interaction with a tool towards fostering engagement-oriented interaction with people, and from an event-based emotional pride in a momentary interaction towards a long-term organisational attitude of pride. This study provides a concrete example for design researchers on how to generate applicable experience design principles by interweaving theories and case studies.

4.4

Study IV: Xgoals in the design process

Lu, Yichen, and Virpi Roto. (n.d.). "Experience goal as a designerly instrument to guide experience-focused design." *International Journal of Design*. (submitted).

Experience-focused design deliberates to prioritise experiential objectives over functionality and technological requirements and to enable a possibility-driven design approach (Hassenzahl 2010; Desmet and Hassenzahl 2012). Many XFD studies focus on the theories of experience and identify the elusive and complex nature of experience (Law et al. 2009). However, few of them investigate how designers can remain focused on the experiential goals along a design journey (Convertino

et al. 2015), let alone translate the targeted experiences into a matured design concept (Roto, Saariluoma, et al. 2017; Camere and Bordegoni 2015). To address this challenge, **Study IV** conceptualises an experience goal (Xgoal) as a designerly instrument and aims to understand how Xgoals contribute to creative design practice. The research question of **Study IV** is, thus, what are the possible functions of Xgoals in the design process?.

Study IV reports the results of the interviews with eight XFD researchers who provided insights and suggestions on Xgoal setting and utilisation in the creative design process. The results are categorised against the four design activities: background exploration, concept generation, concept evaluation, and concept implementation. The findings of the eight expert interviews depict three key benefits of setting well-defined Xgoals. First, exploring Xgoals is a process of representing the intended experiential aspects of design with different descriptive representations. Concepts are crafted as divergently as possible in order to expand the considered design space. Second, experimenting with tentative Xgoals is a prescriptive means to testing initial ideas. Merits from different ideas are identified and synthesised into several convergent concepts. These key concepts are tested in an iterative process and therefore constantly reframe the considered design space. Third, maintaining designers' attention to Xgoal setting and utilisation keeps design activities moving on and directs concept development towards an experiential outcome (see Figure 4.4.1).

The findings further imply that Xgoals can facilitate collaborative design as springboards to launch radical ideas. Xgoals can serve as spotlights to illuminate the promising design space by clustering reflective knowledge about the design situation. Meanwhile, Xgoals can function as a compass to direct the moves of design activities by effectively communicating experiential aspects of design across different disciplines (see Figure 4.4.1).

In conclusion, **Study IV** sheds light on Xgoals, which can function as a generative, reflective, and communicative tool in guiding creative design practices. Future studies on this area could focus on how to balance Xgoals with other design objectives and to translate Xgoals into appropriate formats for the different purposes of design activities.

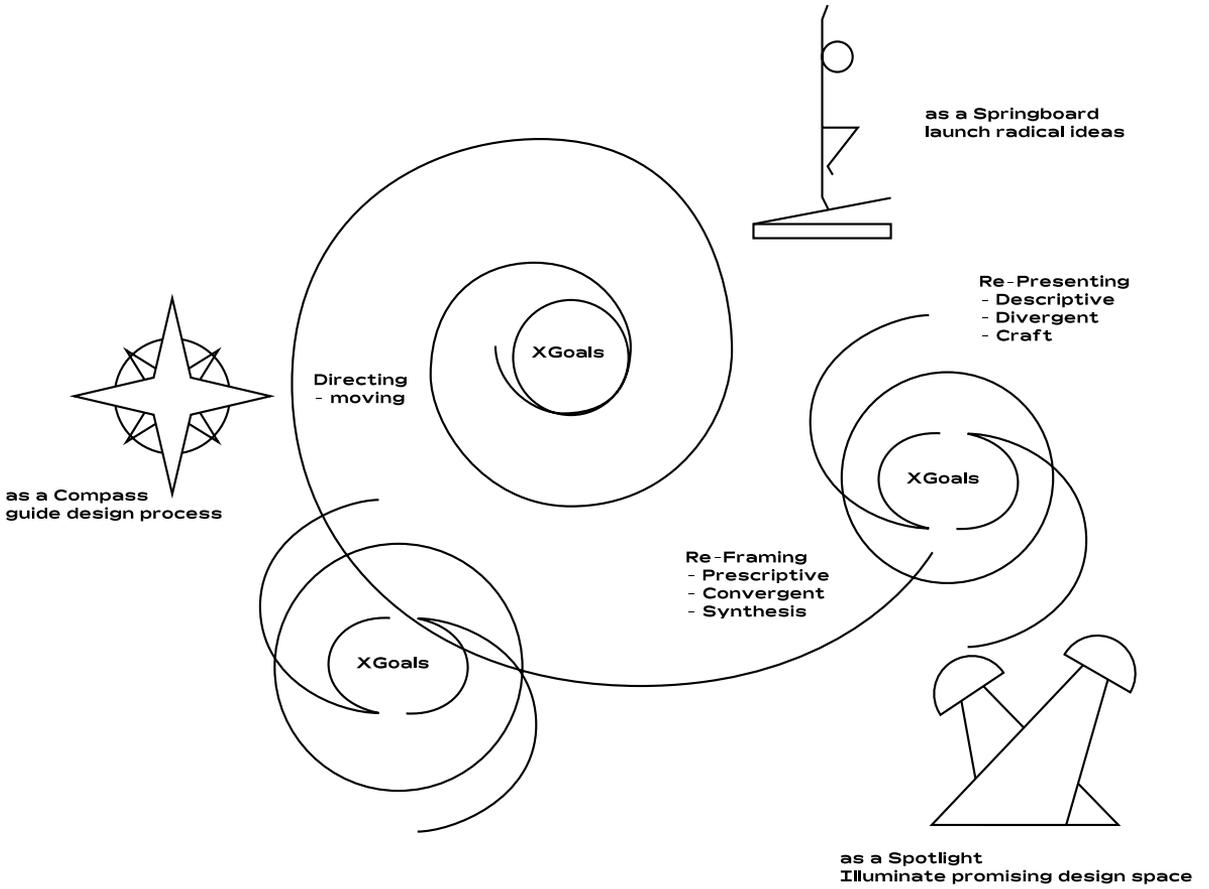


Figure 4.4.1 Three benefits of Xgoals in creative design practices

5

Discussion

The findings of the four studies indicate that to prioritise experience goals (Xgoals) over design constraints enables a creative approach to seeking new opportunities for meaningful experiences at work. According to the results of each study and the literature study (see Chapter 2), this chapter first answers the research question of each study. Furthermore, the cross-cutting implications of this research uncover the potential function of Xgoals. Finally, the limitations of this research and future studies are discussed.

5.1 Answers to research questions

5.1.1 RQ1: HOW CAN MEANINGFUL XGOALS EXPAND THE CONSIDERED DESIGN SPACE OF PROFESSIONAL TOOLS?

Study I exemplifies three design cases and indicates that well-defined Xgoals potentially expand design space by recasting design themes. In the context of the collaboration between an Experience-driven design course and the B2B heavy engineering industrial companies, the design students followed an Xgoal-directed approach. They initially interpreted the underlying value, concerns, and needs of different stakeholders and then synthesised the insights into meaningful Xgoals of targeted people. The experiment with a tentative translation from Xgoals to concepts supported to provoke an empathic understanding of different stakeholders, creative imagination of future scenarios, and thematic framing without predefined constraints.

Setting Xgoals with an in-depth meaning shifted the original focus from a specified problem in the given brief towards an underlying meaning for humans to experience. Xgoals kept designers away from the trap of simply striving for a no-error status. Instead, Xgoals provided new insightful perspectives to reframe the original issues and therefore brought in diverse dimensions of design space. For example, in one design brief, the company was concerned with its brand recognition in the market, and the given problem was the poor aesthetic appearance of a product. The Xgoals provided the new design perspective to let customers feel *wow*, *pride*, and *trust*. The momentary experience of *wow* was elicited by the uniform product aesthetic style details. The episodic experience of *pride* was evoked by the featured interaction with the

product. The long-term experience of trust was kept by company-client engagement via a service application. The resulting concepts varied in realm from traditional industrial design to interaction design to service design and even to strategic design.

This doctoral research suggests Xgoals help to expand the focus of design from a situation of singular end-users towards a network of different stakeholders; from human-tool interaction managed by a digital process towards face-to-face communication in events; and from momentary workflow towards long-term loyalty to an organisation. Xgoals therefore expand design space at least in terms of the social and the temporal dimensions. Xgoals may guide design practice to explore the four orders of design “manifested in symbols and images, physical artefacts, actions and activities, and environments or systems” (Buchanan 2001, 203).

The intervention of Xgoals can support a possibility-driven approach to design space expansion. They serve the primary lines to sketch out a designers’ imagination of experiential vision. Xgoals concisely concretise the intended experiences in the form of high-level visionary design goals. In other words, Xgoals crystallise designers’ insights and vision that defines the meaningfulness of experiences to be designed for. Therefore, setting Xgoals proposes an in-depth design inquiry. Similar inquiries can be seen in other possibility-driven design approaches, e.g., “be-goals” in a three-level hierarchy of goals for experience design (Hassenzahl 2010), “vision defining the goal” in the ViP approach (Hekkert and van Dijk 2011), the life goals of design for happiness (Desmet and Hassenzahl 2012), three ingredients of positive design (Desmet and Pohlmeier 2013), and “why” and “meaning” in designing for meaningful experiences (Jensen 2014).

The experiment with tentative Xgoals address the core challenge of design, design abduction, “how to think from consequences (e.g., a need to be addressed, or a value to be attained) back to causes (the designed objects, systems, services) and working principles (the way things work, as well as the way they need to be used/enacted to achieve functionality)” (Dorst 2015a, 24). The exploration with Xgoal candidates (i.e., consequences in design abduction), tentative working principles and creative design expression (i.e., causes in design abduction) is an experimental process of design space expansion through constantly identifying and comparing different possibilities.

To summarise, setting and utilising Xgoals both contribute to an expansion of the design space. Setting meaningful Xgoals traces back to the in-depth reason why certain experiences are worth designing for,

provides new dimensions into original design space, and keeps a certain degree of distance with existing obstacles in each context. Furthermore, meaningful Xgoals direct a design abduction process toward seeking opportunities without a predefinition of means to the targeted experience.

5.1.2 RQ2: HOW CAN XGOALS BE SET IN AN EXPERIENCE-FOCUSED APPROACH TO DESIGNING FOR MEANINGFUL EXPERIENCES AT WORK?

One challenge of XFD is to specify the intended experience and to convey it well to different stakeholders (e.g., Kaasinen et al. 2015b; Yoon et al. 2016). The Xgoal-directed approach, including Xgoal setting, Xgoal realisation, and Xgoal evaluation, does provide a step-by-step design structure. However, a simplified activity structure can hardly equip designers with the explicit knowledge on how to set Xgoals with clarity and precision because the standardised procedures are usually left abstract from the design content, designer, and design context, whereas XFD is essentially content-oriented (Dorst 2008; Hassenzahl 2010). In this doctoral research setting, the experiences at work are at the core of design content, whereas “meaningful experience at work” is too general and vague as an Xgoal to substantialise the content of XFD.

To set clarified Xgoals for work tool design, designers should first understand what can be meaningful experiences in the work domain. How work becomes meaningful is revealed by the mechanisms of the meaning of work (Rosso, Dekas, and Wrzesniewski 2010). These mechanisms are utilised to “explain the underlying psychological and social processes through which work takes on meaning or is perceived as meaningful” (ibid.). Concerning Xgoal setting, these mechanisms provide theoretical sources of meaningful experiences at work ranging from self-oriented to other-oriented: *authenticity, self-efficacy, self-esteem, purpose, belongingness, transcendence, and cultural and interpersonal sense-making*. The first six high-level mechanisms emphasise the psychological processes that lead individuals to experience meaningfulness, whereas the last mechanism, cultural and interpersonal sense making, focuses on meaning-making from a social and cultural perspective. These mechanisms may prompt work tool designers to seek a comprehensive understanding of the meaning of work related to the targeted context.

To set high-level design goals, Positive Design theory (Desmet and Pohlmeier 2013) informs experience-focused design with the most

possibility-driven and universal framework in terms of design for human flourishing. This framework is composed of three balanced starting points of design: **pleasure**, **personal significance**, and **virtue** (ibid.). The framework covers a person's momentary pleasures, personal goals and inspirations, and idealised human value. From the perspective of the UX timespan (Roto et al., 2011), pleasure tends toward momentary experience, whereas personal significance and virtue tend towards episodic or cumulative experience.

Study II maps the Xgoals of 10 selected work tool design cases to the mechanisms of the meaning of work and the components of positive design, respectively. The result indicates that the elements of these two theories complement each other and contribute to the guidelines of experience design for work tools. **Study II** proposes a positive design framework for work tools (PDFWork, see Figure 4.2.1).

With PDFWork, if designers aim to design for personal significance, they can get inspired by the self-efficacy mechanisms of competence and *control/autonomy* and the self-connection mechanisms of *identity affirmation* and *personal engagement*. Besides the self-oriented aspect, designers can also link personal significance with the perceptions that are informed by the other-oriented mechanisms of perceived impact, significance of work, and interpersonal connectedness. In other words, designers can associate design for personal significance with the perceptions of one's own good performance and social interaction with others.

Designers can easily associate virtue with the other-oriented and social-related mechanisms of the meaning of work, e.g., interpersonal connectedness, which contribute to a sense of belongingness and togetherness. As well, designers can design for virtue from the self-focused mechanisms, e.g., personal engagement, self-esteem, and identity affirmation.

Pleasure is commonly associated with hedonic experience, especially in leisure product design. For serious industrial workplace products, design seems to mainly focus on pragmatic perspectives rather than pleasure (Väätäjä, Seppänen, and Paananen 2014; Nuutinen et al. 2011). However, **Study II** suggests that design for pleasure in the workplace can be associated with the mechanism of personal engagement that underlines an immersed and energetic state at work.

In summary, according to the proposed PDFWork framework, the mechanisms of the meaning of work substantiate each component of the positive design framework and offer potential Xgoals, thus assisting designers to interpret an in-depth meaning of work and translate it into meaningful workplace Xgoals. However, the PDFWork framework is

limited by the selected theoretical roots so it is only one source for workplace Xgoal setting. Other studies, e.g., the findings of Tuch et al. (2016), indicate that fulfilment of *competence*, *popularity* and *security* needs contribute to positive experiences at work, can be also considered as potential sources for design goal setting for meaningful experiences at work.

5.1.3 RQ3: HOW CAN DESIGNERS BE HELPED IN ORDER TO PROCEED FROM ABSTRACT XGOALS TO DESIGN EXPRESSION?

Although many psychological and social science studies contribute to the knowledge of certain experiences, few of them can directly inform designers on how to design for that experience (Vetere et al. 2005). Design researchers therefore attempt to translate external knowledge into design principles, e.g., design strategies for fostering gratitude, empathy, compassion, and altruism (Calvo and Peters 2014, 86), however, most of these theories may arguably appear too abstract for designers and far away from the fine granularity of concrete guidance required for the design task.

To further investigate the gap between an abstract Xgoal and its realisation, **Study III** targets the experience of pride at work. First, **Study III** specifies the concept of “pride at work” by cross-cutting theories from the psychological structure of pride, pride experience at work, and design for pride experience. Based on the literature study, the social and temporal dimensions of a pride experience at work is introduced: self-focused short-term pride, self-focused long-term pride, other-focused short-term pride, and other-focused long-term pride. Second, this study collects 20 experience design cases that were specially devoted to positive experiences in the context of the metals and engineering industry. The pride-related Xgoals were categorised into the four types of pride, and then the extracted design strategies of these goals were mapped to each type of pride (see Figure 4.3.1). These design-for-pride strategies combine the multidisciplinary theoretical knowledge and the design knowledge manifested in the practices, and uncover the pride experience patterns in the workplace context. These strategies vary from “evoking self-achievement in individual interactions with tools to maintaining long-term motivation of self-competence development, and from highlighting one’s contribution in face-to-face collaborative work facilitated by interactive tools to fostering co-experience of organizational pride throughout social events” (see Figure 4.3.1).

Besides identifying experience design strategies from theories or cases, designers can borrow ethnographic approaches (e.g., observation or design probe) to obtain an empathic understanding of human experiences, and further engage with people to craft contextualised experiences together (Wright and McCarthy 2010). In this research setting, most of the design cases received inspiration from the field. Therefore, unlike deriving experience patterns from condensed available theories, experiential insights from first-hand data of the field maintains the richness and freshness of experience.

To design for intended experience, designers need to understand scientific mechanisms that can trigger a certain experience, to learn practical design strategies from inspiring cases, and to gain first-hand experiences in the targeted contexts. The synthetic knowledge from theories, cases, and context can integrate scattered experiential knowledge, facilitate experience pattern creation and application, and therefore reduce the gap between targeted experience and Xgoal realisation.

5.1.4 RQ4: HOW CAN XGOALS HELP DESIGNERS IN THE DIFFERENT PHASES OF THE XFD?

To elicit more insights on Xgoal as a conceptual tool for possibility-driven design, **Study IV** presents the findings of the expert interviews and suggests potential functions of Xgoals in the four types of design activities: background exploration, concept generation, concept evaluation, and concept implementation.

For background exploration, the findings of the expert interviews uncover three concerns with utilising Xgoals: generating ideas with concise starting points, understanding the context systematically, and deriving goals from the designers' initial ideas. Accordingly, these concerns thus suggest three potential functions of Xgoals in the early stage of the design process: *facilitate creative ideation*, *empathic understanding of design context*, and *original idea crystallisation*. A quality Xgoal is an intriguing starting point in one word or phrase that can be understood by all stakeholders in collaborative design. To start with Xgoal setting in the background exploration helps designers to elicit different stakeholders' feelings, to trigger collaborative imagination, and to encourage insights from different perspectives. These insights derived from Xgoals are experience-oriented. They may imply the in-depth reason for experiences rather than the existing constraints. Therefore, Xgoals empower ideation in the early stage of design. Furthermore, Xgoal setting can be integrated into a systematic mapping approach, e.g., to set Xgoals

for each stakeholder along the customer journey. Tentative Xgoals with associated ideas provide channels to understanding the context and mark the explored design space. The findings also suggest that the third potential function of Xgoals in the background exploration is to grasp an experiential idea in the simple form, e.g., a metaphor “feel like...” becomes a design driver in the later design process (Lindholm and Keinonen 2003).

The interview data reveals four key issues that designers need to deal with when generating concepts: dispense contextualised meaning to Xgoals, diversify the association with Xgoals, evolve Xgoals into an iterative process, and balance Xgoals with other goals. Accordingly, the findings first suggest that well-defined Xgoals can help designers to *keep focus on making sense of targeted experiences in the designed context*. Second, Xgoals as high-level goals enable *diverse association and creative imagination* that can bridge Xgoals to concrete design expression. Third, the development of an Xgoal *facilitates a designers’ iterative circle of learning and reflection* on the Xgoal and its associated concepts, which causes an Xgoal either to evolve into more concrete sub-design goals or to replace it with a new one. Fourth, Xgoals remind designers and stakeholders to *keep an eye on experiential objectives* when they balance different goals in concept generation.

For concept evaluation, the experts’ comments focus on three aspects related to the potential functions of Xgoals: create access to realistic experiences, keep concepts open, and adjust evaluation criteria. First, Xgoals help to articulate experiential quality. Xgoals *underpin concept demonstration and assist designers with various experiential representations* that create the possibility for realistic experiences. Second, Xgoals in the concept evaluation *serve to provoke stakeholders’ discussion and to stimulate idea generation* rather than keep or kill a concept. However, the interview data points out that there is no straightforward relation between Xgoals and evaluation criteria. For a developed concept, the translation or association from Xgoals to specific measures may require several layers in the designers’ active reasoning. This translation makes it a challenge for participants to pinpoint which experiences have been designed for from the concept representations. Therefore, the understanding of Xgoals within a certain context can *facilitate the adjustment of evaluation criteria* for a specific concept.

For concept implementation, the findings from the expert interviews show the potential in how Xgoals may benefit the communication between concept designers and concept implementers in three aspects: to evoke empathy, to facilitate knowledge transfer, and to develop design

requirements. First, well-communicated Xgoals may evoke an empathic understanding of the targeted experiencers, and enable a common definition to align different interpretations, and thus *ease the communication between different stakeholders*. Second, a common understanding of Xgoals supports *professional knowledge across different disciplines and a design specification derivation from an Xgoal*.

In conclusion, a set of well-articulated Xgoals may evoke empathic understanding of the targeted context, support design space exploration, nurture all stakeholders' imaginations, direct creative concept generation, ease communication between different stakeholders, and facilitate sub-goal and design requirement derivation. Although these potential functions of Xgoal are categorised in different design activities, Xgoal can serve as a versatile design instrument at different stages of a creative design process.

5.1.5 CROSS-CUTTING RQ5: WHY AND HOW DO XGOALS WORK AS DESIGNERLY INSTRUMENTS?

The collected student cases and the findings of the researcher interviews make it evident that meaningful Xgoals were employed in most of the design projects, yet it remains a puzzle for designers why and how Xgoals work in the design process. Combining the interview data and related earlier studies, **Study IV** identifies three critical facets of Xgoals in the design process: representing experiential aspects of design, reframing considered design space, and directing design moves. These facets of Xgoals pinpoint the reason why Xgoals are qualified to be designerly instruments.

Representing experiential aspects of design

Xgoals with associated design expression present and represent key experiential information throughout an iterative design process. In the early phase of design, Xgoals as the generative starting points drive creative imagination into divergent directions. The more design representations express experiential aspects of design, the more channels access the unexplored design space, and the more possibilities are created to approach targeted experiences. Structuring Xgoal setting on a design framework (e.g., a customer journey) can help to systematically gain and present contextualised and empathic knowledge. This increasing knowledge further facilitates Xgoal development into more descriptive, engaging, and communicable design representations that benefit knowledge exchange in collaborative interdisciplinary design activities.

Reframing the considered design space

The evolution of Xgoals through different design representations is also the process when Xgoals frame and reframe the explored design space. Xgoals as design objectives and as a synthesis of the current design knowledge have the nature of being convergent and prescriptive in each progressive move of the design. Xgoals may be initially abstracted from the designers' original ideas or hypothesis that will be tested in the later design process. Designers dispense contextualised knowledge into Xgoals and try tentative design ideas with different stakeholders. Ideally, Xgoals are balanced with other design objectives and further formulated into operationalised design specifications and evaluation criteria for concept selection and implementation.

Directing design moves

Xgoal setting and realisation are wicked problems in nature, and hence, they do not follow a rational idealised linear engineering design process (Cockton 2017). Instead, Xgoals submit to an internal logic of abductive design reasoning that characterises XFD rationale. Xgoals serve as guiding stars throughout the design process (Koskinen, Karvonen, and Tokkonen 2013; Väättäjä et al. 2015). The interview findings reveal that Xgoals may impact especially query, explanation and evaluation, thereby directing collaborative efforts to experience embodiment in design concepts. Xgoals break through the puzzles, point out the next explorative direction and thus make a move in design practice.

Additionally, in the early phase of design, Xgoals and concepts are constantly changed and developed due to the enhanced understanding of the context. Thus, the evaluation criteria should be adjusted and adapted in the different stages of design. Xgoal setting, conceptualising, and evaluation are not mechanically separated, but rather, concurrent in the design process.

In conclusion, Xgoals may serve to springboard experiential design representations, to illuminate promising design space, and to guide design direction. These main benefits of Xgoals in XFD, empower Xgoals to be generative, reflective, and communicative instruments. These functions explain *how* an Xgoal represents a triple designerly tool in creative design practices.

Xgoal as a generative instrument for design space expansion

The early phase of creative XFD initially addresses two typically wicked problems (Rittel and Webber 1973), “what experience to design for” (i.e., Xgoal setting) and “how to create conditions to evoke the targeted experience” (i.e., Xgoal realisation) (Desmet and Schifferstein 2011). The two inquiries both share the ten properties of wicked problems (Rittel and Webber 1973), e.g., Xgoal setting and utilisation in design practice have no definitive formulation, no stopping rule, no absolute correctness, and more than one possible explanation. These properties of wickedness suggest there is a fundamental indeterminacy in XFD (Buchanan 1992).

Xgoal setting and realisation can be viewed as two unknowns of design abduction that result in a process of creative exploration (Dorst 2015b). Aligning with the logical formula of design abduction (*ibid.*), a specified Xgoal is in line with the nature of the outcome (i.e., consequence). Xgoal realisation is therefore the equivalent of applying a particular pattern of relationships (i.e., working principles) for this desired outcome. To bridge the gap between consequence and working principles requires iterative trials of a hypothetical pattern of relationships until a desired frame emerges (Dorst 2015a; 2015b). Similarly, to create and apply an experience pattern (Hassenzahl et al. 2013) as a design strategy may help designers to leap from an Xgoal to Xgoal expression in concepts. The iterative trials of applying tentative experience patterns into the targeted context embrace more possibilities.

In line with the creative design process as the co-evolution of problem/solution space (Dorst and Cross 2001), Xgoal setting and Xgoal realisation seem to emerge together and intertwine with each other along the design timeline. However, the emphasis on first generating the experiential vision and goals prevents designers from beginning with a consideration of solutions in detail (Hekkert and van Dijk 2011). Instead, setting Xgoals allows them to turn their hands to nearly anything possible.

In summary, Xgoals setting and utilisation can form double wicked problems and lead a design abduction process which facilitates an expansion of the considered design space. Therefore, Xgoals are qualified to be generative designerly instruments that direct a possibility-driven design approach.

Xgoal as a reflective instrument for learning the design situation

Tentative Xgoal setting and Xgoal realisation are experimental because each Xgoal serves as a design inquiry into the unknown design space. To maximise the closeness between the Xgoal and real-life experience of the targeted experiencers, designers need to foster empathy and imagination. They go through iterative trials and errors with each candidate Xgoal to understand how Xgoals make sense for the targeted experiencers.

The experiments with a tentatively proposed Xgoal comprise the core part of the design process which is “making educated guesses when proposing solutions” (Dorst 2015b, 43). No matter whether an Xgoal succeeds or fails, it may bring the reflective knowledge from each attempt in the design abduction process (ibid., 49-50). Experiments with Xgoals setting and utilisation can provoke a “reflective conversation with the situation” (Schön 1992) and further reframe or improve an existing Xgoal in relation to the targeted context. The resulting knowledge is situated and a unique result of designerly ways of Xgoal intervention (Cross 2001). Importantly, Xgoals with associated reflective knowledge can help to mark which area of the design space has been explored and to illuminate which is the next promising area to explore. This reflective designerly way of knowing is commonly generated in design practices. However, designers normally focus more on generating ideas rather than making reflective knowledge explicit and documented. Thus, the highlight of Xgoals not only helps to elicit reflective knowledge on experiential aspects of design but also supports designers to analyse, compare, and organise insightful reflections with a centralised theme, which contributes to design reasoning and decision-making.

Xgoal as a communicative instrument for sharing and transferring experiential knowledge

Language is the primary tool for establishing meaning and facilitating management and transformation of situation in design, although it might be not first concerned with precise representation (Dalsgaard 2017). Verbalised Xgoals in a word or a short phrase can provide different stakeholders a common lens decoupled from professional knowledge. The proposed Xgoals can be further developed into keywords to back up the narrative and storytelling of the targeted experiences.

Besides this, other design representations of Xgoals as well as the process of producing them are also helpful to define and communicate

Xgoals, e.g., sketches, personas, scenarios, user journeys, presentations, and reports (Varsaluoma et al. 2015). Multiple presentations of a same set of Xgoals can elicit different insights, foster empathy for the targeted experiencers, and eventually clarify the understanding of the experiential knowledge. Experience designers have the responsibility to interpret concerns of different stakeholders and to translate Xgoals into their professional languages. The confirmation of Xgoals can thus lead the discussion onto the sub-goal derivation regarding functionality, usability, and other design requirements. The communication and discussion revolving around Xgoals helps to reach a balance of the different sub-goals in the early phase of design.

The methods and techniques of co-design and participatory design can be tailored for Xgoal definition, communication, and evaluation in the early stage of collaborative design projects. The model of the Xgoals elicitation process coupled with the instructions for communicating Xgoals (Varsaluoma et al. 2015) contributes to the collaborative Xgoal setting from a procedural perspective. Communication with a focus on Xgoals can prevent the misunderstanding or confusion of the Xgoals in the early stage of the design process. After all, a set of quality Xgoals are worth the collaborative effort to communicate. In return, effective communication among different stakeholders brings out an in-depth understanding and clear articulation of sharable Xgoals, which both push the design forward.

Xgoals in tool-related design in the metals and engineering industry

Within this doctoral research context, the main challenge of introducing XFD into B2B heavy engineering industrial systems was to change the in-house design orientation. Heavy engineering companies make design decisions based on objectivity and rationality and follow an object-centred problem-solving approach (Nuutinen et al. 2011). In contrast, Xgoal setting and utilisation starts with seeking explorative opportunities and requires the designers' intuition, imagination, and reflection through a collaborative and iterative design process (Varsaluoma et al. 2015). This design orientation change reflects the historical development of the design methods movement from a desire to "scientise" design (i.e., a search for scientific design products and a concern for the scientific design process) (Cross 2001) as a technical-rational goal-directed process for solutions towards a collaborative social process of design argumentation (Rittel 1984; 1988) and reflective knowledge-integration

practice (Schön 1983). This study implies that Xgoals lead to design abduction, a creative design reasoning process where Xgoal definition and realisation as wicked problem and solution are in “co-evolution” (Dorst 2015; Dorst and Cross 2001). The openness and richness of Xgoals breaks through the formal logic type of reasoning, rather it encourages designers to utilise a different representation of the Xgoal for communication (e.g., storytelling and experience prototyping) “to explain or justify what he is proposing, speculating about future consequences of his plan, deciding the appropriate course of action” (Rittel 1988, 2).

Particularly for the heavy engineering industry, Xgoal as a theoretical and conceptual designerly instrument powerfully catalyses the design orientation shift from the traditional logic of problem solving towards innovative radical possibility seeking.

5.2 From Xgoals to concepts

Possibility-driven design is a general approach to creatively seeking potentials for happiness and well-being (Desmet and Hassenzahl 2012). This dissertation pinpoints Xgoal setting and Xgoal utilisation as a specific design technique for possibility-driven design. In design practice, there is a crucial creative leap between Xgoals and their associated design embodiment. In a traditional user-centred design approach, design objectives are normally the straightforward result of user studies, or more specifically, the abstraction from the users’ complaint of a product (Norman and Verganti 2014). The translation from user problems to solutions leads to an incremental improvement at the usability and utility levels. In other words, it only addresses do-goals and motor-goals without be-goals (Hassenzahl 2010). However, possibility-driven experience design addresses the profoundly meaningful “why” (Hekkert and van Dijk 2011), and the translation accordingly starts from *be-goals* into associated *do-goals* and *motor-goals* (see section 2.2.1).

Theories play an important role in translating high-level goals into ideas by offering appropriate means of abstraction and therefore allowing “distance” from the user data (Wahlström et al. 2016). Not only do theories provide a goal setting structure or perspectives but also an explanation and concretisation for design goals at the proper level of concreteness. Design theories contribute to a means for triggering novel ideas with the potential input of theories from other disciplines. For example, inspired by activity theory and cognitive theory, Hassenzahl (2010)

develops a three-level hierarchy of goals and further utilises the psychological needs as sources for setting be-goals in experience design (2013). Similarly, Desmet and Pohlmeier (2013) apply positive psychology into design for flourishing with three sub-goals: personal significance, pleasure, and virtue. Continuing this tradition with the complementary mechanisms of the meaning of work, this dissertation presents the positive design framework for meaningful experiences at work (Lu and Roto 2015), which proposes the specified experiences of human flourishing in the context of the heavy engineering industrial work environment. Furthermore, this dissertation synthesises organisational management and psychology and establishes the conceptual design framework for pride experience at work (Lu and Roto 2016).

Besides proposing in-depth meaningful Xgoals, theories from cognitive and social science (e.g., core task analysis and the joint cognitive systems) provide frameworks to effectively and systematically gain new design insights from user studies (Wahlström et al. 2016). These insights facilitate goal setting and sub-goal derivation, and more importantly, make sense of these theory-informing goals in a targeted context. These theory-based and contextualised insights can be further developed into practical design principles and therefore benefit idea generation and conceptual reconfiguration with both theoretical and contextual reasoning (Wahlström et al. 2016).

In contrast, the student design cases studied in this dissertation obviously lack the evidence and professional foundation to translate scientific theory into design expression. Instead, they tended to utilise more designerly instruments and approaches for concept rationalisation, e.g., to build a vision with a metaphor and to abstract the features of the metaphor and then to translate them into a new design context with scenarios (Hekkert, Mostert, and Stompff 2003). However, it is evident that scientific theory-informing tools have been recently utilised in XFD practice due to the vivid expression of hard knowledge and fun in use, e.g., various design cards for ideation (Yoon, Desmet and Pohlmeier 2016). As well, designers should tailor external resources and develop self-serving tools and approaches themselves (Lee 2014).

In conclusion, understanding people in the work domain is necessary for the overall interpretation of the context even if the observed people may not be the users of the design outcome. The user study insights abstracted through multidisciplinary theories do help in effectively bringing out the crucial elements, filtering out futile details, and systematising messy information for Xgoal setting, derivation, and ideation. However, designers are the living persons who are able to control the

concreteness of Xgoals and ideas in different design stages. Therefore, rather than directly feed designers the Xgoals and experience patterns with the doctrine of “what actual is”, design theories and tools should encourage experienced designers to freely envision “what ought to be” with their intuition, inspiration, and lived experiences (Suri 2003).

5.3 Limitations

This dissertation follows Hassenzahl’s assertion “think experience before product” (Hassenzahl 2010; 2013) and introduces Xgoal as a key concept for possibility-driven XFD. The overall contribution of this doctoral dissertation can be considered as a continuum mainly with the nascent theory of positive design for human flourishing (Desmet and Pohlmeier 2013). The theories of radical innovation by meaning change (Norman and Verganti 2014), the mechanisms of the meaning of work (Rosso, Dekas, and Wrzesniewski 2010), and the psychological and organisational theories of pride underpin the first three studies respectively. All these parent theories are inspiring for design theory development. On the other hand, the resulting theory-informed design guidance and principles inevitably inherit the weakness engendered by the parent theories, among which the most noticeable one is the lack of empirical evidence for tested design cases with the resulting theory.

This dissertation acknowledges that little solid evidence has been given to show whether Xgoals as well as the proposed PDFWork can lead to creating meaningful experiences at work. The published company feedback on the students’ projects can be the supportive material (e.g., the booklet from the experience-driven design course 2015, 23) which indicates that an Xgoal-driven approach can help companies create novel design concepts. Another theoretical limitation may occur with the justification of the parent theories, although the theoretical outcome can indicate their feasibility in organising data. Admittedly, it cannot exclude the possibilities that other theoretical frameworks can better code and categorise the empirical data. There might be valuable findings and insights excluded by the scope or the structure of the predefined conceptual framework. This implies an underlying danger that the resulting design principles and framework of this thesis might restrict ideation if designers overly stick to it.

Methodologically, there are several apparent limitations in empirical data collection and analysis. First, the main data source of this dissertation

is the collection of 20 Master's student design cases within the same course, which was conducted yearly between 2012 to 2015 by the same two design researchers in one research group. The XFD pedagogical similarity with the specificity of the research interest of the two researchers might lead to a monotonous tone among the collected cases in which they influenced in teaching, tutoring, and grading. As well, the interference between different design teams and the bias caused by the earlier cases can be hardly avoided in the design journeys, and may further result in the repetition of Xgoals and similarity in Xgoal utilisation in the design concepts.

Second, although the fresh eyes of students may see novel ideas, the approximately seven-week design projects where students started to explore unfamiliar contexts from scratch may seem to be not sufficiently mature in terms of proper Xgoal setting, ideation, and evaluation. This means that if more time were given to students, they would identify more sources of Xgoal setting and a stronger reasoning pattern for Xgoal realisation. Most notably, it is considerably challenging for students to understand the special context of the heavy engineering industrial workplace and the multiple stakeholders within the business-to-business network. The limited understanding of the context might increase the difficulty for design students to balance the divergence of concepts and design constraints and might further hinder the variety of Xgoals and the expansion of the considered design space.

Third, the design researchers might unintentionally bring their own subjective understanding and wishes rather than designers' original ideas when interpreting and analysing design reports. The reported utilisation of Xgoals as a design inquiry instrument could be different from the actual process of utilising them. The reports are the accumulated reflection of setting and using Xgoals, whereas the reflection-in-designing might be missed because the design students may focus on justification and arguments for design outcome rather than a critical consideration of the usability of the design tools. It might be better to let the students themselves retrospectively categorise Xgoals into different theoretical elements.

Fourth, the twenty design projects from one research unit might not reach the adequately descent sample size for distilling solid generalisable design principles. This means that this dissertation presents a promising approach to identifying XFD strategies in a targeted context rather than directly offering so-called universal design recipes. Inevitably, the lack of the real industrial case implementation and long-term Xgoal evaluation results in the missing empirical evidence of the durable impact of Xgoals

on new product development and organisational innovation. Those student cases did enlighten the heavy engineering industrial companies, and several cases were even evaluated by their clients. However, the investigation of the long-term Xgoal intervention in the business-to-business organisations is out of the scope of this doctoral study.

Fifth, for the expert interview study, there is also a limitation in terms of the small sample size of the interviewees and that of the research units. Although they are experienced senior design researchers, it seems challenging and intensive for most of them to comment on Xgoal, a new conceptual design tool with the resulting design theories in one hour. They might be not familiar with the parent theories, and they could hardly imagine how to utilise them in real-life design practice. Therefore, rather than evaluating the Xgoal-directed design approach against their practices, the interviewed experts contributed to the potential function of Xgoal in different phases of the design process.

5.4 Future studies

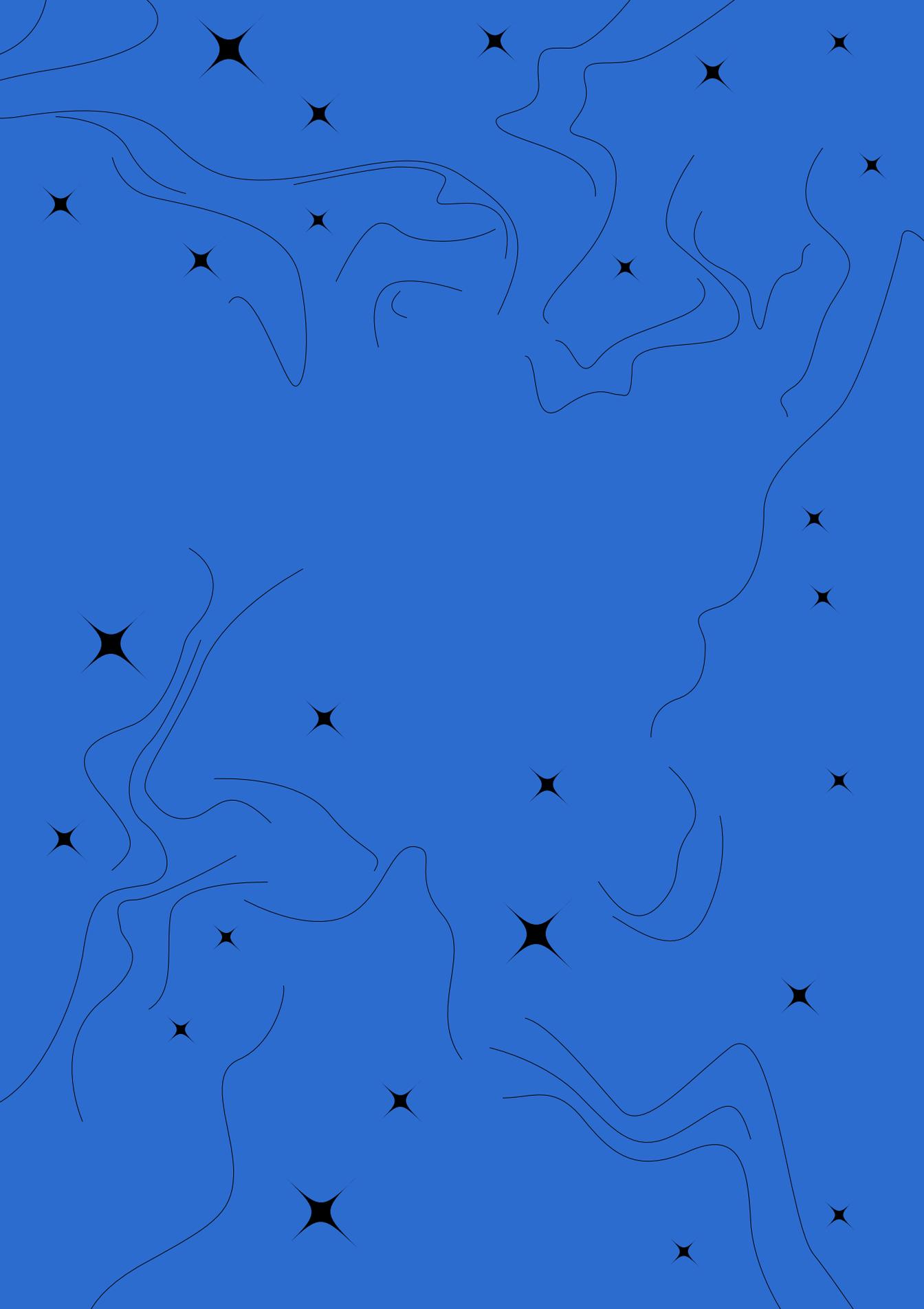
The application of Xgoal as a designerly instrument of inquiry maintains the designers' and other stakeholders' focus on the experiential aspects of the design outcome in collaborative design practices (Kaasinen et al. 2015b; Roto et al. 2017). The setting of this doctoral research intentionally centralises Xgoal in different design activities, which enables the specific investigation of Xgoal setting and translation into design concepts. However, in real industrial design cases, Xgoals should be seamlessly integrated with other design objectives, e.g., business goals and technical specification safety criteria. There is much room for future research on design goal setting. For example, how to relate and balance Xgoals with other design concerns, how to keep a proper distance with the existing problems, and when to best prioritise Xgoals for the considered design space expansion. Besides this, there is another challenge in how to translate Xgoals into an experiential specification (Jiminez et al. 2014) and how to integrate it with other design criteria for concept evaluation.

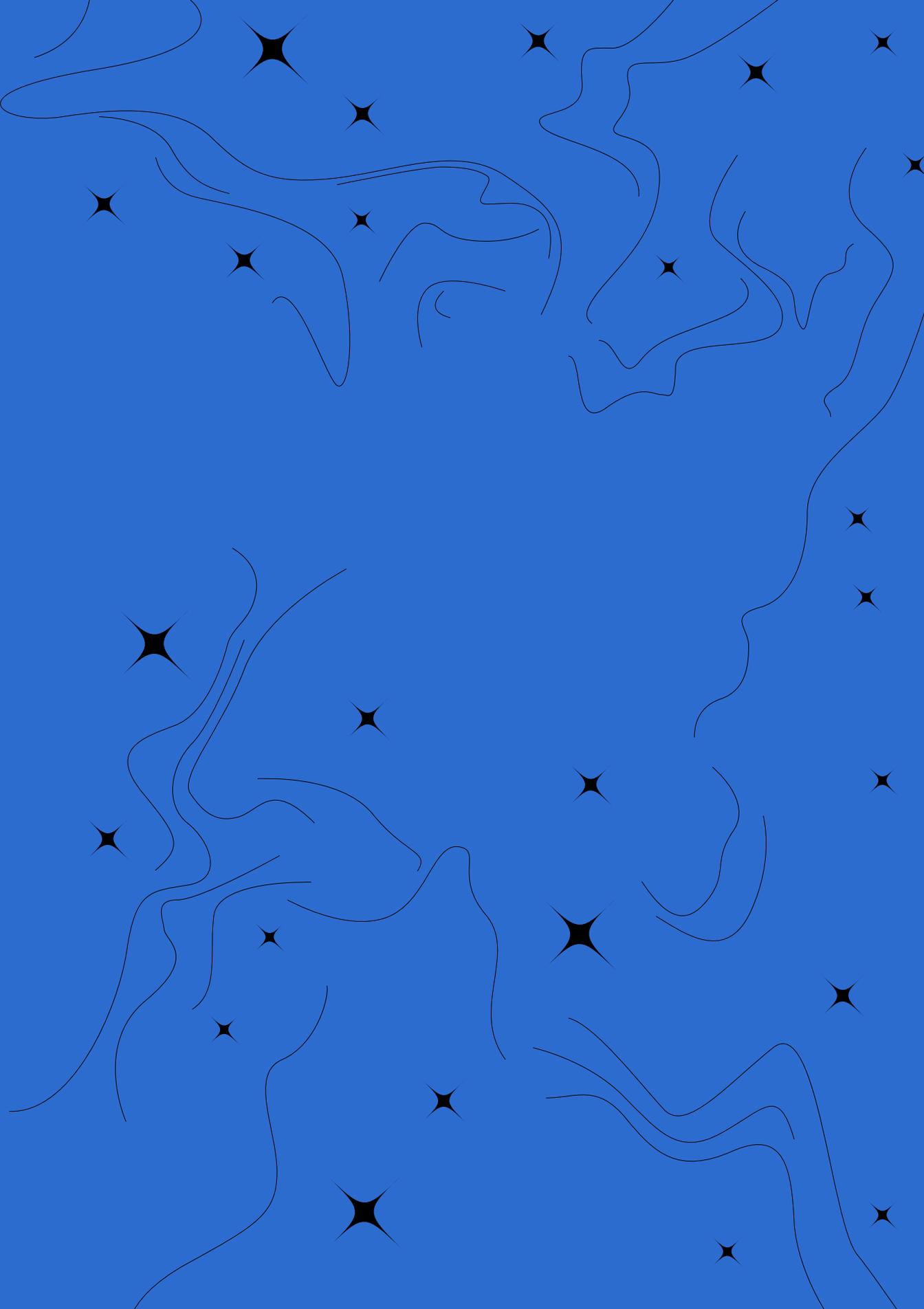
Within the category of Xgoals, the coherent and consistent setting of brand Xgoals, customer Xgoals, user Xgoals, employee Xgoals, and company-wide Xgoals is worth investigating in collaboration with experience designers, marketing people, and product managers (Roto et al. 2015). Design researchers need to pay attention to how different means

to Xgoal setting can optimise possibility-driven service design for new touchpoints in addition to the main products (Roto et al. 2016). Furthermore, the guidance to evaluate the appropriateness of an Xgoal are required, i.e., how to critically consider and justify the ethical issues of an Xgoal before ideation.

The future study can also focus on how Xgoal setting in collaborative design can support the different stakeholders' commitment to Xgoal utilisation (Kaasinen et al. 2015b). Moreover, Xgoal can potentially structure field studies, generate experiential ideas, cluster design insights, and derive evaluation criteria. These potentials indicate the need to transform Xgoal from a purely conceptual inquiry into versatile design tools in multiple levels of granularity with different formats for different purposes of design activities (Roto et al. 2017). For instance, the representation of an experiential brand promise for brainstorming should be different from that of an experiential specification for product detail evaluation. Xgoal-related tool development may start from the five qualities of designerly instruments of inquiry: perception, conception, externalisation, knowing-through-action, and mediation (Dalsgaard 2017).

For realising a specific Xgoal, design research should embrace a broader and updated theoretical framework and deepen the objective understanding of that experience. As well, the experience realisation in artistic approaches, e.g., plots in movies and fiction, can inspire the generation of experience patterns. The design strategies for pride experience generated in the context of a heavy engineering industrial workplace can be further tested in other domains, e.g., the healthcare environment. The design cases for a certain experience in different contexts are worth collecting for analysis and comparison to complete the list of design strategies for that experience. Last but not least, design researchers should be more actively involved in XFD practices and document the process of Xgoal setting and utilisation in design activities, and reflect on why a certain Xgoal may succeed or fail.





6

Conclusion

Design is “a dynamic evolutionary process and requires a starting point, an idea, a seed to nourish and grow” (Desmet and Hassenzahl 2012). In the early stage of design practice, the goals of design content impact the choice of design strategy. Recent design research on possibility-driven design shifts the design orientation from conventionally solving problems for a no-error status towards creatively seeking potentials for human flourishing (e.g., Desmet and Hassenzahl 2012; Desmet and Pohlmeier 2013). This dissertation follows Hassenzahl’s assertion of “experience before product” (Hassenzahl 2010; 2013) and concentrates on highlighting meaningful experiences as high-level design goals in possibility-driven design practices. In particular, this research introduces the experience goal (Xgoal) as a conceptual instrument that concretises intended experience and supports designers to govern experiential design content in the different stages of the design process (Kaasinen et al. 2015b; Roto et al. 2017). Xgoals underline two intertwined challenges in XFD: what experiences to design for (i.e., Xgoal setting) and how to evoke the targeted experiences by creating the conditions (i.e., Xgoal realisation) (Desmet and Schifferstein 2011). Xgoal setting and Xgoal realisation address the core of possibility-driven design, design abduction, in which designers constantly experiment with Xgoals and possible means to evoking a proposed experience until an appropriate match between the two emerge (Dorst 2015a; 2015b).

This doctoral research focuses on evoking meaningful workplace experiences by work tool design. In the research context of academia-industry collaboration, this research conducted an Experience-Driven Design course and guided Master students’ design projects that were given by the B2B heavy engineering industry companies. This research aimed for evoking meaningful experiences at work and investigated Xgoals setting and utilisation in the Master student design activities. To tackle the challenge of Xgoal setting, the mechanisms of the meaning of work (Rosso, Dekas, and Wrzesniewski 2010) and Positive Design Framework (Desmet and Pohlmeier 2013) were employed as the parent theories. These theories provide multiple dimensions and profound sources for setting meaningful Xgoals. The theoretical framework of the meaning of work presents the dimension varying from the pursuit of agency towards that of communion, and the other dimension varying from self-orientation towards other-orientation (Rosso, Dekas, and Wrzesniewski 2010). Meanwhile, the Positive Design Framework covers both momentary hedonic and long-term eudaimonic aspects of meaning in experiences (Mekler and Hornbæk 2016). With these two theoretical lenses, this research examined 31 Xgoals collected from 10 cases. The findings show

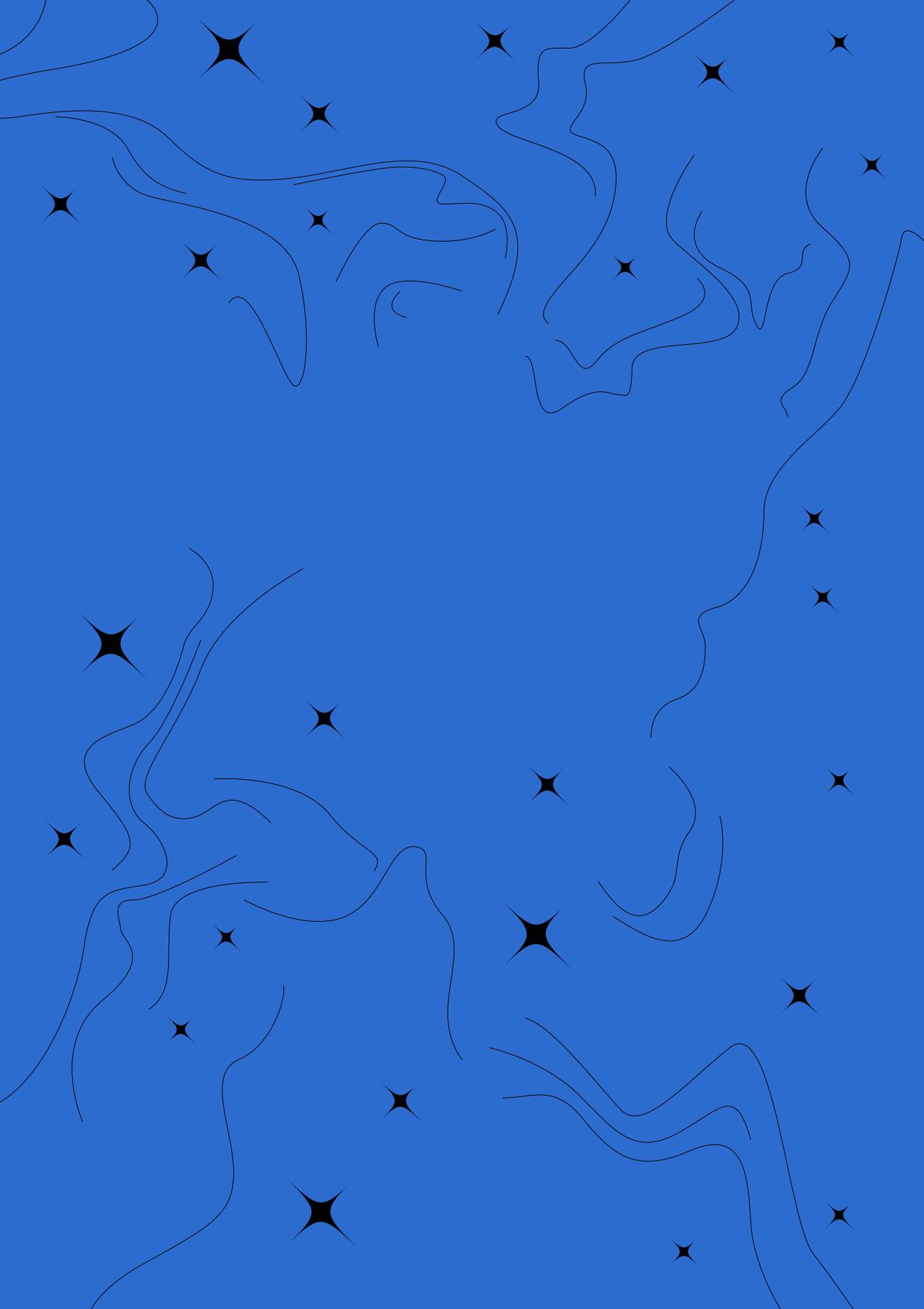
that the theoretical elements of the two frameworks are complementary and contribute to establishing the Positive Design Framework for Xgoal setting related to work tools. The proposed framework indicates the pathways to designing for virtue, personal significance, and pleasure respectively from the meaning of work perspective, and embraces the multiple dimensions of the two parent theories. Not limited by work tools, the new framework can be applied into other types of design outcome. Additionally, it can serve as the guidance for employee experience research and company portfolio design.

The second challenge addressed in this research is to bridge the gap between Xgoal setting and Xgoal realisation. Some XFD studies propose high-level design goals, but few of them articulate specified and operational design strategies for Xgoal fulfilment in a certain context (Yoon, Pohlmeier, and Desmet 2016). This research identified pride as the most designed for Xgoal in the 20 collected cases. Thirty-three pride-related Xgoals were analysed and categorised into the framework of pride experiences along the temporal and the social dimensions. By analysis of design reasoning for the pride-related Xgoals in the reported concepts, this research identified the design strategies for pride in the workplace. These strategies vary from evoking self-achievement in individual interactions with tools to maintaining long-term motivation for self-competence development. They also vary from highlighting one's contribution in face-to-face collaborative work to fostering co-experiences of organisational pride through social events.

In the B2B industrial environment, tools that enable meaningful end-user experiences (UX) are related to efficiency, work satisfaction, and professional pride. From the customers' viewpoint, meaningful employee experiences prompt productivity, competitiveness, organisational culture, and belongingness (CX). From the perspective of tool provider, compelling user and customer experiences can be considered as a promising source of competitive advantages and market differentiation (BX) (Väätäjä, Seppänen, and Paananen 2014). Therefore, Xgoal setting explores the interplay between UX goals, CX goals, and BX goals, and further facilitate the expansion of the considered design space from the main product towards a service touchpoint and even to company strategy (Lu and Roto, 2014; Roto et al. 2015; Roto et al. 2016). In such a complex and networked context, Xgoal setting as a designerly instrument of inquiry (Dalsgaard 2017) facilitates the explorative framing process to make a match between “whose experience to design for,” “what experience to design for,” and “how to evoke the targeted experience.” The findings of the expert interviews suggest Xgoals can support idea-

tion, reflection, and communication in creative design practices. Xgoals can constantly remind the design team to concentrate on experiential aspects in different phases of the design practice. The findings also recommend to utilise various representations of Xgoals for a shared understanding of the experiential aspects of design among different stakeholders.

To sum up, this research follows the recent trend of possibility-driven design for human flourishing, borrows the form of taxonomies and frameworks of the meaning of work from organisational management (Rosso, Dekas, and Wrzesniewski 2010) and contributes to the nascent theory development (Edmondson and Mcmanus 2007) of positive design (Desmet and Pohlmeier 2013) for workplace experience. For the heavy engineering industry, this research contributes to facilitating the design orientation change from engineering-driven product improvement towards profoundly experiential vision creation. Future work can be first devoted to the empirical evidence in real-life design projects: how this research outcome can assist companies to develop specific and customised XFD strategies, translate experiential insights into design goal setting, optimise the Xgoal communication, realisation, and assessment in product-service system development, and eventually have an impact on workplace experiences. Furthermore, design instruments for Xgoal setting and realisation in relation to other design goals are worth developing further to support opportunity framing in the early stage of design practice.





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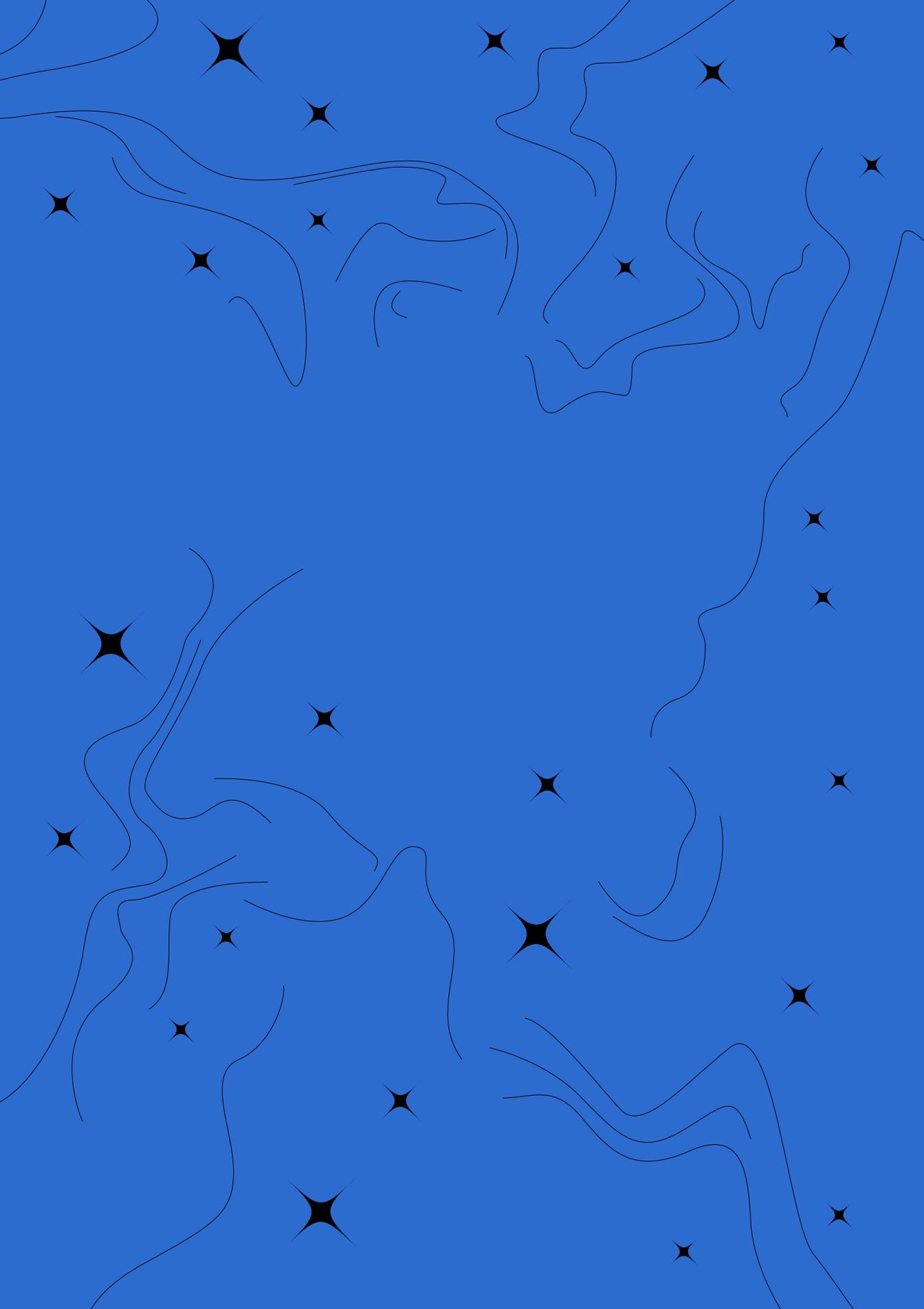
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Research papers

PAPER 1.

Lu, Yichen, and Virpi Roto. 2014. "Towards meaning change: experience goals driving design space expansion." In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational*, 717-726. Helsinki: ACM.

Towards Meaning Change: Experience Goals Driving Design Space Expansion

Yichen Lu

Aalto University
School of Arts, Design, and Architecture
Hämeentie 135C, 00560 Helsinki, Finland
yichen.lu@aalto.fi

Virpi Roto

Aalto University
School of Arts, Design, and Architecture
Hämeentie 135C, 00560 Helsinki, Finland
virpi.roto@aalto.fi

ABSTRACT

Experience design is a relatively new approach to product design. While there are several possible starting points in designing for positive experiences, we start with experience goals that state a profound source for a meaningful experience. In this paper, we investigate three design cases that used experience goals as the starting point for both incremental and radical design, and analyse them from the perspective of their potential for design space expansion. Our work addresses the recent call for design research directed toward new interpretations of what could be meaningful to people, which is seen as the source for creating new meanings for products, and thereby, possibly leading to radical innovations. Based on this idea, we think about the design space as a set of possible concepts derived from deep meanings that experience goals help to communicate. According to our initial results from the small-scale touchpoint design cases, the type of experience goals we use seem to have the potential to generate not only incremental but also radical design ideas.

Author Keywords

Experience goals; Experience design; Design space; Touchpoint design; Meaning-driven design; Design research.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

A key activity in design is to explore new design ideas. A design space is commonly understood as the territory of all possible solutions that would be regarded as meaningful to

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audience in the relevant contexts [20]. According to Westerlund's findings, design space explorations are done from the vantage point of view of possible solutions rather than from the point of view of problems or briefs.

There is an acknowledged need for expanding the design space from routine solutions to new and even to radical solutions [e.g. 6, 15]. Human-Centred Design (HCD) has been the prominent way in the field of Human-Computer Interaction (HCI) for designing new products, but its ability in generating radical solutions has been criticized [15]. Gero and Kumar develop a concept that design spaces can be expanded through new design variables and might result in creative design results [6]. Norman and Verganti propose meaning-centred design to be the way for design research to generate radical innovations [15].

Experience design is a new trend in HCI that is not necessarily based on HCD, but can be started with, for instance, designer's vision of a new way of interaction [10], or a known psychological need [9]. The basic idea of experience design is to define what kind of experience to design for and take it as the starting point of generating design ideas [10]. Experience design not only fixes an existing problem, but focuses on the positive experiences [8].

In this paper, we explain the idea of experience goals and how they differ from typical starting points for design. We present three design cases where the same experience goals were used for creating incremental and radical design ideas. We address the call by Norman & Verganti to direct design research toward new interpretations of what is meaningful to people [15] in our domain of business-to-business companies, and especially in designing the touchpoints between a company and their customers (not only products but services, information channels, contracts, etc.). Norman & Verganti propose that the new meanings for products can be understood through research and observations of socio-cultural changes. While we fully agree with this perspective, we believe the idea of new meaning can also be applied in smaller-scale projects, in our case the meaning change in various touchpoints between a company and its customers, and also within a company. In our research, we are not after radical innovations in a single product design space but in a spectrum of possible touchpoints. We will show that

experience goals, which state the design goal as a new experience or a new meaning can expand the design space to a direction that allows radical ideas to emerge.

Since radical ideas require expanding the design space, our main focus is to see if the experience goals can help designers to expand the design space all the way to the radical ideas. We see the design space for changing the meaning is about the meaning opportunities rather than the technical opportunities. This is why the experience goals that define a new meaning through a new experience are in a key role in our design space. Figure 1 illustrates our idea.

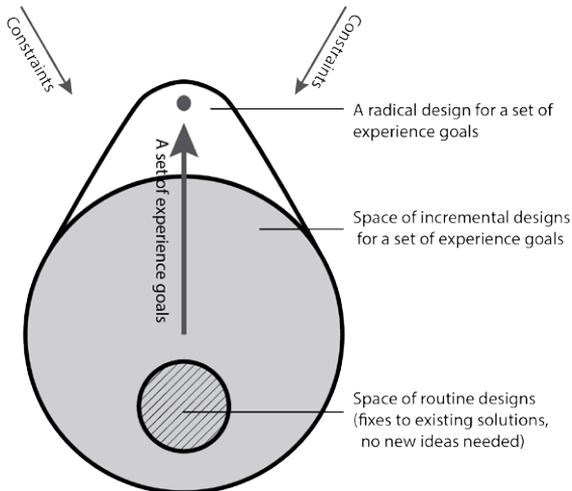


Figure 1. Our view to expanding the design space by experience goals (inspired by Gero and Kumar [6]).

RELATED RESEARCH

Focusing on the positive aspects rather than problem solving can introduce novel perspectives to product design. Possibility-driven design was developed as the counter-approach to a popular problem-solving design [3]. In possibility-driven design, designers do not focus on a problem to be solved but rather on a possibility that would enable human flourishing. It can be triggered by a problem, but in its purest form, designers take a basic psychological need and address it in a new way. Desmet and Hassenzahl use Tamagotchi electronic pet as an example of possibility-driven design, as Tamagotchi addresses the psychological need for relatedness and the associated interest in nurturing, care, and enjoyment through taking responsibility. These aspects are intriguing from experience design perspective, as psychological needs (especially stimulation, relatedness, competence, and popularity) are shown to be related to the positive experiences [9].

The recent work by Norman and Verganti [15] studies the sources for incremental and radical innovation, and conclude that radical innovation may come from design research that is directed toward new interpretations of what could be meaningful to people. No new technology is

necessarily needed if the meaning change is introduced (e.g. watches as a status symbol, mini-skirt of 1960's as women's liberation). We adopt this perspective in our work and aim to start designing from the positive meaning level.

Inspired by the experience design approaches [10,8], possibility-driven design [3], and meaning-driven design [15], we wanted to test how setting experience goals that address new meaningful experience could aid to broaden the design space from routine solutions to incremental and even to radical ideas.

The above approaches emphasize a very similar activity: finding the deep meaning for the thing to be designed. Hassenzahl calls it the Why level, and often maps the Why to the basic psychological needs [8]. Hekkert guides designers to study the current product and interaction and clarify its reason for existence [10]. Norman & Verganti make meaning as the central concept of meaning-driven design, as they see that design research can lead to radical innovation by providing new meaning [15].

The best experiences are typically related to meaningful, valuable events that deeply touch a person. In the workplace, meaningful experiences typically provide better work motivation and/or make a person proud of her/his profession. Indeed, Focusing on meaning is a natural path to take in experience design. In fact, Desmet and Hekkert state that the experience of meaning and aesthetics are the two influencers for emotional experience [4].

Our approach to experience design is to work with business-to-business companies and investigate their design assignments from several stakeholders' perspectives: not only the end users, but also people making the investment decisions in the customer companies, or whoever is the stakeholder group we design for. Lately, we have also started to use experience design for designing communication inside our partner company in order to change the mindset, so the company's own employees can be our target user group. We also think about the different touchpoints through which we can strengthen the intended experience. All our cases were related to experiences in work context, which still is a less studied context in UX research [1].

The overall goal of our research is to provide examples of what experience design could mean and what benefits it could bring in business-to-business environments. Although our focus on multiple stakeholders and touchpoints is different from the above (mostly user-centric) design approaches, our approach is similar in that we define statements of the deep experiences that could change the meaning of the design. We call these statements of intended experiences as experience goals, and introduce them in the next chapter.

EXPERIENCE GOALS

In general, setting goals or requirements for product design is not a new idea. It is hard to find a product development

process where no goals would be stated in the early phases of design. However, the type of goals differs a lot, and the flexibility of the goals in generating different design ideas varies as well.

An experience goal describes the intended momentary emotion or the emotional relationship/bond that a person has towards the designed product or service. By referring both to momentary and long-term experience, we want to address all the time spans of user experience [17,18]. We prefer to use term goal instead of requirement for the experiences to design for, since a designer cannot force the user to feel a certain way about the product. Experiences with interactive products and services are context-dependent, dynamic, and subjective [14,18], so we cannot guarantee that a certain experience will always realize. What a designer can do is to design *for* an experience [19, 22]. We can aim to design something that raises certain emotional response when the circumstances are right. But as Desmet and Schifferstein state, it is challenging to find out the right experience to design for [2]. Once we have done that, we can formulate the experience goals.

Naturally, there are similarities between experience goals and some similar concepts, but we will show now how experience goals are different from the earlier concepts. In a traditional human-centred design process, the design goals regarding user's experience are articulated as 'user requirements'. According to ISO 9241-210 standard, *user requirements* include the intended context of use, requirements derived from the user needs and the context of use; requirements arising from existing knowledge, standards, and guidelines; usability objectives; and organizational requirements [11]. The experiential (emotional) goals are missing from this list, and it is relatively rare to see experiential goals defined in real-life projects either.

In business planning, it is relatively common to state *value propositions* for a brand or a future product. They are persuasive statements of the value the company or product aims to deliver for the customer. Lately, emotional or symbolic value propositions have gained attention, as the utilitarian value is just one type of value provided for the customer. A value proposition "ties the customer and company perspectives together for value creation and competitive advantage" [16 p. 630], so there often is a cost-benefit thinking behind. Experience goals rarely stem from thinking the return of investment, but experience goal states the kind of feeling that a designer (vs. a salesperson) would like a user (vs. a customer) to feel while interacting with the product (vs. before purchase). Still, emotional value propositions can become close to experience goals and can act as the starting point for defining experience goals.

In the field of design, the starting point for design is often a *design brief*. A design brief for a design agency can be similar to the one used by Dorst & Cross, describing the basic information about the customer, the design

assignment, the context, timeframe, and the format of the design proposal [5]. When the design brief is defined within an organization, it can be as short and open as the one used by Kankainen [11]. We have been unable to find a design brief that would describe experience goals for the design.

A *design driver* by Wikberg & Keinonen is closer to the idea of an experience goal, as it focuses on the positive design goal and states it in a crystallized, compact format [21]. A design driver leaves the technology solution open, as does an experience goal. Wikberg & Keinonen encourage narrowing down the number of design drives to a handful in order to avoid a diluted and vague concept, and we are on the same lines [12]. However, we miss documented design drivers that would define the experience to design for.

Hassenzahl introduces the idea of *pragmatic do-goals* and *hedonic be-goals*, and emphasizes the importance of setting the be-goals as the starting point for design, before deriving the functional do-goals [7]. Following this idea, in his later work, Hassenzahl starts experience design from the why level, defining be-goals that map often to six *basic psychological needs*: autonomy, competence, relatedness, popularity, stimulation, and security [8]. In our thinking, these needs have the potential to introduce a new meaning into products that, according to Norman & Verganti helps to produce radical new ideas [15]. So, we believe the basic psychological needs can serve as high-level experience goals, or act as one source of inspiration when setting more specific experience goals.

Psychological needs is one great source for experience goal setting, but we have identified five broader approaches for defining experience goals: brand identity, psychological knowledge of human beings, empathic understanding of the users, vision of the product renewal, and technological opportunities [12]. Because of the space limitation, we are unable to introduce these approaches in more detail here, but the point we want to make is that experience goals for introducing new meanings can come from different sources.

When thinking about the experience goals in relation to the design space (Fig. 1), we hypothesise that they can guide both incremental and radical design, as well as problem-solving and possibility-driven design. E.g., a problem 'the product is ugly' can be converted to a positive experience goal 'beautiful', which is likely to inspire an incremental design that fixes the ugliness problem. If we go further in the design space and set the experience goal as 'luxury', we may get closer to a radical design idea, similar to the example given by Norman and Verganti, using a watch as a status symbol [15]. Moving away from problem-solving design, experience goals can also guide possibility-driven design. E.g., instead of merely improving visual experience, experience goals can lead designers to look for more possibilities in a larger scope, such as product service systems. From the long-term perspective, touchpoints other than product itself could be designed for the experience of

‘excellence’. In business-to-business environment, we have found it intriguing indeed to use experience design for the different touchpoints, some of which are reported in our three case studies.

CASE STUDIES

We tested our ideas of experience goals in three different design projects during a 2-month master-level course on Experience-Driven Design. The design projects were proposed by three metal and engineering industry companies, and supervised by the authors. For each project, three students worked together as a design team and followed a common design process: design orientation exploration, experience goal setting and confirmation, concept generation and evaluation, final concept presentation. Company people were involved throughout design process as information providers and commentators.

In this chapter, each case is described from five aspects: design orientation, experience goals, incremental design, radical design and case summary. The section of design orientation covers the aim of each company, design background and problem identification. The way to define experience goals and their meanings in a certain case are briefly introduced in experience goal section. In two cases, one high-level experience goal has two sub goals for more specific explanation and guidance. In each case, incremental design and radical design both take an experiential perspective and share the same experience goals. The incremental design is focused on problem solving and pragmatic improvement, which can be utilized by the company within a short time. In contrast, the radical design does not build on the existing solutions but starts from the deep meaning that a company could convey to its customers through any touchpoints.

Company A

Design Orientation

Company A is an international company with sites on many continents. The starting point of the project was to redesign the graphical interface for an internal communication channel for one of the sites. The channel is for internal information dissemination and currently displayed on TV screens around the office: at the reception, coffee areas, and in the open-space office. The target audience for the system are employees, customers and guests of the company. The main problem is the lack of attractiveness on both the content and visual design, which makes people not interested in following the information shown on the screens.

Experience Goals

Through several interviews with target audience of the communication channel and observations in the field study and a questionnaire survey, the students identified the need of employees and visitors to relate both to each other and to the company. Relatedness is one of basic psychological needs that are suitable for experience design, which is described as “feeling that you have regular intimate contact

with people who care about you rather than feeling lonely and uncared for” [9]. In the usage context of the communication channel, to elicit the sense of relatedness between employees, workers and visitors was considered as one of the fundamental reasons why it should exist. In other words, relatedness could be the meaning and value of the existence of the channel. So relatedness was selected as the ultimate goal for design. Linking to this explicit nature of the communication channel, the design students interpreted relatedness as engagement through communication and connectivity. Engagement was defined as the higher-level experience goal, which would not only spark better camaraderie between colleagues but also allow them to feel a greater sense of belonging to the company. Besides, smooth communication and good connectivity were considered as two experience subgoals of engagement. The former emphasized the feeling of information dissemination, and the latter stressed on bringing people together within the company.

Incremental Design Concept

Limited by the compatibility of the current software, the incremental design concept focuses on the content, usability and aesthetics of the graphical user interface of the communication channel. Unnecessary and uninteresting categories of information are substituted by new categories that users hope for, which can improve connectivity between audience and signage system. In order to enhance visual communication, icons are added to the original timeline to inform viewers which category is currently active on screen and how long she or he needs to wait for a certain page. From the point of aesthetics, the background picture, the typography and the layout of template were redesigned in line with the brand image. Thus, providing targeted audience what they would like to watch in an easy, appealing and engaging way could satisfy the need of relatedness.

Radical Design Concept

The radical concept is to bring all the communication channels under one main system which would allow dissemination of information to all company sites. This would also allow inter-departments around the world to stay connected in the loop of what is happening somewhere else halfway around the globe. It not only increases the connectivity of the entire company organization, but also enables employees to know of the information relevant to the company worldwide. Therefore, it allows the level of communication to be boosted and for the employees to feel a sense of belonging to the company on a completely different scale, as they are now part of a bigger picture. From the perspective of an organization, a hierarchical system framework has been designed to show how the information can be obtained and disseminated through the communication channels.

In order to keep the engagement level high, some personalized information can be distributed specifically to

individual. The screen and a smart ID badge for each user have been employed into the radical concept, so that the system is able to recognize the user and provide personalised information to everyone. For example, the system can greet the workers of the factory with reminders about safety when they arrive to the factory. For the office personnel, the system can check their daily schedule and notify them ahead. During a coffee break, the system can provide a game session for employees so that they can get to know each other better over time. After work, it can display personalized traffic information. For visitors, smart ID badges with customized information are issued by the receptionist when they arrive. The system can recognize a person via the badge and provide information, e.g., giving the visitor guidance to find the meeting place. These scenarios can make the interaction between individual and the system more human-centred.

Summary

In these two cases of Company A, the experience goal relatedness was derived from the knowledge of basic psychological needs. The incremental design concept aims to improve the internal communication system by graphical user interface redesign and content change. It tries to achieve the goal most from usability and aesthetic perspectives, whereas the radical concept totally leaves out the current user interface but comes back to the meaning of the existence of the system. Then relatedness is transformed into the new design features, such as to provide information from other sides of the global company, to be a personal assistant and entertainer. Meanwhile, the relation between the system and target audience has changed since the users turn out to be active information seekers instead of passive message receivers.

Company B

Design Orientation

Company B produces and integrates factory automation systems. Despite of good safety and quality it could provide, the company has found that the lack of product identification prevents itself from standing out in the market. In this case, the customers who normally would make buying decisions were identified as the target user group.

Experience Goals

The design team imagined the world of the customers and their emotions and feelings, and then made the story more realistic together with the Company B people who would correct some mistakes that the design students could have done. The story described how Company B built up trustworthy relationship with one customer during several years. Three customer experience goals, wow, proudness and trust, were identified through iterative process of co-constructing customer stories with Company B.

The goals addressed the different time spans of experience in a customer journey: momentary, episodic, and cumulative [18]. Wow was defined as a momentary feeling that could be produced when the customer encountered

something impressive in a particular way. Wow could play on the captivation of the moment but also be long-lasting. Different wow moments together could help sediment an idea of cool machinery. The second customer experience goal, proudness, with an episodic nature could surface and resurface at different times, e.g., when the customer showed external people the factory or when he realized himself making the right decision to buy Company B machinery. Trust was considered as the third experience goal with a cumulative nature. It was mainly derived from current brand image of company B. The brand image expresses the automation systems of company B can provide high performance and quality every hour of the year. Trust was considered as an experience goal that could be most close to the brand image of efficiency and quality. It must be suggested in the initial touch points of communication (the website or brochure, for example), confirmed with the reality of the well-functioning machines and reassured constantly through innovative services.

Incremental Design Concept

In incremental design concept, the targeted experience is conveyed mainly from the perspectives of visual aesthetics and product features. The main design result is the design guidelines in which the way of using identifiable brand elements are defined, such as logo presentation, colour scheme, aesthetic features of product shape, functional features, etc. In other words, products and touchpoints can be designed into details in line with the experience goals. For instance, the modern and unique looking of automation system with the sense of simplicity and high technology, can easily evoke a feeling of wow for customers. When customers introduce Company B products as their state of the art devices to their visitors, they can feel proud because of owning the advanced equipment. Trust can be seen in product features, e.g., the utilization of larger windows to increase the transparency of internal parts, the adoption of lights to show the status of working process, etc.

Radical Design Concept

The radical concept is to launch new customer service via a mobile application. When the customers buy Company B's products they get a whole connection with the Company B as well; a bond that continues through the whole customer experience in years, supporting the trust between the customers and Company B. With the application, it is possible for customers to keep their factories under control via mobile phone in anywhere at anytime. It can constantly and automatically update the status of the machines and also provide training materials to customers. Also, it provides an easy and geo-localized way to call company B; the call is redirected to a country and service specific call centre. For customers, the feeling of taking parts of factory in their pocket may trigger a wow effect. When showing the automation system to others, customers may feel proudness due to its uniqueness. Besides, the feeling of control and a personal connection to the working system can uplift customers' trust towards Company B.

Summary

In these two cases of Company B, the experience goals wow, pride and trust are mainly derived from empathic understanding of customers and brand image. The incremental design results in design style guide that can uniform product aesthetic and functional features in line with the experience goals. These features are quite fixed and on the surface of the products, which can be easily recognised immediately. However, in the radical design concept, the experience goals are permeated into the new service features that are interactive and benefit the customer over time. Via the launch of mobile App, Company B can build up direct intimate and long-term relationship with customers in a modern and daily way. Utilization of mobile app does not introduce new technology, but it introduces a new service that changes the factory automation system towards a personal information source. It helps an employee to make the right decisions in his job and thus enhances pride experience.

Company C

Design Orientation

Company C specializes in construction materials. It has launched a new, more sustainable but also more expensive construction material and wants to increase its use in construction industry. The main challenge is that in this domain, there are many restrictions and regulations for construction materials and taking new materials into use involves great risks and investment in learning. Professionals in construction business tend to be skeptical with new materials and rumors of the properties of the new materials are not always in line with the reality. Thus, it is important to encourage professionals in this industry to consider a new material and remove misconceptions.

Multiple stakeholders (e.g., architects, construction designers, contractors) are normally involved in a building project. In this project, construction engineers were identified as the main target user group, as they carry the responsibility of correct and durable building design and often make the final decision on the material.

Experience Goals

The experience goals in this case, stimulation and trust, were initially distilled from three approaches for identifying experience goals: technology opportunities, knowledge of human psychology and business [12]. After a factory visit, a customer headquarter visit and expert interviews, the experience goals were defined in a concrete way.

According to psychological needs, stimulation was defined as a feeling of motivation and curiosity surrounding the new material as well as enjoyment and pleasure [9]. It was aimed to implant in construction engineers. Two subgoals of stimulation were inspiration and appreciation. Inspiration emphasized on changing conservative mindset of construction engineers and creating a new desire to be pioneers in their field. The second subgoal appreciation meant that construction engineers could feel connected to a

project and receive recognition and acknowledgement for their projects.

The second experience goal trust emphasized that construction engineers could believe into the material that they received from the company and deem the information reliable and trustworthy. Responsibility was the subgoal of trust, stressing on reliability of the company and importance of the role of an engineer.

Incremental Design Concept

With the focus on the problems of poor communication and negative impression on the new construction material, the incremental concept for short-term achievement aims for a new, exciting and memorable way to deliver clear and honest information about the material to construction engineers.

The final design idea is to send construction engineers a USB stick within a special gift package. The package is a box made of conventional cardboard outside, which is for evoking visual and tactile feeling of honesty, warmth and trust. It is different to the mails that construction engineers normally receive. It can trigger a sense of anticipation. With a seal on the package, the gift box invites people to open it. The inside of the box is printed matte black that creates a feeling of surprise, curiosity and holding something valuable. In the centre of the box, the USB disk in a simple frame structure is made of the new construction material in its original colour. The form can highlight the unique properties of the material, e.g., its lightness. The content in the USB disk is a variety of information presented in an honest and trustworthy interface, which can engage and stimulate the audience as well.

Radical Design Concept

The radical concept looks at the construction industry and the company in a long-term time scale. Instead of solving pop-up problems, it aims to change conservative mindset and develop innovative and motivated individuals. It does not only benefit Company C but also the entire industry. The radical concept ties many different possible scenarios together in future. It covers eight aspects: education, collaboration, competition, rewards, research, workshops, network and recognition. For example, the idea of designing Company C branded toys and games for children may help them to develop creativity and to build confidence by sowing the seed of the dream of being a construction engineer. It can foster a lifelong trustworthy relationship between the company and construction engineers. For university students, Company C may organize workshops and competition to help them to gain practical experience and build network with experts in the business. In return, Company C can get inspiration from the students' fresh ideas. For successful industry workers, Company C may award them with Michelin Engineering Certifications and invite them to give a talk in company seminars. This changes the meaning of the whole company in people's

lives, as those taking the action can feel appreciation from Company C and the whole industry.

Summary

In these two cases of Company C, the experience goals stimulation and trust are mainly derived from the aspects of technology, psychology and business [12]. The incremental design results in a new way of product information delivery. The experience goals may be achieved through the initiate interaction with the package of the USB gift. However, in the radical design concept, these experience goals guide the design of activities for talent cultivation via toys, design competition, etc. Instead of sending promotional materials to current engineers, the radical concept aims to foster interest and curiosity of the youth in this industry and their open-mindedness towards new materials and ideas. This way, the company can foster long-term engagement with their potential future stakeholders.

ANALYSIS

In the previous chapter, we have introduced three experience design cases that utilized profound experience goals in designing a touchpoint between a company and different stakeholders. Table 1 summarizes the three design cases from the perspective of the company’s motivation, the experience goals students designed for, the design concepts produced (incremental and radical concepts – for radical we also list the touchpoints utilized), and the intended meaning change from incremental design towards radical design.

From starting point to experience goal

In these three cases, the design assignments were examined with the lens of meaning, which served as reference points for experience goal setting. Each design task was oriented from the motivation of each company although the concreteness of each starting point was varied according to

different cases. Whatever the starting points are provided by a company, they are closely related to the concerns of a company and the existing solutions that are insufficient or in the way of company’s aim achievement. The starting points of the three cases can be summarized as follows.

A: Old internal communication channel display was boring to the audience.

B: Good quality was not sufficient to stand out in the competitive market.

C: Traditional marketing material distribution could hardly serve for new construction material promotion.

Rather than immediately plunging into problem identifying and solving based on the starting points, in these three cases, the design students were trained to step back and look at the starting points in consideration of experience design. The starting points can be considered as reference points for understanding of a company’s underlying concerns and design opportunity exploration. In other words, they can provide valuable background information or implication for experience goal setting According to [12], in these three cases, experience goals were mainly derived from two sources. One source is company or brand image, which is related to high-level concerns of the company, e.g., trust is an experience goal distilled from the brand image of Company B. The other is scientific understanding of human beings that links, e.g., to psychological needs, which turns into an experience goal of relatedness in Company A case and stimulation in Company C case. On one hand, experience goals can be set as high as the vision of the company. However, on the other hand, they can be also fundamentally defined from basic needs. Besides, experience goals can be also defined from other aspects,

Table 1. Summary of the three experience design cases

	Motivation of the Company	Experience Goals	Incremental	Radical	Meaning Change from incremental design towards radical design
A	Internal communication improvement	Relatedness (engagement through communication & connectivity)	GUI aesthetics and usability	Interaction with internal digital signage system via ID badge and screens	From company information to personal assistant & entertainer
B	Product detail design for brand recognition	Wow, Proudness and Trust	Design style guide to uniform product aesthetic and functional features	Service innovation via a mobile app	From high quality to trusted relationship
C	New construction material promotion	Stimulation (inspiration and appreciation) and Trust	Interaction with a gift (the package with USB stick inside)	Activities for innovative talent cultivation via toys, competition, etc.	From extra burden to personal growth

e.g., empathic understanding of users (in the case of Company B). By setting experience goals and transforming into specific design contexts, the new design briefs of the three cases can be framed as follows.

A: Provide target audience the feeling of engagement through connectivity and communication via interaction with internal digital signage system.

B: Make the brand of company identifiable by evoking a long-term customer experience consisting of “wow, proudness and trust” through details.

C: Create rethinking in the construction industry by stimulating construction engineers to be more ambitious and creative.

Considering company as sender of certain experience and target audience as receiver of that, both sides should be taken into account when setting experience goals. Experience goal is the core of new design brief, in which company’s intended purpose can be achieved when targeted audience can receive targeted experience. Setting proper experience goals is a crucial process of iterations and verifications with the company, which can help the design team dig out concrete and explicit meanings of these goals. A successful setting of experience goals can already imply top-level and abstract thinking of design concepts.

Experience goal as a driver of design space expansion

In our cases, the incremental concept is a practical solution in short-term perspective whereas radical concept addresses a long-term aim, regardless of existing constraints. Experience goal is a new driving factor to expand the design space in both incremental and radical concept design. If we compare the results of incremental design to those of radical ones, experience goal can apparently enhance creativity especially in radical design. Figure 2 illustrates the design space expansion on three levels: change in the interaction concept, introduction of a new service and strategy respectively. In each case, the distance between existing design, incremental concept design and radical concept design is related to the nature of the task itself.

In the case of company C, after setting stimulation as an experience goal, a new design question came to the design team: how to evoke a feeling of stimulation for construction engineers. It seems to have nothing to do with the existing solution passive input of information, such as promoting new technology via email or paper material. There was no concrete object to be (re)designed but a set of experience goals to be designed for. On the other hand, the new challenge left much possibility for new idea exploration in different time scale. The incremental concept was designed for the experience of opening the USB gift package, which would attract construction engineers to familiarize themselves with the new technology by interacting with the gift. The radical idea to instil ambition for change within the minds of construction engineers, so they would not only improve their own skills and self-worth, but also contribute

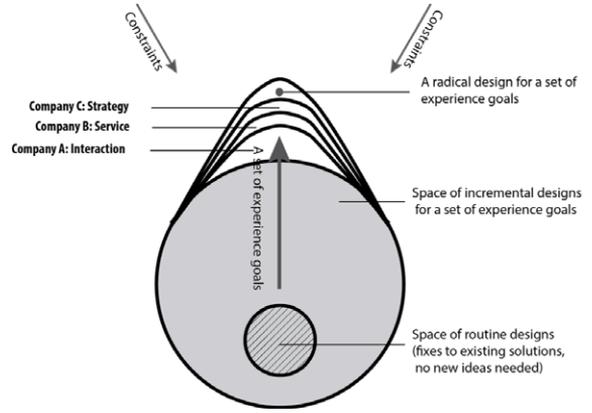


Figure 2. The design space expanded by experience goals to different extents.

to the industry as a whole and future construction. When keeping the experience goals, the radical idea focused on strategy design of cultivating young creative talents for the industry through innovative activities, which was beyond the traditional mindset of design something concrete. It can be seen that driven by experience goals, the space of concepts was expanded from traditional marketing material design to design for interaction with a gift then to talent cultivation strategic design.

Different from the case of Company C, Company B gave a more concrete, specific design task to the design students. Normally, the routine solution to improvement of brand identification is adding graphical elements into product details through graphical design. In this case, however, brand identification was expected to be naturally realized in new customer experience “wow, proudness and trust”. Experience goals firstly guided to apply brand identifiable elements into form detailed design in the perspective of visual sense. Besides, in the incremental design, experience goals were embodied into new product tangible features, e.g., large windows providing visibility inside of the automation system could elicit a feeling of trust. Thus, brand can be identified by a setting of targeted experience, not limited by the brand graphical element. In radical design, the idea “to take part of factory with you by using an App on your mobile phone” was to evoke targeted customer experience by remote service innovation design. Similar to the case of Company C, it can be also seen that the experience goals enlarged the design space from graphical detailed design to product feature design and finally to service design.

The incremental concept design for Company A was much restricted by technical limitations of the current screen management application. The top experience goal “relatedness” could be hardly achieved by graphical user interface redesign that improved usability and aesthetics. Compared with the previous two cases, the experience goal did not bring out much more possibilities of completely

new design. Nevertheless, without technical constraints, it enriched the interaction design for radical concepts, in which different audience could be engaged in the personalised interaction with the new internal communication system. Therefore, the design space was much expanded from traditional GUI design to interaction design by the experience goal.

It can be seen that all of these radical design concepts may fundamentally improve the relationship between companies and their target audience. From a long-term perspective, target audience can be activated and engaged through experiential involvement, in which a target experience may be triggered. Thus, these radical design concepts provide new ways for active and durable engagement with clients that are new in the studied contexts.

CONCLUSION

In this paper, we introduced experience goals and how they can help in designing new meanings. We reported three design cases where we investigated how experience goals can expand design space from routine design to incremental and radical concept design.

Different from existing experience design of consumer product in which experience goals come from intensive user studies, we distilled experience goals more from latent company concerns and basic psychological needs, although initial exploration of design context is still necessary for understanding what is meaningful for the target audience. As one can see from our cases in industry context, it is beneficial to also think about the other stakeholders and not only the user of the design. Broadening the perspective from the product improvement to the spectrum of all possible touchpoints can have much higher influence on the experiences and on the company's success. We also noticed this broader scope helps to expand the design space.

Experience goals imply that company's high level needs can be satisfied by evoking certain experience for the target audience. Moving the focus away from existing solutions, designers can invent new design possibilities guided by experience goals. The nature of experience essentially expands the scope of what to design, since the concepts can vary in realm from traditional industrial design to interaction design to service design and even to strategic design. The same set of experience goals can guide both incremental design and radical design, especially if one expands the scope from one product to other possible touchpoints. However, the creativity of design is restricted by the constraints, e.g., certain support conditions for designers, which might limit the design space (Figure 2). According to Norman & Verganti [15], radical design should be free from the weaknesses of the existing design in order to avoid problem-solving trap. This applies also to definition of experience goals, since 'avoid frustration' as an experience goal is unlikely to lead to radical design, although it may easily come up as a need from user studies.

Admittedly, there are several limitations in our research. First, the eight-week design project cases where students started to study unfamiliar contexts from scratch are not optimal for showing the power of experience goals. They did not have the time for proper experience goal exploration, validation and verification, so it is possible that some other sets of experience goal derived from aspects other than company concerns or psychological needs can expand the design space even more. Second, we only reported three cases, which is not a sufficient number to make conclusions on the probability with which experience goals can lead to radically new ideas. However, this kind of verification would be almost impossible to conduct, as concept ideation is not a process that could be run as a controlled experiment with experience goals as the only variable. Taking into account the suboptimal type of the three projects, we consider the results very promising, so we welcome further studies to test and improve our approach. Third, expanding the design space is influenced by the competence of designers. Master design students, especially those who lack working experience, are not experienced in balancing divergence of concepts and design constraints. On the other hand, acting as external observants with open minds, the students were not stuck with the current solutions and could rethink the concepts from a new perspective, which is required for coming up with radical design concepts [15]. Fourth, it is easy to see that incremental design results can obviously satisfy the need of company. However, we can hardly guarantee that our radical ideas from the short projects would lead to a radical leap in companies' success. Nevertheless, in business-to-business heavy engineering industry, these concepts are considered to be bold, advanced, and innovative compared to the existing solutions.

Our work on experience goals reported in this work can be considered as baby steps with a lot of room for further studies. For example, it is important to investigate how the source of experience goals can impact on design space expansion, e.g., whether experience goals from basic psychological needs have more impact on design space expansion than those from technology perspectives. In each case we reported, the experience goals were the same in both incremental and radical concept design, but it would be interesting to study experience goals specifically targeted for radical design. We are working on the best practices to generate more specific goals and even measurable targets from the broadly stated experience goals. We also investigate utilizing the experience goals in the different phases of product development.

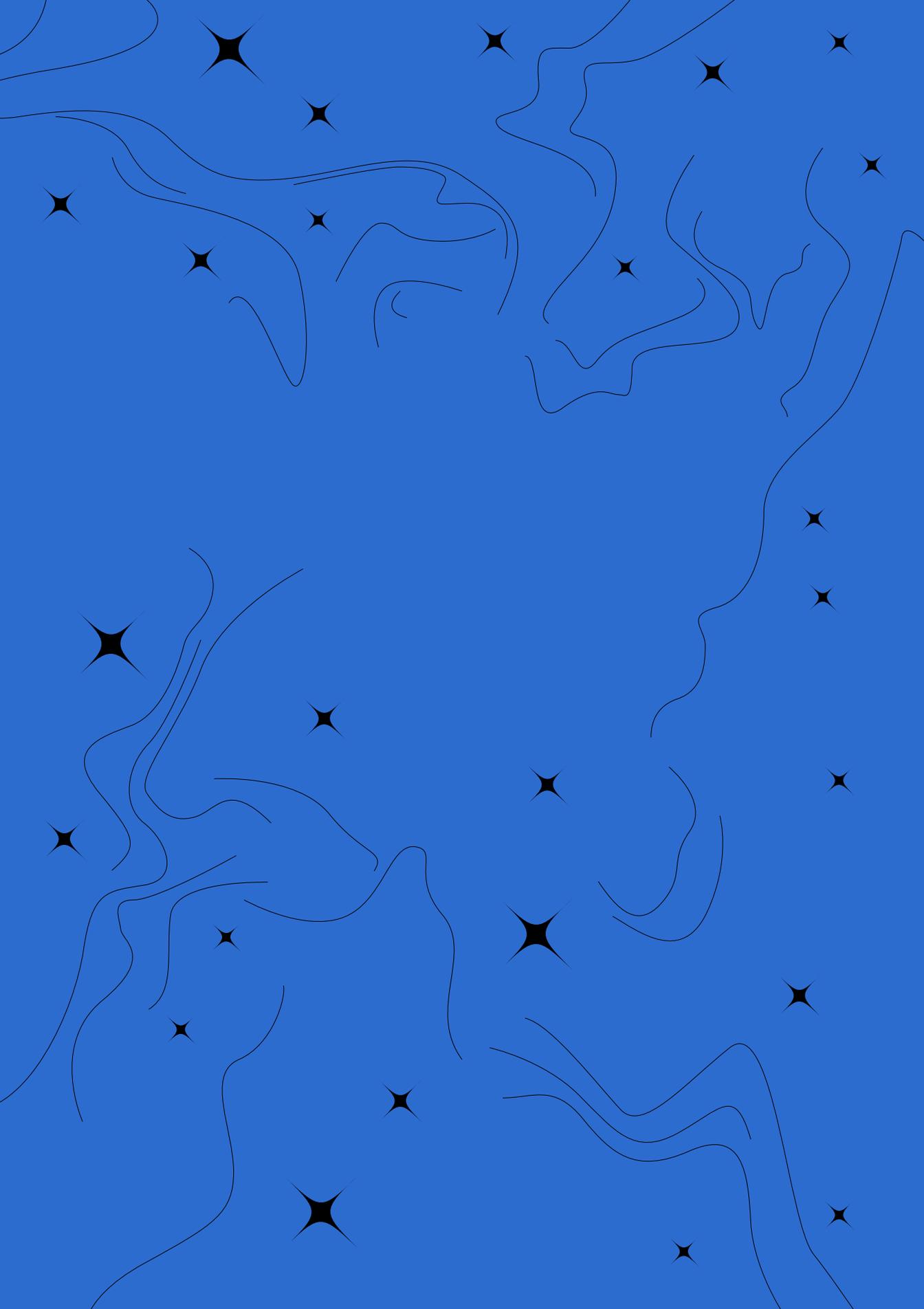
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PAPER 2.

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Evoking meaningful experiences at work – a positive design framework for work tools

Yichen Lu* and Virpi Roto

School of Arts, Design and Architecture, Aalto University, Aalto, Finland

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Experience design takes experiential aspects as the starting point of design. This approach is hardly ever utilised in the work context, although positive and meaningful experiences in the workplace are known to be important. Thus, we are interested in the profound experiences that address the meaning of work in the long run, since the perception of one's work as meaningful has been shown to elicit various positive effects both for the employees and the employers. This research article therefore investigates how to define meaningful experience goals for work tool design. The research examined 31 experience goals collected from 10 tool design cases through the lens of 2 theories: the mechanisms of meaningful work (MMW) and the positive design framework (PDF). From this, we have identified that the MMW can substantiate the PDF and extend its application into work-related contexts. Complemented by these mechanisms, a PDF for work tools has been proposed to help experience designers in the challenging task of experience goal definition in the early phase of experience design.

Keywords: positive design; meaningful experiences; experience goal; work tool; mechanisms of meaningful work

1. Introduction

Work has always been central to human existence (Klein 2008). The domain of work is a rich area for inquiry in terms of the variety of meanings that are generated in and around work (Wrzesniewski 2003). Meaningful experiences at work are highly related to workers' subjective well-being and have a positive impact on enterprise performance (Lips-Wiersma and Morris 2011). Thus, much research has been conducted for evoking meaningful experiences at work from the perspectives of psychology and organisational behaviour since the last century, such as work motivation (Hackman and Oldham 1976; Roberson 1990), job satisfaction (Wrzesniewski et al. 1997), and job engagement (May, Gilson, and Harter 2004). The meaning of work lies at the core of employees' experiences of their job (Wrzesniewski et al. 2013). Rosso, Dekas, and Wrzesniewski (2010) identify the sources of the meaning of work varying from the self (e.g. one's values, motivation) to others (e.g. co-workers, leaders) and from the work context (e.g. design of job tasks, organisational mission) to spiritual life (e.g. spirituality, sacred callings). How to shape the meaning of work has been well investigated and has been divided into external determinants (e.g. job characteristics) and internal influences (e.g. individual attributes) (Wrzesniewski 2003). Another perspective that has been recently noticed relates to the tendency

*Corresponding author. Email: yichen.lu@aalto.fi

of people to frame their job to fit their own unique orientation towards the domain of work, e.g. job crafting (Wrzesniewski et al. 2013). All of these studied perspectives provide abundant indication for designing the specifications of meaningful contents, methods, and structures of work tasks.

However, in the industrial workplace, the individual's experience of using interactive tools has not been sufficiently studied from the meaning of work perspective. By work tools, we refer to those products that are utilised to accomplish work-related tasks, such as machines for producing the actual work outcome, devices for planning, controlling and reporting the work, and mediums for work-related communication. This research focuses on the interactive tools employed at work, which are designed to receive input from the users and provide them with output. For simplicity, we use the term 'tool' or 'work tool' in this article to refer to these interactive instruments used for work-related tasks. Restricted by the current routines of expert users and the regulations of industrial safety-critical domains, the design of work tools remains relatively conservative compared to the rapid innovation in the field of consumer electronics.

There seems to be common agreement that quality tool design depends much on its fit-to-work and usability, so tool design has focused on ergonomics, safety, efficiency, and ease of learning and use. These are pragmatic aspects that aim to optimise a tool for the work. Besides this, tool design is normally conducted in the business-to-business (B2B) setting where the purchasers of tools are often different from the actual tool users. Traditionally, purchasing decisions depend much more on measurable performance criteria, productivity of the systems, and cost efficiency rather than the end users' experience (Nuutinen et al. 2011). It has already been identified that tools play a key role in how satisfying, exciting, and meaningful the whole activity is portrayed to the workers (Savioja, Liinasuo, and Koskinen 2014). However, little attention has been paid to how a tool can be designed to elicit positive and meaningful experiences at work.

In the field of consumer product design, the research has advanced in these directions. Design research related to interactive products has studied experience design (Sanders and Dandavate 1999; Jordan 2000; Hekkert, Mostert, and Stomppf 2003; Hassenzahl 2010), positive design (Desmet and Pohlmeier 2013), and happiness design (Desmet and Hassenzahl 2012; Desmet, Pohlmeier, and Forlizzi 2013). This study follows these movements, but it transfers them from the business-to-consumer (B2C) world to the B2B world, and from leisure products to work tools. The aim of this study is to facilitate a mindset change of tool designers from problem solving to possibility seeking, and help them to design for profound experiences in work contexts.

Consequently, the key question for this research is, 'how can design of work tools contribute to the meaningful experience at work?' To tackle this question, this research explores how the positive design approach (Desmet and Pohlmeier 2013) can be applied in work tool design with a focus on meaningful experiences at work. This requires an understanding of the sources of meaningful work; thus, the mechanisms of meaningful work (MMW) (Rosso, Dekas, and Wrzesniewski 2010) are used to observe if and how the three ingredients of positive design can be employed in work contexts. Specifically, this research first collected experience goals from the tool design cases in the Master student design projects that were conducted in Design Department of Aalto University during the year from 2012 to 2013. Then, these were mapped both to the MMW in the theoretical framework by Rosso, Dekas, and Wrzesniewski (2010) and the elements of the positive design framework (PDF) by Desmet and Pohlmeier (2013). Thereafter, the research compared the results of the two categorisations, investigated their underlying relationship, and eventually developed a PDF for work tools (PDFWork). The purpose of this resulting framework is to guide work tool designers to define meaningful experiences as the starting point of design.

This article first introduces the main literature on the meaning of work, work design, and experience-driven design approaches. Then, it analyses the experience goals of 10 work tool

design cases among which 3 cases are explained in detail. Based on this, a framework is proposed on how to define experience goals for work tool design. In the end, the article lists the limitations of the study and provides suggestions on future research.

2. Related research

This research mainly stems from the experience design of consumer products, including the latest developments of positive design. These concepts were introduced into a new context, the industrial workplaces, and have utilised the research of experiences at work and especially meaning of work. This section summarises the relevant previous research on experience design, positive design, and experiences at work.

2.1. Experience design

Experience design can be understood in many different ways. However, its meaning should not be reduced only to design that aims to eliminate frustration (e.g. improving usability) or improve aesthetics of the user interface (e.g. beautifying graphics). To this extent, we argue that the best experiences lie not on the user interface level, but in the available functions at the very core of the product concept. For example, the Philips Wake-up Lamp aimed to provide the best possible wake-up experience, and thus the essential of the concept is not a clock, but a lamp. As Hassenzahl, Diefenbach, and Göritz (2010) have shown, quality experiences can be mapped to basic human needs, and these needs can hardly be met by just improving the user interface.

The essence of experience design is ‘to consider the experience before products’ (Hassenzahl 2010, 63). This suggests that designers should decide what kind of experience to target before deciding what kind of product to design. An online banking site may aim at trust experiences, while a gaming site strives to provide entertaining experiences for its visitors. These target experiences are termed experience goals, and are employed to communicate the aim of a design project to all stakeholders (Lu and Roto 2014).

Desmet and Schifferstein (2011) list two key challenges of experience design: to determine what experience to aim for and to design to evoke that experience. It is indeed challenging to set the best experience goals – it requires a thorough understanding of what the target user group feels in a particular context and often the incorporation of other stakeholders’ needs. One possible approach for defining the experience goal would be to rely on existing theories on human values, appreciations, or needs, for example, by taking basic human needs as a list of potential starting points for experience goal definition. The PDF by Desmet and Pohlmeier (2013) can be used for the same purpose.

2.2. Positive design

Positive design contributes to human flourishing which in essence means to live life to one’s fullest potential (Ryan and Deci 2001). The framework of positive design combines three key components of subjective well-being: *pleasure*, *personal significance*, and *virtue* (Desmet and Pohlmeier 2013), which are generally grounded in classifications from the disciplines of philosophy and psychology. These components represent the three positive design ingredients that are explicated as follows (Desmet and Pohlmeier 2013).

Design for *virtue* is to design for virtuous behaviour. It implies a normative distinction between what is good and what is bad, which is independent of what we might enjoy or strive for.

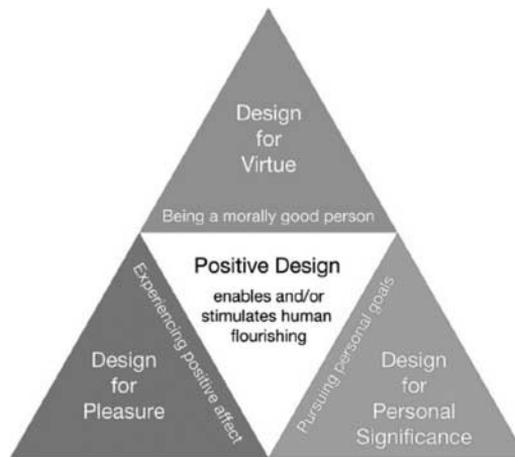


Figure 1. Positive Design Framework (Desmet & Pohlmeier, 2013, p. 7).

Design for *personal significance* is focused on one's personal goals and aspirations that last for a period; it can also be derived from the awareness of one's past achievement or from a sense of progress towards a future goal.

Design for *pleasure* is to design for momentary enjoyment, with a focus on the here and now, the presence of positive affect and the absence of negative affect.

Subjective well-being can be independently stimulated by each of them; design for flourishing is the intersection of all three ingredients (see Figure 1).

It is not necessary to cover all three ingredients in one design. The design can often only emphasise one of them, but it should avoid imparting any negative effects on the other two (Desmet and Pohlmeier 2013). Because these essential ingredients are universal (Desmet and Pohlmeier 2013), when the framework is applied into the metal and engineering industry context, the manifestations of the three ingredients are noticeably context-dependent. Since the primary concern of this research is to identify if this framework would assist us in setting experience goals for meaningful work tool design, experiences in work contexts would also be worth studying.

2.3. Experience at work

Work has seemingly always been a substantial part of human life, although its nature continues to evolve as historical, technical, and economic circumstances change (Klein 2008). Work is about a search for daily meaning (Terkel 1974). Generally, people spend most of their waking lives at work. In return, work provides rich meaningful experiences for them.

Work results in the feeling of achievement, attributable to two aspects: a primary biological driver to master the environment and a more sociocultural force, the pleasure gained from achievement (Klein 2008). According to an earlier view on the psychological aspects of work, work was seen as one of man's main links with reality (Freud 1930/1961). Jahoda (1966) suggests several dimensions concerning the link with reality, such as a strong sense of time, experiences of objective and subjective knowledge, enjoyment of competence, and balance of pleasure and self-regulation.

The most commonly studied affective quality at work remains the concept of job satisfaction. According to the most widely cited definition, job satisfaction is 'a pleasurable or positive

emotional state resulting from the appraisal of one's job or job experiences' (Locke 1976, 1300). Others define it as an attitude that indicates the extent to which a person likes or dislikes his or her job (Spector 1997; Brief 1998).

One of the most influential theories of job satisfaction continues to be the Job Characteristics Model (Hackman and Oldham 1976). It comprises the five core job dimensions: skill variety, task identity, task significance, task autonomy, and task feedback. They in turn lead to three psychological states: the perceived meaningfulness of work, felt responsibility for outcomes, and knowledge of results.

Herzberg (1966) discovered that the factors that lead to satisfaction (i.e. 'motivators': achievement, recognition of achievement, responsibility, and the work itself) are not often the same as those that lead to dissatisfaction (i.e. 'hygiene factors': company policy and administration, supervision (technical), salary, interpersonal relations (supervisory), and working conditions). Further, Herzberg argues that eliminating hygiene factors from a job would prevent dissatisfaction, but hardly bring about satisfaction; job satisfaction results from motivator factors, such as increasing work enrichment, challenge, and personal reward. Excluding 'motivator factors' (Herzberg, Mausner, and Snyderman 1959), Sandelands and Buckner (1989) investigated other work feelings associated with aesthetic experience in the literature, e.g. 'intrinsic satisfaction' (Koch 1956; Staw 1977), 'flow' (Csikszentmihalyi 1975), and 'peak experiences' (Maslow 1971).

Sandelands and Boudens (2000) noticed that when people refer to their feelings about work, they rarely mention the feeling embedded in the job task or rewards, such as work affect and emotion; instead, they talk primarily about their involvement in the life of the group, e.g. experiences of relationships with others. Sandelands and Boudens (2000) call attention to the social dimensions of feeling at work, which is in line with the recent suggestion on social characteristics of jobs for the future of job design (Oldham and Hackman 2010).

In work organisations, social interaction is much more pervasive and prominent than before. Oldham and Hackman (2010) for instance point out that the social attributes of jobs has revived researchers' attention, e.g. dealing with others and feedback from agents, required interaction, and interaction opportunities. New social dimensions such as interaction outside the organisation, social support, and interdependence are supposed to contribute to employee's motivation and well-being (Morgeson and Humphrey 2006). To this extent, Humphrey, Nahrgang, and Morgeson (2007) suggest that four social characteristics (interdependence, feedback from others, social support, and interaction outside the organisation) would contribute to subjective performance assessments, turnover intentions, and satisfaction.

According to Wrzesniewski (2003), the traditional studies of experience at work follow a top-down approach from the perspective of the manager, which limits the potential of employee to actively shape tasks and social relationships at work. To alleviate this, Wrzesniewski (2003) suggests a relatively new concept, job crafting, wherein the employee can reframe job designs in personally meaningful ways. It allows employees to cultivate a positive sense of meaning and identity in their work. Job crafting changes the meaning of work to one that is at the core of the employees' experience of their jobs (Wrzesniewski 2003).

Rosso, Dekas, and Wrzesniewski (2010) categorise seven MMW that emphasise the psychological processes underlying the experience of meaningfulness. The meaning of work that these mechanisms drive ranges from the fulfilment of the self to the transcendence of the self entirely. The definition and explanation of high-level mechanisms and sub-mechanisms are excerpted in Table 1 (Rosso, Dekas, and Wrzesniewski 2010). Rosso, Dekas, and Wrzesniewski (2010) classify the mechanisms along the dimension of self-oriented and other-oriented. The self-oriented dimension contains *control/autonomy*, *competence* and *self-esteem*, *self-concordance*, *identity affirmation*, and *personal engagement*. The other end is oriented towards those aspects beyond oneself such as other individuals, groups, collectives, organisations, and higher powers, which

Table 1. Mechanisms of meaningful work (Rosso, Dekas, and Wrzesniewski 2010).

High-level mechanism	Explanation of mechanism	Mechanism
Authenticity	I.e. ‘a sense of coherence or alignment between one’s behaviour and perceptions of the “true” self’ (Markus 1977; Ryan, Deci, and Grolnick 1995; Sheldon et al. 1997)	<i>Self-concordance</i> <i>Identity affirmation</i> <i>Personal engagement</i>
Self-efficacy	I.e. ‘individuals’ beliefs that they have the power and ability to produce an intended effect or to make a difference’ (Bandura 1977; Baumeister and Vohs 2002)	<i>Control or autonomy</i> <i>Competence</i> <i>Perceived impact</i>
Self-esteem	I.e. ‘an individual’s assessment or evaluation of his or her own self-worth’ (Baumeister 1998)	<i>Self-esteem</i>
Purpose	I.e. ‘a sense of directedness and intentionality in life’ (Ryff 1989)	<i>Significance of work</i> <i>Value systems</i>
Belongingness	I.e. ‘a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships’ (Baumeister and Leary 1995)	<i>Social identification</i> <i>Interpersonal connectedness</i>
Transcendence	I.e. ‘connecting or superseding the ego to an entity greater than the self or beyond the material world; subordinating the self to groups, experiences, or entities that transcend the self’ (Maslow 1971)	<i>Interconnection</i> <i>Self-abnegation</i>
Cultural and interpersonal sensemaking	I.e. ‘understanding how different types of work meaning are constructed in the sociocultural context’ (Wrzesniewski, Dutton, and Debebe 2003)	<i>Social/cultural construction</i> <i>Interpersonal sensemaking</i>

include *perceived impact*, *significance of work*, *interconnection*, *self-abnegation*, *value systems*, *social identification*, and *interpersonal connectedness*.

3. Methodology

How can the design of a work tool contribute to the meaningful experience of work? This study is dedicated to addressing this question, and the theoretical approach is both top-down and bottom-up. In the top-down approach, the study borrowed theoretical elements from both experience design and work design. To this end, we wanted to determine how the knowledge of the two domains could complement each other and contribute to the guidelines of experience design for meaningful experience at work. In the bottom-up approach, the study searched for meaningful experiences at work that have been designed for in the three experience design cases – an e-learning tool, a tugboat bridge and a Bond App – to reveal what kinds of experience goals have been utilised thus far.

The PDF builds on the recent developments in positive psychology and design theory, and was found to be highly suitable and inspirational for our design research. In the experience design, we utilised the three timespans of user experience (Roto et al. 2011) that appear to map to the elements of the PDF: *pleasure* in the momentary experience, *personal significance* in the episodic experience, and *virtue* in the cumulative experience. As this framework is not tied to any specific domain, it can be reasonably assumed to be applicable for work tool design.

From the field of work design, we chose the MMW (Rosso, Dekas, and Wrzesniewski 2010). Rosso et al. have reviewed the extant discrete studies and found that these have mostly emphasised single sources of work meaning (e.g. work motivation, task characteristics). Rosso et al. have uncovered the central sources of the meaning of work which include the self, others, the work context, and what they term ‘spiritual life’. It has been further suggested that employees may draw on multiple sources of meaning in their work, and the combination and interaction between these sources may construct the meaningful experiences at work as

a whole. Rosso, Dekas, and Wrzesniewski (2010) have categorised the defined mechanisms as the hows and whys of observed relationships of the identified sources of the meaning of work. The first six mechanisms (Table 1) accentuate the fulfilment of fundamental human needs and stress primarily the psychological processes leading to experienced meaningfulness. However, the seventh mechanism, *cultural and interpersonal sensemaking*, focuses on the actual construction of meaning from the sociocultural perspectives, which is why Rosso et al. state that it differs markedly from the previous six mechanisms. As ‘meaning-making’ is beyond the scope of this study, we only focus on the first six mechanisms and exclude the *cultural and interpersonal sensemaking* mechanism. We argue that these meaningful work mechanisms may prompt work tool designers to have a comprehensive understanding of how employees see meaning in their work, and further facilitate them to shape potential meaningful experiences.

We have practised experience goal setting in an Experience-Driven Design course, taught by the authors three times during the years 2012 and 2013. In this course, teams of two to three Master students of Industrial and Strategic Design worked on two-month design cases provided by metal and engineering industry companies. All 14 cases have undergone the experience design process: design orientation exploration, experience goal setting and confirmation, concept generation and evaluation, and final concept presentation. The students working on these cases were not aware of the frameworks that were utilised in this article, but all of them defined experience goals that would yield positive and meaningful experiences with work tools. Meanwhile, the company personnel were involved throughout the design process as information providers and commentators.

For this study, 10 of the student works were analysed that related to tool design in work contexts whereas the remaining 4 were unrelated to work tool design. The designed work tools in this study vary from the interfaces or devices directly related to the production system (e.g. the tugboat bridge console in C1, eLearning tool in C3, hoist remote control in C8, process control system in C9) to the peripheral touchpoints for the different stakeholders involved in the system (e.g. the mobile customer service application in C2, futuristic factory in C4, mobile sales application for tablets in C6, mobile crane monitoring application in C10). Additionally, another two cases are related to the working environment (e.g. the touchless elevator UI for an office building in C5, information screens for an office in C7). Thirty-one user experience goals were collected from the 10 tool design cases, and this data set was used in the bottom-up analysis. The goal categorisation was conducted by two researchers (the authors) independently.

First, according to the PDF by Desmet and Pohlmeier (2013), each experience goal was mapped into one of the three components of positive design: design for *pleasure*, design for *personal significance*, and design for *virtue* (Desmet and Pohlmeier 2013). The goal categorisation resulted to an inter-rater agreement of 65%. The two researchers then discussed the disagreements until consensus was reached.

Second, all 31 experience goals were categorised according to the 13 mechanisms in MMW: *self-concordance*, *identity affirmation*, *personal engagement*, *control* or *autonomy*, *competence*, *perceived impact*, *self-esteem*, *significance of work*, *value systems*, *social identification*, *interpersonal connectedness*, *interconnection*, and *self-abnegation* (Rosso, Dekas, and Wrzesniewski 2010). They were then utilised for classification of the experience goals as they were shown to contribute to work meaningfulness, and could well serve as the starting points in defining the experience goals for work tools. The categorisation was conducted the same manner as in the first phase, with an inter-rater agreement of 74%.

Finally, the study compared the results of two categorisations and investigated the relationship between meaningfulness of work and positive design (Figure 2).

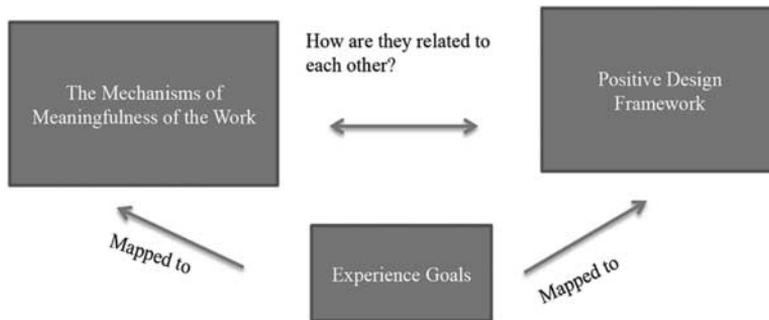


Figure 2. Experience goals mapped to two theories.

Table 2. Experience goals of case 1 and their mapping to the PDF and MMW frameworks.

Experience goal	Explanation	Positive design component	Mechanism of meaningful work
<i>Security</i>	The feeling of being guided even without a human teacher present	<i>Virtue</i>	<i>Interpersonal connectedness</i>
<i>Competence</i>	Balancing the feeling of incompetence and over-confidence	<i>Personal significance</i>	<i>Competence</i>
<i>Stimulation</i>	Enjoyment of learning	<i>Pleasure</i>	<i>Personal engagement</i>

3.1. Examples of experience design of tools at work

In order to provide a concrete explanation of the two experience goal categorisations, three example design cases were explored in greater detail. We chose examples that featured all three components of positive design, to show the variety of the different types of experience goals used, and how they were categorised.

3.1.1. Design case 1: e-learning tool

The first example is an e-learning tool design case for beginner forklift truck drivers (Roto, Uibo, and Vienamo 2012). When a new employee must learn to drive a forklift truck, a senior driver is typically required to teach him or her. To reduce the senior driver’s workload, an e-learning tool was created to assist in teaching typical tasks involved in moving pallets in the warehouse with the forklift truck. The students derived experience goals based on the interviews of the warehouse workers and their own experience in learning to drive the truck (Table 2).

In this design case, the *security* goal was addressed by adding a virtual eye on the e-learning tool, which seemed to follow the beginner driver and provided feedback in naturalistic language (bottom of Figure 3). The feeling of being taken care of satisfies the need for *interpersonal connectedness*, which manifests design for *virtue*.

Balancing the feeling of incompetence and over-confidence was addressed by asking the learner to evaluate the successfulness of the exercise, and thus provide the learner an opportunity to reflect on the skill level. Related to goal achievement, the experience goal of *competence* is set for *personal significance*. Meanwhile, *competence* itself is one of the *self-efficacy* mechanisms in MMW.

For the *stimulation* goal, the students provided feedback using stimulating natural language. There were also integrated gaming features, e.g. earning stars after completing a level (Figure 3).



Figure 3. The e-learning tool used gamification design for stimulation and the virtual eye for the security goal.

Table 3. Experience goals of case 2 and their mapping to PDF and MMW frameworks.

Experience goal	Explanation	Positive design component	Mechanism of meaningful work
<i>Proudness</i>	To be proud to master a tool and be part of an organisation	<i>Personal significance</i>	<i>Identity affirmation</i>
<i>Being in the spotlight</i>	To be a central person like an orchestra conductor	<i>Personal significance</i>	<i>Significance of work</i>
<i>Connection</i>	To be one with the tugboat and the sea	<i>Virtue</i>	<i>Personal engagement</i>
<i>Enjoyment</i>	To be immersed in the pleasant interaction with the tool	<i>Pleasure</i>	<i>Personal engagement</i>

The enjoyment of learning is elicited by the gamification design for *pleasure*. It is clearly saturated with the mechanism of *personal engagement*.

3.1.2. Design case 2: tugboat bridge

An example of radical or futuristic design is the case of a new control console for a tugboat captain. This design concept aims to provide a totally new experience for the captain's tool, the tugboat, and especially its bridge. After visiting the manufacturing factory, studying the domain material provided by the client company, mapping the contexts, and exercising empathy for the users, the design students developed a concept inspired by the quote from Steven Spielberg 'make it like conducting an orchestra'. 'Conducting an orchestra' served as a metaphor for the user experience of the console control, which facilitated the design students to envision future scenarios and generate four user experience goals: *proudness*, *being in the spotlight*, *connection*, and *enjoyment* (Table 3).

The whole concept of a futuristic tugboat bridge addressed the *proudness* goal: the captain feels privileged to work in a bright and spacious tugboat that is provided by a well-known

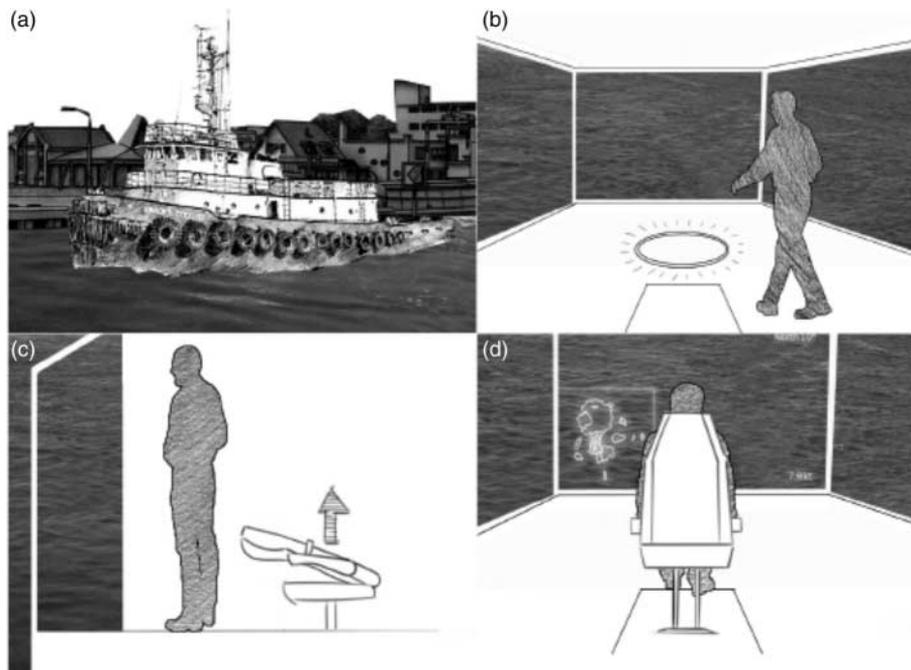


Figure 4. The scenario of a captain's experiences with the futuristic tugboat bridge.

and admired employer. In this case, *proudness* originates from an aspiration that is the core of *personal significance*. It can generate the activation of personal identities through work. In containing one mechanism of meaningful work, *identity affirmation*, *proudness* as a goal is set for *personal significance*.

The feeling of *being in the spotlight* arises from a directed light on the floor that lights up when the captain steps onto the figurative stage (Figure 4(b)). After which, the bridge welcomes him and provides a seat in the centre of the bridge (Figure 4(c)). The interaction between the tugboat bridge and the captain is designed to evoke a sensation of being a central person like an orchestra conductor. This feeling enables a person to fulfil one's aspiration and perceive work as significant. The experience goal of *being in a spotlight* is set for *personal significance*, reflecting another mechanism of meaningful work, *the significance of work*.

The large windows and new control tools integrated in the chair enhance the *connection* with the tugboat and the sea, as well as the captain's *enjoyment* of the work (Figure 4(d)). The experience goals of *connection* and *enjoyment* can both manifest authentic engagement with the work. With an emphasis on being one with the tool and work environment, the goal of *connection* is set for *virtue*. The *enjoyment* experience goal highlights the pleasant interaction with the tool; thus, it is set for *pleasure*.

3.1.3. Design case 3: mobile application

The third case creates a customer experience for a company that produces and integrates factory automation systems. The goals addressed the different timespans of experience in a customer journey: momentary, episodic, and cumulative (Roto et al. 2011). *Wow* was defined as a momentary sensation that could be produced when the customer encountered something impressive in a particular way. *Wow* is captivation of the moment, but it can create a long-lasting memory. The second customer experience goal, *proudness* with an episodic nature, could surface and resurface

at different times, e.g. the design can invoke the customers' feeling of *pride* at any time. *Trust* was considered the third experience goal with a cumulative nature. It was mainly derived from the current brand image of efficiency and quality. Table 4 describes the experience goals used in this case.

The design concept sought to launch a new kind of customer service via a mobile application, Bond App. When the customers purchase the products of this company, they have developed a connection to the entire company; a bond that continues throughout the whole customer journey, supporting *trust* between the customers and the company. With the application, it is possible for the customers to manage their factories via a mobile phone from anywhere, at anytime. It can constantly and automatically update the status of the machines and also provide training materials to customers. Also, it provides an easy and geo-localised way to call the company; calls are redirected to a country and service-specific call centre (Figure 5).

For business customers, controlling aspects of a factory with a mobile application may trigger a 'wow' experience, a mixed feeling of fascination, pleasant surprise, and desire (Desmet, Porcelijn, and Van Dijk 2005). This mobile control without the limitation of space and time can easily elicit a *wow* within the customer's initial encounter. However, a durable *wow* effect requires unceasing surprises. Thus, rather than the behaviour-level interaction with the application, various updated services are actually designed for retaining long-term engagement. Durable

Table 4. Experience goals of case 3 and their mapping to PDF and MMW frameworks.

Experience goal	Explanation	Positive design component	Mechanism of meaningful work
<i>Wow</i>	A momentary feeling that could be produced when the customer encountered something impressive in a particular way	<i>Pleasure</i>	<i>Personal engagement</i>
<i>Proudness</i>	An episodic feeling of being proud that could surface and resurface at different times	<i>Personal significance</i>	<i>Perceived impact</i>
<i>Trust</i>	A cumulative feeling that was mainly derived from the current brand image of efficiency and quality	<i>Virtue</i>	<i>Self-abnegation</i>



Figure 5. User interface designs of Bond App.

work stresses on keeping people immersed and engaged at work, which is in line with another mechanism of meaningful work, *personal engagement*.

When demonstrating the automation system to others, customers may feel *proudness* due to its uniqueness. Meanwhile, the mobile application enables customers to become more responsible employees because they can manage the automation system anytime and anywhere. Further, it is quite possible that these customers will perceive that they have positively impacted their organisations. Hence, the *proudness* experience goal is set for *personal significance*, which is substantiated by the meaningful work mechanism of *perceived impact*.

Besides this, the experience goal of *trust* is enhanced by the sense of control and a personal connection to the work system, which in turn encourages the customers to naturally perceive the brand image of efficiency and quality. At a deeper level, *trust* expands the perception of confidence in tools towards that of reliability in the tool provider. The experience of trust in something beyond oneself is the foundation for the meaningfulness of subordinating oneself to an organisation's vision. As a user experience goal, *trust* can guide design for *virtue* enriched by the mechanism of *self-abnegation*.

4. Results

The 10 cases of tool design in the metal and engineering industry established 31 experience goals altogether. Nine cases introduced three experience goals each, and one case produced four goals. Table 5 provides an overview of all the experience goals that the students defined. They are categorised according to the components of PDF (Desmet and Pohlmeier 2013) and MMW (Rosso, Dekas, and Wrzesniewski 2010).

The categorisation against PDF in Table 5 shows that 14 of the 31 goals are defined from the perspective of *personal significance* (45%), e.g. *competence*, *proudness*, and *empowering*. Eleven goals match the concept of designing for *virtue* (36%), e.g. *trust*, *engagement*, and *discovery*. In contrast, only six goals follow the concept of designing for *pleasure* (19%), e.g. *excitement*, *stimulation*, and *enjoyment* (Figure 6).

When looking at the individual cases in Table 5, four cases contain experience goals that cover all of three components of PDF, and the other six cases have goals that cover two components each. All of these cases contain experience goals defined for *personal significance*, and five cases contain two goals. Eight cases have *virtue*-related experience goals, and three cases involve two of those. Six out of 10 cases have one goal defined for *pleasure*.

The categorisation of the 31 experience goals to the 13 mechanisms of MMW revealed that 9 goals (29%) follow the mechanism of *personal engagement*, 7 (23%) *interpersonal connectedness*, 5 (16%) *competence*, and 4 (13%) *identity affirmation*. The mechanism of *self-abnegation* was met by two (7%) experience goals. Those of *control or autonomy*, *significance of work*, *self-esteem*, and *perceived impact* all have one goal. No goals fall into the mechanisms of *self-concordance*, *value systems*, *social identification*, and *interconnection*. Figure 7 shows the distribution of experience goals according to the 13 mechanisms of MMW.

A case-by-case assessment of Table 5 reveals that eight cases employ the mechanism of *personal engagement*. Five cases employ *competence* and the same number *interpersonal connectedness*. Four cases employ the three mechanisms of *personal engagement*, *competence*, and *interpersonal connectedness*. All in all, in 8 cases out of 10, different experience goals are mapped to different mechanisms in MMW (Rosso, Dekas, and Wrzesniewski 2010). There is some repetition in that the experience goals of the same case are derived from the same mechanism of meaningful work. For example, one repetition happens in a case with

Table 5. The set of experience goals mapped to the PDF and the MMW.

Case	Experience goal	Component of PDF (i.e. what is the experience goal designed for?)	MMW (i.e. what does an experience goal imply for the meaningful experience of work?)
C1	Security	Virtue	Interpersonal connectedness
	Competence	Personal significance	Competence
C2	Stimulation	Pleasure	Personal engagement
	Proudness	Personal significance	Identity affirmation
	Being in a spotlight	Personal significance	Significance of work
	Connection	Virtue	Personal engagement
C3	Enjoyment	Pleasure	Personal engagement
	Wow	Pleasure	Personal engagement
	Proudness	Personal significance	Perceived impact
C4	Trust	Virtue	Self-abnegation
	Self-actualisation	Personal significance	Identity affirmation
C5	Competence	Personal significance	Competence
	Pleasure	Pleasure	Personal engagement
C6	Disruption	Virtue	Identity affirmation
	Discovery	Virtue	Personal engagement
	Control	Personal significance	Control/autonomy
C7	Trust	Virtue	Self-abnegation
	Engagement	Virtue	Interpersonal connectedness
C8	Excitement	Pleasure	Personal engagement
	Connectivity	Personal significance	Interpersonal connectedness
	Engagement	Virtue	Interpersonal connectedness
C9	Communication	Virtue	Interpersonal connectedness
	Competence	Personal significance	Competence
C10	Self-esteem	Virtue	Self-esteem
	Proudness	Personal significance	Identity affirmation
	Competence	Personal significance	Competence
C10	Enjoyment	Pleasure	Personal engagement
	Connectedness	Personal significance	Interpersonal connectedness
	Relationship	Virtue	Interpersonal connectedness
	Empowerment	Personal significance	Competence
	Dynamism	Personal significance	Personal engagement

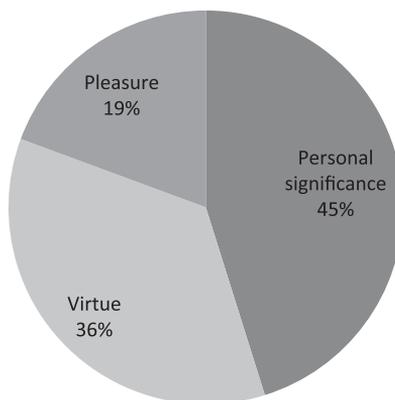


Figure 6. Thirty-one experience goals categorised by the components in the PDF.

three experience goals *connectivity*, *engagement*, and *communication* that all belong to one mechanism, *interpersonal connectedness*.

When we compare the goal categorisations between the two frameworks, 14 experience goals were mapped to the *personal significance* component of PDF. Five goals out of these match

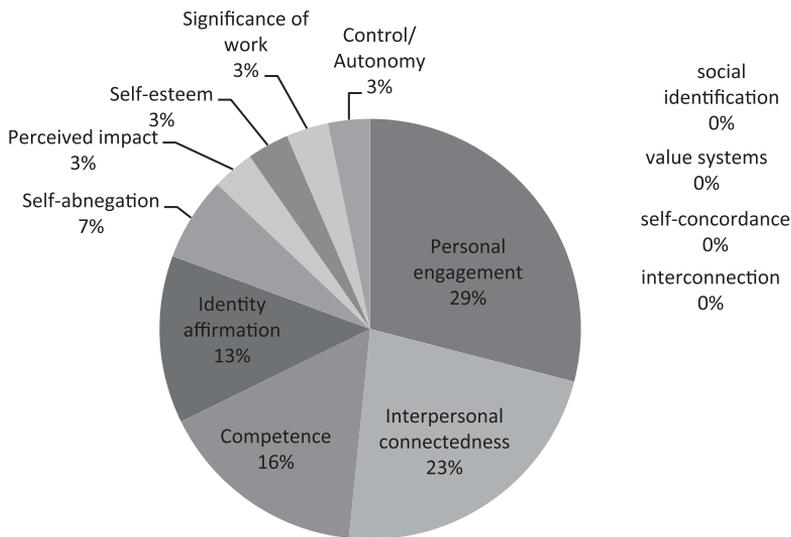


Figure 7. Experience goals categorised to the MMW.

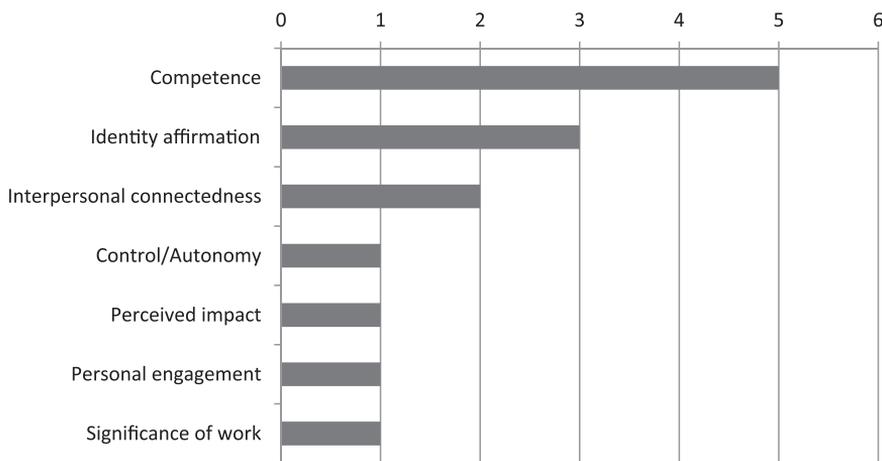


Figure 8. Distribution of personal significance-related experience goals against the MMW.

the mechanism of *competence*, three goals of *identity affirmation*, and two goals of *interpersonal connectedness*. The rest of the *personal significance*-related goals are scattered into the categories of *control and autonomy*, *perceived impact*, *personal engagement*, and *significance of work* (Figure 8).

There are 11 experience goals mapped to the *virtue* component of PDF, among which 5 goals are in the category *interpersonal connectedness*, 2 goals in *personal engagement*, and 2 in *self-abnegation* as well. The mechanisms of *identity*, *affirmation*, and *self-esteem* were related to one goal each (Figure 9).

The six experience goals that were mapped to the *pleasure* component of PDF all fall into the mechanism of *personal engagement*.

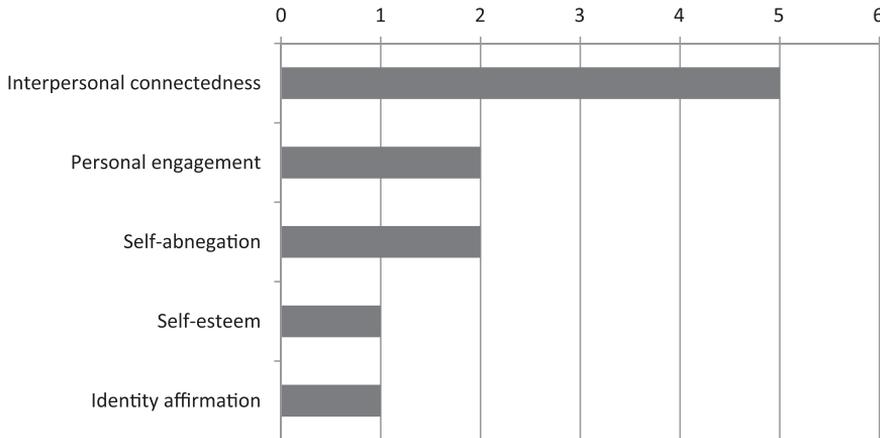


Figure 9. Distribution of virtue-related experience goals against the MMW.

5. Analysis

All the 10 cases of tool design in the metal and engineering industry contexts started with defining 3–4 experience goals. When the 31 experience goals used in these cases were categorised against the 3 components of PDF, it was discovered that *personal significance* is the most prevailing component, utilised in each case. Fourteen of the 31 goals are *personal significance*-related, falling into 7 different categories of MMW. It is worth noting that 5 out of these 14 goals are derived from the mechanism of *competence*. The experience of *competence* results from conquering challenges at work by oneself, which helps to boost individual potential at work. *Competence* seems a prominent source for setting the *personal significance*-related experience goal in work-related contexts. Tools designed for personal significance with meaningfulness of self-efficacy may promote the workers' motivation, empower their capability, enhance their performance, and positively influence the work outcomes, which may in turn create the long-term value for the customers who invest in the tools.

In this study, *virtue* is also a frequently utilised component of PDF, and an ingredient for experience goal setting. Eleven out of 31 goals match the concept of designing for *virtue*, and 8 out of 10 cases employ *virtue*-related experience goals. These goals cover five categories of MMW. It is noteworthy that five of these goals are derived from the meaningful work mechanism of *interpersonal connectedness*. *Interpersonal closeness* in the workplace contributes to a sense of belongingness and togetherness, evoking the feelings of comfort and support (Rosso, Dekas, and Wrzesniewski 2010). This expands self-oriented concerns towards the social aspects of work. In the B2B setting, tools that can evoke the employees' experiences of relatedness are beneficial for workers and organisations, thereby may enhance their loyalty towards the work tool provider.

Six of these 10 cases employ experience goals that are related to the *pleasure* component of PDF. All of them are linked to the mechanism of *personal engagement* that underlines an immersed and energetic state at work.

We realise that it may be difficult to find any evident correlation between the experience goals employed in these cases and the meaningful work mechanisms of *self-concordance*, *value systems*, *social identification*, and *interconnection*. These mechanisms are all related to value, varying from the individual level to collective level, or even a divine power. The perception of *self-concordance* allows people to feel that their behaviours are in line with their interests and

values. *Value systems* provide a sense of assurance that one is acting in accordance with fundamental values shared by a group of people (Baumeister and Vohs 2002; Wiener 1988). Similarly, *social identification* accentuates the sense of belongingness evoked by shared identities, beliefs, or attributes (Hogg and Terry 2000) while *interconnection* suggests the individual can transcend the self and contribute to something greater than oneself (Maslow 1971; Rosso, Dekas, and Wrzesniewski 2010). Compared with the efficacy-related meaningful mechanisms (e.g. *control* or *autonomy, competence*), the value-related mechanisms are more intrinsic and stable, which can hardly be shaped by tool designers. For this reason, these value-related mechanisms can hardly contribute to the PDF for work tool design. In summary, the experience goals in our tool design cases indicate that the meaningful work mechanisms of *competence, interpersonal connectedness, and personal engagement* can contribute to design for *personal significance*, design for *virtue*, and design for *pleasure*.

6. Discussion

In this study, we followed an approach that sorted the experience goals of 10 tool design cases pursuant to both the PDF and the MMW. According to Desmet, Pohlmeier, and Forlizzi (2013), positive design is design for human flourishing that requires a balanced contribution from all of the three design components (personal significance, virtue, and pleasure). Although the framework is concise, it embraces and balances both hedonic (i.e. pleasure) and eudaimonic (i.e. personal significance and virtue) perspectives in design. Our study demonstrates the MMW are able to associate with each of the three design components, especially personal significance and virtue.

Most personal significance-related goals are derived from those self-oriented and differentiation-driven mechanisms of MMW, e.g. the experience goal of *empowerment* emanates from the mechanism of *competence*. However, several personal significance-related goals also incorporate other-oriented aspects. For example, in the case of the tugboat bridge design, the experience goal of *proudness* is derived from the meaningful mechanism of *identity affirmation* and embodied by the feeling of mastering an advanced tool and belonging to an organisation. Another example of this experience goal in the mobile application case reflects the perceived impact of the mechanism, which is evoked by demonstrating the application to others, e.g. clients. Hence, although personal significance would suggest a self-oriented design component, MMW infuses an other-oriented consideration into the experience goal setting.

In working contexts, *virtue* is easily associated with the other-related mechanisms of meaningfulness. The mechanism of *interpersonal connectedness* is offered, for instance, in the case of the e-learning tool design for beginner forklift drivers. Here, the *security* experience goal is elicited by the perception of being guided even without a human teacher. Another example occurs in the case of the mobile application design for automation systems. Associated with the mechanism of *self-abnegation*, the experience goal of *trust* is manifested by trust in the tool, tool provider, and even organisation. It is worth noting that these cases also demonstrate that *virtue* can be designed from the self-focused mechanisms, e.g. *personal engagement*. In the case of the tugboat bridge design, *connection* with the working environment is a *virtue*-related experience goal derived from the mechanism of *personal engagement*. It is embodied by the sense of being one with the tugboat and sea. Therefore, with these mechanisms of meaningfulness, the space comprising design for *virtue* can be expanded towards both other-oriented and self-oriented directions, which is similar to design for personal significance.

Commonly, design for *pleasure* is readily associated with hedonic experience goals, e.g. relaxation, humour, and fantasy, especially in leisure product design such as electronic toy design. In

6.1. Suggestions on how to use PDF for work tools

Although we have not yet applied the new framework into design cases, we would like to offer some initial suggestions for the utilisation of the new framework. The main aim of the PDFWork framework is to guide the early phases of a design process where it can elevate the vision of work tool design from that of easy-to-use tools to one of promoting meaningful experiences at work and a future of flourishing, motivated employees. The framework assists designers to envision experiences that could enable future employees to become morally sound workers, pursue their personal goals, and enjoy their work. For example, the mechanism of *identity affirmation* can trigger notions of a future working environment that manifests the importance of the employees' tasks (*personal significance*) and indicates their responsibilities (*virtue*).

The items of MMW under each element of positive design can be considered as the initial sources of the experience goal definition, which can spark inspiration and empower concept generation in the fuzzy front end of the design process. It is critical for designers and other stakeholders to interpret what an experience goal means in the envisioned working contexts and how they will work together for design novelty. It is not necessary to directly derive experience goals from PDFWork and generate design concepts that fully adhere to it. However, initial concepts should explicitly avoid running counter to any component of positive design, e.g. to avoid provoking job dissatisfaction, immoral behaviour at work, or threats to employee motivation. An effective concept can therefore fully manifest the highlighted experience goals and simultaneously not fail any aspect of positive design.

In addition to guiding design, we encourage researchers to utilise the PDFWork framework whenever studying experiences at work, either in the background research phase or when evaluating new designs. PDFWork can serve as an experience-oriented framework that guides work experience data collection and data analysis. For example, a thematic interview can focus on virtue, pleasure, and personal significance. This kind of research can hopefully lead to supplements in the framework, especially with new mechanisms under the pleasure element.

The ultimate outcome of utilising our framework is improved employee enjoyment at work. In an ideal case, an employer will address all of the elements in our framework in their work design. One tool can hardly enable all the experiences, but the employer can implement a portfolio of tools and services that addresses all of the items in PDFWork. An ideal workplace might thus provide a selection of products and services that are able to evoke various experiences derived from PDFWork, covering and balancing the three components of positive design.

A tool provider could take our framework as a basis in business planning and act as a supplier of an experiential portfolio of generic work tools and services, such as communication tools and evaluation systems.

7. Conclusions

While experience design has been gaining attention with leisure and consumer products, tool design for work primarily focuses on performance and maintenance issues. The more developed the everyday technology becomes, the more people will also demand from their tools at work. We see it as an inevitable outcome that experiential aspects will become important for tools used in the workplace as well.

Our interest lies in the fuzzy front end of experience design, where the design team should identify a way to define what experiences to design for. Without guidance, it is difficult to specify meaningful experience goals for design.

Having studied the literature both on experience design and job satisfaction, the existing frameworks of positive design (Desmet and Pohlmeier 2013) and meaningful work (Rosso,

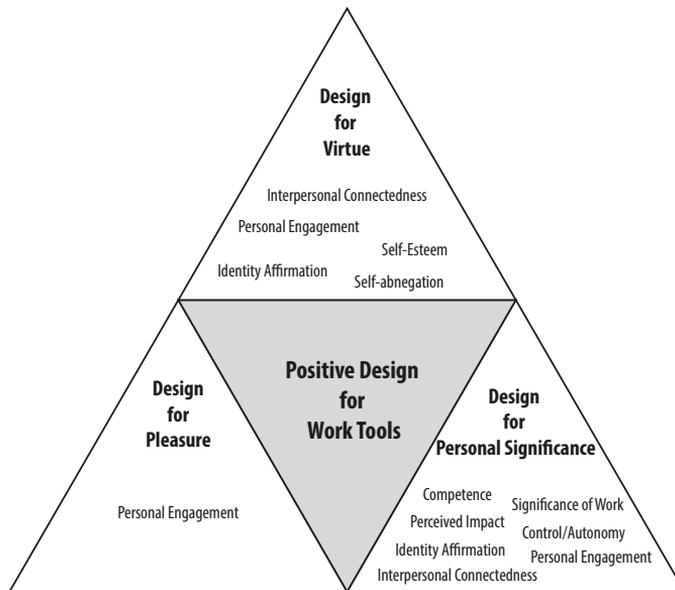


Figure 10. PDF for work tools (PDFWork).

contrast, design for work tools is normally considered from eudaimonic perspectives, e.g. feeling of control and competence. However, in our studies, more than half of the cases contain an experience goal set for pleasure, and they are all related to the MMW *personal engagement*. For example, in the mobile application design case, the experience goal of *wow* accentuates the peak experience engaged by the pleasant surprise in the uniqueness of the application. Similarly in the tugboat bridge design case, the *enjoyment* experience goal is evoked by the experience of flow, the sense of being immersed in a pleasant interaction with the tool. Furthermore, the experience goal of *stimulation* is highlighted by the playfulness and fun which can engage people to learn new tools, as seen in the case of e-learning tool design. The meaningfulness of *personal engagement* can thus guide designers to infuse these enjoyment ingredients into serious work tool design.

Design for human flourishing requires a balanced and positive effect that is operationalised in terms of pleasure, virtue, and personal significance (Desmet and Pohlmeier 2013). Desmet and Pohlmeier (2013) further suggest that if people pursue only future aspirations and happiness, it might paradoxically engender misery unless they allot time to experience momentary joy and pleasure. However, in the domain of work-related design, much has been emphasised on the eudaimonic perspectives, e.g. motivation, performance, and communication. The MMW employed in this study demonstrates such a bias: it is much more related to *virtue* and *personal significance* than to *pleasure*. That may account for why there is only one mechanism, *personal engagement*, which contributes to design for pleasure.

The main contribution of our study is a PDF for work tools (Figure 10). This framework is based on mapping the MMW (Rosso, Dekas, and Wrzesniewski 2010) to the three components of the PDF (Desmet and Pohlmeier 2013), and it aims to guide designers of work tools to define meaningful experience goals as the starting point of their design. Since the nature of experience design defines a targeted experience before deciding on what to design, we argue that our framework can also provide inspiration not only for work tool design, but also for other types of design related to meaningful experience at work, such as event design, service design, or job design.

Dekas, and Wrzesniewski 2010) seem most promising for defining the experience goals for tools used at work. Our hypothesis asserted that the MMW would help us to define more specific experiences for the framework of positive design, which consists of three high-level categories of *virtue*, *personal significance*, and *pleasure*. Indeed, we were able to map the MMW by Rosso, Dekas, and Wrzesniewski (2010) to the three components of the PDF by Desmet and Pohlmeier (2013). However, we did not find many items in MMW that would fall inside the pleasure component of PDF. This is likely due to the MMW focus on meaning, which ‘moves beyond the hedonic perspectives of work behaviour to deeper considerations of purpose and significance and eudaimonic aspects of well-being’ (Rosso, Dekas, and Wrzesniewski 2010, 93). Desmet and Pohlmeier offer the pleasure component to specifically address momentary hedonic experiences, not the deeper meaning. However, this does not decrease the importance of pleasurable experiences with work tools, rather it is an indication that meaningful experiences at work largely exclude pleasurable experiences. More work is required to study how to design for pleasure in work-related tools.

Furthermore, we tested if the experience goals that we have used for designing positive experiences for work tools could be mapped to these frameworks. Our data set included 10 tool design cases from Master’s level course assignments, which were provided by metal and engineering companies. In these cases, the students designed for positive experiences with no specific guidance on what these might entail in the work context. Altogether, we mapped 31 experience goals employed in the student assignments, and discovered that all of them can be mapped onto the two frameworks.

In the B2B environment, tools that enable profound user experiences are related to efficiency, work satisfaction, and professional proudness; from the customers’ viewpoint, a meaningful user experience prompts productivity, competitiveness, organisational culture, and belongingness; from the perspective of tool provider, profound user and customer experience can be considered as a promising source of competitive advantages and market differentiation. We assert that our work can contribute to the design of tools, service, and other tangible or intangible touchpoints in the B2B domains. Our work specifies what positive design can convey to tool design for profound experience at work, while in the meantime offering experience goal possibilities for the design team to ponder over.

7.1. Limitations

We would like to position our framework for experience design as a nascent theory, as several limitations exist in our research. First, our theory-driven framework for work tool design is based on the PDF. It can thus hardly be avoided that our framework inherits the difficulties engendered by the theory itself. PDF, as a recent theory, still lacks some degree of empirical evidence and assessment tools, among other difficulties in design approaches and methods, consumer behaviour, and ethical issues (Desmet and Pohlmeier 2013).

Second, we only applied the mechanisms of MMW that focus on the fulfilment of fundamental human needs. As such, we excluded sociocultural factors that shape the meaning people make of different aspects of their work (Wrzesniewski et al. 2013). For instance, in Eastern cultures, flaunting tools to others is probably perceived as impoliteness and superficiality. Due to the breadth of cultural variety, cultural influence in meaningful experiences at work was not included in our studies.

Third, from a methodological perspective, there are limitations for the mapping of each experience goal to one positive design component and one meaningful mechanism. The three components of positive design are not exclusive, i.e. one experience instance may address several components. The MMW are likewise similar in their nature. Thus, it is quite likely that one

experience goal can be related to more than one component and fall into different categories of meaningful mechanisms. In an ideal condition, if the designers themselves, rather than the researchers, were invited to categorise and map the experience goals against the models, the results could be different and reflect more the origins of the design concepts.

Fourth, from the data perspective, there was little time for experience goal exploration and in-depth analysis given that all of the cases were two-month Master student projects. As such, it was a difficult task for the students who lacked practical design experience to define experience goals for the unfamiliar domain; on the other hand, their fresh eyes did contribute new inspiring ideas to the experts of this particular domain. The fact that these studies are based on only 10 cases may have resulted in the lack of experience goals for certain mechanisms of meaningfulness. For instance, we did not find any experience goals that could be mapped to the mechanisms related to value systems. We believe these mechanisms are related to *virtue* and *personal significance* items of PDF, but we have no evidence to determine whether these mechanisms can be utilised in experience design.

Last but not the least, we still need an actual case that can demonstrate the usage and effect of the new framework application, although we have provided researchers and practitioners the potential benefit from the use of the framework in discussion section.

7.2. Future work

Our results suggest that meaningful experiences at work largely exclude *pleasurable* experiences. Presumably, this is due to the in-depth nature of meaning, and more momentary nature of *pleasure*. As similarly demonstrated, *pleasure* is an important component of positive experiences at work, but we still lack a framework that would specify the types of pleasure that best fit in workplace contexts. Thus, it remains an open question if it is possible to provide more precise guidance for setting pleasurable experience goals for work tools.

Our future work should aim at the verification of the framework with regard to how it affects experience goal setting and conceptualisation in design practice. The framework as design principle and guidance will need to be tested in future studies.

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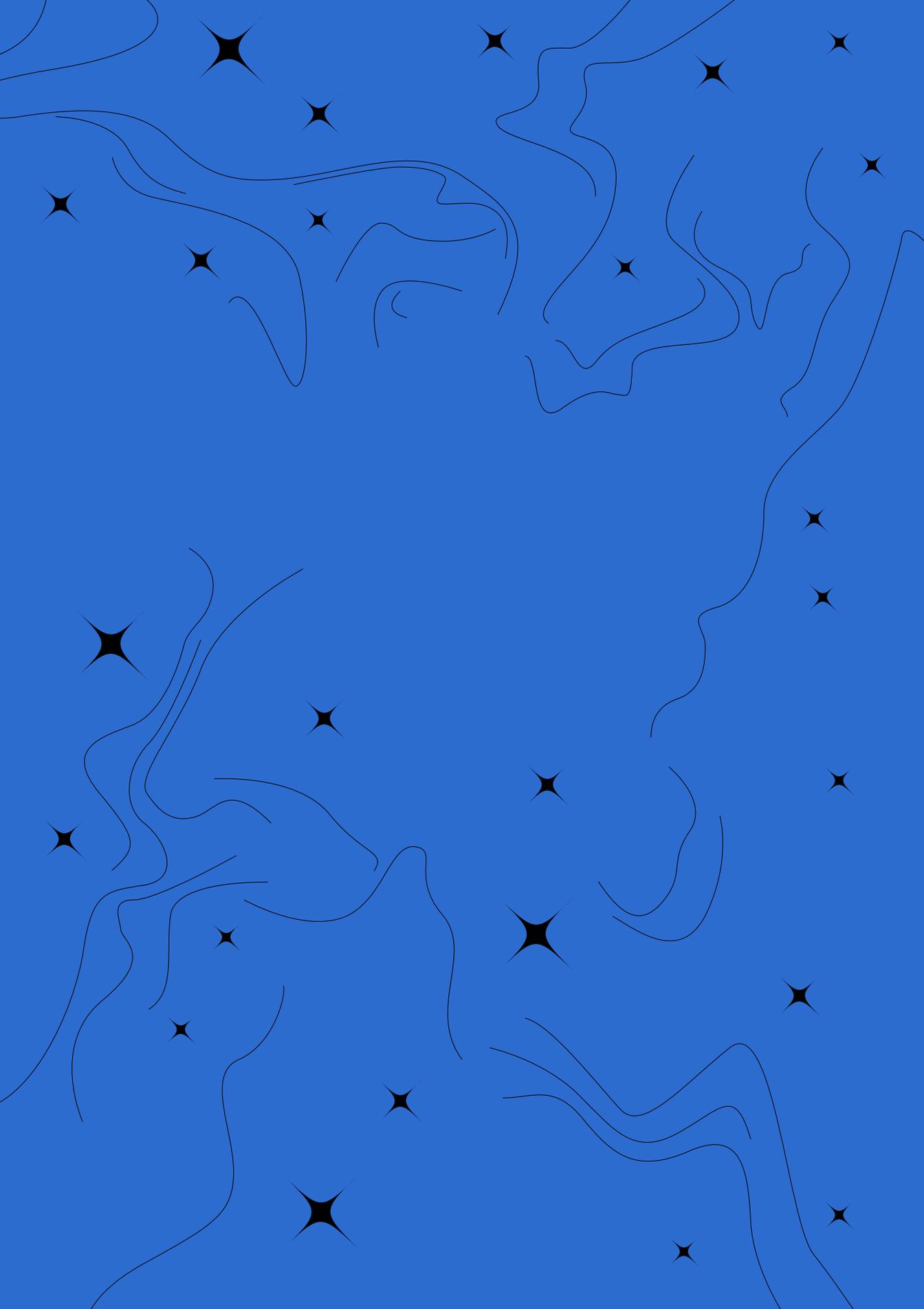
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PAPER 3.

Lu, Yichen, and Virpi Roto. 2016. "Design for Pride in the Workplace."
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Design for Pride in the Workplace

Yichen Lu* and Virpi Roto

*Correspondence:
yichen.lu@aalto.fi
Dept of Design,
School of Arts, Design
and Architecture, Aalto
University, Hämeentie 135C,
Helsinki, Finland

Abstract

Background: Pride is one of the most meaningful experiences in daily life. Many psychological studies emphasize self-oriented and event-based achievements as the main sources of pride, whereas work from organizational management considers pride as a collective attitude derived from other-focused activities and fostered by the sense of belongingness. Taking the interdisciplinary aspects of pride into account, this article addresses the challenge of how experience design can contribute to pride experience in the workplace.

Methods: By cross-cutting theories from psychology and organizational management, this study introduces a framework of dynamic pride. The data includes 20 experience design cases that were specifically devoted to positive experiences in the context of the metal and engineering industry. 33 pride-related experience design goals were analyzed and categorized into the framework of pride.

Results: This study introduces the social and temporal dimensions of pride experience at work. The pride-related experience design goals fall into four categories: self-focused short-term pride, self-focused long-term pride, other-focused short-term pride, and other-focused long-term pride. Accordingly, the extracted design strategies of these goals were mapped to each type of pride. Most of these design strategies were clustered in the categories of self-focused short-term pride and other-focused long-term pride.

Conclusions: This study reveals the design strategies for dynamics of pride in the workplace varying from evoking self-achievement in individual interactions with tools to maintaining long-term motivation of self-competence development, and from highlighting one's contribution in face-to-face collaborative work facilitated by interactive tools to fostering co-experience of organizational pride throughout social events.

Keywords: Experience design, Pride experience, Design strategy, Self-focus, Other-focus, Short-term, Long-term

Background

People feel life holds more meaning when they are motivated by cherished goals, aware of self-improvement, involved in healthy interpersonal relationships, and loyal to their beliefs. In essence, these profound experiences of meaning make life worth living (e.g., Seligman and Csikszentmihalyi 2000). However, the contribution of subjective value experiences, especially those of happiness, has not gained adequate attention in empirical research until the emergence of positive psychology. This new branch of psychology shifted the research focus from pathology to optimal human function and flourishing

(Seligman and Csikszentmihalyi 2000), and it addresses how to enable individuals and communities to thrive (Seligman 2011).

Positive psychology has promoted human flourishing as the ultimate goal of scientific research. It has been increasingly applied to other disciplines, such as education, policy, management, mental health, computer science, engineering, and design (Calvo and Peters 2014, p. 25). In the field of human–computer interaction, the “positive technology” approach was proposed to utilize interactive technologies for personal experience optimization (Riva et al. 2012). From the perspective of multidisciplinary efforts, Calvo and Peters (2014) refer to this area of design and development of technology for psychological wellbeing and human potential as “positive computing”.

Highly connected with technology and engineering, the discipline of design (e.g., industrial design, product design, and interaction design) has been inspired by the mindset of positive psychology: from preventing pain towards promoting happiness, from material sufficiency towards experiential value (Pohlmeier 2012), from immediate response towards long-term impact, and from designing solutions towards designing possibilities (Desmet and Hassenzahl 2012; Jensen 2014). Human flourishing has essentially changed the traditional design process, exemplified by recent scholarly advice, such as “think experience before product” (Hassenzahl 2010) and “first decide what kind of experience to be aimed for and then design certain features to evoke the targeted experience” (Desmet and Schifferstein 2011). Design approaches, such as experience-based design (Bate and Robert 2007), experience-centered design (Wright and McCarthy 2010), experience-driven design (Desmet and Schifferstein 2011), positive design (Desmet and Pohlmeier 2013), experience design (Hassenzahl et al. 2013) and design for profound experiences (Jensen 2014), prioritize quality experience goals over material-level requirements. One typical experience design case introduced by Hassenzahl (2010) is Philips wake-up light simulating sunrise and bird singing for natural wake-up experience in the morning. Combining an alarm clock and a bedside lamp, it guides user gently out of a deep sleep phase by progressively increasing in light intensity and volume of bird singing. Adding to this understanding of experience design, Lu and Roto (2014) defined an experience goal addressing in-depth meaning as the starting point and driver of design process. Functionality and usability requirements are submissive to ultimate experience goals.

To facilitate the designers’ adaptation to this mindset change, design researchers have started to translate knowledge from the field of psychology into design approaches. Hassenzahl et al. (2010) selected six out of 10 psychological needs (Sheldon et al. 2001) and suggested utilizing an “experience pattern” as a tool to distill the essence of an experience and transfer it to the targeted context. Desmet (2012) introduced a basic set of 25 positive emotion types and proposed six main sources of positive emotions in human product interactions. Desmet and Pohlmeier (2013) created a framework suggesting three ingredients of design for human flourishing: pleasure, personal significance, and virtue. Calvo and Peters (2014) identified the determinant factors of wellbeing and provided the strategies to develop a certain factor as well as its evaluation methods. For the specific context of the industrial work environment, Lu and Roto (2015) borrowed the knowledge on the meaning of work (Rosso et al. 2010) and provided high-level design strategies for evoking meaningful experiences at work regarding work tool design, such as promoting competence for the perception of personal significance. These frameworks

address positive experiences as the root of design, and open the door to design for well-being in general. However, these theories may arguably appear too essential, comprehensive, or concise for designers, and scarcely reach to the fine granularity required for design action. The nature of design practice remains highly context-dependent and the resulting design is required to be concrete and to manifest in details. Therefore, more explicit and practicable strategies for experience design are needed regarding a specific experience in a targeted context.

This study aims to investigate design strategies for human flourishing with a special focus on pride experience in the workplace, because the nature of pride is full of richness regarding meaningful experiences at work. According to the positive computing framework (Calvo and Peters 2014, p. 87), pride covers the dimension from *intra-personal* pride that is experienced within oneself (e.g., feelings of self-achievement) to *interpersonal* pride that is experienced from interaction between oneself and others (e.g., perception of respect from others). From the perspective of time, pride can be experienced as a moment-by-moment positive emotion evoked by unstable events, such as success in a challenging task. Also, pride can be considered as a cumulative experience based on a long-term rational attitude, such as loyalty towards one's community. In contrast to the richness of pride, current design research studies provide limited sources of design for pride, which are mainly constrained by the mere scope of product design and the perspective of self-achievement and personal distinct possession (Desmet 2012).

Pride as a meaningful experience design goal in the workplace is worth investigating further. This study specifically strives to provide designers concrete design-for-pride strategies from two angles: the literature review on the multiple facets of pride and the empirical data on pride embodiment in design concepts. Accordingly, with a special focus on workplace, this study addresses two research questions: first, to identify what are the dimensions of pride that help designers to understand the design space for pride experience; second, to distinguish the strategies that designers have used so far in the design-for-pride cases. By synthesizing theoretical and empirical knowledge, this study proposes a multi-dimensional framework of design-mediated pride¹ and the design strategies for evoking dynamics of pride in the workplace.

The remaining sections of this paper are structured accordingly: first, a theoretical framework of pride based on literature review is presented and the need of knowledge on design-mediated pride is identified; second, 20 cases that were designed for positive experience at work are analyzed based on self-focus to other-focus dimensions and short-term to long-term timespans; third, derived from these cases, the design strategies for evoking pride experience at work are proposed; finally, the insights from these design strategies are discussed.

Literature Review

Psychological Structure of Pride

Pride is a fundamental human emotion involving a complex self-evaluative process (Tracy and Robins 2004). Different from other “purely” basic emotions, such as the

¹ Thanks to the anonymous Reviewer 1.

universally admired emotion of love or the universally reviled emotion of jealousy (Williams and DeSteno 2009), pride is comprised of two distinct facets. To this extent, Tangney (1990) referred to “alpha” pride as pride in self and “beta” pride as pride in behavior. Furthermore, Tracy and Robins (2004) distinguished between authentic pride and hubristic pride: authentic pride is evoked by accomplishment from successful behavior and positively related to genuine self-esteem and prosocial traits, whereas hubristic pride is more towards self-aggrandizement and positively related to narcissism (Tracy et al. 2014). Additionally, the two facets of pride differ from each other in cognitive antecedents (Tracy and Robins 2007b). Authentic pride is triggered more by unstable, specific, and controllable attributions, such as solid results due to hard work, whereas hubristic pride is more likely to occur from stable, global, and uncontrollable causes, such as feelings of superiority from “who I am” (Tracy and Robins 2007b). As this study focuses on designing for positive pride, hubristic pride is excluded in the scope of this paper.

Self-Focus Versus Other-Focus

Both self- and other-focused pride are sources of positive emotion (Desmet 2012); moreover, the categories of self and social have been identified as wellbeing factors (Calvo and Peters 2014). Self-focused pride emphasizes more on interaction within oneself and response to oneself whereas other-focused pride accentuates interpersonal interaction and the influence between self and others. Most studies emphasize pride as a self-conscious and performance-related experience triggered by self-efficacy (Tracy and Robins 2007a). Besides its elicitation through self-achievement, pride as a fundamental social emotion can also be “generated by appraisals when one is responsible for a socially valued outcome or for being a socially valued person” (Mascolo and Fischer 1995, p. 66). Moral accomplishment and prosocial actions are associated with the feeling of pride that may motivate and reinforce one’s socially valued conduct (Tangney et al. 2007), such as caregiving (Tracy and Robins 2007b), treating others well (Michie 2009), and positively responding to others’ emotions and needs (Leffel et al. 2008). Nakamura’s (2013) related work suggests that compared with self-oriented achievement, other-oriented prosocial action has an even stronger relationship to pride in both family life and work life. Therefore, no matter whether it is triggered by self-oriented task accomplishment or other-oriented altruistic activities, pride functions as both a “barometer” and “motivator” (McCullough et al. 2001) in assessing, regulating, and encouraging one’s behavior toward being “good, competent, and virtuous” (Haidt 2003, p. 860).

Short-Term Versus Long-Term

Pride derived from subjective histories of success may promote eagerness towards new anticipatory goals (Katzenbach 2003b). This promotion-related eagerness may energize and enhance performance (Higgins et al. 2001) and thus renew the experience of pride. As such, pride can transition from a temporary emotional experience towards a durable attitude of pride. According to the timespans of user experience (Roto et al. 2011), a new challenging goal may evoke an anticipatory pride for a person with a subjective history of success (Higgins et al. 2001); incremental progress in problem solving may elicit a momentary pride; when reflecting on an overcome challenge, a person may feel an episodic pride in the achievement. These performance-related types of pride are

short-term, event-specific, and ascribed to internal attributes, such as ability or effort (Weiner 1985). Additionally, another kind of long-term and cognitive attitudinal pride exists in organizational studies, which does not rely on single events, but cumulative experience related to the overall evaluation of a target (Gouthier and Rhein 2011), such as being proud of one's community.

Pride Experience at Work

Pride is one of the most intense experiences in work life (Katzenbach 2003b), and work itself is a source of pride (Hodson 1998). Katzenbach (2003b) distinguishes institution-building pride which is based on largely intangible value and collective interest from self-serving pride which is driven by power and materialism.

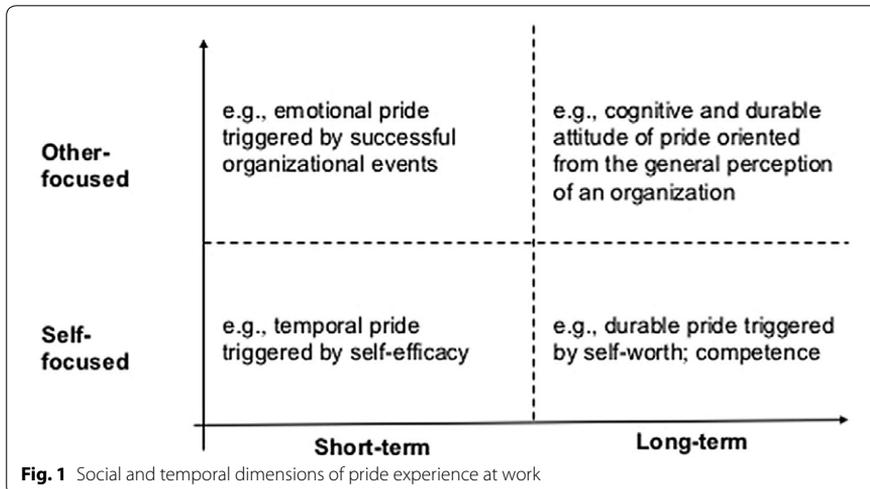
Employees can take intrinsic pride in what they make, how they work, and whom they work with (Katzenbach 2003b). Experience of pride in achievement can be empathized by others in social interaction at work and thereby contribute to psychological empowerment and promote future successes (Froman 2010). Katzenbach (2003b) introduces a powerful "closed loop of energy" derived from pride: better performance contributes to business success, and recognized business success instills a strong feeling of pride, which fuels future better performance. This cycle can be repeatedly applied in organizational management.

Gouthier and Rhein (2011) discern two types of organizational pride: one is an emotional pride triggered by successful organizational events, and the other is a cognitive and durable attitude of pride oriented from the general perception of the organization and employees' sense of belonging to the organization (Lea and Webley 1997). On this matter, the celebration of successful events, presence of a successful company history and culture, and successful advertising campaigns have been identified as activators of organizational pride (Gouthier and Rhein 2011).

In summary, pride experience can be derived from self-focused achievement and other-focused interpersonal interaction. The richness of pride also lies in covering a timespan from a temporary emotion to a durable attitude. Pride can be intensively experienced in the workplace, and intrinsic pride can be evoked by organizational celebration and reputation. From the psychology and organizational management literature review, two dimensions of pride were identified relevant for design: social dimension from self-focused to other-focused and temporal dimension from short-term to long-term (Fig. 1).

Design for Pride Experience

Recently, design researchers have started to explore how design can contribute to pride experience. Desmet (2012) introduced pride among the 25 positive emotions in the scope of human-product interactions: pride may be evoked by owning a unique product, being able to use a complex product, achieving something a product facilitates, or receiving positive feedback from others concerning the product one owns. Based on Desmet's work, Yoon et al. (2013) developed a tool to facilitate emotional granularity in design and specified that pride may be triggered by "one's praiseworthy behavior surpassing internal and external standard, and/or one recognizes that others appreciate it"



(ibid., p.8). Compared with the two dimensions of pride (Fig. 1), pride as a collective experience in social interaction (Battarbee and Koskinen 2005) and the long-term cumulative experience has not yet been fully addressed in existing experience design theories.

One example of positive design for pride given by Desmet and Pohlmeier (2013) is a designed social interactive activity in which patients with dementia can match record pieces in order to play music from their past on a turntable with others; thus, a feeling of pride may arise from task completion within the social interaction. Moreover, two cases of work tool design for meaningful experience at work (Lu and Roto 2015) indicate that employees may feel proud of mastering a tool and being part of an organization; meanwhile, customers may experience pride when they make a right decision on a tool purchase and present manufactured tools to their clients. These design examples suggest how designers shape the conditions that may evoke a pride experience in a specific context. These cases reveal different strategies of designing for dynamics of pride. On one hand, those theoretical sources of pride, such as achievement, competence, owning something special, and positive appraisal from self and others, are clearly embodied in these three cases. On the other hand, when referring to a pride experience in a specific context, designers seem to employ specific context-adapted design strategies, such as utilizing the positive relationship between personalized music and a patient with dementia, developing the employee's perceptions of organizational reputation, and highlighting one's contribution of a right decision to an organization.

Because the nature of design knowledge is highly applicable and practice-driven (Cross 2001), besides the theoretical perspective, it is meaningful to examine how different types of pride were designed for in the concrete cases. This study aims to help designers to discover profound and unique sources of pride experience in the specific context of the workplace. The design-for-pride strategies employed by the collected cases will be identified and analyzed against the theoretical dimensions of pride (Fig. 1).

Methods

This study falls under research for design category of design research, since the main aim of this work is to improve design practice (Frayling 1993). In line with Zimmerman et al. (2010), this research for design activity yields to a framework and design recommendations that help designers in their work. Besides a literature review, the research data is also derived from empirical design studies. The specific design approach under study is experience design, in which experience goals are the key prerequisite for design activity and defined in the early stage of the design process. Experience goals drive the whole design process and evolve into the designed artifacts that may evoke the targeted experience (Lu and Roto 2015). Thus, this study proposes that the design strategies for shaping a certain experience can be distilled from the argumentation of the experience goal realization in the design concepts. According to the premise of experience design, any kind of design that best fulfills the experience goals can be the design outcome. In the workplace context, specifically, this may mean a tool, service, space, or even an event.

The authors of this paper studied the reports of 20 experience design cases that were conducted in collaboration with masters-level design students and seven companies in the metal and engineering industry from 2012 to 2015. The given design briefs from the different companies share the same high-level goal to design for meaningful experience at work in heavy industry. The differences among the 20 assignments lie in the design contexts varying from heavy machine operation (e.g., crane remote control, tugboat console, control room of automation system) to the peripheral touchpoints for different stakeholders involved in the industrial system (e.g., a mobile application for factory automation customers, a mobile sales application for ship components, a mobile crane monitoring application).

In the beginning of the design course, experience design approaches were taught to the students by at least one of the authors. Design teams were then comprised of two to three master students who worked full time on a two-month design assignment from one company. Each company assignment was tackled by one team of students. All the teams underwent the following design process: familiarizing oneself with the target context and users, defining a set of profound experience goals, deriving concepts from the determined goals, and finally evaluating design concepts against these goals with relevant stakeholders. Most teams produced two design concepts: one called 'incremental' to address the company's current needs, and another called 'radical,' which was supposed to radically improve the user experience and show what experience design could mean without limitations for the outcome. The students defined the experience goals based on different sources (Kaasinen et al. 2015), and they had the freedom to set up goals that would fit their case briefs. In each case, experience goals were formatted into a word or a short phrase for convenient communication among different stakeholders. There was no special rule with regard to how many experience goals the students should define, whereas the relations between a set of experience goals were expected for clarification. Involved throughout the whole design process, the company personnel were available for providing information and comments. At least one of the authors followed these cases by arranging weekly meetings with the design teams and reading their design diaries. The students were not given special guidance for designing for pride, as pride was not a presumed design goal in any of the assignments. Rather, the students were trained

to identify multiple profound experience goals for the targeted workplace contexts. Only after a majority of cases ended up pride-related experience goals, the authors got interested in a deeper study of pride experience at work. Hence the analysis of the design cases was retrospective and the final reports of the student teams served as the primary data source for this part of the research.

Four Design Case Examples

The design case description can provide better understanding of the experience design in the industrial workplace context. Due to the limited length of this article, this section will shortly describe four example cases that tackled pride from different perspectives.

The customer for the first experience design case was Kemppi, a manufacturer of welding machines. The task was to design a mobile application with which people (e.g. welding students) could train their welding skills with welding without the actual welding equipment, but rather with the help of a welding simulator game. The design students drew three experience goals: Pleasure (the joy of welding), Self-motivation (willingness to practice constantly), and Pride (about their skills, the results, and the welding itself). The Pleasure goal was tackled by gamification features; Self-motivation by sharing and communicating the progress; and Pride by a physical certificate after completing all levels of training (Fig. 2). The incremental concept was a mobile application as suggested in the assignment, and the radical concept focused on the best possible pride experience by inviting selected application users to showcase their real-life welding skills in an event similar to an art exhibition.

Another kind of experience design case was completed for Konecranes, focusing on the maintenance services of cranes at waste-to-energy plants. After studying the employees at the plant, the students set goals for the crane maintenance service experience. Of the three goals, two were related to the pride experience: Worthiness (an affirmation of their importance as a customer) and Belongingness (a meaningful relationship with Konecranes employees). The radical concept is called Mood sphere, consisting of a light ball at the plant and an identity badge for each employee. Both the badge and the ball show the status of the crane and the related Konecranes service. The crane operators can interact with the ball to communicate their feelings about the crane and its service (Fig. 3).

In the third case, students were asked to redesign a tugboat steering simulator for Rolls-Royce Marine. The objective was to create a quality experience both for the



Fig. 2 A physical certificate was designed to enhance pride after completing welding training



Fig. 3 A light ball communicates the status of a crane to the crane operator, and the operator can send emotional messages to Konecranes service by interacting with the ball

salesperson demonstrating the steering properties with different thruster options and for the customer wanting to see its functionality. The task for the students was focused on the physical design of the simulator, consisting of two big joystick devices and a display. The practical goal was to enable a portable system. The experience goals were derived with the salesperson's experience in mind, since the salesperson is the primary user of the simulator. The students utilized the metaphor of Q from the James Bond movies and set three experience goals that all were related to the experience of pride: Sense of directing (directing the situation by suggesting possible solutions), Expertise (presenting oneself as a professional, technical expert), and Pride (proudly representing the company). The design strategy to fulfill the Sense of directing goal was to boost the feeling of control; Expertise goal by using impressive technology; and Pride by drawing attention with a novel way of presentation. The radical solution proposed by the students was a simulator vehicle, similar to a Segway, with the steering joysticks mounted on it (Fig. 4).

The last experience design task reported here was assigned by a factory automation company, Fastems, who wanted to extend their training center into a visitor space. In this case, the company already had defined company-wide experience goals (Roto et al.

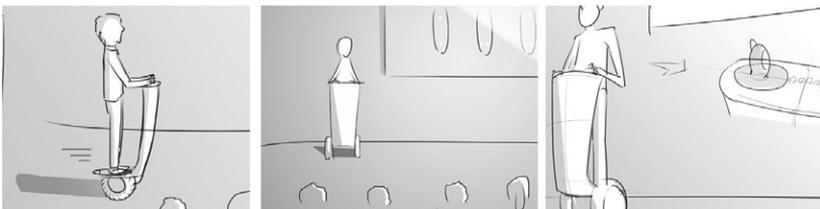


Fig. 4 A salesperson presenting in front of an audience by driving a tugboat steering simulator

2015) for experience development projects, from which the students derived four experience goals for this specific case. One of these was Participation for pride, which aims to foster a pride experience in customers by being able to influence the development activities at Fastems. In addition to the physical space design in the center of the factory activities, students proposed an interactive table as a collaboration platform in the space (Fig. 5).

Selecting Pride-Related Experience Goals

To decide whether a case is an endeavor for evoking a pride experience at work, the authors analyzed the final reports of all student teams, and examined the description of each experience goal setting and its infusion into a design concept. Compared to the existing guidance on designing for pride, this study adopted a broader and deeper understanding of pride based on the literature study. Besides the experience goals literally labeled with “pride,” those having the potential to elicit pride experience were also taken into account as pride-related experience goals and their relevance to pride is indicated in Table 1. The researchers interpreted the implication of these goals situated in the design context rather than their original meaning. For example, in the Kemppi case introduced above, pride as a long-term experience is based on a momentary pleasurable pride and episodic evaluative pride in self-motivation and thus Pleasure and Self-motivation are grouped into pride-related experience goals. On the other hand, if the experience goals and their embodiment in the final concepts both have little connection with pride, then these goals are excluded in this study.

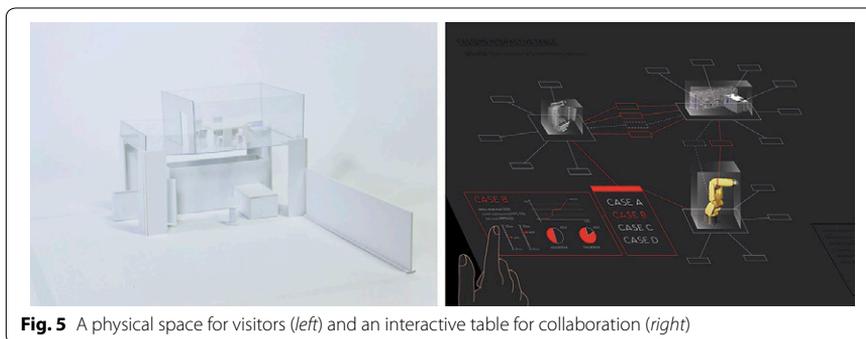


Fig. 5 A physical space for visitors (*left*) and an interactive table for collaboration (*right*)

Table 1 The experience goals with high relevance to pride

Pride-related experience goals	References
Sense of directing, expertise, excellence, competence, empowering, confidence, appreciation, usefulness, achievement, pleasure	Pride as a reaction to experiencing ‘mastery and achievement’ (e.g., Tracy and Robins 2007b)
Worthiness, self-esteem, self-actualization, self-motivation, being in a spot light, ambition	Pride highly relates to a person’s self-evaluation and self-respect (e.g., Tracy and Robins 2007a)
Engagement, connectivity, communication	Pride elicited by prosocial conduct or action benefiting others (e.g., Nakamura 2013)
Belongingness	Pride evoked by being part of an organization or organizational events (e.g., Gouthier and Rhein 2011)

In these 20 design cases, altogether 61 experience goals were identified and more than half (33) of them were pride-related. Meanwhile, only two cases out of 20 have little connection with pride: one stressed Discovery as an experience in taking an elevator; the other focused on a Trust experience evoked by the designed cover for an expensive ship component placed outside.

Analyzing Pride-Related Experience Goals Against Two Dimensions of Pride

Each goal was then postulated to fall into the category either long-term or short-term experience. Two researchers (the authors) conducted the goal categorization independently, resulting to an inter-rater agreement of 87.88 %. Consensus was reached by discussion. These pride-related experience goals were also categorized along the self-focus or other-focus dimension. The inter-rater agreement in this case was 72.73 %, and the consensus was reached by discussion.

Combining the two categorizations, each selected experience goal was supposed to belong to one of these four groups: self-focused short-term pride, self-focused long-term pride, other-focused short-term pride, and other-focused long-term pride. Accordingly, the design strategies used by the students for different types of pride were compared within and across categories.

Results

According to the social dimension, 17 out of 33 pride-related experience goals are self-focused, whereas the remaining 16 goals are other-focused. Along the temporal dimension, 15 out of 33 pride-related experience goals are short-term, and the rest are long-term. The experience goals for self-focus short-term pride and other-focus long-term pride both take one-third of all the pride-related experience goals whereas other-focus short-term pride was the least designed for.

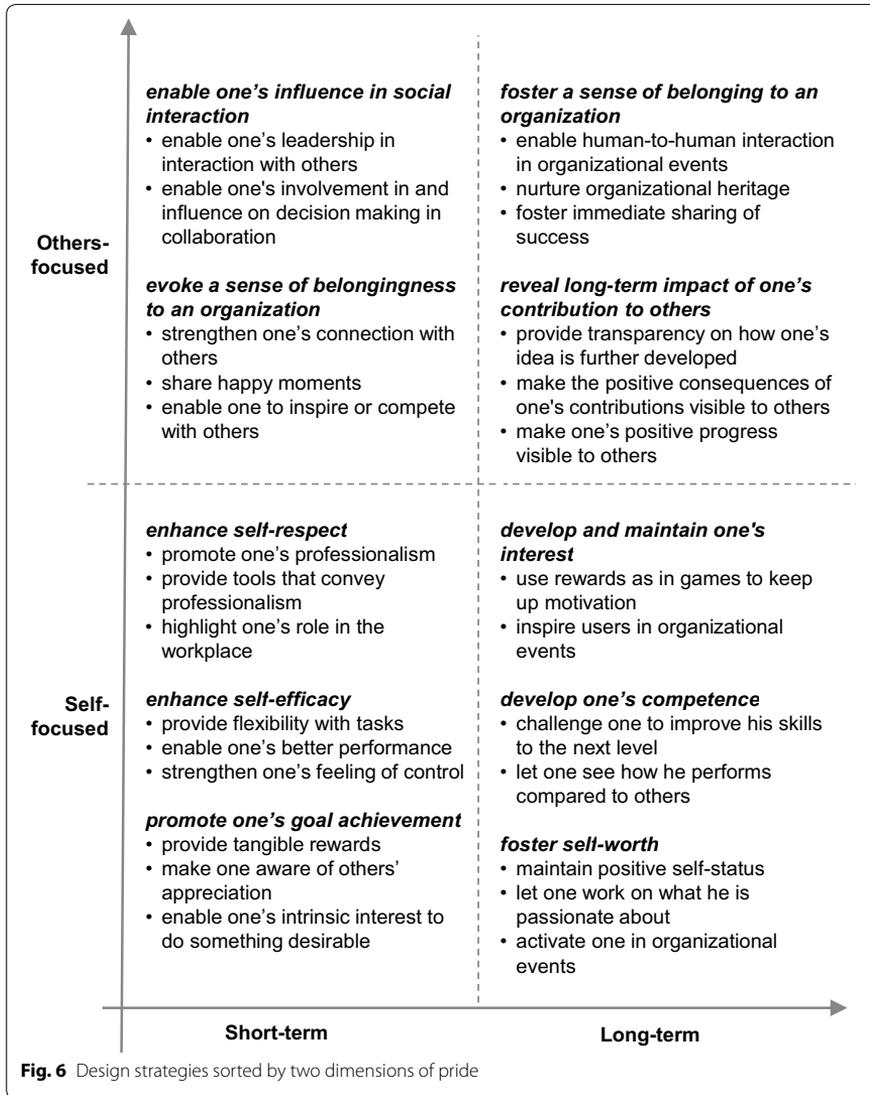
As shown in Fig. 6, different design strategies are summarized and grouped along the social and temporal dimensions of pride.

Design for Self-Focus Short-Term Pride

10 out of the 33 pride-related experience goals are both self-focus and short-term. The design strategies are distilled into three aspects: enhancing self-respect, enhancing self-efficacy, and promoting one's goal achievement.

Enhancing Self-Respect

Three experience goals indicate that enhancing the feeling of self-respect is a pathway to pride experience. Thus, providing users with a distinctive interactive tool or workspace and strengthening their unique expertise may increase self-awareness of users' own professionalism, which leads to self-respect enhancement. For instance, in the Rolls-Royce Marine case introduced above, the salesperson drives in front of the customers a special and attractive vehicle that demonstrates the same technology in the tugboat steering. This unique way of presentation reflects the professional engineering knowledge of a tugboat salesperson.



Enhancing Self-Efficacy

Five experience goals suggest that evoking the feeling of control, improvement, and autonomy can enable momentary pride experience. For example, providing an overview of all the machines' data may enhance a manager's feeling of control; boosting performances with a new application may enhance a worker's feeling of competence; providing flexible options of the control room layout may enhance an operator's feeling of work autonomy.

Promoting One's Goal Achievement

Two experience goals indicate goal achievement promotion may induce anticipatory pride. For example, rewarding a learner's practice of welding with a tangible certificate and fueling one's intrinsic interest in doing something desirable may be a pathway to pride promotion.

Design for Self-Focus Long-Term Pride

Seven out of the 33 pride-related experience goals are designed for self-focused long-term pride. They stress three aspects: fostering self-worth, developing one's competence, and developing and maintaining one's interest.

Fostering a Sense of Self-Worth

Three goals indicate that activating one in organizational events, letting one work on what one is passionate about, and maintaining a positive self-status may foster self-worth, which would thus result in a durable self-focused pride. For example, in the case of Konecranes, the end users are often invited to a series of organizational events that may increase one's awareness of their own value; making one passionate about one's work may result in self-actualization in a society; maintaining a decent status in a smooth transfer from work to retirement may increase one's self-esteem.

Developing One's Competence

Two goals indicate that challenging one to the next level of skills and letting one see how they perform compared to others may produce a durable and self-focused pride. In the case of Kempppi, the app provides gamification elements and makes the long-term skill improvement visible, which may in turn keep learners practicing through enjoyment of welding and competition with others.

Developing and Maintaining One's Interest

Two goals from two cases indicate that motivating users with rewards as in games and keeping users' inspirations in a series of organizational events may result in self-focus long-term pride. In the case of Kempppi, the app keeps an update of unlocked features to encourage learners onto the next practice level; a company can hold competitions, workshops, and seminars to maintain one's interest and ambition and can thus accumulate one's long-term pride.

Design for Other-Focus Short-Term Pride

Five out of the 33 pride-related experience goals are both other-focus and short-term. They emphasize two aspects: enabling one's influence in social interaction and evoking a sense of belongingness to an organization.

Enabling One's Influence in Social Interaction

Two experience goals indicate that fueling one's leadership in social interaction and revealing one's influence on decision-making may result in other-focused short-term pride. In the Rolls-Royces case introduced above, the special vehicle may guide others' attention and provide a salesperson with a sense of directing, thus facilitate the salesperson's leadership in interacting with the audience. Moreover, enabling the customers' involvement and hence developing awareness of their impact on decision-making may build pride in customers through social interaction.

Evoking a Sense of Belongingness to an Organization

Three experience goals indicate that facilitating a connection with others, sharing happy moments, and stimulating inspiration and appreciation from others may lead to the

feeling of other-focus short-term pride. For example, the output of an interactive system at the entrance of the office may evoke employees' belongingness to a company by worldwide company information dissemination and entertainment activity arrangement. Besides this, organizational events may have the similar impact on stakeholder engagement by stimulating their inspiration.

Design for Other-focus Long-Term Pride

11 out of the 33 experience goals are designed for other-focus long-term pride. These goals focus on two main aspects: fostering a sense of belonging to an organization and revealing long-term impacts of one's contribution to others.

Fostering a Sense of Belonging to an Organization

Six experience goals address the issue that enabling human-to-human interaction in organizational events, nurturing organizational heritage, and fostering immediate sharing of success may instill a sense of belonging to an organization and thus lead to other-focus long-term pride. For example, human-to-human interaction at work provides the feeling of camaraderie, the appreciation between each other, and the historical success of a company, which all contribute to collective pride towards an organization.

Revealing the Long-term Impact of One's Contribution to Others

Five experience goals indicate that other-focused long-term pride can be produced by providing transparency on one's idea development, making the positive consequences of one's contributions visible to others, and making one's positive progress visible to others. For example, the visualization of a process in which one's work is further developed and implemented by others, and the positive confirmation of one's critical decisions for an organization from a long-term perspective may increase one's stable pride evoked by others.

Discussion

Workplace as a social space provides a rich context for stimulation, development, and maintenance of the dynamics of pride. Design for pride in the workplace is a powerful, yet little utilized approach to keeping the closed loop of energy up for a successful business. By cross-cutting theories from psychology and organizational management, this study first introduces the social and temporal dimensions of pride. Based on the theoretical framework of pride, the empirical data from 20 experience design cases reveals contextualized and concrete design strategies for the dynamics of pride experience at work. The design implication drawn from these design strategies is given as follows.

The design strategies for self-focused short-term pride is in line with the sources of pride in human-production interaction (Desmet 2012): self-efficacy enhancement is related to "using the tool induces pride of task performance"; self-respect enhancements matches with "owning the tool induces pride of one's expertise"; and goal achievement promotion fits with "the tool enables results that induces pride of one's task performance". To evoke such pride much depends on a well-designed momentary interaction between tool and user, for example, by measuring and visualizing incremental performance improvement in time.

When moving to a self-focus long-term pride, the design strategies adapt to the long-term effect, such as motivation maintenance, competence development and fostering self-worth. The key to designing for this type of pride is to explore and personalize the individual intrinsic meaning and to hold it longer, which is in line with positive design for personal significance, i.e., not focusing on the momentary effect, but on one's personal goals and aspirations (Desmet and Pohlmeier 2013).

Besides the facilitation of work performance enhancement, interactive tools can also be designed for other-focused short-term pride to assist users' leadership or involvement in momentary social interaction, such as sharing one's ideas by instant prototyping for collaborative discussion. Additionally, seeing others' responses to one's contribution may happen in organizational events, such as competitions, workshops, and seminars. These kinds of events may strengthen one's connection with others, trigger social interaction, and stimulate each other's creativity, in which co-experience of pride can be evoked within an organization.

Other-focused long-term pride is highly related to entrepreneurial spirit and loyalty. Company leaders aim to instill such pride into their employees and customers. The implications from organizational management can enter into design strategy by fostering a sense of belonging to an organization through activities (Gouthier and Rhein 2011). Belongingness is an other-oriented communion, which is about sharing common social identity and strengthening interpersonal connectedness (Rosso et al. 2010). Thus, sharing a positive identity is an important source of the other-focused pride, especially in organizational work contexts. Meanwhile, the visualization of progress and metrics can enable employees to track their own and others' work (Katzenbach 2003b), and thereby reveal the long-term impact of one's contribution to others, which is also a key design strategy for other-focused pride.

These four types of pride apparently connect to each other and work together. For example, one's pride derived from the pleasure of interaction with a work tool may bring out both enjoyment and self-enhancement at work. The pleasurable pride may serve as an intrinsic motivator for long-term good work performance. The visualization of one's positive work results and progress may evoke others' appreciation. In the long run, the collective impacts of everyone's incremental contribution accumulate and sustain organizational success and thereby lead to a durable pride towards one's organization.

In conclusion, this paper identifies two main trends in designing for pride experience in the workplace: designers can uplift their vision from self-focused and achievement-oriented interaction with a tool towards fostering engagement-oriented interaction with people, and from event-based emotional pride in momentary interaction towards a long-term organizational attitude of pride. Meanwhile, the role of a tool becomes that of an interactive facilitator for co-experience of pride in activities rather than the passive means of task completion.

This study opens the discussion that experience design researchers need to study external knowledge in order to broaden the understanding of targeted experience, associate multiple dimensions of such experience with the design context, and then transfer the constructed knowledge into experience design strategy for concept generation.

Limitation and Future Development

This study is a primary exploration on how to design for a specific positive experience in a targeted context. From the study approach perspective, the design strategies distilled from the triangulation between theories and empirical data were born with considerable validity which lies in the traceable evidences from available knowledge and concrete design cases. On the other hand, however, the predefined four-type-pride framework might limit the variety of the strategies, because there might be valuable special strategies that could be excluded by the scope of this framework. This limitation reflects that it could be a danger if designers overly rely on the available strategies and thus they might be restricted by the structured framework. In this sense, these identified patterns should serve more for understanding, inspiring and framing new themes, instead of fixing designers' mindset.

From the data perspective, it is based on the collection of 20 student design cases in one design department from 2012 to 2015, which determines the specificity and limitation of this study. The interference between different design teams and the bias influenced by the earlier cases may be hardly avoided in the design process, which may lead to limitations of experience goal setting and idea generation. Although the fresh eyes of students may generate novel ideas and explore new possibilities, their limited breadth of mature design experience for the workplace may also result in some shallow design concepts. Moreover, a 2-month project can hardly include a long-term evaluation of design results.

From the finding validity perspective, the pride experience design strategies were presented as backup tools in the latest course but without guiding the students to use them. Compared with previous cases, pride was defined more towards durable pride and organizational pride in the recent cases. More importantly, inspired by these cases, the companies have gradually changed their mindset from focusing on usability towards prioritizing experience, and have recognized pride can be designed from not only interaction quality in task but also organizational impact. This impact was manifested in the industrial seminar when two companies presented and referred the student cases as their new path to experience design innovation. At least one design-for-pride case was implemented entirely from the students' concepts, and got positive feedback from the company's clients.

Future studies will focus on at least three directions. First, it is worth adding case diversity to the data collection: cases from different programs in different research institutes or companies are needed for both qualitative and quantitative studies to assess whether the two dimensions of design for pride can be applied to a large number of design cases. Second, there is a definite need to trace the real implementation of certain strategies in the client companies to identify the long-term impact on both workers' subjective well-being and business development. Third, it is also meaningful to observe designing for pride in other domains and to identify what kind of strategies are common patterns and to what degree the differences of contexts lead to the specificity of design strategies.

Authors' contributions

YL did the literature review. Both YL and VR set up the experience design courses, collected the design cases, analysed the data, developed the framework and wrote the manuscript together. Both authors read and approved the final manuscript.

Competing interests

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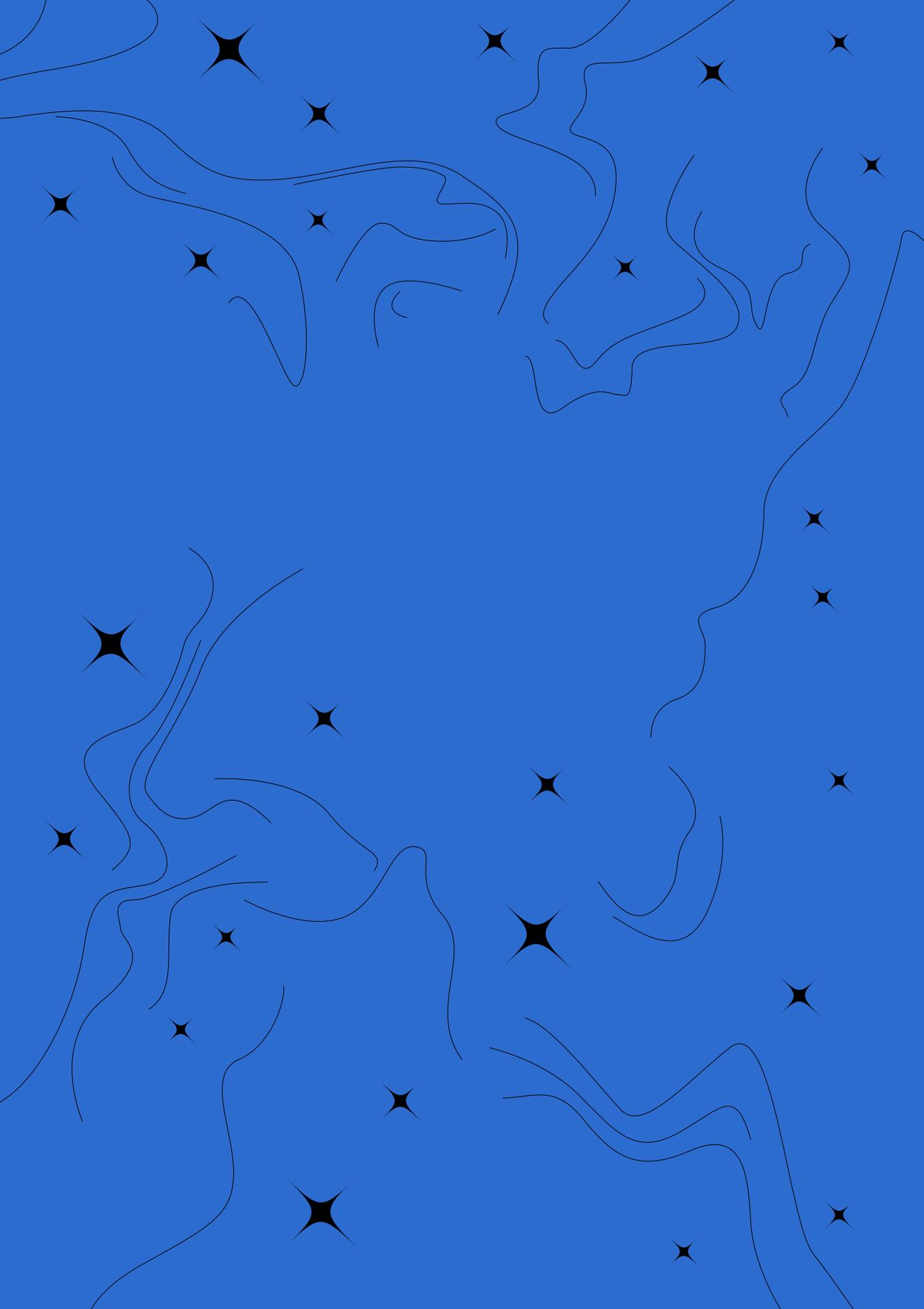
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PAPER 4.

Lu, Yichen, and Virpi Roto. (n.d.). "Experience goal as a designerly instrument to guide experience-focused design." *International Journal of Design*. (submitted).

Experience goal as a designerly instrument to guide experience-focused design

Experience-focused design deliberates to prioritise experiential objectives over functionality and technological requirements and to enable a possibility-driven design approach. However, the elusive and complex nature of experience makes it challenging for design practice to remain focused on the experiential goals while following a design journey. Consequently, this article addresses this challenge and analyses an experience goal as a designerly instrument that aims to provide more weight to the intended experience in the different phases of the design practice. This article reports the results of the interviews with eight experience-focused design researchers who provided insights and suggestions on experience goal setting and utilisation with regards to creative design practices. The findings indicate that an experience goal has three facets acting as a springboard for radical ideas, a guide in the design process, and an illuminator of unexplored design space. The findings shed light on why and how an experience goal can be employed as a generative, reflective, and communicative tool for creative design.

Keywords - Designerly Instrument, Experience-Focused Design, Experience Goal.

Relevance to Design Practice –The identified functions of experience goals help design practitioners to understand the benefits of prioritising experiential objectives in creative design practices and to exploit the full potential of experience goals for design generation, reflection, and communication.

Introduction

Design is generally regarded as a set of creative human activities or artefacts produced in these activities. Specifically, Reymen defines designing as “the activity of transforming the state of the product being designed or of the design process into another state towards the design goal,” in contrast to a design as “a representation of the state of the product being designed” (Reymen, 2001, p. 46). Likewise, many studies investigate designing as a process of, e.g., exploration, learning, reasoning, making decisions, solving problems, creating possibilities, and transforming situations. Each of these different theories on designing, however, share the viewpoint that designing is a goal-oriented process (Friedman, 2003; Simon, 1996). Indeed, purpose and planning toward desired outcomes are at the core of designing (Friedman & Stolterman, 2015).

Design goals are the focus of the design process and design content. On this point, Erbuomwan, Sivaloganathan, & Jebb (1996) define design goals as the purposes for design actions and decisions taken in each design step. Design goals are commonly not explicit in the beginning, and they can evolve through conceiving, planning, and making in a design process (Buchanan, 2001). In turn, the progressive goals guide the situated choice of design activities and push forward design progress (Mostow, 1985). Regardless of the goal-related issues, i.e., how to handle interaction between

different goals in a design process (ibid.), discerning desirable goals, and creating conditions to reach them are primarily demanded for the success of design (Friedman, 2003).

It is a common challenge for designers to maintain a balance between radical openness and goal-directedness in the goal transformation from the abstract and vague into the concrete and explicit. As such, Dorst (2015) points out “an essential part of the design process is making educated guesses when proposing solutions,” but “design ultimately needs to be rigorous in its approach if it is to deliver results for the real world” (p. 43). According to the theses of Dorst (1997), to maintain this balance addresses a *method* in designers’ *madness* (Cross, 1996) and it implies two fundamentally different paradigms of design methodology. Respectively, the *method* refers to the paradigm of goal-directed rational problem solving, whereas the *madness* can be explained by the paradigm of reflective “knowing-in-action” practice (Schön, 1983).

Design goals play a significant role in choosing and utilising design methods. Three major intellectual waves identified in the past 50 years of design research (Rodgers & Yee, 2016) indicate that various approaches to design goal setting and utilisation in different design practices. The first wave of design research was aimed at the logical consistency of the design process and explored many linear, step-by-step models that originated from the scientific techniques and approaches to traditional problem solving, management, and operational research in the 1950s (Bayazit, 2004; Cross, 2001). Therefore, the first-generation design methods suggest that design goals are equivalent to specific requirements and should be clarified at the starting point of a design process.

Two notable streams emerged out of the second wave of design research that dates from the 1970s (Feast, 2015; Rodgers & Yee, 2016). One follows Schön’s depiction of design as a reflective conversation with the situation, where “design knowledge is knowing in action, revealed in and by actual designing” (Schön, 1992, p. 3). The other stream corresponds to Rittel’s consideration of designing as an argumentative process that is driven by debate among participants (Rittel, 1984). The second-generation design methods, hence, reveal that design goals should be engaged with both individual cognition and collaborative intelligence and that these goals develop with the designers’ growing knowledge of design issues.

The third wave of design research moves away from positivistic models and scientific approaches, acknowledges design as a distinct discipline, and contributes to “designerly ways of knowing” (Cross, 2001; Rodgers & Yee, 2016). Facing contemporary global issues, state-of-the-art design adopts a wide range of conceptual, methodological, technological, and theoretical approaches in various forms (Rodgers & Yee, 2016). The third-generation design methods imply a plural and balanced view on setting design goals that can facilitate a creative and transformative intervention for a meaningful life.

This article follows the third wave of design research and concentrates on goal setting and utilisation in designing for meaningful experiences. Recently, new design approaches that centralise experience in the design process and outcome have been investigated, including among others, experience-based design (Bate & Robert, 2007), experience-centred design (Wright & McCarthy, 2010), experience design (Hassenzahl, 2010), experience-driven design (Desmet & Schifferstein,

2011), positive design (Desmet & Pohlmeier, 2013), and design for profound experiences (Jensen, 2014). Consequently, this article utilises the term *experience-focused design* (XFD) to refer to these design approaches, all of which aim to shift the focus of design from utilitarian functions to the experiential aspects. This article sheds light on how XFD employs an *experience goal* (Xgoal) as a conceptual tool to explore goal setting and realisation. Therefore, the research question is *what are the possible functions of Xgoals in creative XFD practice?*

The existing studies of XFD approaches stress the significance of experiences as design outcome and highlight the priority of experiential objectives over technical and functional requirements in design practices. Xgoal setting and Xgoal utilisation have been studied as a promising technique for collaborative design to guide the design process and to hold different stakeholders' attention to the experiential aspects of the design outcome (Kaasinen et al., 2015; Roto et al., 2017). However, few of these studies articulate well why and how experiential objectives influence a creative design progress. In other words, it remains unclear how Xgoals might work in an actual design process. This article aims to motivate and preview a framework for understanding the function of Xgoals in the different phases of the XFD.

In this article, we first introduce experiences as the prioritised design goals. Second, we conceptualise approaches to designing for experiences into two steps: Xgoal setting and Xgoal realisation. Third, we present the study of the interviews with eight design researchers on the possible functions of Xgoals in design practice. Fourth, we uncover why and how Xgoals can serve as a designerly instrument to guide XFD. Finally, we point out possible directions for future studies on Xgoals.

Experience as the prioritised design goal

The value of experience with regards to design first attracted marketing studies in terms of customer experience and brand experience, e.g., how to get customers to sense, feel, think, act, and relate to a company and brand (Holbrook & Hirschman, 1982; Schmitt, 2000). Pine & Gilmore (1998) recognise compelling experiences as a competitive offering for connecting customers, consumers, and employees, and also for securing their loyalty. Companies have started to utilise designerly approaches to develop consistent expressions of their brands through the customer experiences of the multiple touchpoints (Suri, 2003).

The emergence of user experience in computer interactions echoed the experience economy (Pine & Gilmore, 1998). Experience has been the keyword in the third wave of human-computer interaction (HCI) research after the first wave of designing for human factors and the second of designing for human actors (Bødker, 2006; 2015). The focus on experience has been recognised as a new design perspective and new design content in interaction design practice, which changes the task-oriented and problem-solving approach in traditional HCI (e.g., Preece, Sharp & Rogers, 2015).

From a psychological perspective, Hassenzahl (2010; 2013) identifies key reasons to consider experience as a design objective. First, experiences make people happier than material possessions, because experiences are closer to the Self and can be positively reinterpreted as retrospective

summaries of the past (Van Boven & Gilovich, 2003). Second, experiences provide meaning to actions and situations, and thereby motivate future activities (Hassenzahl, 2010; 2013).

Recently, inspired by the theory of positive psychology (Seligman & Csikszentmihalyi, 2000), the orientation of design has shifted from preventing pain towards promoting human flourishing (Desmet & Pohlmeier, 2013), from material sufficiency towards experiential value (Pohlmeier, 2012), from utility and usability towards hedonic and eudemonic aspects of use (Mekler & Hornbæk, 2016), from immediate response towards long-term impact (Roto et al., 2011), and from designing solutions towards designing possibilities (Desmet & Hassenzahl, 2012; Jensen, 2014).

From the design approach perspective, conceptually putting people and their experiences at the core of the designers' attention is a simple way for idea organisation and integration (Suri, 2003). The concept of a product to be designed has been expanding towards the full range of domains through the twentieth century: from physical artefacts to any result of creative work (Buchanan, 2009). As such, experience is a common channel to the Four Orders of Design (signs, artefacts, actions, and organisation) (ibid.). The arguments, e.g., "take an intended user experience as the primary objective of a design process" (Hekkert, Mostert, & Stompff, 2003), "think experience before product," concern "designing right things" rather than "designing things right" (Suri, 2003).

To sum up, the studies from marketing, human-computer interaction, and psychology inform designers of the importance of experiences as a new design orientation and uplift the design mission from a utilitarian goal towards an experiential vision.

Experience goal

Experience has been investigated from many perspectives, such as philosophy, anthropology, psychology, and business. However, it remains a complex, elusive but open concept in design research. Earlier work on experience (Hassenzahl, 2010; Law et al., 2009) discusses its crucial properties: it is *subjective* but traceable via the psychological process; it is *holistic* in the integration of perception, action, motivation, and cognition; it is *situated* due to the particularity of place and time; it is *dynamic* and influenced by order and timing. A rigorous definition of experience with regards to design seems difficult to pin down in design literature (e.g., Battarbee, 2004). Thus, this article follows the definition of experience from the Merriam-Webster Dictionary: "something personally encountered, undergone, or lived through."

Notably, this article introduces the *experience goal* (Xgoal) as the intended momentary emotion or the meaningful relationship/bond that a person has with the designed product or service (Lu & Roto, 2014). Xgoal turns intended experience into an articulated and formalised design aim. It not only refers to momentary "experiencing" in operation and action levels from the pragmatic and hedonic perspective but also stresses the long-term experience that addresses in-depth meaning from the eudaimonic perspective (Mekler & Hornbæk, 2016).

Xgoal setting and utilisation have been investigated in designing industrial systems with a focus on how Xgoals are integrated into product development (Kaasinen et al., 2015; Roto et al., 2017), whereas Lu and Roto (2014) focuses on how Xgoals expand the opportunity space within creative

design. In these studies, Xgoal has been employed as a conceptual tool to tackle the two main challenges of XFD: defining what kind of experiences to design for and embodying those experiences into a concrete design concept (Desmet & Schifferstein, 2011). Correspondingly, a simplified procedural design approach is conceptualised into two steps: first to set Xgoals (i.e., understand and articulate aimed experiences) and then to realise the Xgoals (i.e., translate Xgoals into a specific design that may embody or express aimed experiences). Kaasinen et al. (2015) identifies five sources of Xgoal setting, i.e., Brand, Theory, Empathy, Technology, and Vision. Roto et al. (2017) furthermore suggests Xgoals help to structure user studies on experience, maintain an XFD orientation within a design team, and facilitate concept evaluation. From the procedural perspective, the model of Xgoals elicitation process combined with the instructions for communicating Xgoals (Varsaluoma et al., 2015) represents the early contribution to collaborative Xgoal setting.

Results

This section reports the findings from the interviews with the quotes that typify the interviewees' main concerns about Xgoals in the four design activities: background exploration, concept generation, concept evaluation, and concept implementation. Each finding was derived from the comments of two or more interviewees, although only one quote is presented for each finding to save space. The quotes are cited with pseudonyms to protect the interviewees' anonymity and with the numbering marked for coding and categorisation.

Xgoals in the background exploration

Three distinct activities in Xgoal setting emerged from the interviewees' concerns on the background exploration of their design projects: *generate ideas with concise starting points*, *understand the context systematically*, and *derive goals from the designers' initial ideas*.

First, unlike objective and measurable engineering design requirements, Xgoals serve as hooks to elicit the key stakeholders' underlying dreams and concerns:

So it is really good to have something like Mr. Q [metaphor from Bond movies to express how a system could address Pride Xgoal] as a starting point for discussion, because it is a good way to tease out the motivations, hopes and stuff like that...(Max2_3)

To enrich the key stakeholders' imagination, Xgoals need to be concise but meaningful for openness of design vision interpretation:

Vision is abstract... Vision can be interpreted in many ways. So, this is very abstract for me but these things in the interviews become concrete. If they use a metaphor, then you can ask what do you mean by that. Actually, you can dig down to what they actually say, what they have, they would like to, what they miss, they are not sure of. For me, personally, these things can be better as design inspiration, such broad abstract vision. (Tom1_5)

In particular, Xgoals can be directly derived from those stable and meaningful elements, i.e., brand slogan or company values:

How to make a design decision based on ...brand, so if you have the brand experience. Basically, it develops the

approach to take a brand, work with the brand, try to understand the value of the brand, and make it possible to translate the brand into specific touchpoints, basically the interaction between customers and the brand. (Max1_1)

One given exemplary case is designing monitoring systems for the elderly, and it started with the company brand slogan “peace of mind” that functioned as the backbone of the whole project:

That was the only thing absolutely that the investors created in the very beginning... The clients said this is all about peace of mind. (James2_1)

The second feature of Xgoal setting is to employ the component way of service design thinking with a focus on systematic understanding of the design context:

You can always look at pieces of this process and say there are relations from here to all the spots in the processes that all the actors have. Then it is like a component way of thinking. (Peter3_1)

This suggestion extends the initial focus on user to the relationship of multiple actors and from an isolated piece of the process to the entire product-service lifecycle:

If the students have the opportunity to tackle one of the salesmen, they would ask what sort of process these salespersons go through from being asked to pitch the product to the customer to processing the deal basically. (Tom1_8)

Tools, such as customer journey, stakeholder map, and value map, can be utilised for complex system analysis and may support setting Xgoals in a systematic manner (e.g., Tom1_8). Moreover, the agreement among different stakeholders on the criteria of goal selections can be formalised and structured beforehand:

The structure of agreeing on the criteria could be formalised and structured. People from different backgrounds could come up with the criteria, the criteria should lead to a goal, a vision, then you know what is basic for the vision. (Max3_4)

Third, experience visions and goals can be directly derived from the designers’ inspiring ideas. For example, one participant shared the case in which the designers contemplated the project proposal and initialised the experience vision “to feel like a treasure hunt.” Guided by this experience vision, the designers defined several experiential qualities, e.g., curiosity:

This is designer-driven, because it starts with my idea’s vision ‘to feel like a treasure hunt.’ We started with a focal point. That’s a convergence when you are setting goals is framing... They are all prosperous. These thematic objectives, are sort of initial frames... We can see the initial thematic objectives here as sort of a lamp, if we put up a lamp here like this. This is a lamp with fresh light that shows this entire space over here.

The following qualities were extracted from workshop participants’ experiences of Astrid Lindgren’s authorship: Respect for the child; Empathy; Equality; Questioning of authority; Respect for the culture; Respect for nature; Curiosity; Breaking the norms. (Mark1_7)

A high-level experience vision with the derived experiential qualities crystallises the meaning of the design concept and functions as the backbone throughout the whole design project. Tools are available for designers to identify Xgoals from different design aspects. For example, a framework introduced by one interviewee consists of the practical, the communicational, the aesthetic, the

organisational, and the ethical quality dimensions:

I ended with here some kinds of quality responsibility, technology and practical staff, communicational and organisational specific, so things have been done here. And I am talking about how to identify qualities in use in phenomenological analysis. I used phenomenological analysis to identify user Xgoals. Anyhow I do these kinds of the hierarchical means-ends of objective trees for design objectives and user Xgoals. Anyhow, I also have some work in trying to figure out the valuation criteria for quality indicators of interaction design in UX. (Mark1_8)

Another view of design-led Xgoal setting is that designers' new interpretation of the context with initial problems can reframe the design brief.

This is reframing a problem. (George2_1)

Xgoals in concept generation

Four key themes emerge from the eight researchers' insights into Xgoals in the concept generation phase: *dispense contextualised meaning to Xgoals*, *diversify the association with Xgoals*, *evolve Xgoals in an iterative process*, and *balance Xgoals with other objectives*.

The first theme to *dispense contextualised meaning to Xgoals* points out that designers should grasp the specific meaning of these goals in a certain context. Naturally, a set of chosen Xgoals are abstract and vague for designers in the beginning of concept generation:

I would like to start with developing a certain sense of what do these words mean? What sorts of concepts are attached to these words? Personally, these kinds of words are a little bit vague for me to be able to design with. So I would start to bring it down into what kind of project qualities or interaction qualities would they relate to. Experience is sort of an overall thing and how can you translate that into the more specific interaction properties? (Tom3_10)

Designers need to ground the Xgoals into the targeted context with different concept representations, i.e., scenarios, role-playing, and prototypes. These different representations facilitate the designers' accesses to the unexplored space of the contextualised knowledge:

If there is knowledge we are looking for here, I am a designer, I am using different representations and they give me accesses to different parts of this knowledge. (Peter3_2)

The second theme to *diversify the association with Xgoals* argues that Xgoal realisation in the concept generation is not the same as mechanical translation or rational derivation from design objectives in the linear engineering design. Rather, it is a creative association around a set of Xgoals, in which Xgoals can springboard radical ideas:

This high-level idea about being Q and what comes out of that is association, is not translation. There is an association "sense of directing," "expertise" and "pride" with it...If you think this is translation or rational derivation, then it starts or brings out all the questions like "do they really understand Q," "is this really about Q," where there is a fact this is a springboard. It is a scaffold. It's a stage of design thinking then let you get here, and in that sense, you can throw Q away...Open to be wise is to be more open to more UX goals. (George1_1)

Interviewees proposed an Xgoal encyclopedia (George1_5), repository (Max2_2), and toolbox (Tom1_9) for shifting between the different levels of concreteness in the Xgoal realisation:

Maybe you should make a toolbox that helps to shift up and down between different levels of concreteness. You can have this movie which is completely open, or you have the trust in technology, pride in oneself, hard work to achieve profession, ... Then we have something for designers to reflect on that, get them to start thinking what does this or that mean, [...] You need a sort of flexibility in tools as well depending on who you are communicating the UX goals to. (Tom1_9)

The third theme to *evolve Xgoals in an iterative process* recommends that designers should modify and develop Xgoals in the different stages of design, especially in the concept generation. Creative design is an iterative process in which designers constantly reflect on and assess ideas (Lucy3_1). It is inevitable to change goals when new knowledge is introduced and the design space is accordingly reframed:

The only thing I can say is that once you have chosen the Xgoal, you cannot think you are done. You are going to revise them, because something that is in the beginning, it works to be rather abstracted but in the end, it was extremely specific. So you kind to have to change them and revise them in the different stages of the process. (Mark3_1)

The last theme to *balance Xgoals with other goals* is concerned with the danger of overly emphasising experience-centred, or anything-centred design. This danger might narrow the designers' view to a certain issue in the very early stage of design and thus risk losing sight of the broader picture:

If you have ever anything-centred design, it's going to make mistakes, whether it is experience-centred, customer-centred, user-centred, human-centred, sustainability-centred, you are basically saying the whole of the design falls down to gain one thing right. (George3_4)

The need for accommodating multiple perspectives is visible particularly in collaborative multidisciplinary design projects:

The design goals sometimes have to compromise that thing you might want to do [...] the best design goals come to where not necessarily everybody's happy but which potentially bring the best and most useful outcomes and which might be in a social or business sense but also in the research context. (Lucy4_1)

In any piece of experience design work, there should be a balance between the importance of experience and outcomes. According to the three-level hierarchy of goals (Hassenzahl, 2010), experience design saliently uplifts be-goals over do-goals and motor-goals. However, designers should be prevented from overly focusing on be-goals and forgetting about other goals:

Outcome always matters. And I think my key position is that in any piece of design work there the balance between the importance of experience and outcomes differs. [...] So the balance between being and doing is different on every design project and to what the user experience movement has done is to emphasise the be-goals. But not to emphasise them so much that we forget about the do goals and a lot of time in design it's the do goals that make the real difference not the be goals. (George2_4)

Xgoals in concept evaluation

Three themes related to Xgoals in concept evaluation emerge from the comments of the eight researchers: *create access to realistic experiences*, *keep concepts open*, and *adjust evaluation criteria*. First, Xgoals are suggested to dispense experiential elements into different types of representations for concept demonstration and evaluation. *Different types of design representations* can facilitate concept demonstration and even stimulate idea generation in the meantime:

Representation is one way to show what would happen and it is one way to show the vision, it is one way to test the vision, it is a new way to get new ideas about what they should do or what they should not do, what the participants want out of the experience. So, if you enrol salespeople in this role play, they would be able to say exactly what they want and how and why they want to be based on actually experiencing the situation or acknowledging it at least. (Max4_1)

Prototype tests in the wild and in everyday situations are a good resource to analyse how people intuitively interact with a prototype:

We will build the prototype and then we will test it in the wild so at an exhibition or we will tackle it at a conference or in a more everyday situation to see how people respond, and if they interact or not. (Lucyl_3)

Doing or imagining, i.e., roleplay, is recommended as one effective way to get access to the embodied experience:

Doing is supposed to be the best way to understand the experience. The next best thing is to have people imagining they are doing it, which is maybe more feasible at some point sometimes. (Max4_2)

In contrast, some concept representations can hardly provide easy access to real experiences, e.g., a blueprint lacks the experiential aspects of real life which are essential to bring people into the targeted situation:

You get access to that through the representations. Some of them, like blueprints, lack access, do not give us any real access to understanding what experience of demonstrating this engine thing is. (Peter3_3)

Second, the interview data strongly suggests to *keep concepts open*. Rather than selecting one concept with high overall scores, designers are suggested to keep several concepts open in the meantime and make sure they are as diverse as possible. Different concepts can inform designers as to which aspects of the problem-solution space they have worked on:

One way is to still keep the set of the concepts open. [...] Think separately, instead of picking one, pick several and make sure they are different. Then you know you are working on different aspects, understanding right now what you have of the solution/problem space. So if you start to cut away stuff, it will be difficult to go back to that space, if you realise that space you chose was wrong. (Peter3_4)

Third, there is not necessarily a straightforward relationship between Xgoals and evaluation measures, and there is the potential to confuse the two:

It is not a necessarily straightforward relationship between creating the goals and measures. I think there is a potential mistake here in confusing evaluation measures with design goals. (George3_5)

When designers' understanding of the targeted context matures, design goals, concepts, and evaluation criteria evolve hand in hand in an iterative process. In that sense, *evaluation criteria need to be adjusted* according to the increased design knowledge of the targeted context.

There was a stage of revising and some new criteria [...] since the design team had a better understanding of this situation. (Mark1_3)

Xgoals in concept implementation

The interview data suggests that Xgoals may potentially improve the communication between concept designers and concept implementers in three different aspects: *evoke empathy*, *facilitate knowledge transfer*, and *develop design requirements respectively*. First, it is a key task for concept designers to help concept implementers build empathic understanding of Xgoals with concept representations, i.e., personas, videos, scenarios, or prototypes:

One story and video where the product does not meet an experienced goal and another story and video where the product does meet an Xgoal so they can get a feeling for what the experience is like with and without that. It will help them understand what kind of experience they are trying to evoke in the design. [...] You need to get them to feel it, not just think about it. (Elena4_2)

Building empathy is important because concept implementers, i.e., programmers, developers, or engineers, need to see functions and interaction properties from those concept representations:

Regardless of what I present to my programmers or developers, they think in terms of functionality. I compensated for these things and managed to create empathy, with storyboard, with scenarios. If they cannot see the functionality, it does not carry anything to them. (Mark4_4)

Second, when dealing with the concept implementers, it requires designers to quickly adapt to the implementers' way of thinking and *translate Xgoals into implementers' language*, e.g., to transform pride into a use case, task flow, product specifications, and requirements:

To build something, what do I do with pride [...]? That does not make sense to the developers. So, we need to transform pride into product specifications and requirements in order to make sense in that context. (Mark4_1)

One method to concretise the Xgoals for implementers is that utilised in object-oriented programming: a user story with adjectives and adverbs communicating the sources for aimed user experiences:

Regardless of what I present before we started to work, for instance, we highlight all these nouns, every noun is a potential object in a system, and a verb is potential function. [...] Adjectives and adverbs, they are actually user experience cause. (Mark4_4)

Third, based on the understanding of Xgoals, concept implementers need to *create and refine their own set of operational design requirements*. In this context, scenarios are not necessarily fixed in every detail; rather it should be flexible for concept implementers to take over scenarios and creatively develop them further with their professional tools. Not only concept designers but also concept implementers desire for their own contribution and authorship of a project. For example, when graphic designers' understanding of Xgoals becomes in line with that of concept designers,

graphic designers should be encouraged to develop colour schemes with professional techniques, i.e., mood boards:

Because she is a graphic designer, these keywords [design drivers] are not enough to help her to find a graphical profile. What she did was to take each keyword and she did brainstorming and word association around each one of them, created word clouds. So she got a new word cloud with associated words around each of the keywords. Then she did an image search on Google for all of these words. She took all of the images and created a mood board based on that. This mood board helped her to create an image reader and a theme and a colour scheme.

She needed to revise and create her own set of criteria that are meaningful to her, compared to other ones. So we should not think these necessary standards that we created are meaningful for the system developers. (Mark1_14, Mark4_5)

In summary, the findings of the eight researcher interviews indicate the potential functions of the Xgoals in the different design activities. In background exploration, Xgoals provide inspiration sources from different angles and frame the initial design space. Furthermore, Xgoal setting may facilitate a broad but systematic understanding of the design context. In concept generation, Xgoals diversify and guide the designers' association, and derive concepts that are grounded in the targeted context. Xgoals with different concept representations create various channels to real experiences. In concept evaluation, concepts remain open and evaluation criteria are refined following the designers' matured understanding of the targeted context. In concept implementation, Xgoals help implementers develop empathic understanding and facilitate experiential knowledge transfer between multiple stakeholders and across disciplinary boundaries.

Discussion

In this section, we first discuss three important facets of Xgoals identified from the findings of the interview study. Second, we suggest possible functions of Xgoals for creative design.

Three facets of Xgoals

The themes distilled from interview data suggest two critical facets of Xgoals in different design activities: *represent experiential aspects of design* and *reframe considered design space*. Table 1 illustrates how the emerged interview themes map to the representing and reframing facets. Additionally, the earlier work has discussed the core facet of Xgoals, i.e., directing the design process.

Table 1. Xgoals in different design activities.

<i>Facets</i>	<i>Background Exploration</i>	<i>Concept Generation</i>	<i>Concept Evaluation</i>	<i>Concept Implementation</i>
Re-Presenting	Generate ideas with concise starting points Understand the design context systematically	Diversify association with Xgoals Evolve Xgoals in an iterative process	Create possibilities for real experiences Keep concepts open	Evoke empathy Facilitate knowledge transfer
Re-Framing	Derive goals from designers' creative ideas	Balance Xgoals with other objectives Dispense contextualised meaning to Xgoals	Adjust evaluation criteria	Develop design requirements respectively
Directing	Xgoals as guides throughout an iterative design process			

Represent experiential aspects of design

Xgoals with associated design artefacts present and represent key experiential information throughout an iterative design process. In the early phase of design, Xgoals as the generative starting points drive creative imagination to divergent directions. Xgoals can be easily adapted to various types of design representations, i.e., a metaphor, a set of emotional vocabularies, a structured experience sheet, a persona, a prototype, and a scenario. The more design representations express the experiential aspects of design, the more channels access the unexplored design space, and the more possibilities are created to approach targeted experiences. Structuring Xgoal setting within a design framework (e.g., customer journey) can help to systematically gain and present contextualised and empathic knowledge. The increasing knowledge further facilitates Xgoal development into more descriptive, engaging, and communicable design representations that benefit knowledge exchange in collaborative interdisciplinary design activities. When representing experiential aspects of design, designers go through a design-as-craft process with an emphasis on “the process of making sense of a situation, where designers interpret the effects of their designs on the situation at hand and the effects of the situation at hand on their designs” (Wright, Blythe, & McCarthy, 2005, p. 7)

Reframe the considered design space

The evolvement of Xgoals through different design representations is also the process whereby Xgoals frame and reframe the explored design space. Xgoals as design objectives and as a synthesis of the current design knowledge have the nature of being convergent and prescriptive in each move of the design progress. Xgoals may be initially abstracted from the designers' original ideas or hypothesis that are tested in the later design process. Designers then dispense contextualised knowledge into Xgoals and try tentative design ideas with different stakeholders. Ideally, Xgoals are

balanced with other design objectives and further formulated into operationalised design specifications and evaluation criteria for concept selection and implementation.

Directing design moves

In possibility-driven design, Xgoal setting and realisation are wicked problems in nature, and hence they do not follow a rational idealised linear engineering design process (Cockton, 2017). Instead, Xgoals submit to an internal logic of abductive design reasoning that characterises an XFD rationale. Xgoals serve as guiding stars throughout the design process (Koskinen, Karvonen, & Tokkonen, 2013; Varsaluoma et al., 2015). This study reveals the impact of Xgoals, especially on query, explanation, and evaluation, thereby directing collaborative efforts to experience embodiment in design concepts. Xgoals break through these puzzles, pointing out the next explorative direction, and thus make a move in design practice.

In conclusion, based on the findings of the eight interviews, Xgoals may serve to springboard experiential design representations, to illuminate promising design space, and to guide design direction. In the early phase of design, Xgoals and concepts are constantly changed and developed due to the enhanced understanding of the context. Thus, the evaluation criteria should be adjusted and adapted in the different stages of design. Xgoal setting, conceptualising and evaluation are not mechanically separated, but rather, concurrent in the design process.

Xgoal as a designerly instrument

The previous studies make it evident that Xgoals were employed in reported design projects (e.g., Kaasinen et al., 2015; Roto et al., 2017), yet it remains a puzzle for designers as to why and how Xgoals work in a creative design process. This section analyses the three facets that resulted from the interviews against the design research literature, which brings forth the main contribution of this article, a conceptual model of Xgoals as a designerly instrument (Figure 1). According to this model, the main benefits of Xgoals in XFD include design space expansion, design situation learning, and experiential knowledge communication. Accordingly, using familiar terms from the design literature, well-defined Xgoals can function as a generative, reflective, and communicative designerly instrument.

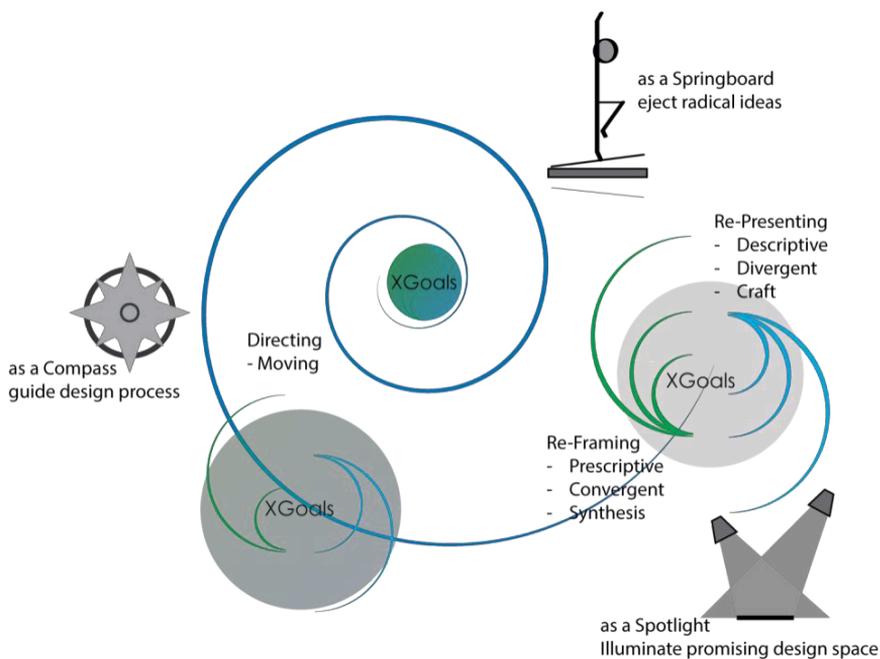


Figure 1. Three facets of Xgoals

Xgoal as a generative instrument for design space expansion

The early phase of creative XFD is rather fuzzy and iterative (Kaasinen et al., 2015; Varsaluoma et al., 2015), because it initially addresses two typical wicked problems (Rittel & Webber, 1973) “what experience to design for” (i.e., Xgoal setting) and “how to create conditions to evoke the targeted experience” (i.e., Xgoal realisation) (Desmet et al., 2011). The properties of *wicked problems* (Rittel & Webber, 1973) suggest that Xgoal setting and utilisation in design practice has among other concerns no definitive formulation, no stopping rule, no absolute correctness, and more than one possible explanation. In other words, these properties of *wickedness* suggest there is a fundamental indeterminacy in the Xgoal-directed design approach (Buchanan, 1992).

Xgoal setting and realisation can be regarded as two unknowns of design abduction that result in a process of creative exploration (Dorst, 2015). Aligning with the logical formula of design abduction (ibid.), a specified Xgoal is in line with something in the nature of the outcome (i.e., consequence). Xgoal realisation is therefore the equivalent of applying a particular pattern of relationships (i.e., working principles) for this desired outcome. To bridge the gap between consequence and working principles requires iterative trials of a hypothetical pattern of relationships until a desired frame emerges (Dorst, 2015). Similarly, to create and apply an experience pattern (Hassenzahl et al., 2013) as a design strategy may help to leap from an Xgoal to Xgoal expression in a concept. The iterative trials of applying tentative experience patterns into the targeted context embrace more possibilities.

Apparently, Xgoal setting and utilisation tends to reject the linear, step-by-step model of the design process that is divided into conventional problem definition and problem solution (Buchanan,

1992). In line with the creative design process as the co-evolution of the problem/solution space (Dorst & Cross, 2001), Xgoal setting and Xgoal realisation seem to emerge together and intertwine with each other along the design timeline. However, the emphasis on first generating the experiential vision and Xgoals prevents designers from beginning with a detailed consideration of practical solutions (Hekkert & van Dijk, 2011). Instead, setting Xgoals allows designers to turn their hands to nearly anything possible.

Xgoal as a reflective instrument for learning a design situation

Tentative Xgoal setting and Xgoal realisation are experimental, because each Xgoal serves as a design inquiry of the unknown design space. For designers, Xgoal setting is primarily based on empathy and imagining of others' experiences. To maximise the closeness between the Xgoal and real-life experience of the experiencers, designers need to go through iterative trials and errors with each potential Xgoal to understand which Xgoals are appreciated by the targeted experiencers.

The experiments with a tentatively proposed Xgoal compose an essential part of the design process which is "making educated guesses when proposing solutions" (Dorst, 2015, p. 43). No matter whether an Xgoal succeeds or fails, it may bring the reflective knowledge from each attempt into the design abduction process (ibid., pp. 49-50), e.g., why a certain Xgoal is more promising than other alternatives or what kind of conditions should be created for this Xgoal. Schön (1992) depicts design as a reflective conversation, where "design knowledge is knowing in action, revealed in and by actual designing" (ibid., p. 3). Accordingly, experiments with Xgoal setting and utilisation can provoke a "reflective conversation with the situation" (Schön, 1983) and further develop an existing Xgoal in relation to the targeted context. The resulting Xgoal-related knowledge can help to mark the considered design space and illuminate the next promising area to explore.

Reflective designerly knowledge is normally generated in design practices. However, designers usually focus more on generating ideas rather than making reflective knowledge explicit and documented. The highlight of Xgoals not only helps to elicit reflective knowledge on experiential aspects of design, but it also supports designers in analysing, comparing, and organising insightful reflection with a centralised theme, which contributes to design reasoning and decision-making.

Xgoal as a communicative instrument for sharing and transferring experiential knowledge

Xgoals are suggested to be primarily defined in a few concise vocabularies, because it is convenient and effective to initially convey experiential information in a word or a short phrase. Verbalised Xgoals can provide different stakeholders a common lens decoupled from professional knowledge. No matter what roles people play in collaborative work, e.g., programmers, engineers, salesmen, graphic designers, or project managers, they can at least literally interpret a verbalised Xgoal in a common language. Importantly, language is the primary tool for establishing meaning and facilitating management and transformation of a situation in design, although it might not be first concerned with a precise representation (Dalsgaard, 2014).

Besides the concise form of words, other representations of Xgoals as well as the activities of producing them are also helpful to define and communicate Xgoals, such as sketches, personas,

scenarios, user journeys, presentations, and reports (Varsaluoma et al., 2015). Multiple presentations of the same set of Xgoals can elicit different insights, foster empathy for the targeted experiencers, and eventually clarify the understanding of experiential knowledge. Xgoals are uplifted as the high-level objectives of a design task, the confirmation of Xgoals can thus lead to the sub-goals of translation and derivation in relevance to functionality, usability, and other design requirements. In this sense, when discussing high-level Xgoals, it is likely to provoke discussion of other types of design objectives that are derived from the proposed Xgoals, i.e., business goals or engineering constraints.

Furthermore, the communication and discussion revolving around the Xgoals can lead to a balance in the different sub-goals in the early phase of design. Inevitably, the individual's ability for empathy, imagination, and association with Xgoals and Xgoal representations are varied. Therefore, experience designers have the responsibility to interpret the concerns of different stakeholders, to step into their shoes, and to translate the Xgoals into their respective professional languages. In addition to the versatile skills for knowledge translation, experience designers can direct the collaborative efforts for a sharable definition and utilisation of Xgoals. The methods and techniques of co-design and participatory design can be tailored for Xgoal definition, communication, and evaluation in the early stage of collaborative design projects. The model for the Xgoal elicitation process with the instructions for communicating Xgoals (Varsaluoma et al., 2015) is the early contribution from the procedural perspective. Communication with a focus on Xgoals can prevent the misunderstanding or confusion of Xgoals from the early stage of the design process. Effective communication among different stakeholders brings out an in-depth understanding and clear articulation of sharable Xgoals, which push design forward.

Challenges in setting and utilising Xgoals

This article investigated experiential objectives in creative design projects. The findings indicate Xgoals can be designerly utilised, which has not been sufficiently emphasised in the early studies (Kaasinen et al., 2015; Varsaluoma et al., 2015; Roto et al., 2017). However, the challenges in setting and utilising Xgoals are arguably almost the same: 1) specific assessment criteria of Xgoals, 2) systematic balance between Xgoals and other objectives, 3) creative derivation and association from Xgoals to design specifications and concept evaluation criteria, and 4) various formats of sharing Xgoals in different stages of design. For creative design, it is tricky to systematically experiment with tentative Xgoals to reframe the considered design space and find the appropriate match between Xgoals and design concepts.

Limitations

The limitations of this study mainly lie in the small sample size of interviewees and that of research units. Although these experts are seasoned design researchers, it seems intensive for most of them to comment on Xgoals in a limited time. It was also challenging for them to imagine how to use Xgoals in real-life design practice. Therefore, instead of uncovering the Xgoal setting and utilisation in actual cases, this study merely contributes to the preview of Xgoal functions in different phases of the design

process.

Conclusions

This article addresses how Xgoals can be utilised in the creative design practice. Many XFD studies recognise the significance of experience as a high-level design objective and a final offering of design, but few of them investigate why and how experiential objectives actually work in designing for experiences. To tackle this challenge, this article conceptualises XFD approaches into Xgoal setting and realisation. The specific research question of this article was *what are the possible functions of Xgoals in creative XFD practice?* The findings of eight researchers' interview data depict three key benefits of well-defined Xgoals: *representing the intended experiential aspects of design*, *reframing considered design space*, and *directing design moves to the experiential aspects*. Furthermore, Xgoals can serve as generative convergence points for ideation. The experiments with tentative Xgoals accumulate reflective knowledge about the design situation, which can be analysed, clustered, compared, and synthesised through the lens of Xgoals. For collaborative design, Xgoals maintain the focus of different stakeholders on the experiential qualities of design and help them communicate and exchange experiential design objectives across disciplines. On the other hand, it was difficult to balance Xgoals with other design objectives and to translate Xgoals into concept implementation requirements.

This article concludes that Xgoal can serve as a generative, reflective, and communicative designerly instrument in different stages of collaborative design. For future studies, it is worth further developing the techniques to assist Xgoal adaption with other design tools and to facilitate creative translation from Xgoals to design expressions. Meanwhile, design researchers should be more actively involved in experience design practices and document the actual process of Xgoal setting and utilisation in design activities, and reflect on why certain Xgoals may succeed or fail.

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Yichen Lu received her Bachelor degree from Jiangnan University in China and Master's degree from Delft University of Technology in the Netherlands. Her background is Industrial Design and Design for Interaction. Her research is situated in design methodology with a special focus on experiential design goal setting and translation in the creative design activities.

For most adults, work is an important part of life. Experiences at work are shaped considerably by the workplace context wherein professional tools often play a crucial role. Given this significance, this doctoral research is concerned with human flourishing at work as mediated by professional tools and work-related service touchpoints. This dissertation concentrates on prioritising meaningful experiences as high-level design goals in the early phase of the design process, which enables a creative approach to professional tool innovation. Theoretically, this research utilises the multidisciplinary lenses of positive psychology, organisational management, and possibility-driven design thinking to study experiential objectives in creative design practice. Methodologically, this dissertation investigates experience goal setting and utilisation in the design projects that collaborated with the heavy industry companies. This research contributes a theory-inspired and design case-based approach to tool design for evoking meaningful experiences at work.



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