

RITUALS AND INTERACTIVE TECHNOLOGIES:

Designing
Extraordinary
Experiences

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Abstract

Rituals have played crucial roles in cultural, societal, and individual lives, preserving cultural memories, shaping social structures, and imbuing life with meaning. While this remains true today, rituals have evolved and people increasingly appropriate interactive technologies, even if they are not specifically designed for rituals, and irrespective of whether Human-Computer Interaction (HCI) research focuses on it. However, despite rituals' importance for people and their increasing overlap with interactive technologies, rituals and related design issues are only vaguely researched in HCI. To address these gaps and outline this emerging research area in HCI, this thesis transfers ritual theories to HCI, structures previous work applying a newly-developed classification scheme of four ritual dimensions (*ritual complexity, variability, actor(s), and origin*), and condenses findings from five publications that investigated real-world cases of rituals with interactive technologies, and intentionally designed interactive technologies for rituals.

This thesis presents empirical evidence for the real-world existence and relevance of rituals with interactive technologies. People of all ages use various interactive technologies for diverse rituals: Young adults invent new rituals around their smartphones to feel more grown up (P1), couples simultaneously delete their dating apps to symbolise the start of a relationship (P4), and older adults use streaming platforms to participate in worship services (P2, P3). Analysing such real-world examples, this thesis develops a second classification scheme of three roles interactive technologies take in rituals: the role of *facilitators* simplifying ritual tasks, *enablers* inviting extraordinary ritual experiences, or *social actors* being emotionally valued and thus taking centre stage in rituals (P1). Interactive technologies were rarely intentionally designed for use in rituals, especially as *enabler* or *social actor*, and sometimes changed rituals in undesirable ways. Therefore, this thesis delves into intentionally designing *enabler* and *social actor* technologies for rituals following a research through design approach, both in terms of the design process (P3) and outcomes (P4, P5). Three specific cases were chosen to cover the broad spectrum of rituals, from less (P4, P5) to more complex (P2, P3), prescribed (P2, P3) to newly invented (P4, P5), social (P2, P3, P4) to individual (P5) and religious (P2, P3, P5) to secular (P4). As a result, this thesis demonstrates how specific design methods, such as provotyping, can suit the unique challenges of designing interactive technologies for rituals and presents the novel provotype God-I-Box (P3). In addition, this thesis presents a novel *enabler* technology, *El Corazón* (P4), and a novel *social actor* technology, the *Blessing Companion* (P5), both intentionally designed for rituals. Reflecting on these design cases, this thesis proposes two unique experiential qualities that can inspire the future design of interactive technologies for rituals: *effort of use* and *uncontrollability*.

Overall, this thesis makes empirical, artefact, methodological, and theoretical contributions that lay the foundations for ritual research in HCI. Furthermore, it provides concrete tools for analysing and designing rituals with interactive technologies, including two classification schemes and two experiential qualities, contributing to academic understanding and practical application in HCI.

Zusammenfassung

Rituale spielen seit jeher eine bedeutende Rolle im menschlichen Leben. Sie tragen dazu bei kulturelle Erinnerungen zu bewahren, soziale Strukturen zu prägen und dem individuellen Dasein Sinn zu verleihen. Auch in der heutigen Zeit sind Rituale relevant, haben sich jedoch weiterentwickelt und integrieren zunehmend interaktive Technologien, auch wenn diese nicht explizit für Rituale gestaltet wurden. Trotz ihrer Bedeutung und des wachsenden Einflusses interaktiver Technologien auf Rituale bleiben Rituale und damit verbundene Designfragen innerhalb der HCI weitgehend unerforscht. Um diese Forschungslücken zu adressieren und Ritualforschung in der HCI strukturiert aufzuarbeiten, überträgt diese Arbeit Ritualtheorien in die HCI und entwickelt ein neues Klassifizierungsschema bestehend aus vier Ritualdimensionen: *rituelle Komplexität*, *Variabilität*, *Akteur(e)* und *Ursprung*. Darüber hinaus trägt diese Arbeit die Erkenntnisse aus fünf Publikationen zusammen, in denen realweltliche Rituale mit interaktiven Technologien und die bewusste Gestaltung interaktiver Technologien für Rituale erforscht wurden.

Um die Existenz und Relevanz von Ritualen mit interaktiven Technologien zu untermauern, dokumentiert diese Arbeit zunächst realweltliche Beispiele. Dabei wird deutlich, dass Menschen aller Altersgruppen eine Vielzahl interaktiver Technologien für unterschiedlichste Rituale einsetzen: Junge Erwachsene erfinden neue Rituale rund um ihre Smartphones um sich erwachsener zu fühlen (P1), Paare löschen ihre Dating-Apps gleichzeitig um den Beginn einer Beziehung zu symbolisieren (P4) und ältere Erwachsene nutzen Streaming-Plattformen um an Gottesdiensten teilzunehmen (P2, P3). Eine Analyse solcher Beispiele zeigt, dass interaktive Technologien dabei drei unterschiedliche Rollen in Ritualen einnehmen: *Facilitator* vereinfachen Rituale, *Enabler*, ermöglichen außergewöhnliche Ritualerfahrungen, und *Social Actor*, werden emotional wertgeschätzt und stehen deshalb selbst im Mittelpunkt von Ritualen (P1). Interaktive Technologien wurden jedoch selten bewusst für den Einsatz in Ritualen gestaltet, insbesondere nicht als *Enabler* oder *Social Actor*, und verändern Rituale so auch in unerwünschter Weise. Deshalb beschäftigt sich ein zweiter Teil dieser Arbeit mit der bewussten Gestaltung von interaktiven Technologien für Rituale, sowohl im Hinblick auf den Gestaltungsprozess (P3) als auch auf die Ergebnisse (P4, P5). Dabei deckt die Arbeit durch die bewusste Wahl einzelner Beispiele ein breites Spektrum von Ritualen ab, von einfach (P4, P5) bis komplex (P2, P3), vorgeschrieben (P2, P3) bis neu erfunden (P4, P5), sozial (P2, P3, P4) bis individuell (P5) und religiös (P2, P3, P5) bis säkular (P4). Im Ergebnis demonstriert diese Arbeit, wie spezifische Designmethoden wie das Prototyping den besonderen Herausforderungen der Gestaltung von interaktiven Technologien für Rituale gerecht werden können und präsentiert den neuen *God-I-Box* Prototyp (P3). Darüber hinaus werden zwei neue Artefakte präsentiert, *El Corazón* (*Enabler*, P4) und *Blessing Companion* (*Social Actor*, P5), die beide bewusst für Rituale gestaltet wurden. Basierend auf diesen Designbeispielen entwickelt die Arbeit zudem zwei neue Erfahrungsqualitäten, die die zukünftige Gestaltung interaktiver Technologien für Rituale inspirieren können: *Effort of use*, ein Gefühl von Aufwand, und *uncontrollability*, ein Gefühl von Unverfügbarkeit.

Insgesamt leistet diese Arbeit empirische, artefaktbezogene, methodologische und theoretische Beiträge und schafft so Grundlagen für die systematische Erforschung von Ritualen in der HCI. Darüber hinaus liefert sie konkrete Werkzeuge für die Analyse und Gestaltung von Ritualen mit interaktiven Technologien, darunter zwei Klassifizierungsschemata sowie zwei Erfahrungsqualitäten, die sowohl zum akademischen Verständnis als auch zur praktischen Anwendung in der HCI beitragen.

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Synopsis

1 Introduction

Rituals exceed times and places and fulfil various cultural, social and individual functions (C. Bell, 1997; Cooke & Macy, 2005; M. Nielsen, 2018). Although rituals often evoke associations with ancient cultures, there is growing evidence that rituals are still relevant today, be it emerging ritual initiatives and professions such as ritual agencies or ritual designers that strive towards making rituals accessible to more people (e.g., Evangelisch-Lutherische Kirchenkreise Hamburg-Ost und Hamburg-West/Südholstein, 2022; Evangelisch-Lutherischer Kirchenkreis Lübeck-Lauenburg, 2021) or anecdotal reports of new rituals such as deleting dating apps together upon entering into more serious relationships (Klüber et al., 2020a). Schnell (2009) aptly describes this current need for rituals as a phase of ‘longing for rituals’. Today’s rituals are no longer limited to purely analogue elements but increasingly include digital components and interactive technologies¹. As interactive technologies continue to spread into every sphere of life, they also change existing rituals and enable new ones (Kapferer, 2004) – irrespective of whether HCI research focuses on it. The COVID-19 pandemic, in particular, has intensified this trend with more rituals, such as worship services, being mediated by technology (Cambpell, 2020; Nord et al., 2021). Disciplines such as theology, digital religion, psychology, sociology, anthropology or ritual studies have documented how rituals change, including those arising through interactive technologies. However, their focus is more descriptive and conceptualises technology as a given rather than something that can purposefully be designed. So, despite the considerable body of knowledge in these disciplines regarding rituals and interactive technologies, design knowledge has been neglected, prompting the need for new perspectives, such as those of HCI.

The topic of ritual ties in with many current debates in HCI, such as an overarching shift in study away from usability, ease of use, accuracy or efficiency more towards experiences, fun, enjoyment, mindfulness, meaning, spirituality or reflection (Blythe & Monk, 2018; Harrison et al., 2007). This major shift is accompanied by what has been termed the ‘gradual and considerable expansion of HCI’s concerns, methodologies, and application areas’ (Filimowicz & Tzankova, 2018, p. 3). This expansion involves significant shifts in research focus, with HCI studies now delving into novel contexts such as everyday life or home environments, as well as exploring new types of data, such as qualitative data on subjective experiences (Bødker, 2015; Grudin, 2005; Grudin, 2017; Harrison et al., 2007). These developments are crucial prerequisites for the study of rituals in HCI. Thus, unsurprisingly, ritual is a term that is increasingly used in HCI publications. Designed artefacts are named Ritual Machines (Kirk et

¹I use the term ‘interactive technology’ in line with Pierce’s understanding as “the technology that HCI as a field is primarily concerned with [... entailing] some type of electronic, digital, computational, or information technology” Pierce, 2012, p. 960. I use interactive technology and technology interchangeably throughout this thesis.

al., 2016) or Mirror Ritual (Rajcic & McCormack, 2020b), novel greeting rituals are explored in virtual spaces (McVeigh-Schultz & Isbister, 2021), and complex rituals such as funerals are technology-mediated so those unable to attend in person can say goodbye from afar (Uriu et al., 2021b). However, ritual seems to be a term with as many meanings as mentions and knowledge about rituals in HCI is rarely compared, linked, or discussed.

Given the high relevance and topicality of rituals involving interactive technologies and the hitherto little-focused consideration of ritual research in HCI, this thesis is dedicated to exploring rituals with interactive technologies from an HCI perspective. It addresses two fundamental questions: First, what are rituals with interactive technologies in theory and real-world settings? Second, how can interactive technologies be intentionally designed for rituals in terms of the design process and outcome?

To explore these two questions, I investigated a variety of rituals with interactive technologies in five separate publications, including transition rituals in relationships and coming-of-age phases, Protestant online worship services and everyday blessing rituals. I use this synopsis to link and analyse the publications on a meta-level to learn more about the topic in focus: rituals with interactive technologies. This thesis contributes to the evolving body of research on rituals in HCI by providing an overview of ritual research, empirically exploring real-world rituals with interactive technologies, applying novel methods for designing interactive technologies for rituals, intentionally designing novel interactive technologies for rituals, and theoretically reflecting gained insights.

The thesis consists of two parts: A synopsis and a collection of five publications. The synopsis begins with 2 Research on Rituals, a section reviewing the literature on ritual research more generally to situate the work in the context of ritual research and establish knowledge of the variety of ritual understandings. Next, the 3 HCI Research on Rituals section presents a structured overview of ritual research within HCI, highlighting the rituals researched and current research approaches. The 4 Publications Overview section gives an overview of the five publications compiled in this thesis that each contributes to aspects of the two fundamental questions posed above. The 5 General Discussion section highlights the overarching contributions of this thesis by bringing together individual results. The contributions are discussed in light of the research questions and prior research, and implications for future research and design are presented. The 6 Conclusion section closes the synopsis and is followed by the five publications.

Table S1 collates the most essential information on each publication at a glance. It highlights the publications' research outcomes, contributions based on Wobbrock and Kientz (2016), characteristics across four ritual dimensions (complexity, variability, actor(s), origin), and role of technology within rituals (facilitator, enabler, social actor). Both the four ritual dimensions and the three technology roles were developed as part of this thesis and will be presented in detail later on (see Section 2.1.2 and Section 4.2).

P#	Research Outcomes	Contributions ^a	Ritual Dimensions	Technology Role
P1	Documentation of real-world transition rituals with interactive technologies, formulation of a classification scheme of three recurring roles interactive technologies take in real-world rituals: facilitator, enabler, social actor	Empirical Theoretical	All	Facilitator Enabler Social actor
P2	In-depth investigation of technology appropriations for real-world online worship service rituals, identification of tensions due to facilitator technology appropriations	Empirical	Macro Prescribed Social Religious	Facilitator
P3	Identification and transferal of the provotype methodology to the online worship service ritual context, iterative development of the God-I-Box provotype, exploration of believers' and pastors' initial reactions to assess the methodology's suitability	Methodological Artefact Empirical	Macro Prescribed Social Religious	Enabler
P4	In-depth investigation of real-world relationship transition rituals, formulation of a design space for relationship transitions, iterative development of El Corazón, exploration of couple's perspectives on El Corazón	Artefact Empirical	Meso, Micro Newly invented Social Secular	Enabler
P5	In-depth investigation of real-world blessing rituals, iterative development of the Blessing Companion	Artefact Empirical	Meso, Micro Newly invented Individual Religious	Social actor

Table S1: Overview of the five publications and research contributions.

^abased on the contribution types of Wobbrock and Kientz (2016)

2 Research on Rituals

I briefly review ritual theory in the social sciences and ritual studies to introduce ritual research more generally and help better comprehend and structure various ritual understandings also present within HCI.

2.1 Evolution of Ritual Studies: A Brief Overview

The term ‘ritual’ derives from the Latin word ‘ritus’, which means religious use, ceremony or custom (Husmann, 2017). Rituals were originally closely associated with a religious context (Krieger & Belliger, 2013), but their meaning has expanded over time, and the term ‘ritual’ is also applied to non-religious actions, for example, in the form of personal rituals or ritual-like activities (C. Bell, 1997; Schnell, 2009). In broad terms, rituals are a specific form of human behaviour (C. Bell, 1997; Brosius et al., 2013) that have been researched by disciplines such as anthropology, sociology, religious studies, philosophy, and socio-biology for an extended time. These different disciplines have all contributed to ritual studies, an interdisciplinary field focusing on ritual research. In order to understand the diversity of ritual understandings that exist today, it is worth taking a brief look at the development of ritual studies.

2.1.1 Four Phases of Ritual Studies

The development of ritual studies can be roughly divided into four phases, each bringing new perspectives and approaches to ritual research (Platvoet, 1995; Schnell, 2009). Rituals first became a research topic when anthropologists and sociologists travelled to different places and reported on local customs and traditions of indigenous communities (e.g., Arnold van Gennep, Emile Durkheim; the first phase of ritual studies; about 1870-1960) (Platvoet, 1995). During this first phase of ritual studies, rituals were interpreted as closely linked to religious acts (Platvoet, 1995). Following that, researchers started identifying rituals in other societies and secular performative actions such as communication or theatre (e.g., Victor Turner, Mary Douglas; the second phase of ritual studies; from about 1960) (Platvoet, 1995). Particularly in connection with rituals in communication, a change in perspective from the macro to the micro was evident: Rituals were identified in individual interactions between people, such as in greetings (also called ‘interaction rituals’) (Collins, 2005). A critical attitude towards rituals characterised a third phase of ritual studies. Here, research focused on rituals as an instrument of power (e.g., Kaperer, Erdmann; from about 1980) (Platvoet, 1995). In recent years, researchers documented a fourth phase of ritual studies: longing for rituals (Schnell, 2009). According to Schnell (2009), this phase of ritual studies is characterised by its pragmatic, playful approach to rituals, focusing on the positive and meaning- or community-creating aspects of rituals. Where there are no rituals yet, new ones are invented as in psychotherapy contexts (Ciompi, 2002; Schnell, 2009). The need for rituals is particularly pronounced during transitions in life, whether in terms of location, condition, position or age group, as people are often searching for meaning and appropriate coping strategies during this time (Schnell, 2009; Van Gennep, 1961). Personal rituals are also referred to as ‘ritual-like activities’ (C. Bell, 1997). Ritual-like activities are often less obviously identified as rituals but use ritual elements and functions (C. Bell, 1997). People appropriate and apply elements of

rituals to create novel ritual-like activities, especially when there are no culturally determined rituals available (e.g., Eschler et al., 2018; Nord, 2017). However, not only individuals but also institutions are developing a more pragmatic, playful approach to rituals. New ritual initiatives within institutions (e.g., ritual agencies within the Nordkirche in Germany) and new job profiles are emerging (cf. ritual designer) (Evangelisch-Lutherische Kirchenkreise Hamburg-Ost und Hamburg-West/Südholstein, 2022; Evangelisch-Lutherischer Kirchenkreis Lübeck-Lauenburg, 2021). The phase of longing for rituals is thus also a phase of *designing rituals* (Radde-Antweiler, 2006). As such, this pragmatic and design-oriented approach to rituals forms the basis for addressing rituals from a design-oriented perspective within HCI.

2.1.2 Four Dimensions Structuring Ritual Diversity

Given this diversity of ritual understandings depending on research focus, discipline or historical context (also see appendix of (Grimes, 2013) for a collection of ritual definitions across disciplines), it becomes clear that defining ritual is less clear-cut (Platvoet, 1995; Tambiah, 1979). In addition, each ritual is not static but subject to change, often referred to as ritual dynamic, which further complicates a simple understanding of rituals (Kapferer, 2004; Sundermeier et al., 2010). By analysing not only the historically documented rituals but also the rituals considered in HCI and my studies, I developed four dimensions that help structure and make accessible these different understandings and research foci (see Figure S1). In their development, I followed an iterative and inductive approach that extended over the entire period of my doctoral research. Over time, I considered various possible dimensions and repeatedly reviewed and questioned them when encountering novel rituals. The first two dimensions emerged relatively early, while the others developed later. The final set of four dimensions is minimalist and inclusive, highlighting only the most significant differences between existing rituals. Each dimension uniquely addresses a distinct aspect while maintaining an equivalent level of abstraction and specificity across all dimensions. The four dimensions are a theoretical contribution for HCI that I will refer to throughout the thesis to describe each ritual considered in more detail.

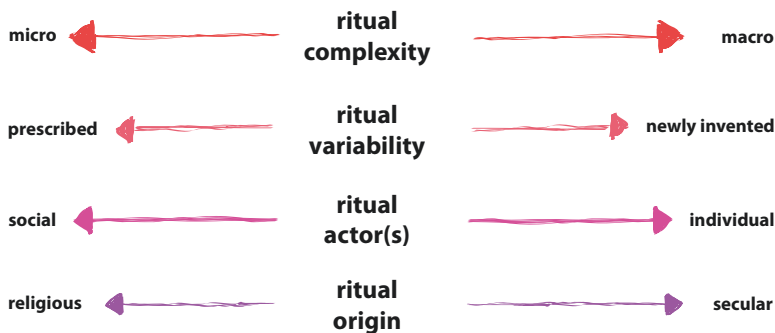


Figure S1: Four dimensions structuring ritual diversity.

First, rituals considered over the years differ in complexity. While rituals considered in early phases were rather complex, merged several less complex rituals, took time, and incisive (e.g., religious ceremonies), rituals considered in later phases were also small, simple, short, and ordinary (e.g., interaction rituals). The rituals considered range from macro (to meso) to micro rituals. Second, rituals considered over the years differ in their degree of variability. Many of the rituals researched are coined by the idea of being prescribed, formalised, and passed on over centuries. The ritual actors know precisely how to perform the ritual, often unconsciously, and thus have expectations regarding the ritual experience. These prescribed rituals are contrasted by newly invented rituals, like personal rituals or rituals in psychotherapy. Newly invented rituals are more flexible, can be customised and are therefore not associated with expectations by their ritual actors, at least initially. Third, rituals considered over the years differ in who is involved as a ritual actor. Most of the rituals researched are social, fulfil social functions, and involve several ritual actors. In fact, researchers have highlighted a potential bias in ritual studies toward the social perspective, as much of the research has been conducted from sociological and anthropological perspectives (Schnell, 2009). However, in the fourth phase of ritual studies, individual rituals moved into focus, such as therapy rituals serving individual functions and only including one ritual actor. Fourth, rituals considered over the years differ in their origin or worldview. As described, the term ritual derives from the Latin word ‘ritus’, referring to religious ceremonies. So, while rituals were initially closely related to religion, this connection was loosened over time, and researchers also used the term ritual for actions in more secular contexts, such as interpersonal greeting rituals or personal rituals in everyday life.

The four dimensions emphasise similarities and differences between rituals, each of which is accompanied by unique requirements. As I will demonstrate in Section 3.2, these varying requirements also impact the design of interactive technology for rituals.

2.2 Elements and Functions of Rituals

Given these diverse perspectives on rituals, the reader might wonder: What is a ritual? Despite all differences emphasised through the four dimensions, it is generally agreed that rituals are a type of action in their own right, *sui generis*, that address specific human purposes, are distinct from other types of actions such as routines, and that some common elements can be identified that characterise rituals more or less across all contexts and understandings (C. Bell, 1997; Grimes, 2013; Krieger & Belliger, 2013; Platvoet, 1995). To help readers develop an understanding of rituals, I will describe the most significant elements below.

A central element is that rituals are focused, situated, and embodied actions instead of thoughts (Sundermeier et al., 2010). These actions are more or less stylised and formalised (Sas et al., 2016; Schnell, 2009). As such, ritual actions are not (purely) instrumental. They are not primarily about manipulating the physical world but about creating or manipulating meaning (Rappaport, 1999). Rituals have performative effects (Krieger & Belliger, 2013), and ritual actions can even become uncoupled from pragmatic goals. Putting up a love lock symbolizes but does not directly affect a relationship's stability (Nord, 2017) – referred to as causal opacity and goal-demotion (Legare & Souza, 2012; Rossano, 2012). In turn, rituals focus on the process rather than a pragmatic goal and point beyond themselves. They are imbued with multidimensional symbolism (Sundermeier et al., 2010) and, as such, can have

special meaning for the ritual actors involved (Schnell, 2009). Rituals are perceived as extraordinary, having a serious or sacred reference rather than ordinary or everyday (Schnell, 2009). Rituals are repeated over time and/or people (Sundermeier et al., 2010).

Furthermore, rituals have recurring functions that are not always easy to separate from the elements (Platvoet, 1995). Viewed from a meta-level, rituals can have individual, social and/or cultural functions (C. Bell, 1997). For example, on an individual level, rituals can generate and channel emotions (Summers-Effler, 2006), can help generate meaning from personally relevant incidents (Sas et al., 2016; Schnell, 2009), or can have therapeutic effects, e.g., when used as a means of coping (Cooke & Macy, 2005; Imber-Black, 1999; Van der Hart, 1978). On a social level, rituals can support the construction and consolidation of an individual's status within groups or society (Turner, 2017; Van Gennep, 1961) and, as such, are a structural force shaping social existence and society (Kapitány & Nielsen, 2017; Rossano, 2012; Trice et al., 1969). On a societal level, rituals can contribute to creating a cultural memory, and their symbols can be the basis for culture in groups (Summers-Effler, 2006).

Researchers in ritual studies have made a case for using a polythetic definition for rituals, meaning certain elements (but not all) must be present to signify a ritual (Platvoet, 1995). Such an approach seems particularly useful to structure, categorise, and compare various occurrences of rituals without declaring any one understanding of ritual solely valid. Given this thesis's broad exploratory goal to take a first step towards a more systematic exploration of rituals with interactive technologies from an HCI perspective and HCI's diverse perspectives on rituals, as will be demonstrated in Section 3, adopting such an approach for this thesis and HCI seems reasonable as well.

2.3 Demarcation and Specification of Rituals

2.3.1 What Rituals are Not

It can be challenging to differentiate between ritual and similar concepts, especially concerning personal, less prescribed rituals (C. Bell, 1997). In colloquial language, ritual is often equated with routine or habit. However, there is a consensus in ritual research that rituals are not routines or habits. For example, Grimes (2013) stated that rituals are not habits 'because rituals are thoughtful and meaningful rather than mindless' (p. 211). However, rituals share similarities with habits insofar as both can be 'done regularly without much thought' (p. 212). In addition, other than routines, rituals are not primarily focused on the pragmatic goal of an action (Legare & Souza, 2012; Sundermeier et al., 2010). Therefore, the daily tooth brushing routine with the primary goal of clean teeth is not a ritual. However, there are situations in which brushing teeth can become a ritual. For example, one could imagine a ritual celebrating a baby's first toothbrushing in the family. This action would not primarily be about cleaning the baby's teeth but about the broader context of the baby being able to eat solid food and becoming less dependent on the mother's food supply. Whether something is a ritual or a routine can often not be answered easily or unsituated. It depends entirely on the specific actions and contextual factors. This type of reasoning is also in line with C. Bell (1997), who argued that potentially any action could be more or less ritualised and that examining rituals in context is crucial to understanding whether they are indeed rituals.

2.3.2 Rituals with Interactive Technologies

All previous descriptions of rituals in Section 2 lack a core element that is crucial for an HCI perspective: interactive technologies. So why should rituals be exciting for HCI researchers at all, and what can HCI researchers contribute to the general debate? In today's world, interactive technologies have permeated all areas of life - including rituals. This phenomenon is also recognised in ritual studies, where researchers assume that interactive technologies contribute notably to ritual dynamics by leading to ritual changes (Kapferer, 2004). For example, researchers have observed an expansion into online spaces where rituals such as sharing pictures of candles for collective mourning and dedicated ritual websites emerged (Radde-Antweiler, 2006; Sumiala, 2013). Others have analysed the participation in rituals from a distance, such as TV or online worship services, often referred to as media or technology-mediated rituals (Hutchings, 2017; Thomas, 1998). During the COVID-19 pandemic, researchers documented an increase in technology-mediated worship services, as rituals could only take place thanks to technological mediation (Campbell, 2020, 2021; Nord et al., 2021).

These examples show that interactive technologies increasingly impact rituals and that ritual research focuses on describing and analysing existing ritual practices more generally. Even though technology's design affects ritual experiences, ritual research does not focus on how the design of interactive technologies influences rituals and experiences. Interactive technologies are conceptualised as given, less as material that can be shaped and designed. This underlying assumption distinguishes a ritual studies perspective on interactive technologies in rituals from an HCI perspective because HCI seeks to understand interactive technologies' design and their consequences (Dix et al., 2004).

2.4 Summary and Conclusion of Research on Rituals

Summarising the above sections, five key insights form the basis of the ritual understanding and approach to research in this thesis. First, especially the fourth phase of ritual studies, longing for rituals, provides a productive basis for exploring rituals from an HCI perspective. It is characterised by a pragmatic approach to the concept of ritual, looks primarily at rituals in everyday life rather than in formalised contexts, and includes a variety of rituals with interactive technologies. These elements also form the basis of this thesis.

Second, the concept of 'ritual' is more complex than it appears at first glance. For example, it can encompass complex, prescribed, religious rituals such as worship services and less complex, newly invented, secular rituals such as personal rituals. To explore rituals with interactive technologies from an HCI perspective and provide an initial overview, it seems essential to engage with this complexity and investigate different rituals, comparing them to identify similarities and differences and, thus, learning more about rituals more generally.

Third, considering the pragmatic approach to the concept of ritual proposed above, the need to explore different rituals, and the variety of rituals researched within HCI, a polythetic definition of rituals seems most suitable for this thesis. In this sense, all specific rituals discussed in this thesis are rituals. For example, in P2 and P3, we explored technology-mediated worship services. Worship services are focused, situated, embodied actions that are stylised and formalised. The actions performed are not purely instrumental and have performative effects. The focus in worship services is on the process itself, not any goal to

be achieved through the process, and worship services point beyond themselves. They are composed of multidimensional symbolism and are perceived as extraordinary. In addition, worship services are repeated over time and people. Taken together, worship services can be clearly identified as rituals. To give another example, many of these elements also apply the ritual of love locks explored in P4. However, the actions performed in the love lock ritual are less formalised, the multidimensional symbolism is not as comprehensive as in worship services, and the ritual is usually only repeated over time (by other people) and not by the same people. In the sense of a polythetic definition, both examples can be understood as rituals despite their differences.

Fourth, to nevertheless structure and work out essential differences between rituals, I suggest four dimensions: ritual complexity, ritual variability, ritual actor(s), and ritual origin (see Figure S1). I argue that the four dimensions help uncover specific differences and similarities between rituals that are particularly useful for an HCI perspective. To demonstrate this, I will apply the four dimensions repeatedly in this thesis. For example, I use the dimensions to structure the rituals researched in HCI (see Section 3), to select different rituals to explore in my publications (e.g., religious rituals (P2, P3, P5), and secular rituals (P1, P4)), or to guide the design of novel interactive technologies for rituals (e.g., P3, P4, P5).

Fifth, while previous research on rituals with interactive technologies has primarily taken a descriptive approach, HCI can bring a new perspective to the general ritual discourse, namely a technology design-focused perspective that includes the intentional design of interactive technology for rituals and its impact on the resulting experiences. In this thesis, I have therefore placed a focus on intentionally designing novel interactive technologies for rituals, resulting in three artefacts: God-I-Box (P2), El Corazón (P4), and Blessing Companion (P5).

3 HCI Research on Rituals with Interactive Technologies

Research on rituals is emerging within HCI, with the word ‘ritual’ appearing in a growing number of HCI publications. The term ‘ritual’ is used in various contexts, in connection with a wide range of research approaches and for various motivations. For example, rituals documented in HCI publications range from everyday rituals such as greeting or tea rituals (Brereton et al., 2017; Melnyk et al., 2014; Sabie et al., 2023; van der Hoog et al., 2004) to rituals as distinguished ceremonies out of the ordinary such as Christmas or wedding celebrations (Massimi et al., 2014; Petrelli & Light, 2014). The variety of rituals considered within HCI reflects the diversity of ritual understandings described in ritual theory (e.g., ritual actor dimension from social to individual). However, HCI research on rituals is rarely interconnected beyond the contextual or technological affiliation. Individual ritual publications stand next to each other without reference, link or comparison, and knowledge about rituals in HCI is diluted, scattered, and thus difficult to find. An overview of the rituals and approaches to research in HCI is needed that reflects the body of knowledge and details topics of interest. I iteratively collected HCI research throughout my doctoral research. I repeated systematic searches for relevant publications in the ACM DL (‘ritual*’) and gathered more relevant publications through additional sources such as Google Scholar alerts (‘ritual’ AND ‘HCI’), HCI

journals, or paper recommendations. Following an iterative hermeneutic analysis approach, I collected and analyzed publications in a cyclical, reflexive process. Over time and with more knowledge, novel perspectives on the body of work emerged. I systematically documented relevant papers, adding relevant information to a massive spreadsheet with novel categories and perspectives being added and refined over time. This collection builds the basis for what will be described in the following chapters.

3.1 Not all Mentions of Ritual are Specific

A search for ritual research in HCI reveals publications with varying degrees of specificity in terms of their ritual understanding. Many publications do not specify their ritual understanding and are coined by a superficial, casual mention of rituals without further explanation. For example, publications often use the term ‘ritual’ once or twice without any further reference (e.g., Ashford, 2021; Corbett & Le Dantec, 2018; D. Kim et al., 2022; Nanavati et al., 2023; Sarangapani et al., 2019; Vosinakis et al., 2022; Wenxuanzi & Li, 2021). In some examples, the term ‘ritual’ is integrated into novel technologies’ names without detailing this decision or its meaning. Examples are the artefacts Mirror Ritual (Rajcic & McCormack, 2020a, 2020b) or Ritual Drones (Gamboa et al., 2021) or the platform RITUAL (Celdrán et al., 2022). Other publications contain more descriptions of the rituals in focus but do not categorise them specifically or relate them to other examples or ritual literature (e.g., Baharin & Khalidi, 2015; Barron et al., 2021; Butzer et al., 2020; Cho et al., 2021; Evans et al., 2020; Huck et al., 2014; Ozenc et al., 2007; Soro et al., 2016). In these examples, the ritual in focus is usually described in a few sentences like ‘many people perform a small ritual when they enter their homes: after taking off our coats, we empty our pockets of things like money, keys and mobile phones when we enter our apartments’ (van der Hoog et al., 2004, p. 775).

Overall, these publications contribute marginally to knowledge regarding ritual research in HCI, and it is often difficult for the reader to find, understand and categorise the rituals researched sensibly, given the lack of information. However, many publications that appear in a search for ‘ritual*’ belong to this category, and it seems essential to be aware of this phenomenon when searching for ritual research in HCI.

3.2 The Rituals Researched in HCI

To provide a structured overview of the rituals researched in HCI and their similarities and differences, I will present them along the four dimensions: ritual complexity, ritual variability, ritual actor, and ritual origin (see Figure S1). For each dimension, I highlight unique challenges that I explored in the five publications of this thesis.

3.2.1 Ritual Complexity: Macro to Micro

Rituals described in HCI literature differ regarding their complexity, from macro to micro. Macro rituals received the least attention in previous HCI literature, with most examples relating to prescribed rituals, such as weddings (Massimi et al., 2014; Stark, 2017), funerals (Uriu et al., 2021b), or specific religious rituals such as pilgrimage rituals (Putri et al., 2020) or

Tatbeer rituals (Alshehri & Su, 2023). Only few examples document newly invented macro rituals such as gender transition rituals on social media (Haimson, 2018), cancer survivor rituals (Eschler et al., 2018), or (the lack of) divorce rituals (Hansen & Koefoed Hansen, 2022). The micro rituals explored in previous work are either technology-mediated interaction rituals between various social actors, such as greeting or farewell rituals (Cranor et al., 2010; McVeigh-Schultz & Isbister, 2021; Melnyk et al., 2014; Pallay et al., 2009), or interaction rituals between an individual and technology, such as authentication rituals (Barron et al., 2021; Mudliar, 2020) or ritualised interactions with ATMs (Primlani et al., 2022).

In contrast to macro or micro rituals, the range of researched rituals in between is broad. Various small meso rituals are explored, mainly in relation to family rituals performed regularly (Ambe et al., 2017; Brereton et al., 2015, 2017; Cherenshchykova & Miller, 2021; Luo et al., 2023; Ozenc et al., 2007) or couple rituals, especially for couples living apart (Baharin & Khalidi, 2015; Kirk et al., 2016). Some of the more complex meso-rituals centre on mourning (Eriksson & Hansen, 2017; Uriu & Okude, 2010; Uriu et al., 2021a) or prayers from home (Abokhodair et al., 2020; Choi & Achituv, 2012). In addition, there are also various exceptional examples, such as runner rituals (Menheere et al., 2020), driver rituals (Wu et al., 2018, 2021), walking rituals (Jiang et al., 2018), or ‘wave rituals’ performed by crowds in stadiums (McWharter, 2023). While most of the examples up to this level of complexity take place in everyday life, the most complex meso rituals tend to be placed outside of everyday life. Examples include business rituals (Dolata et al., 2019) or live art performances and exhibits (Loke et al., 2012; Mah et al., 2020) that all take place in special locations.

The ritual complexity dimension emphasises unique challenges for designing interactive technologies that vary depending on the specific form. For macro rituals, a unique challenge is to navigate complexity. This complexity comprises considerations of long durations (hours rather than seconds), the various smaller rituals interconnected to form the macro ritual, the usually heightened significance of the ritual for the actor(s) involved and the ritual’s rare occurrence in a person’s life. In contrast, a unique challenge for micro rituals is their inconspicuousness despite having essential functions. Micro rituals can easily be overlooked because of their short durations, the few steps or interactions performed, and their less heightened significance for the actor(s) involved. When micro rituals are to be supported by interactive technologies, they still need to fit into people’s lives just as unobtrusively.

3.2.2 Ritual Variability: Prescribed to Newly Invented

The rituals described in HCI literature differ in their variability, from prescribed to self-invented. Prescribed rituals are less commonly focused on than newly invented ones within HCI. However, some examples exist that cover various religious rituals (e.g., Alshehri & Su, 2023; Huck et al., 2015; Odefunso et al., 2022; Putri et al., 2020; Uriu et al., 2021b), wedding rituals (e.g., Massimi et al., 2014; Stark, 2017), traditional rituals celebrated in certain cultures (e.g., J. Li et al., 2023), or social interaction rituals (e.g., Pallay et al., 2009). In these examples, the prescriptions originate from culture or social environment (e.g., Apaydın & Subaşı, 2020; Kanai & Kitahara, 2011; J. Li et al., 2023) and are sometimes institutionally integrated (e.g., Putri et al., 2020; Uriu et al., 2021b; Zainuddin, 2021).

The newly invented rituals covered in previous work are more diverse than prescribed rituals, ranging from the ritual of cancer survivor tattoos (Eschler et al., 2018), to bed-time or sleep rituals (Cherenshchykova & Miller, 2019, 2021; Karlgren & Mcmillan, 2023; Ozenc et al., 2007), to driver rituals (Wu et al., 2018, 2021), to couple and family rituals (Brereton et al., 2015; Butzer et al., 2020; Kirk et al., 2016; Soro et al., 2016; van der Hoog et al., 2004), to rituals of letting go (Eriksson & Hansen, 2017; Sas et al., 2016). New rituals are invented either by people themselves (e.g., therapists (Sas et al., 2016), families (Cherenshchykova & Miller, 2019; Ozenc et al., 2007), people at existential transitions (Eschler et al., 2018; Haimson, 2018), business people (Dolata et al., 2019), friends (Taylor & Harper, 2002), individuals (Menheere et al., 2020; Primlani et al., 2022)) or by HCI researchers and designers (Browne & Swift, 2018; Hemmert et al., 2022; Loke et al., 2012; Mah et al., 2020; Morris et al., 2023; van der Hoog et al., 2004). Often, novel rituals are invented intentionally, with or without explicit reference to ritual theories, to take specific functions. Such functions described in previous work are, for example, to manage emotions (Wu et al., 2018, 2021), to cope with existential transitions (Eschler et al., 2018; Haimson, 2018; Hemmert et al., 2022; Sas et al., 2016), to connect family members living apart (Brereton et al., 2015; Butzer et al., 2020; Kirk et al., 2016; van der Hoog et al., 2004), to bring rhythm into children's lives (Cherenshchykova & Miller, 2019, 2021; Ozenc et al., 2007), to change one's mindset and emotions (Morris et al., 2023; Primlani et al., 2022), or to create meaning (Eriksson & Hansen, 2017).

The ritual variability dimension also emphasises unique challenges for designing interactive technologies depending on the specific form. Prescribed rituals pose unique challenges based on their prescription's origin, history, and resulting expectations. Introducing novel interactive technologies to contexts of prescribed rituals will inevitably change these rituals. Therefore, a unique challenge is designing new technologies for prescribed rituals that will be accepted and enable ritual actors to have experiences that match their expectations. Moreover, when prescribed rituals are institutionalised, the structures often have to approve changes, monitor the correct execution and accompany the teaching of the rituals. As a result, all ritual actors affected by prescribed rituals must be involved early on when designing new interactive technologies for these rituals. In contrast, a unique challenge for newly invented rituals is to navigate their flexibility and adaptability. Designing for newly invented rituals also means facing fewer framework conditions and being required to find sources of inspiration and cornerstones for the design. The question arises as to who is legitimised to invent novel rituals or make decisions in the design of interactive technologies for new rituals. In addition, interactive technologies intentionally designed to invite novel ritual experiences might make such experiences more probable, but never with absolute certainty. Whether a new ritual actually develops and sustains around an intentionally designed technology also depends on factors that are beyond a designer's control, such as context, previous experiences, or individual understandings and expectations of rituals.

3.2.3 Ritual Actor(s): Social to Individual

The rituals described in HCI literature also differ regarding the ritual actors involved, from social to individual. In previous work, many social rituals have been considered, corresponding to the presumed bias for social rituals and social perspectives (see Section 2). The social rituals researched range from weddings (Massimi et al., 2014; Stark, 2017) or online-

streamed funerals (Uriu et al., 2021b) to family rituals relating to children going to bed (Cherenshchykova & Miller, 2021; Ozenc et al., 2007) and greeting rituals (McVeigh-Schultz & Isbister, 2021; Pallay et al., 2009). A wide variety of social actors are involved in the rituals described: Friends (Melnyk et al., 2014; Taylor & Harper, 2002), families (Cherenshchykova & Miller, 2021; Luo et al., 2023; Ozenc et al., 2007), couples (Baharin & Khalidi, 2015; Kirk et al., 2016; Massimi et al., 2014; Stark, 2017), people with a similar cultural background (Kanai & Kitahara, 2011; J. Li et al., 2023; Pallay et al., 2009), people from a religious community (Huck et al., 2014, 2015; Odefunso et al., 2022), or people who met by chance at a cultural event (Browne & Swift, 2018; Loke et al., 2012; Mah et al., 2020; Morris et al., 2023). In many examples, new technologies are developed to support specific social goals, such as more social exchange (Pallay et al., 2009; Taylor & Harper, 2002), more empathy (Huck et al., 2014, 2015), better family sleep (Cherenshchykova & Miller, 2021; Ozenc et al., 2007), feeling connected from a distance (Brereton et al., 2015; Kirk et al., 2016; van der Hoog et al., 2004), or generating compassion in public spaces (Mah et al., 2020).

Individual rituals have received less attention in HCI, with only two types of individual rituals: interaction rituals involving one person and their device (Barron et al., 2021; Benabdallah, 2020; Chang & Ishii, 2006; Primlani et al., 2022) and grief rituals (Eriksson & Hansen, 2017; Hemmert et al., 2022; Sas et al., 2016; Uriu & Okude, 2010; Uriu et al., 2018).

The ritual actor(s) dimension also emphasises unique challenges for designing interactive technologies for social and individual rituals. For social rituals, a unique challenge is understanding the social structures and cultures and balancing the potentially different social and individual needs of several ritual actors. Social rituals primarily fulfil social functions and usually concern individual aspects of people's relationship with one another (e.g., empathy, social exchange, feeling connected from a distance). In contrast, a unique challenge for individual rituals is their similarity to routines, at least as seen from the outside. Identifying individual rituals is not an easy task, also because they often take place in private spaces. Moreover, individual rituals are idiosyncratic, and usually also newly invented, making it more challenging to design technologies that actually fit. This also results in the difficulty of transferability to other contexts and/or people.

3.2.4 Ritual Origin: Religious to Secular

The rituals described in HCI literature also differ regarding their origin, from religious to secular. Some publications focus on institutionally administered rituals, such as weddings (Massimi et al., 2014; Stark, 2017), funerals (Uriu et al., 2021b), or pilgrimage (Putri et al., 2020). Other publications have taken a different approach and mixed and matched religious elements and symbols to enable novel rituals, such as *ThanatoFenestra* inspired by the Buddhist family altar (Uriu & Okude, 2010), or the *Human-God Interfaces*, a set of tangible artefacts based on Catholic beliefs (Hemmert et al., 2020).

In the absence of other references, I have categorised all examples that do not explicitly state a religious reference as secular. As a side note, it seems quite possible that far more of the rituals described take inspiration from or integrate religious elements than are explicitly named as such. Overall, significantly more rituals within HCI literature are secular, and the examples cover a wide range of contexts, from traditional (Kanai & Kitahara, 2011; J. Li et al.,

2023; Zainuddin, 2021) and cultural rituals (Loke et al., 2012; Striner et al., 2021) to family (Cherenshchykova & Miller, 2021; Ozenc et al., 2007) or individual rituals (Benabdallah, 2020; Eriksson & Hansen, 2017; Jiang et al., 2018; Primlani et al., 2022; Sas et al., 2016).

The ritual origin dimension also emphasises unique challenges for designing interactive technologies for religious and secular rituals. A unique challenge for religious rituals is the connection to something greater or outside oneself and the long-developed religious traditions. Interactive technologies for religious rituals must fit with these spiritual dimensions and religious traditions. Therefore, a thorough understanding of religion at several levels is needed, including the general belief system, a congregation's specific practices around the belief system, and an individual's religious experiences in these practices and beyond. While religious rituals are often recognised as such at first glance, this recognition is often more difficult with secular rituals. Here, a unique challenge is identifying possible contexts and sites of rituals. Especially in everyday life, secular rituals may have a closer similarity to routines and might be challenging to detect or design. In addition, the cultural context and the corresponding value systems of possible ritual actors must be understood if interactive technologies are to be designed for this ritual context. This is challenging because cultural values are not fixed or documented but require conversations with people and immersion in the cultural context.

3.3 Approaches to Ritual Research in HCI

The following sections describe the main research approaches to rituals with interactive technologies in HCI. Previous work can roughly be divided into two major lines of inquiry: analysis and design. Each line of inquiry contains a multitude of perspectives, and they are not mutually exclusive but rather emphasise different focal points in research. Together, they help understand the main approaches and topics discussed in HCI research on rituals.

3.3.1 Analysis: Understanding Ritual Experiences

A first line of inquiry is dedicated to analysing ritual experiences. It is about gaining a better understanding of ritual experiences at various levels, such as determining the existence of ritual experiences with interactive technologies per se or analysing how newly designed interactive technologies for rituals are perceived.

Analytical research on rituals in HCI at the most basic level (1) observes behaviours in the real world that can best be understood as rituals with interactive technologies. This research strand documents cases of rituals with interactive technologies from the real world and thus proves their fundamental existence. For example, Taylor and Harper (2002) analysed teenagers' mobile phone usage and found that their practices are best understood as ritualised gift-giving. Similarly, Haimson (2018) analysed how people in gender transition used social media and found that their usage patterns could be understood through transition ritual theories. Knox and Watanabe (2018) documented how a Buddhist temple in Japan performed funeral ceremonies for AIBO robots to support emotional detachment from the robots. Besides cases of rituals that have developed over a more extended period, the literature also documents the emergence of new rituals within prototype deployments. For

example, Gayler et al. (2020) reported how couples ritualistically appropriated a novel 3D flavour printing technology. The couple invented small rituals integrating the technology to support their transitions throughout the day, such as to calm down at the end of the day.

Another strand of analytical research (2) analyses how technology is appropriated for rituals in the real world. For example, Massimi et al. (2014) documented how various technologies were appropriated for wedding rituals to plan, perform and remember those rituals. Moreover, Massimi and Neustaedter (2014) documented how video chat technologies were appropriated for use in major life events. Another example is the work of Claisse and Durrant (2023) that explored the spontaneous appropriation of video chat technologies during the pandemic to perform Buddhist rituals online.

While the first two kinds of analytical research investigated rituals with interactive technologies, other works exist that (3) analyse ritual experiences without interactive technologies to inspire the design of interactive technologies. For example, Cherenshchykova and Miller (2019) studied practices around sleep in families and found that rituals play an essential role and that future technologies should support existing bedtime rituals. Similarly, Wu et al. (2018) studied human-vehicle interactions and found that drivers perform small rituals in everyday driving to support their emotional transitions connected with driving, which future technologies should support. Other works studied specific rituals to identify opportunities for future technologies, such as Petrelli and Light (2014) and their study on Christmas family rituals, Eschler et al. (2018) and their study on cancer survivor tattoo rituals, or Sas et al. (2016) and their study on rituals of letting go to inspire the design of digital object disposal. The first three analytical research strands show that inspiration for designing new interactive technologies can come from analysing existing rituals, whether deliberate or accidental.

Yet another analysis approach is more closely linked to design and encompasses works that (4) evaluate novel interactive technologies for rituals. Researchers first designed novel interactive technologies and subsequently evaluated them. To do so, researchers used various strategies to present their novel interactive technologies. For example, they used videos to convey conceptual ideas (Uriu et al., 2021a) or realised functional prototypes that people can live with (Kirk et al., 2016). Evaluations of technologies were carried out for various reasons, such as gathering initial feedback for further design improvements (Kanai & Kitahara, 2011; Soro et al., 2016; Uriu et al., 2021a), understanding people's experiences with the artefact (Dolata et al., 2019; Loke et al., 2012; Ozenc et al., 2007), or learning more about people's perspectives on potential future practices (Kirk et al., 2016; Uriu & Odom, 2016).

3.3.2 Design: Exploring Novel Interactive Technologies for Rituals

A second line of inquiry is dedicated to designing interactive technologies for rituals. Researchers have designed novel interactive technologies for various reasons and have taken very different approaches to the design.

Previous work has documented (1) the design of novel interactive technologies that support specific goals. For example, researchers designed technologies to increase social exchange (Pallay et al., 2009), empathy (Huck et al., 2014, 2015), sleep quality (Cherenshchykova & Miller, 2021; Ozenc et al., 2007), connectedness over a distance (Brereton et al., 2015; Hlubinka et al., 2002; Kirk et al., 2016; van der Hoog et al., 2004), or compassion

in public spaces (Mah et al., 2020). The goals were often more prominent than the topic of ritual, and rituals were only one way to support the goals. Thus, the question of what it means to design technologies for rituals intentionally is of secondary importance in this strand.

The topic of designing interactive technologies for rituals is more focal in works that (2) seek to solve specific ritual problems through design. Here, real-world problems are identified, and novel interactive technologies are designed to solve those specific problems. For example, a co-design project with elderly citizens of a rural area developed a streaming platform for attending worship services at a distance (Struzek et al., 2019). In doing so, the project encountered various problems unique to the local environment, such as the variety of devices that had to be supported or the poor internet connection. Similarly, Uriu et al. (2021b) set up a webcasting system for a funeral after COVID-19-related travel and meeting restrictions prevented the relatives of a deceased person from attending the funeral in person. Although rituals are at the centre of this research strand, it is less about exploring new possibilities and more about solving problems with existing technologies.

Works that (3) seek to initiate reflection or even change at a meta-level through design take a completely different approach. For example, Ritual Machines and Fenestra are designed not as solutions to fix existing problems but as a means to learn more about people's perspectives on current and potential future practices (Kirk et al., 2016; Uriu & Odom, 2016). By engaging with the artefacts, people should be encouraged to reflect and share their own perspectives. Other examples, HeartBeats and DataVows, are also intended to promote reflection but are designed with a more critical focus (Eriksson & Hansen, 2017; Stark, 2017). Both artefacts challenge perspectives on existing rituals or values, such as the value of personal digital data (Eriksson & Hansen, 2017) or the values incorporated in existing wedding rituals (Stark, 2017).

While the first three research strands reveal different design objectives, the following strands are more concerned with the design process itself. A common approach to exploring the design of novel technologies for rituals is (4) to mix and match existing (tangible and intangible) ritual elements. For example, to design Wish Happiness (Mah et al., 2020), SenseCenser (Uriu et al., 2018) or ThanatoFenestra (Uriu & Okude, 2010), the researchers drew on elements from existing rituals, such as incense smoke, light, sound, or photos and combined them in a way to create novel ritual artefacts that nonetheless fit into the context. Various artefacts designed in the Human-God Interfaces project mix and match Catholic beliefs with everyday tangible objects to create novel possibilities to encounter and experience those beliefs in small rituals (Hemmert et al., 2020). Whilst these examples aim to enable new rituals, the mix-and-match approach was also used to extend existing rituals. For example, Gustbowl is designed to expand the ritual of coming home and emptying one's pockets to enable connection with a remote family member (van der Hoog et al., 2004). Similarly, the Messaging Kettle expands the functionality of a kettle so one can get in touch with a remote family member when engaging in the ritual of making tea (Soro et al., 2016).

Another common approach to designing novel technologies for rituals is (5) gathering qualitative or ethnographic insights first that inspire novel designs. This approach attempts to abstract findings from the real world and to translate them into novel interactive technologies. Researchers applied various methods such as more or less structured interviews in or outside potential use contexts (Brereton et al., 2015; Butzer et al., 2020; Cherenshchykova & Miller, 2019; Evans et al., 2020) or cultural probes (Eriksson & Hansen, 2017; Kirk et al.,

2016). Often, individual insights inspired the subsequent design. For example, Kirk et al. (2016) collected a wide range of data about a couple's experience of home while together or apart and were inspired by one particular activity documented by both partners: their unique ritual of having a drink together at the end of the day that signifies that 'they have done "all the serious stuff"' (Kirk et al., 2016, p. 2478). Subsequently, they designed a novel technology to support their drinking ritual while apart. As reflected by this example, it was often rituals identified in the field that were then supported or enhanced by a new interactive technology (Brereton et al., 2015; Cherenshchykova & Miller, 2019; van der Hoog et al., 2004) or that were transferred from analogue to digital (Evans et al., 2020; Striner et al., 2021). However, the intentional design of interactive technologies for rituals was rarely the original aim; it emerged from their ethnographic insights. Researchers gathered ethnographic insights relating to specific design goals, such as supporting families in coping with mobile life (Kirk et al., 2016), connecting family members living apart (Brereton et al., 2015; van der Hoog et al., 2004), or improving sleep quality (Cherenshchykova & Miller, 2019), and only through these ethnographic insights did they learn about rituals' essential roles.

Overall, the design of new interactive technology for rituals is often (6) characterised by researcher-centred interests. The researchers decide on the rituals to be designed for and the specific design of the interactive technologies, often with little decision-influencing involvement from those affected. For example, a range of novel artefacts was designed based on research interests of exploring a design space more generally (Benabdallah, 2020; Choi & Achituv, 2012; Hemmert et al., 2020; Mah et al., 2020; Stark, 2017; Uriu & Okude, 2010; Uriu et al., 2018, 2021a) or exploring the effectiveness of a theoretically derived design (Cranor et al., 2010; Dolata et al., 2019; Huck et al., 2014, 2015). In the examples where those affected were involved in the design phase, the influence was often limited to them sharing their perspectives as inspiration for the designers at the beginning of the project, with the designers then prioritising and designing new interactive technologies (Brereton et al., 2015; Butzer et al., 2020; Cherenshchykova & Miller, 2019; van der Hoog et al., 2004). In rare cases, those affected were involved again at a later stage and were invited to live with the new technology or share their views on it (e.g., Kirk et al., 2016).

3.4 Summary and Conclusion of HCI Research on Rituals

Overall, the previous sections provided an overview of ritual research in HCI, including several key findings and open questions for future work that I will summarise in the following.

First, the term 'ritual' is used in many HCI publications, but often only in passing and without further explanation. This complicates understanding ritual research in HCI and identifying relevant publications.

Second, previous work has documented individual examples of rituals with interactive technologies in the real world. These examples demonstrate the fundamental existence of rituals with interactive technologies in the real world. However, it remains unclear how relevant rituals with interactive technologies are, i.e., whether they are only marginal phenomena in connection with special situations (e.g., gender transition), special people (e.g.,

teenagers) or special technologies (e.g., robots), or whether they are more broadly relevant. Therefore, as a first study in this thesis, I collected stories of real-world rituals with interactive technologies in P1.

Third, HCI researchers have explored various rituals but have rarely established connections between them. A structural basis is needed to systematise research on rituals in HCI and bring together the individual results. Therefore, I developed four dimensions of rituals (ritual complexity, variability, actor(s), and origin) and applied those dimensions to structure previous work. This process revealed similarities, differences, and challenges of various rituals documented in previous work. For example, many publications focused on less complex and newly invented rituals, with only a few examples addressing more complex and prescribed rituals. Furthermore, unique challenges have hardly been reflected upon, such as designing novel interactive technologies for complex prescribed rituals that ritual actors will accept and enable appropriate ritual experiences. Therefore, I explored various rituals and their unique challenges in the individual publications to cover the entire spectrum of ritual dimensions and purposefully selected rituals that have received less attention in HCI. For example, I focused on worship services in P2 and P3 (complex, prescribed, social, religious rituals), at relationship transition rituals (RTR) other than weddings in P4 (less complex, newly invented, social, secular rituals) and everyday blessing rituals in P5 (less complex, newly invented, individual, religious rituals). The ritual dimensions are only a first step toward more systematic research on rituals with interactive technologies in HCI. In P1, I developed a second classification scheme that complements the ritual dimensions. While the ritual dimensions help to structure rituals, the second scheme helps to structure interactive technologies in rituals and describes three roles that interactive technologies take in rituals.

Fourth, rituals often became a design focus by chance, for example, because they offered a way to support specific goals or were brought up as a focal topic by participants. Research intentionally designing novel interactive technologies for rituals is rare. I have therefore dedicated most publications to the intentional design of interactive technologies for rituals to learn more about the specifics of this particular design space (P3, P4, P5). In doing so, I systematically selected cases that would also advance HCI research on rituals more generally (e.g., because they explored specific rituals and roles of interactive technologies in these rituals that had not previously been researched).

4 Publications Overview

In the previous sections, I presented a brief overview of ritual research more generally and within HCI. This review is a first step towards collating ritual research in HCI and making it more accessible to the HCI community. In addition, it also highlights areas for future research to which I contribute with this thesis. Most importantly, this thesis aims to create a basis for more systematic research on rituals in HCI, for example, by analysing the preliminary work (as in Section 2 and Section 3), but also by analysing more real-world examples, developing structuring elements such as the ritual dimensions (see Figure S1), and addressing open questions such as intentionally designing interactive technologies for rituals.

While the individual publications are structured around specific questions relating to specific rituals, in this synopsis, I mainly highlight their respective contribution to HCI research on rituals more generally. To this end, I provide an overview of each publication, highlighting the characteristics and findings in relation to the ritual dimensions (see Figure S1) and the roles of interactive technologies in rituals (will be introduced in P1). The overviews are not mere summaries but emphasise essential details on interactive technology's roles in diverse rituals. All publications have been published in peer-reviewed journals (P1) or peer-reviewed proceedings of high-profile conferences (CHI: P2, P5, DIS: P3, TEI: P4). Independently of the publications directly relevant to this thesis, I have contributed to another 18 publications (see Appendix: List of Publications) and organised five scientific workshops to deepen individual topics and exchange ideas with leading researchers in fields relevant to this thesis (e.g., participatory aspects of research (Berger et al., 2020, 2023; Mucha et al., 2021), research in religious and/or spiritual contexts (Markum et al., 2022, 2023)).

4.1 Methodology

All publications are the result of interdisciplinary collaborations. HCI research can generally be regarded as interdisciplinary, integrating and applying methodological and subject-related knowledge from other disciplines such as psychology, computer science, engineering, or design (Blackwell, 2015; Liu et al., 2014; Rex Hartson, 1998). The overarching theme of this thesis, the research and design of interactive technology for rituals, touches on additional disciplines. This is also evident from the list of co-authors, who have backgrounds in HCI, Protestant theology, social anthropology, psychology, and design.

Since ritual research in HCI is still in its infancy, this thesis has an exploratory focus. This exploratory orientation is also reflected in the research questions and methods applied. For example, I primarily worked with qualitative-empirical methods such as adapted Contextual Inquiry (Holtzblatt & Beyer, 2017), adapted Critical Incident method (online) (Flanagan, 1954), iterative analysis inspired by Grounded Theory (Emerson et al., 2011), Thematic Analysis (Braun & Clarke, 2006), Affinity Diagramming (Holtzblatt & Beyer, 2017) and design-orientated methods such as research through design (RtD) (Zimmerman et al., 2007), Design Probes (Mattelmäki et al., 2006), and Provotyping (Mogensen, 1992). Applying these methods, this thesis makes empirical, artefact, methodological, and theoretical contributions.

All research was conducted in Germany and guided by me, a German female researcher in her late 20s trained in HCI. I was raised in a Christian tradition and thus have basic knowledge of the Christian rituals covered in this thesis, but I am no longer a member of any church congregation. I have personal experiences with RTRs since I have been in committed relationships and am married now. As co-founder of the Participation section within the German Informatics Society, the participation of those affected is an essential theme for me. As a reminder before diving into the details, Table S1 provides an overview of the most essential information on each publication at a glance.

4.2 P1 Overview: Interactive Technologies Take Three Recurring Roles in Real-World Rituals

4.2.1 Objective

The overview of previous HCI research on rituals has documented individual instances of real-world rituals with interactive technologies. However, these were often more anecdotal (e.g., Gayler et al., 2020) and either focussed on specific contexts or technologies instead of rituals per se (e.g., Eschler et al., 2018; Haimson, 2018; Massimi & Neustaedter, 2014). Therefore, as a first step, we² wanted to determine whether rituals with interactive technologies are relevant today, i.e., whether they occur in the real world and without our intervention. We collected stories of rituals that integrated interactive technologies to (1) broaden HCI's view and identify more real-world examples for analysis of interactive technology's roles in rituals, (2) understand better how people appropriate and use interactive technologies during life transition rituals and (3) identify opportunities for future research and design.

The first publication thus makes an empirical contribution and documents that young adults indeed have and invent rituals with interactive technologies and that interactive technologies take on different roles in rituals. The publication also makes a theoretical contribution by proposing a classification scheme of three roles that can serve as a structuring element for analysing and designing interactive technologies in rituals more generally.

In this study, we deliberately focussed on transition rituals (Van Gennep, 1961) because life transitions can create feelings of uncertainty that increase the need for meaning-making and coping strategies such as rituals (Cooke & Macy, 2005; Ozenc, 2014; Schnell, 2009). Accordingly, we expected that people in transitional phases, in particular, would possibly resort to rituals. During life transitions without established cultural rituals, people may adopt transition mechanisms (e.g., rituals) and adapt them to their immediate needs. Given our objective to identify more real-world examples of rituals with interactive technologies, we did not further restrict the rituals to be described with regard to the four dimensions of rituals. As a result, very diverse rituals were shared by our participants.

4.2.2 Methodology

Using an adapted Critical Incident method (Flanagan, 1954), we collected and analysed 84 stories of rituals with interactive technologies. We recruited students in technology-related subjects because they are likely to be tech-savvy and in (multiple) life transitions. Through an online survey with open questions, we asked participants to detail one specific ritualistic transition experience involving technology and provide further context to their story. Inspired by the Grounded Theory approach (Emerson et al., 2011), we analysed participants' stories iteratively and identified three overarching roles of interactive technologies in transition rituals.

²I deliberately use the word 'we' in relation to the publications to emphasise that they were produced jointly with co-authors.

4.2.3 Outcomes

The first significant result of the study is the identification and documentation of various rituals with interactive technologies that young adults have in coming-of-age transitions. Participants' stories confirmed what had been described anecdotally in the literature: Rituals with interactive technologies exist, they play an essential role in contemporary life, and they are infinitely diverse even in such a narrowly defined group (see Figure P1.2 in P1).

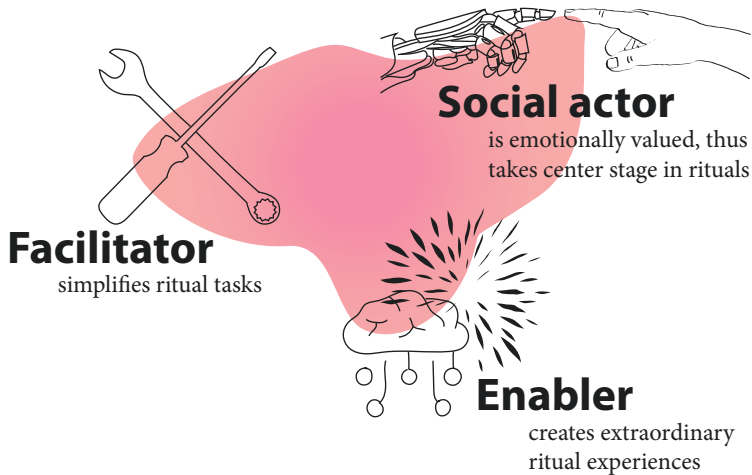


Figure S2: The three roles interactive technologies take in rituals.

In addition to documenting contemporary rituals, analysing participants' stories provided a more detailed insight into interactive technologies' roles in rituals. Interactive technologies were facilitators, enablers, or social actors (see Figure S2). Interactive technologies as (1) facilitators simplified parts of a ritual, mainly utilitarian goal-oriented tasks, that would otherwise have been accomplishable as well. In other words, facilitators were useful. Facilitators were tools that could be replaced by any other tool with the same capacity and were used in a routinised way. People were often already familiar with facilitator technologies from other contexts, such as e-mail or video conferencing applications used at work, and then employed them for tasks within the context of rituals. Interactive technologies as (2) enablers enabled (novel) rituals. In doing so, they focused on different aspects than facilitators, such as creating friction and extraordinary experiences rather than simplifying tasks. Enablers could be exchangeable as long as other technologies better supported the goal of experiencing extraordinary rituals, emotional values, and meaning attached to them. In turn, enabler technologies focused on supporting non-utilitarian goal achievement. Interactive technologies as (3) social actors took centre stage: A specific interactive technology was valued or even loved and thereby caused a desire to perform a ritual. The emotional value of interactive technology for a person was central to this role. Social actors had a temporally stable, personal significance for participants, making the technology meaningful and worthwhile.

They were perceived as unique or having unique qualities with particular values attached to them (e.g., one's first smartphone). Thus, technologies taking the role of social actors were not exchangeable, distinguishing them from the other roles. In addition, social actors did not simplify or enable transition rituals performed for other reasons but were at the centre of transition rituals and could even be the reason why a transition ritual was performed.

Each role comes with its own requirements and design implications: While it can be useful to focus on efficiency when designing facilitators, enablers should be designed with the expected, often extraordinary experiences in mind and social actors with their emotional value and social role in mind. Participants' stories uncovered that the aspect of intentional design has been neglected in real-world examples. The technologies in participants' stories were rarely explicitly designed for taking the enabler or social actor role.

Overall, these findings give rise to several implications and open questions for future work: First, the three roles offer a new structuring view of interactive technologies in rituals and should be considered in future work because what makes a 'good' technology also depends on the role it is intended to take. Second, future work should investigate whether the three roles can be usefully applied when analysing other rituals with interactive technologies, especially outside a transition context. Third, future work should explore whether the three roles can be usefully applied to support designing novel interactive technologies for rituals. In particular, the roles of enabler and social actor should be considered, as these were rarely explicitly designed for in participants' stories. I have explored these open questions in the following publications, in which I investigated the spontaneous appropriation of facilitator technologies (P2), proposed a method for developing novel enabler technologies (P3), designed a novel enabler technology (P4), and designed a novel social actor technology (P5).

4.3 P2 Overview: Appropriation of Facilitator Technologies for Rituals Leads to Tensions

4.3.1 Objective

My time as a doctoral student coincided with the COVID-19 pandemic, which also brought about changes in rituals that had previously received little attention in HCI: Religious rituals in everyday life. During the pandemic, religious communities in Germany were unable to meet on-site and appropriated technologies such as online streaming platforms for religious rituals such as worship services (Nord et al., 2021). These contextual circumstances provided a unique opportunity to understand better the spontaneous appropriation of interactive technologies in religious rituals and their consequences on the ritual experiences. Such knowledge is particularly valuable for HCI because, as described in Section 3.2, HCI has little knowledge of complex religious rituals. In addition, the detailed analysis of a real-world ritual offers the opportunity to apply and test the classification scheme of interactive technology's roles in rituals in a different context. In this study, we specifically focused on Protestant online worship service rituals during the COVID-19 pandemic. During the pandemic, the increase in online worship service offers was enormous (e.g., surveyed German pastors who offered online worship services before (4%) or during the pandemic (65%)) (Nord et al., 2021; Schlag & Nord, 2021). In essence, Christian worship services are collective gatherings where

congregants invoke an external power, seeking to make its presence tangible (Meyer-Blanck, 2011). Although the exact sequence of typical worship elements can vary between faith tradition, type of worship service, and local community, many online worship services followed ‘normal case’ worship services in their structure and elements involved. In doing so, they focused on preserving the existing ritual. Applying the four dimensions of rituals, worship services are complex, prescribed, social, religious rituals.

To gain more knowledge about the spontaneous appropriation of interactive technologies in rituals and the roles they take, we virtually observed and interviewed congregants during and after their participation in online worship services. As a result, we provide a detailed account of online worship service experiences and the elements that do (or do not) support the ritual experience, thereby making an empirical contribution.

4.3.2 Methodology

Due to the ongoing COVID-19 pandemic at the time of the study, we adapted the Contextual Inquiry method to allow for observations at a distance (Holtzblatt & Beyer, 2017; Mörike, 2021) and accompanied five online worship service experiences with eight congregants. Each session lasted about 1.5 to 2 hours. During the online worship service participation experiences, we refrained from asking questions to avoid interrupting the experiences and only observed participants taking notes. After the experiences, we asked participants to think through their experience and detail their thoughts and feelings. We analysed that data roughly following the Contextual Design method (Holtzblatt & Beyer, 2017), building an affinity diagram, an identity model, and walking the data with an interdisciplinary team of HCI students, researchers, and Protestant theologians.

4.3.3 Outcomes

For many congregations, the introduction of new technology for online worship services was based on a problem-solving idea: If meeting in person is not possible, then meeting online might be a solution. However, this problem-solving approach has not only resulted in positive experiences but has also caused tensions. Applying our lens of three roles to analyse the observations and statements, it became clear that the interactive technologies used for online worship services were most likely to take a facilitator role. Streaming worship services simplified to organise and participate in worship services. For example, participants noted that it was easier to sing along with subtitles, as no additional service book was needed. Many congregants were already familiar with accessing live streams from other contexts, and previous experiences with the same technology thus influenced their participation. For example, one participant used YouTube in other contexts without full-screen mode and, therefore, did not switch on full-screen mode when she participated in a worship service via YouTube.

Overall, the online worship services made it easier and more flexible for participants to organise and participate in the worship service or skip individual elements. Despite or perhaps because of this simplification, however, the online worship service experience was not entirely positive for participants but rather characterised by tension. The tensions arose mainly from the discrepancy between what the participants had imagined and hoped for and what the experience actually felt like. Our participants were looking for a sense of community -

and found individualisation; they were looking for something special in everyday life - and found the everyday; they were looking for a faith-strengthening, extraordinary atmosphere - and found an infotainment atmosphere. The simplification of participation incidentally rationalised away essential elements of the valued and longed-for worship service experience.

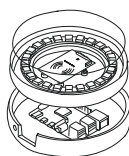
With regard to potential next steps, such as exploring new technologies for technology-mediated religious rituals, we could have continued in the same problem-solving pattern used by congregations: Meeting on-site was difficult and not possible, so the problem was solved with a live stream that allowed and simplified participation. Feeling connected to the community in online worship services is complicated, so we could solve the problem by making the current number of participants more easily visible. Yet, this approach overlooks the dynamic changes in rituals within online and everyday contexts (Campbell, 2020; Claisse & Durrant, 2023; Claisse & Durrant, 2022), disregarding both technological capacities and deeply rooted community values. However, how could the ritual experience be improved in other ways through design? A recourse to the three roles, especially the role of technology as an enabler, has shown us a new way forward: It might be worth focusing on how novel interactive technology could enable (rather than facilitate) a valuable ritual experience. However, how can such an enabling technology be designed, especially in the context of complex, prescribed, social, and religious rituals? We explored this question in P3.

4.4 P3 Overview: Provotype Method for Intentionally Designing Enabler Technologies for Rituals

The God-I-Box is a provotype that reflects existing tensions such as community vs individuality. It allows access to parts of an online worship service through dedicated tangible objects, thus dividing the worship service into small units making congregants act almost as liturgists of their online worship service.



God-I-Box



4.4.1 Objective

From the preceding work, the overarching question arose about how technologies could be designed not simply to solve problems but with the exploratory aim of enabling new ritual experiences, in our case, new worship service ritual experiences, based on a thorough understanding and integration of existing perspectives. An analysis of HCI literature on technology-mediated rituals uncovered that no suitable methodological approach was documented. Previous work either explored new enabler technologies, with designers proposing new technologies for less complex, newly invented, mostly individual rituals (e.g., Uriu & Odom, 2016; Uriu & Okude, 2010; Uriu et al., 2018, 2021a) or developed new technologies for complex, prescribed, social rituals in close collaboration with those affected, with the results being less exploratory and more problem-solving (e.g., Struzek et al., 2019; Uriu et al., 2021b). However, we required a methodological approach that would allow for both exploration of new enabler technologies but for complex, prescribed, social, and religious rituals.

Therefore, this work aimed to identify a theoretically suitable methodological approach, adapt it to the context of technology-mediated rituals and explore whether it could actually be applicable in practice. As a result, we adapted the provotype approach (Mogensen, 1992) to our context by iteratively developing a provotype for technology-mediated worship services, the God-I-Box, and gathered initial reactions to the provotype from congregants and pastors. P3 thus makes a methodological contribution while also integrating artefact and empirical contributions.

4.4.2 Methodology

Based on our findings in P2 and subsequent considerations, requirements for a possible design method emerged: The method should (1) be well suited for early design phases, (2) enable the integration of various ritual actors in the process, (3) facilitate a negotiation process about existing tensions, (4) generate design-relevant knowledge, and (5) enable a better understanding of current practices as well as future possibilities that go beyond a problem-solving perspective. A comprehensive approach that might, theoretically, integrate these elements is the provotype approach. Provotypes, provocative prototypes, are functional artefacts embodying tensions identified in ethnographic research (Boer & Donovan, 2012; Boer et al., 2013). Unlike final products meeting user needs, provotypes serve as tools in early design phases, facilitating engagement with a context and promoting a deeper understanding (Boer & Donovan, 2012; Boer et al., 2013; Shorter et al., 2022). Exposure to provotypes fosters constructive dialogue, allowing researchers to address emerging tensions collaboratively and envision potential futures with those affected in RtD projects (Boer & Donovan, 2012; Boer et al., 2013; Raptis et al., 2017; Shorter et al., 2022).

Based on our ethnographic findings, we iteratively developed our own provotype and consulted with a collaborating theologian and pastor in training throughout the process. Starting with ideation based on the tensions found in the field (P2), we performed two iterations of provotyping and testing to ensure the provotype would invite open exploration and be easy to understand regarding its basic interaction mechanisms.

Following this process, we created the final provotype, the God-I-Box, which we then presented to congregants and pastors. We aimed to gain insights into their initial reactions to the God-I-Box and assess whether these reactions could be useful for our broader objective of exploring enabler technologies for future worship services based on a thorough understanding and integration of existing perspectives. On a meta-level, these insights helped us assess the suitability of the novel methodological approach. We were cautious with this step to ensure that the provocation remained within a productive framework. Thus, we presented the God-I-Box to six congregants and pastors in individual sessions online. Guided by our research objectives, we performed a thematic analysis (Braun & Clarke, 2006) and identified three distinct modes of reactions that the God-I-Box triggered in online first encounters.

4.4.3 Outcomes

The outcomes of this process are twofold: an artefact, the God-I-Box provotype, and empirical findings on initial reactions to the God-I-Box. Taken together, these outcomes help to assess the method's suitability. The God-I-Box reflects the tensions found in P2 (e.g., seeking community vs. experiencing individuality, seeking the extraordinary vs. experiencing ordinariness). Put simply, the God-I-Box allows access to parts of an online worship service by placing dedicated tangible objects on a pedestal-like box. It thus divides the worship service into small chunks and allows congregants to act almost as liturgists of their own worship service – a purposeful exaggeration of individuality and flexibility. The God-I-Box provokes conceptually as it breaks with the traditional structure, content, and circumstances of form and content-related decisions: Congregants are invited to curate their individually structured online worship services, integrate unusual content such as meditative experiences, and speculate about who produces and shares individual parts of an online worship service. The God-I-Box provokes functionally in that congregants are invited to take more active roles, and it provokes aesthetically with no apparent reference to religious content and a simple 3D-printed appearance that is more reminiscent of a do-it-yourself culture.

Analysing the congregants' and pastors' reactions to the God-I-Box, we identified three distinct modes of reactions, each of which contributed to our objectives in different ways. The first mode of reaction, *spontaneous emotions*, was reflected in the verbal and non-verbal expressions of the participants and suggested emotions such as curiosity and surprise but also confusion or rejection. Spontaneous emotions functioned as entry points: They first indicated the participants' attitude towards the God-I-Box but required an active invitation to obtain more information about this attitude. The second mode of reaction, *reflective coping*, was characterised by more cognitive, reflective reactions of coping with the provotype's provocations. For example, congregants and pastors expressed whether they liked/disliked aspects of the God-I-Box, shared reasons for this appraisal or asked more in-depth questions. These reactions uncovered attitudes towards the God-I-Box and the ritual of worship services more generally. Some participants also tried to imagine the God-I-Box's fit into their environment and reflected on its potential impact. This reflective coping reaction was often followed by the third mode of reaction: *exploratory imagination*. Exploratory imagination reactions included, for example, the invention of adapted or novel features and specifications or entirely novel technology concepts. On the one hand, these reactions directly contributed

to our goal of exploring novel enabler technologies for worship services; on the other hand, the participants' ideas were often less exploratory and more concerned with fixing problems of the God-I-Box or changing small features like its light or shape.

Overall, the Provotype approach elicited various responses from congregants and pastors, all contributing to a better understanding of current perspectives on technology-mediated worship services and, thus, increased design-relevant knowledge.

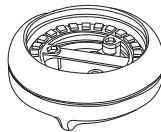
As such, the provotype method provided a way to integrate various ritual actors and simultaneously encouraged reflection on existing tensions. Facilitated through the provotype, pastors learned about and responded to congregants' experiences in current online worship services, and congregants shared more in-depth details on their experiences and perspectives. Taken together, the provotype approach proved to be a suitable method that supported the design process of novel enabler technologies in the context of complex, prescribed, social, and religious rituals. However, what could a technology look like that actually enables new rituals? We explored this question in P4.

4.5 P4 Overview: Enabler Technologies for Rituals can be Designed Intentionally

El Corazón (Spanish for heart) is a ritual artefact enabling novel relationship transition rituals. Couples can open El Corazón and record their heartbeats. After some time, a light becomes visible combining the two heartbeats that is now preserved forever.



**El
Corazón**



4.5.1 Objective

The findings of P1 demonstrated that technologies not only change existing rituals but also enable entirely new ones. In P3, we took a closer look at the design process, but what could technologies look like that are intentionally designed to enable novel rituals? To investigate this question, we considered a ritual context that is not institutionally bound and has demonstrated an openness towards newly invented rituals in the past: RTRs. We understand RTRs

as specific transition rituals performed on special occasions to mark the transition from one relationship status to another. In Germany, a widespread RTR is the wedding. Weddings are also the most frequently researched RTR in HCI literature (e.g., Massimi et al., 2014; Stark, 2017). However, weddings do not cover the diverse transitions of today's relationships, where people move in together before marriage or have open relationships. In turn, it is unsurprising that new RTRs emerge, with a prominent example being love locks hanging on bridges (Nord, 2017). Therefore, the context of relationship transitions seemed particularly appropriate to understand better how to design technologies enabling novel rituals intentionally. Applying the four dimensions of rituals, the RTRs we focused on were less complex, newly invented, social, and secular rituals. Following an RtD approach (Zimmerman et al., 2007), we combined insights from social science theory and ethnographic explorations around the ritual of love locks to learn more about essential aspects for designing novel enabler technologies. Based on these insights, we designed a novel enabler technology and presented it to ten couples. P4 thus makes empirical and artefact contributions.

4.5.2 Methodology

Our RtD process comprised three distinct phases: (1) ethnographic explorations, (2) design, and (3) experiences with the designed artefact. Initiating the RtD process, we first wanted to understand RTRs better, especially newly invented ones. In addition to reviewing the relevant literature, we interviewed seven people who had hung up love locks using an adapted Contextual Inquiry method (Holtzblatt & Beyer, 2017). We brought a love lock so participants could re-enact and demonstrate the ritual step-by-step, and, if possible, we visited the site of their love lock. Each session lasted about 1.5-2 hours. We analysed the data through affinity diagramming and wall walking, condensing our key insights into six pointers for designing technology-mediated RTRs.

The second phase aimed to refine our findings by intentionally designing a novel interactive technology for RTRs. In particular, we wanted to understand whether the design pointers could support the design of technologies that enable RTRs, especially ones that would differ from the love lock ritual. Through joint brainstorming and sketching sessions in an interdisciplinary team, we created ideas for novel enabler technologies in relation to all pointers. Combining and refining these individual ideas, we conceptualized a novel interactive technology, *El Coarazón*, that would enable novel RTRs. Through iterative prototyping, we further refined the artefact's design and interaction and, ultimately, implemented *El Corazón* as a functional artefact that could be experienced.

In the third phase, we wanted to understand better how *El Corazón* would shape resulting ritual experiences and invited ten couples. We asked couples about their perspectives on RTRs and gave them *El Corazón* to explore freely. They were asked to imagine future usage scenarios, and the researchers observed their explorations, taking notes. In subsequent semi-structured interviews, we asked couples about their imagined future ritual experiences and thoughts on *El Corazón*. Each session took about 45 minutes. We transcribed the recorded interviews and analyzed them thematically, focusing on how aspects of the six pointers, manifested in *El Corazón*, shaped the ritual experiences.

4.5.3 Outcomes

Our RtD project illustrated that technologies enabling novel rituals can be designed intentionally. The first phase of our project, ethnographic exploration, helped us better understand newly invented RTRs and their particularities. We condensed our findings into six pointers: *privateness & publicness*, *customisation & uniqueness*, *symbolism & transcendence*, *structuring & extraordinariness*, *physical & psychological accessibility*, and *stimulation & participation*. Together, the pointers mark the design space of RTRs, particularly newly invented ones. For example, we learned that RTRs require *structure & extraordinariness*. Hanging a love lock, particularly the lock itself, was perceived as special and extraordinary, quite different from the everyday. The love lock provided couples structure and marked a particular moment in their relationship, supported by respective symbolisms of, for example, irreversibility (e.g., when the love lock's key is thrown into the water). We expected the pointers to guide design and that their consideration would impact the resulting ritual experiences.

To test this assumption, we designed a novel interactive technology enabling RTRs: El Corazón. It is a tangible artefact that allows couples to record their heartbeats at a specific moment and transforms them into a joint light installation. When designing El Corazón, we were guided by the six pointers and integrated specific features for each dimension. For example, in terms of *structuring & extraordinariness*, we deliberately expanded the required interactions and included moments of friction. Interacting with El Corazón takes time and patience, and a sequence of steps needs to be performed, such as opening El Corazón, recording heartbeats, waiting for the resulting light installation to be generated, and so on. We could have automated or simplified many of these steps, but we consciously decided to structure and emphasize the process. Through this intentional design of a novel technology for rituals, we explored how the pointers could take shape in interactive technologies. In addition, we demonstrated how the pointers can support the design of technologies enabling new rituals.

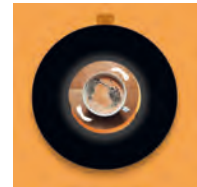
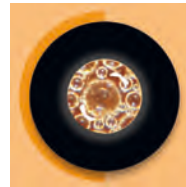
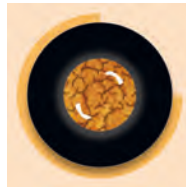
We structured the results of ten couples' explorations along the six pointers and gained more insights into how these came into play in couples' experiences with El Corazón. For example, it was interesting to see that most couples described their experience with El Corazón as positive, exciting, and unusual, despite the extended interaction. All couples welcomed the interaction process; some even requested more effortful interactions. Here, El Corazón differed from the love lock ritual because it generated *structuring & extraordinariness* through the interaction process. Interaction during the love lock ritual was described as pragmatic and quick, and *structuring & extraordinariness* was perceived due to the love lock's symbolism of the perceived relationship stability. In addition, the request for more effortful and extended interaction demonstrated that intentionally designing interactive technologies for rituals requires unique considerations that may differ from those in other contexts.

4.6 P5 Overview: Social Actor Technologies for Rituals can be Designed Intentionally

The Blessing Companion slowly uncovers images of the good in life - the blessed - at its own pace. It aims at supporting individuals cultivate awareness of blessings and encouraging small rituals in everyday life dedicated to fascination, reflection, and intentional perception of the blessed life.



Blessing Companion



4.6.1 Objective

In the above publications, we focussed on the role of technology as a facilitator (P2) or enabler (P3, P4). However, technology can also take the role of a social actor perceived as being socially meaningful and worthwhile, thus taking centre stage in transition rituals (P1). In search of a suitable context to explore the intentional design of a novel social actor technology, we also wanted to expand the range of rituals we explored. So far, we looked at either complex, prescribed, social, religious rituals (e.g., online worship services (P2, P3)) or less complex, newly invented, social, secular rituals (e.g., love lock ritual, ritual with El Corazón (P4)). We did not consider individual rituals or the combination of religious and newly invented rituals. Inspired by recent research on blessing robots (Löffler et al., 2021), blessing rituals in everyday life seemed to be a perfect example for exploring religious, newly invented rituals. A well-known blessing ritual is the Aaronite blessing, pronounced by priests at the end of the worship services. The blessing robot BlessU2 (Meltwater, 2017) takes a social actor role and imitates a pastor performing an Aaronite blessing. While the BlessU2 project served as a starting point for us, our project differed in two ways. First, we wanted to look at newly invented blessing rituals within the everyday. Second, we did not want to imitate existing ritual actors but explore what social actor technologies could look like for entirely new rituals and roles that would not simply imitate human ritual actors in role, form, and interaction. The aim was to explore possible alternative „relations between people and the digital” (Marenko & van Allen, 2016, p. 66) in this context. Therefore, we conducted another RtD project in close collaboration with Protestant theologians. Based on a design probe study

with Protestant believers, we iteratively designed a novel social actor technology for novel everyday blessing rituals, the Blessing Companion. P5 thus makes empirical and artefact contributions.

4.6.2 Methodology

As in the previous design-oriented publications, we followed an RtD approach with three phases (Zimmerman et al., 2007). The process started with exploring blessing experiences within the everyday. We reviewed Protestant theory on blessing and performed a design probe study with six believers who had dealt with the topic of blessing before (e.g., because being in training to become a pastor). We put together a probe package to inspire and support participants to reflect on their own blessing experiences in everyday life and speculate on future blessing technologies (see Figure P5.1 in P5). The study started with a kick-off workshop. Then, participants worked with the packages for 7-17 days and sent messages (text, voice recordings, pictures) via an anonymised chat account. Concluding the study, we performed another workshop to validate our understanding of their experiences, elaborate on essential aspects of their blessing experiences, and speculate on future blessing technologies. Combining the participant-produced data with our transcriptions, we roughly followed an affinity diagramming process and clustered the data for analysis.

In the second phase, the initial design development, we explored how an essential aspect of blessing experiences, their uncontrollability, could be designed. To do so, we performed a material exploration workshop investigating how uncontrollability is reflected in the surroundings and existing materials. Based on these insights, we performed individual and joint sketching sessions, produced a variety of conceptual ideas, and combined those ideas through prototyping.

We used a third phase to refine the design. To do so, we prototyped the Blessing Companion and tested it in a Wizard-of-Oz study with seven participants. Participants explored the Blessing Companion while thinking aloud and shared their perspectives in a subsequent semi-structured interview. We analysed our notes and transcribed recordings through affinity diagramming and used the insights to refine the concept's design – resulting in the Blessing Companion that we then implemented as a functional artefact.

4.6.3 Outcomes

With our project on everyday blessing rituals, we have strengthened our case for the intentional design of technologies for rituals and demonstrated that social actor technologies for rituals can be designed intentionally. The first phase of our project helped us better understand existing blessing experiences and essential qualities for designing novel social actor technologies for this context. We learned that blessings can be small positive moments in everyday life, reminding of an omnipresent blessing that can happen anytime, are not planned and cannot be demanded. Blessings are uncontrollable³, they cannot be forced or guaranteed. For all participants, this uncontrollability was an essential part of their blessing experiences in everyday life. So, it is not surprising that uncontrollability also played a

³German: unverfügbar

significant role in the ideas for new social actor technologies. For example, participants highlighted the necessity for a new social actor technology to create unexpected times and spaces perceived as distinct from the ordinary. To realise such an experience of surprise and friction, the technology would need to have, to some extent, unpredictable behaviour and character. In terms of the blessing ritual's content, participants imagined a novel technology to serve as a reminder of blessing within everyday life or a thought-provoking impulse, initiating to take a different, positive view of life.

The materials collected and sketches created in phase two showed some recurring ideas to implement uncontrollability, such as an abstractness and ambiguity in form and content or a constant change in appearance, so what one perceives never stays the same. Both were inspired by, for example, the ever-changing cloud images or shades from trees. Another recurring element was technology's uncontrollable character. A novel blessing technology could be designed to be uncontrollable to some extent. For example, instead of the human counterpart, technology could initiate interactions or outputs of the technology to human inputs could vary in an uncontrollable way. In this way, technology could be perceived as having its 'own will'. Yet another recurring element reflecting uncontrollability in design was contradicting affordances or lack of information. For example, technology could integrate abstract shapes, materials, or visuals that do not follow a clear metaphor, unlike existing examples such as the humanoid blessing robot BlessU2 (Löffler et al., 2021). Combining and integrating the various elements of uncontrollability at interaction-, form-, and content level, we conceptualised a novel social actor technology, later called the Blessing Companion. Conceptualised as a companion technology (Niess & Woźniak, 2020), the Blessing Companion is a specific proposition for a novel, socially meaningful relation between people and interactive technology (Marenko & van Allen, 2016). It is designed to be perceived as a counterpart, not a tool or extension of one's self (Hassenzahl et al., 2020), without imitating existing ritual roles or human actors. The Blessing Companion aims at helping individuals cultivate awareness of blessings and encouraging small rituals in everyday life dedicated to fascination, reflection, and intentional perception of the good in life - the blessed life. It presents images of the good in life when being approached, such as a beautiful nature scene. However, these images are not directly recognisable; they cannot be called up on demand but only become comprehensible over days. The Blessing Companion determines the exact time and process, so users must give up control and be patient. At the same time, the Blessing Companion, a physical artefact, functions as a constant reminder of blessings through its physical presence.

Participants encountered a Blessing Companion prototype so we could learn more about the impact of specific design decisions on the resulting experience. For example, the abstractness of the form led to various interpretations which went beyond the associations we had considered. Participants referred to the Blessing Companion as divination sphere, universe, eye, or symbol for infinity. Participants experienced friction and excitement in relation to the processual image unveiling and perceived it as particularly meaningful when the images shown matched their understanding of blessings. Overall, participants described their experiences as neither solely positive nor solely frustrating or dull but as both, resulting in curiosity and speculation about the Blessing Companion. To achieve this valuable friction, however, it seemed particularly important to balance uncontrollability and transparency (or controllability) at all levels: interaction, form, and content. Participants also speculated about potential integrations of the Blessing Companion into their own lives. A recurring idea was

to visit the Blessing Companion as part of a small, fixed ritual every morning or evening. Thus, The Blessing Companion was imagined to become an integral part of the daily rhythm and fulfil specific functions, such as encouraging calming and reflection.

5 General Discussion

This thesis aimed to contribute to HCI's understanding of (1) rituals with interactive technologies in HCI and the real world and (2) how to design interactive technologies for rituals intentionally. While the publication overviews were structured along interactive technologies' roles in rituals, the discussion is structured along the two research questions. This structure allows an additional perspective on the work and brings together individual results. As a result, the discussion condenses more overarching findings, discusses the main contributions of this thesis to HCI and suggests areas for future research on rituals in HCI. In addition, I reflect on the main limitations of this work and close with a conclusion.

5.1 Understanding Rituals with Interactive Technologies

5.1.1 Contribution 1: Evidence for the Existence and Relevance of Rituals with Interactive Technologies in the Real World

Previous work in HCI documenting real-world rituals with interactive technologies has been limited to specific, predetermined rituals or interactive technologies (e.g., Haimson, 2018; Hansen & Koefoed Hansen, 2022; J. Li et al., 2023; Massimi & Neustaedter, 2014; Massimi et al., 2014; Petrelli & Light, 2014), or has identified real-world rituals by chance only (e.g., Gayler et al., 2020; Menheere et al., 2020; Taylor & Harper, 2002), thus making them appear like a marginal phenomenon. This thesis documents various rituals with interactive technologies that exist in the real world, independent of specific interactive technologies and without researchers' intervention, thus highlighting their real-world existence and relevance. For example, P1 documents a variety of rituals with interactive technologies that young adults engage in. These rituals concerned various topics such as participants' relationships, relocation, work/education, growing up, daily rituals and grief/health and included technologies such as smartphones, apps, PC laptops, webpages, games, music players, and more. In a very pragmatic way, young adults appropriated the technologies surrounding them to meet their ritual needs. Another context where young adults appropriated interactive technologies for rituals are relationship transitions, where young couples who met through dating apps delete these apps together to transition to a more serious relationship (P4). But it is not just young adults who engage in rituals with interactive technologies. In P2, where we explored how church congregations appropriated streaming technologies to celebrate worship services during the COVID-19 pandemic, the age range of participants was much broader, ranging from 23 to 69 years. Altogether, these cases demonstrate that rituals with interactive technologies are not just a rare niche phenomenon but ubiquitous, occurring regularly in

the real world across different age groups, technologies, and topics. People engage in rituals and invent new ones where there are no culturally determined rituals yet, and interactive technologies are intimately interwoven in these rituals.

In addition, the real-world rituals with interactive technologies documented in this thesis demonstrate a diversity that goes beyond what has been described in HCI literature. For example, previous work documenting real-world rituals emphasised social rituals involving several ritual actors (e.g., Gayler et al., 2020; Massimi & Neustaedter, 2014; Massimi et al., 2014; McWharter, 2023; Petrelli & Light, 2014; Taylor & Harper, 2002). However, examples such as the transition ritual of reorganising a smartphone's home screen 'for a more adult stage of life' (P1) highlight the existence of individual rituals. Future work could strengthen the evidence for the presence of various rituals with interactive technologies in the real world, particularly by exploring rituals in less considered contexts, such as organisational or work-related rituals or geographically more diverse locations.

5.1.2 Contribution 2: Increased Understanding and Structuring of Rituals with Interactive Technologies in HCI

Up to now, HCI has often assumed an under-complex understanding of rituals. For example, the lack of description and specification in many publications mentioning 'ritual' may indicate an underlying assumption that all readers share the same understanding of 'ritual' and no further explanation is needed (e.g., Ashford, 2021; Corbett & Le Dantec, 2018; D. Kim et al., 2022; Sarangapani et al., 2019; Vosinakis et al., 2022; Wenxuanzi & Li, 2021). However, not all HCI publications share the same understanding of 'ritual' or focus on the same kind of rituals in their research. Instead, HCI research has applied a variety of understandings and, consequently, focused on very different rituals (see Section 3.2). The diversity of ritual understandings in HCI is not a problem per se but reflects the variety of understandings also present in ritual studies (see Section 2). More problematic is the lack of specification of the respective ritual understanding and the lack of reference between the various ritual publications in HCI. To increase HCI's ritual understanding, this thesis presented a brief overview of various ritual understandings in ritual studies, highlighted HCI's ritual research landscape and contextualised its diversity, and explored a variety of rituals in the five publications compiled in this thesis.

In addition, this thesis developed two classification schemes that help systematise and structure (research on) rituals with interactive technologies, namely (1) four dimensions of rituals and (2) three roles of interactive technologies in rituals. I understand these classification schemes as a form of intermediate-level knowledge (Höök & Löwgren, 2012; Löwgren, 2013), 'knowledge that lives in between generalisable theories and single instances' (Frauenberger, 2019, p. 2). As such, they should also be applicable to examples beyond those presented in this thesis, as will be demonstrated in the following paragraphs.

Four Dimensions of Rituals Based on analysing the differences and similarities of the rituals considered over the years, I proposed four dimensions that can help structure rituals: Ritual complexity, ritual variability, ritual actor(s), and ritual origin (see Figure S1). By using these dimensions as a lens for analysis, I was able to structure previous work in HCI and uncover interesting trends (see Section 3.2). For example, previous work paid much attention to

less complex, newly invented, secular rituals (e.g., Brereton et al., 2015; Cherenshchykova & Miller, 2021; Eriksson & Hansen, 2017; Jiang et al., 2018; Kirk et al., 2016; McWharter, 2023; Ozenc et al., 2007; Sas et al., 2016; Wu et al., 2021) and less to more complex, prescribed, religious rituals, with the exception of weddings (Massimi et al., 2014), funerals (Uriu et al., 2021b), and pilgrimage (Putri et al., 2020). Therefore, we explored these previously neglected rituals with our work on technology-mediated worship services (P2 and P3). The four dimensions of rituals emphasise the nature of rituals and can help analyse examples, structure previous work, or uncover open questions for future research and design with regard to rituals. The second classification scheme developed in this thesis complements this perspective with a greater focus on interactive technologies' roles in rituals.

Three Roles of Interactive Technologies in Rituals In P1, we found that interactive technologies take on specific recurring roles in transition rituals. They are facilitators, enablers, and social actors (see Figure S2). Whilst the three roles were identified in the context of transition rituals, they were also useful in the context of other rituals. For example, they supported us in uncovering a mismatch in congregants' expectations (a technology that would enable an extraordinary experience) and current technology's role (a facilitator that simplified access) in the context of technology-mediated worship services (P2, P3), and guided the intentional design of a new enabler technology for RTRs (P4) and a new social actor technology for blessing rituals (P5).

However, the three roles can also be applied beyond my work to analyse and structure previous work. For example, several examples from HCI literature describe how interactive technologies simplified rituals, which I would classify as facilitator technology. A prominent facilitator technology in previous work is video chat technologies that simplified remote participation (e.g., Claisse & Durrant, 2023; Massimi & Neustaedter, 2014; Struzek et al., 2019; Uriu et al., 2021b). Similarly, project management software or to-do lists simplified utilitarian tasks relating to wedding rituals by 'allowing much of the practical planning work to become "invisible"' (Massimi et al., 2014, p. 854). Other examples from previous work resonated more with the idea and focus of interactive technology as enabler. For example, SenseCenser (Uriu et al., 2018) and ThanatoFenestra (Uriu & Okude, 2010) were designed to explore how interactive technologies could enable remembrance rituals in novel ways. Special care was taken in the design to create extraordinary experiences, for example through the use of specific materials typically used in analogue remembrance rituals such as candles or incense smoke. Other examples of enabler technologies are Gustbowl (Hoog et al., 2004, 2004) and Messaging Kettle (Ambe et al., 2017; Brereton et al., 2015, 2017) that were designed to expand existing rituals to enable novel ritual experiences that also involve remote family members. The social actor's role was less represented in previous work. However, an interesting example is the work of Knox and Watanabe (2018), which documents funeral services for AIBO robots in Japan that are intended to support emotional detachments from the robots. As demonstrated in this section, the three roles can be usefully applied to various rituals with interactive technologies. They offer a new lens to look at and structure previous work. Previously, the individual examples stood side by side, unconnected; the three-role perspective makes it possible to see commonalities and thus bring together existing but unconnected findings.

Overall, the four dimensions of rituals and the three roles of interactive technologies in rituals can support others in navigating the evolving area of ritual research in HCI. As demonstrated in this thesis, both classification schemes can function as analytical and generative tools. From an analytical perspective, they can help structure previous work or analyse existing rituals with interactive technologies or novel prototypes. From a generative perspective, they can support research and design of rituals with interactive technologies by prompting to take specific perspectives. This generative perspective will be discussed in greater depth in Section 5.2.1. Both classification schemes are intended as starting points to be evolved in future work. For example, it is conceivable that the three roles of interactive technologies will be further refined with more research and design in the future. Future work can use the two classification schemes to interconnect and identify gaps in previous research, analyse instances of rituals with interactive technologies, and inspire the development of new interactive technologies for rituals.

5.1.3 Contribution 3: Evidence for the Necessity of Intentionally Designing Technologies for Rituals

The cases of real-world rituals with interactive technologies documented in this thesis demonstrate that the technologies appropriated are usually not specifically designed for this purpose: People reorganise their smartphone's home screen to feel more adult (P1), participate in worship services through wide-spread streaming platforms such as youtube (P2), or simultaneously delete their dating apps to mark a relationship's start (P4). In doing so, technologies are selected more or less explicitly for use in rituals. Often, a specific goal is to be achieved, such as feeling more adult (interpreted as more productive) (P1) or meeting for worship services despite contact restrictions during the COVID-19 pandemic (P2). In turn, ways are sought to achieve these goals, leading to the invention of rituals or the appropriation of technologies to solve problems with existing rituals quickly. However, these spontaneous appropriations do not only lead to positive experiences. For example, although online worship services simplify access to worship services, they do not always manage to generate extraordinary ritual experiences (P2). In turn, new ways of more intentionally designing interactive technologies for rituals are needed. In addition, the design explorations in this work have shown that design considerations in the context of rituals can differ significantly from those in other contexts. For example, it can be valuable for ritual experiences if interactive technologies prolong an interaction or even make it more effortful (P4, P5). Ritual experiences have unique demands and, therefore, require intentional design.

A similar argument is also put forward in recent publications. For example, Claisse and Durrant (2023) reported how practising Buddhism online during the COVID-19 pandemic altered the experience of chanting mantras together, as essential elements such as the feeling of people's physical presence during chanting were no longer possible. And Hansen and Koefoed Hansen (2022) called for more intentional ritual design of digital divorce forms that, so far, have been designed according to usability principles only and, as such, do not match people's needs to address their feelings of uncertainty or the divorce's meaning for their life.

Overall, the cases documented in this thesis strengthen the need to understand better how interactive technologies can be designed intentionally for rituals. Although HCI is concerned with understanding and addressing people's needs through respective technology designs

(Dix et al., 2004), people's ritual needs have hardly been considered, and corresponding design knowledge has not been compiled yet. Future research should focus on identifying and collating people's ritual needs across contexts. Only if the needs are recognised and understood can they be considered in the design of new interactive technologies.

5.2 Intentionally Designing Interactive Technologies for Rituals

In addition to understanding better rituals with interactive technologies in HCI and real-world contexts, this thesis also explored how interactive technology can be designed intentionally for rituals. In the following paragraphs, I discuss my contributions concerning this design exploration focus.

5.2.1 Contribution 4: Three Novel Interactive Technologies Intentionally Designed for Rituals

As discussed in Section 5.1.3, exploring how to design technologies for rituals intentionally is necessary. To probe what interactive technologies designed for rituals could look like, this thesis provides three tangible examples of interactive technologies designed for rituals: El Corazón (P4), the Blessing Companion (P5), and the God-I-Box provotype (albeit with a more methodological focus (P3)). All three examples demonstrate that rituals can take centre stage in interactive technology design and be designed intentionally. El Corazón is an example of an enabler technology enabling novel RTRs, the God-I-Box is a methodological artefact supporting the design of future enabler technologies in the context of worship services, and the Blessing Companion is an example of a social actor technology that embodies blessing's uncontrollable character in content, form, and interaction.

The fact that the artefacts are the way they are is no coincidence; very conscious decisions were made during the design process regarding the ritual focus. The two classification schemes have proved particularly helpful in this respect, as they provided guidance by highlighting essential elements that must be addressed in the design. For example, the three-role perspective highlighted the design for an extraordinary RTR experience (enabler) in the design of El Corazón (P4), with a specific focus on experiential aspects of the ritual to design for (see Table P1.1 in P1). As such, it was essential to understand what ritual experience was being sought and how technology could enhance or invite such experience. Based on experiential descriptions of the love lock ritual, we learned that the ritual experience should be *structuring & extraordinary* and translated these qualities into interaction design of a new enabler technology for RTRs without replicating the love lock ritual. Interacting with El Corazón takes time and requires patience and joint interaction. In contrast, applying a social actor perspective to the blessing ritual project guided us in focussing on social aspects and how interactive technology might be perceived as a counterpart rather than a tool or extension of one's self in the design (see Table P1.1 in P1). As such, the Blessing Companion's character and how it is perceived in the ritual experience moved into focus (P5). An example

of this social actor perspective is the idea of translating the blessing's uncontrollability into interaction design by, for example, implementing technology- instead of human-initiated interactions.

Furthermore, the four dimensions of rituals guided the three artefacts' design by highlighting unique aspects depending on the characteristics of the ritual they should support. For example, *El Corazón* was designed for RTRs, a social ritual involving two ritual actors in a romantic relationship. To support this specific social setting characterised by a couple's closeness, *El Corazón* was designed to require two people to interact with it simultaneously. More specifically, we included two heartbeat sensors placed close to each other, and couples must touch both sensors simultaneously for several seconds for them to function. In contrast, the *Blessing Companion* was designed for everyday blessing rituals involving just one ritual actor. Therefore, a proximity sensor was integrated to detect one person approaching head-on smoothly but not several persons approaching from various directions.

In contrast to many previous works, in which rituals tended to become the focus of design by chance (e.g., Brereton et al., 2015; Butzer et al., 2020; Cherenshchykova & Miller, 2019; Evans et al., 2020; Kirk et al., 2016; van der Hoog et al., 2004), we placed rituals at the centre of the design from the outset. In this way, we were able to collect much more targeted data about the ritual experiences and understanding of our participants early on in each project. This data helped us condense essential elements that could then inform our subsequent design, such as the six pointers for RTRs. In turn, we could design interactive technologies enabling completely new rituals without resembling existing rituals in form, interaction or content. This thesis thus expands the range of artefacts documented in HCI, as the artefacts described so far were often developed for existing rituals (e.g., Struzek et al., 2019; Uriu et al., 2021b), extended existing rituals (e.g., Brereton et al., 2015; Hlubinka et al., 2002; Kirk et al., 2016; van der Hoog et al., 2004), or directly integrated various elements of existing rituals such as symbols, materials or interaction in a mix-and-match approach (e.g., Mah et al., 2020; Uriu & Okude, 2010; Uriu et al., 2018).

Overall, the three artefacts demonstrate that technologies can be intentionally designed for rituals. However, their specific design depends very much on the type of ritual and technology's intended role within a ritual. Therefore, the two classification schemes can be valuable tools to think with when designing interactive technologies for rituals and should be considered alongside other commonly considered elements such as the general context, the design goals, or the people involved. While this thesis made a first step towards better understanding what it means to design interactive technologies for rituals intentionally, there are still many tasks for future work. For example, future research and design could make rituals a focus of design in other ritual contexts as well, applying and extending the two classification schemes. In addition, future work could explore how existing or novel rituals can be supported through re-designing existing interactive technologies. All examples presented in this work and most examples from previous work designed novel bespoke artefacts for rituals. However, it would be interesting to explore how a ritual focus in design would change design decisions in relation to existing interactive technologies such as dating apps, robot hoovers, or text-based AI systems.

5.2.2 Contribution 5: Methodological Considerations for Intentionally Designing Interactive Technologies for Rituals

Previous work describing the design of interactive technologies for rituals has rarely reflected on the conditions and processes of design. This gap is also evident from the contribution types addressed in previous work (Wobbrock & Kientz, 2016), that primarily focused on empirical (e.g., Claisse & Durrant, 2023; Eschler et al., 2018; Haimson, 2018; Massimi & Neustaedter, 2014) and artefact (e.g., Huck et al., 2014; Uriu & Okude, 2010; Uriu et al., 2018) contributions. Methodological or theoretical contributions are missing, although the various rituals bring with them unique challenges that raise methodological questions in particular (see Section 3). We have therefore focussed on methodological challenges in P3, and I will use this section to also reflect on the methodological approaches to design in P4 and P5.

In P3, we explored unique methodological challenges of prescribed social rituals. Designing novel interactive technologies for such rituals will inevitably change these rituals, with far-reaching consequences, and will affect multiple ritual actors with potentially different needs that must be addressed. Not addressing these challenges early on in the design can lead to people being disappointed because the ritual no longer meets their expectations (P2), rejecting the novel technology because it changes the ritual in an unacknowledged way, or, if prescribed rituals are administered institutionally, not approving the changed ritual and thus delegitimise it. Of course, the design of interactive technologies can deliberately break with prescriptions to criticise them or highlight opportunities for change (Stark, 2017). However, for new interactive technologies to be accepted by all ritual actors, the actors' various needs, the ritual's prescription, and respective administrators must be understood and integrated into design processes early on. In P3, we addressed these challenges and successfully applied the provotype method (Mogensen, 1992) in the context of technology-mediated worship services. The provotype method allowed us to include various ritual actors early on. By exaggeratedly breaking with certain prescriptions, the God-I-Box provotype provoked pastors and congregants to take positions and share perspectives on technology-mediated worship services as well as ideas for novel enabler technologies. Throughout the provotyping process, it was helpful to consult with a collaborating Protestant theologian who could contribute the perspective of the ritual's history and current interpretations.

In contrast to these considerations for prescribed social rituals, designing technologies for newly invented rituals poses different methodological challenges. To begin with, it is challenging to identify such rituals from the outside because they often resemble routines, take place in private spaces, and are very individual. We encountered these challenges in P5, where we tried to understand individual people's everyday blessing rituals. Given the challenges, we decided to send design probe packages to the participants (Mattelmäki et al., 2006) so they could document their own experiences in their everyday lives without us physically invading their private space or interpreting behaviours from the outside. This process worked well in our context, but we recruited participants sensitised to blessing rituals before (e.g., because they were training to become pastors). Another question arising from the challenges of newly invented rituals is how to identify cornerstones for the design and how technology can be designed in such a way as to invite a novel ritual that is accepted as such. In P4 and P5, we explored the design of technologies for newly invented rituals following an RtD approach (Zimmerman et al., 2007). Across both projects, we began with ethnographic explorations

to immerse us in current ritual experiences and combined those insights with ritual theories. One concrete result of this process is the design space for RTRs encompassing six pointers (P4). The pointers functioned as a cornerstone for design and operated on a more abstract level (e.g., *structuring & extraordinariness*). In designing the two artefacts for newly invented rituals, El Coarazón (P4) and Blessing Companion (P5), we also relied on ritual theories. For example, we took inspiration from the idea that ritual actions can even be uncoupled from pragmatic goals (Krieger & Belliger, 2013; Legare & Souza, 2012; Rossano, 2012) and thus focused heavily on the process of interaction during design, not necessarily on how to achieve a specific outcome through the process. In retrospect, this shift in design focus could have been essential for the success of the artefacts. The participants in both projects could imagine having new rituals with the artefacts, e.g., at meaningful relationship transitions, such as moving into their first flat together (P4) or daily at fixed times, such as every morning (P5).

An overarching question affecting the design of interactive technologies for all rituals is the question of power, which has rarely been reflected. If taking the effects of rituals documented in the literature seriously, such as emotion regulation (Summers-Effler, 2006), reflection and consolidation of social values or the shaping of social existence (Kapitány & Nielsen, 2017; Rossano, 2012; Trice et al., 1969; Van Gennep, 1961), then those having decision-making power in the design of interactive technologies for rituals are immensely powerful. Who decides on the emotions to regulate or the values to reflect and reinforce through a (technology-mediated) ritual (Wojtkowiak, 2018)? In previous work, designers often decided on the ritual to design for or the goals to be achieved through technology designs (e.g., Hemmert et al., 2020; Huck et al., 2015; Mah et al., 2020). In this thesis, I tried to take a different methodological approach and distribute power more widely by involving those potentially affected more closely. While none of the work presented in this thesis followed a strict participatory design approach (Simonsen & Robertson, 2012), I emphasised participation at various stages of the design processes and in all design-oriented publications. For example, in P5, we invited believers not only to share their perspectives on blessing rituals in everyday life but also to engage in ideation sessions for potential future technologies and consulted those interested again and again in the iterative design process. We entered the field without pre-determining the ritual to be designed, the goals to be achieved, or the technology to be integrated, but instead invited the believers to shape the design questions (e.g., what sort of ritual to design for, what sort of technology to explore) and bring potential answers to their questions. Another example is P3, where we explored the methodological approach of provotypes (Boer & Donovan, 2012) to also enable greater participation, particularly in the context of prescribed social rituals. A significant focus was on facilitating engagements between various ritual actors through the God-I-Box provotype, which made existing tensions in believers' experiences of online worship services tangible for pastors. Initial reactions to the God-I-Box showed that the God-I-Box successfully invited various ritual actors to recognise and respond to existing tensions, articulate their perspectives on technology-mediated worship services and thus have a say in exploring new technologies for worship service rituals.

Overall, I hope the various design process examples and methodological reflections invite others to consider methodological challenges and approaches more intentionally when designing novel interactive technologies for rituals. As a starting point, future work can draw on the unique challenges described (see Section 3). However, future work will certainly encounter further challenges and should actively collate these. Above all, future work should

carefully consider power distributions in ritual design processes. In addition, with more design examples in the future, practical tools to support the intentional design of interactive technologies for rituals could also be compiled.

5.2.3 Contribution 6: Two Novel Experiential Qualities for Intentionally Designing Interactive Technologies for Rituals

An essential question for the intentional design of interactive technologies for rituals is what guiding principles one should strive for. Analysing the artefacts designed in this thesis, two specific experiential qualities (Löwgren, 2007) become visible that could be valuable for design in the ritual context, namely *effort of use* and *uncontrollability*. The two qualities are a form of intermediate-level knowledge that can be applied to other ritual contexts as well (Höök & Löwgren, 2012; Löwgren, 2013).

Effort of Use The experiential quality effort of use refers to the experience of interaction with interactive technology as strenuous, prolonged, extended and requiring more investment than usual. In this way, effort of use contradicts classic design principles such as flexibility and efficiency of use (J. Nielsen, 1994) or learnability (Dix et al., 2004). At first glance, it is more closely connected with negative experiences to be avoided. However, in my RtD projects, the effort of use has proven to be a valuable, even desired, experiential quality for the context of ritual experiences.

For example, the interaction with El Corazón was deliberately designed to be effortful and extended, as inspired by the pointer *structuring & extraordinariness* (P4). The pointer reflects that RTRs should not be commonplace and should structure space and time. In addition, it reflects that rituals should emphasise the process rather than a pragmatic goal (Legare & Souza, 2012; Rossano, 2012), sometimes even uncoupling actions from goals like when putting up a love lock that symbolises but does not directly affect stability. The prolonged, effortful interaction required to open up El Corazón and record a couple's heartbeats met these criteria and resulted in specific experiential characteristics. For example, the fact that both partners must invest time and effort together to perform the ritual adds symbolic values of commitment, appreciation, and dedication to the ritual that are then projected onto a couple's relationship. These feelings and symbols would be challenging to invite in an interaction design that only requires a single click. Interestingly, all couples welcomed the prolonged interaction process; some even requested more effortful interactions. Considering the Blessing Companion (P5), effort of use is also addressed in its design. For example, human counterparts cannot simply request to see a blessing (here: something good from everyday life) but are required to patiently wait and come back again and again, which is associated with effort. This effort is further emphasised by the fact that it takes days for the Blessing Companion to finally uncover the blessing.

Uncontrollability The second experiential quality, uncontrollability, refers to the experience that interaction with interactive technology or interactive technology itself 'is not fully controllable, accessible, plannable, visible, available, traceable, graspable, enforceable, or knowable' (Wolf et al., 2023a, p. 2). Again, uncontrollability contradicts prevailing design

principles that suggest designing for comprehensibility, transparency and traceability. However, zooming out from an interaction context, it becomes clear that uncontrollability is an integral part of human experiences: Life is contingent, and some aspects of our experiences always remain uncontrollable (Luhmann, 1987; Rosa, 2020). Sociologist Hartmut Rosa even proposes uncontrollability as an essential component of a sociology of the good life (Rosa, 2021). In line with this perspective, my research on blessing rituals in everyday life has identified uncontrollability as an essential experiential quality, also in blessing rituals involving interactive technologies (P5). As a design exploration, we designed the Blessing Companion as an inherently uncontrollable counterpart that implements uncontrollability at a content, form, and interaction level. Believers cannot call up blessings at the push of a button but must engage with the rhythm of the Blessing Companion, which only slowly reveals images of blessings from everyday life. Uncontrollability as an experiential quality can have various characteristics. For example, something uncontrollable, like the Blessing Companion, can invite interest and fascination over a longer period due to its ambiguity and indefinability. It can trigger various associations and interpretations, ‘like when looking at clouds’ (P5-2), and invites open-ended exploration rather than clearly defined interactions to achieve specific goals. As such, the Blessing Companion, an uncontrollable social actor technology, is not used but explored, lived with, or experienced. Uncontrollability is an experiential quality that thrives on tension. However, identifying the sweet spot of uncontrollability is no easy task: While an exaggerated uncontrollability can be perceived as frustrating, an understated uncontrollability can be perceived as dull. Considering *El Corazón* (P4), some aspects of uncontrollability are also addressed in its design. For example, we deliberately did not include any feedback mechanism during heartbeat recording. A couple has to wait until, finally, the light animation becomes visible. During this process, couples might experience friction because the recording takes some time, and they are required to stay close to each other because of the sensors’ dedicated placements. *El Corazón* takes control in shaping the emerging social configuration (Ambe et al., 2017).

In addition, the concept of uncontrollability brings together and extends various experiential qualities and design considerations discussed in the literature, such as ambiguity and openness (W. Gaver et al., 2003, 2010) or unknowable elements (Hemmert et al., 2020). For example, ambiguity in design suggests distorting or presenting contradicting information (W. Gaver et al., 2003), which we used at a form level in our design of the Blessing Companion (P5). In contrast, unknowable elements, the concealing of underlying interaction mechanisms (Hemmert et al., 2020), open up space for various interpretations about the underlying mechanisms. ‘It could be random, it could be determinism, but it also could be God’ (Hemmert et al., 2020, p. 4). As such, uncontrollable elements are one way to realise uncontrollability at an interaction level.

Overall, I argue that effort of use and uncontrollability can be experiential qualities to strive for when intentionally designing interactive technologies for rituals. Their deviation from what is considered ‘good’ interaction design in other contexts strengthens the argument for intentional ritual technology design. The requirements for the design of technologies for rituals differ fundamentally from those in other contexts. While future work could explore other ways to address the two experiential qualities in design, the qualities should only be designed for with caution and in moderation. The two qualities are undoubtedly also perceived as valuable precisely because they differ from everyday interaction experiences, which tend

to be characterised by ease, efficiency, and controllability. Furthermore, uncontrollability and effort of use are just two experiential qualities of ritual experiences, and I look forward to future research that identifies more such unique qualities.

5.3 Limitations

Overall, this work has several limitations. While individual limitations are discussed within each publication, I will discuss more general limitations in the following paragraphs.

First, the pragmatic approach to the concept of ritual proposed in this work, as, for example, the polythetic definition (Platvoet, 1995), has limitations. While the polythetic ritual definition allowed for flexibility when integrating and comparing various rituals found in the literature and the real world, it comes with a danger of blurring the concept of ritual. For example, the lack of a binary definition (with defining elements being present or absent) implies a degree of subjectivity and contextuality in determining the number or extent of defining elements that must be present for a phenomenon to be classified as ritual. Nonetheless, this pragmatic approach to ritual was helpful for the aims of this thesis, which sought to explore rather than consolidate. It is conceivable that this pragmatic approach to the concept of ritual is less useful when it comes to other research questions, such as those requiring comparative experiments. Another example of the pragmatic approach to ritual in this work is the selection of the rituals researched. In the spirit of an exploratory approach, I investigated as different examples of rituals as possible. To do so, I took orientation from the four dimensions: ritual complexity, variability, actor(s), and origin. Of course, there would have been other possibilities here, and I could by no means consider all the different rituals within the scope of this thesis. Rituals that I have not considered but that might add an interesting perspective are, for example, small micro rituals such as interaction rituals with interactive technologies.

Second, this thesis's exploratory approach, with its focus on qualitative-empirical and design-orientated methods, was crucial for answering the exploratory research questions and developing an initial understanding of the complex phenomena of rituals with interactive technologies for HCI. It is important to mention that findings from observations and interviews in specific contexts have limited generalisability, as they are bound to the contextual circumstances (here: Germany) and people involved. As such, the researcher interpreting the qualitative data impacts exploratory research, too. This is not problematic per se, but the knowledge generated must be interpreted accordingly and from a standpoint epistemological perspective (Harrison et al., 2011). The rich insights are valuable and particularly strong in emphasising little-explored and underrepresented contexts and concepts. Besides findings situated in specific contexts, this thesis also presents intermediate-level knowledge (Höök & Löwgren, 2012; Löwgren, 2013). Such knowledge is considered abstract enough to be transferred to other contexts. So far, I have produced such intermediate-level knowledge, for example, with the experiential quality of uncontrollability, but I have not yet tested all the knowledge in other contexts.

Third, although I presented an overview of related work and discussed my findings in light of relevant related work, I may have overlooked relevant work. I have considered previous work that explicitly linked its work to rituals, i.e., that used the term 'ritual' in its writing. However, researchers may not have explicitly mentioned their work's connection to ritual. Especially in the context of little complex, newly invented, individual, and secular rituals, it

can be challenging to recognise instances of rituals without a theoretically informed ritual perspective. I hope that this work will contribute to establishing more knowledge about rituals in HCI so that researchers can better recognise and name rituals as such in the future.

Fourth, this thesis focused on broadly exploring rituals with interactive technologies across different cases rather than an in-depth study of a single case. As a result, certain insights that could have been gained through a more in-depth approach could not be obtained. For example, I have not deployed the artefacts designed in the real world for extended periods. The evaluation of the artefacts focused more on better understanding their design aspects, recording initial reactions, and imagining possible integrations into everyday life. As such, these evaluations could not capture what would have happened when the artefacts were deployed for more extended periods. This decision was a necessary evil in the context of the thesis, as more extended field deployments would have gone beyond the scope of a thesis that already comprises the exploration of four distinct rituals, nine empirical studies, countless interdisciplinary ideation sessions, and the iterative design of three artefacts. Nonetheless, some aspects may only become apparent over a more extended period, for example, whether a new ritual artefact continues to be interacted with over time or is integrated into everyday life in unexpected ways.

6 Conclusion

This thesis outlined an emerging research area within HCI, research on rituals, to expand HCI's knowledge of rituals with interactive technologies and their intentional design. Although reports of interactive technologies' intersections with rituals exist within HCI, they are often more anecdotal, of secondary importance within a publication, and rarely interconnected. To bring rituals more into focus, this thesis explored what rituals with interactive technologies are in theory and real-world contexts and how they can be designed intentionally.

By examining previous work, this thesis demonstrated that HCI has diverse ritual understandings and follows two main research approaches: understanding ritual experiences and exploring the design of novel interactive technologies for rituals. The empirical work of this thesis contributes additional evidence for the existence and relevance of rituals with interactive technologies in the real world. Interactive technologies are omnipresent in rituals, be it in everyday life (P1, P5), worship services (P2, P3), or relationships (P4). This thesis expands knowledge about how people appropriate existing technologies for rituals, even if this technology is not intentionally designed for rituals. However, it also uncovers that such appropriation can have adverse side effects, as technologies change the ritual experiences - often in undesirable ways (P2, P3). In line with recent work in other ritual contexts, such as the digitalisation of divorce forms (Hansen & Koefoed Hansen, 2022) or Buddhist chanting online (Claisse & Durrant, 2023), this thesis emphasises a need for more knowledge about the intentional design of interactive technology for rituals.

To support future research and design of interactive technologies for rituals, this thesis proposed and applied two classification schemes resulting from the extensive engagement with the topic: Four dimensions of rituals and three roles of interactive technologies. The four dimensions of rituals, ritual complexity, ritual variability, ritual actor(s), and ritual ori-

gin, highlight the unique properties and challenges of respective rituals. Similarly, the three roles of interactive technologies, technology as facilitator, enabler, or social actor, emphasise different foci for research and design. Both schemes guided the design work presented in this thesis, which resulted in three distinct technologies intentionally designed for rituals: the God-I-Box (P3), El Corazón (P4), and the Blessing Companion (P5). Throughout the design work, this thesis explored the unique challenges of rituals and technology roles and demonstrated how design processes and outcomes can be aligned with rituals and roles. Reflections on the design work also brought forth unique experiential qualities that might help design interactive technologies for rituals in the future: effort of use and uncontrollability.

This thesis had an exploratory focus and attempted to lay the foundations for ritual research in HCI, offering many starting points for future work. For example, future research could apply and expand our classification schemes to other ritual contexts, such as rituals in workplaces or organisations, or identify more experiential qualities essential for ritual experiences. I hope that the results obtained and questions raised in this thesis will raise awareness of rituals in HCI and lead to more focused ritual research and design in the future. As we move towards possible new futures through interactive technology's design, we should at least make more conscious decisions about whether we want to leave to chance or actively support deeply human actions that have essential functions for culture, society, and individuals - rituals.

Publications

The following five publications are included in this thesis⁴:

- **P1:** Wolf, S., Mörike, F., Löffler, D., & Hurtienne, J. (2023b). ‘I did digital tidying up for a more adult stage of life’: Ritualistic technology appropriations during life transitions. *Interacting with Computers*, 34(5), 117–128. <https://doi.org/10.1093/iwc/iwad001>
- **P2:** Wolf, S., Moerike, F., Luthe, S., Nord, I., & Hurtienne, J. (2022c). Spirituality at the breakfast table: Experiences of Christian online worship services. *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems*. <https://doi.org/10.1145/3491101.3519856>
- **P3:** Wolf, S., Steinmüller, B., Mörike, F., Luthe, S., & Hurtienne, J. (2023c). The God-I-Box: Iteratively provotyping technology-mediated worship services. *Proceedings of the 2023 ACM Designing Interactive Systems Conference*, 1710–1723. <https://doi.org/10.1145/3563657.3596029>
- **P4:** Klüber, S., Löffler, D., Hassenzahl, M., Nord, I., & Hurtienne, J. (2020a). Designing ritual artifacts for technology-mediated relationship transitions. *Proceedings of the Fourteenth International Conference on Tangible, Embedded, and Embodied Interaction*, 349–361. <https://doi.org/10.1145/3374920.3374937>
- **P5:** Wolf, S., Luthe, S., Baumeister, L., Moerike, F., Janakiraman, V., & Hurtienne, J. (2023a). Designing for uncontrollability: Drawing inspiration from the Blessing Companion. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. <https://doi.org/10.1145/3544548.3581421>

⁴In order to standardise all written texts for this thesis, I have changed the spelling of individual words to match British English throughout all publications where necessary.

Publication 1

‘I Did Digital Tidying up for a More Adult Stage of Life’: Ritualistic Technology Appropriations During Life Transitions

This work has been published as follows:

Wolf, S., Mörike, F., Löffler, D., & Hurtienne, J. (2023b). ‘I did digital tidying up for a more adult stage of life’: Ritualistic technology appropriations during life transitions. *Interacting with Computers*, 34(5), 117–128. <https://doi.org/10.1093/iwc/iwad001>

Abstract

Life transitions, such as the transition from childhood to adulthood, are often accompanied by meaning-making actions such as rituals. Rituals increasingly involve the use of interactive technology. While previous research has focused on specific contexts or technologies, a bird’s eye view of the many appropriation styles during life transitions is missing. To identify the range of technology’s appropriations, we analysed stories from 84 participants and compared these across different life transitions and technologies. We identified three roles interactive technology can play during life transitions: the role of (i) a facilitator easing the accomplishment of tasks within life transitions, (ii) an enabler creating opportunities for new transition rituals and (iii) a social actor that itself is the trigger or the content of transition rituals. We propose the three roles as a classification scheme to structure existing and future research and reflect on the design challenges and evaluation approaches.

- Stories of technology appropriation during life transitions and subsequent meaning-making processes, such as transition rituals, were collected and analysed.
- An initial classification scheme of three roles of interactive technologies during life transitions emerged: technology as facilitator, as enabler, and as social actor.
- The technologies in participants’ stories were rarely explicitly designed for taking the role of an enabler or a social actor during life transitions, which opens up a new space for future work.

Keywords

Technology appropriation, understanding users, transition rituals, major life events, life transitions, ritualistic appropriation

P1.1 Introduction

Transitions are essential phenomena in human life. We are born and we die, move from one place to another, slide into and fade out of relationships, get injured and cured, graduate from school and start work life. Depending on the change's gravity, such transitions pose a potential threat to our well-being and cause feelings of insecurity. During transitions, people are in search of meaning and are looking for appropriate strategies (Schnell, 2009). A type of action that people apply intuitively during transitions and that provides a powerful means of coping and meaning-making are rituals (Cooke & Macy, 2005; Ozenc, 2014). Rituals are focused, situated and embodied actions imbued with multidimensional symbolism, which are disconnected from a pragmatic goal (Legare & Souza, 2012; Sundermeier et al., 2010). Rituals can be found throughout history and all over the world (Cooke & Macy, 2005; M. Nielsen, 2018) and have been an essential focus of research in anthropology, sociology, religious studies, philosophy and sociobiology. Rituals are vital to human meaning-making and social existence (Kapitány & Nielsen, 2017; Rossano, 2012; Trice et al., 1969) - some researchers even 'take ritual to be the social act basic to humanity' (Rappaport, 1999, p. 31). Typically, rituals are thought of as being invariable and formal, with a long history of repetitions of the same ritual (Smith & Stewart, 2011; Sundermeier et al., 2010). However, rituals are not fixed but are subject to change, often referred to as ritual dynamics (Kapferer, 2004). Such changes can be small and subtle or drastic, involving the creation of new rituals or ritual-like activities that, nonetheless, share the structures and characteristics of previous rituals.

Given the entanglement of interactive technologies in everyday life, technologies also take on roles during transitional life phases and subsequent meaning-making processes such as rituals. Researchers in HCI endeavour to better understand technology use during life transitions and how technologies can be designed to better support people during these transitions. They have been generating design insights for technologies supporting transitions in diverse contexts such as ageing (Mao et al., 2020; Romero et al., 2010), grief (Eriksson & Hansen, 2017; Sas et al., 2016; Uriu et al., 2021a, 2021b), health (Eschler et al., 2018), and weddings (Massimi et al., 2014; Stark, 2017). Although theory suggests that meaning-making processes during life transitions like transition rituals share structures and characteristics across contexts, previous work in HCI has not drawn connections across life transitions or technologies. Additionally, previous research either had a focus on particular life transitions such as weddings (Massimi et al., 2014), ageing transition (Romero et al., 2010), gender transition (Haimson, 2018), surviving cancer (Eschler et al., 2018) or a focus on a particular technology, for example, video chat (Massimi & Neustaedter, 2014) or social media (Haimson, 2018). While our work builds on previous findings, we have sought a broader perspective by focusing on transition rituals per se rather than specific rituals at particular transitions or involving particular technologies.

Therefore, we see potential in adopting an explorative approach to investigate how people appropriate technology during life transitions and how technology contributes to concurrent meaning-making processes. The results will enable a more dedicated design of technologies supporting people during life transitions. To this aim, we administered an online survey asking for experiences with technologies during life transitions that participants felt to be ritualistic. We focused our recruitment efforts on tech-savvy students because students are likely to have recently gone through (or are in the middle of) a transitional life phase (coming-

of-age), and we expected tech-savviness to increase the likelihood of finding appropriations of technology. The survey questions aimed at the participants' perspective on what they perceived as an intense changing situation in life and how interactive technology was involved. The diverse responses of the 84 participants, who reported on experiences of deeper relevance to them, ranged from reorganising a smartphone's home screen to begin a more serious adult life, to validating student ID cards to confirm the new status as a student, to deleting dating apps together to prove the seriousness of a new relationship. Our data uncover the broad array of new forms the transitional experiences might take, even among a relatively homogeneous sample of participants.

Despite the relevance of life transitions, there have been few investigations into the role of technology. Our study addresses this gap through the perspectives of younger adults and provides a classification scheme of the major roles that technologies can play in supporting life transitions. Our work contributes to a better understanding of technology use during life transitions by providing insights into how people use, misuse, shape, integrate and perceive technology as material in practice. Our data suggest that interactive technologies take on three different roles during life transitions, namely the role of (i) a facilitator that eases the accomplishment of utilitarian parts of a ritual; (ii) an enabler that opens up opportunities for new interactions and transition rituals; and (iii) a social actor that centres around a distinct relationship with technology, which may even cause a desire for a transition ritual to qualify this relationship. Reflecting on the different roles, we propose matching design and evaluation approaches and discuss the design challenges revealed by our findings.

P1.2 Related Work

P1.2.1 Supporting Life Transitions: Transition Rituals

Over a century ago, anthropologists and other social and cultural scientists found that rituals are a central coping strategy during life transitions (Cooke & Macy, 2005; Ozenc, 2014). Rituals are employed for a wide array of functions and can be described as 'formalised patterns of actions for constructing meaning from a personally relevant event' (Sas et al., 2016; Schnell, 2009, p. 8). Hence, rituals play a fundamental role in situations in life that are important to us. A lack of appropriate coping strategies in life transitions leads to feelings of meaninglessness, and rituals can be successful mechanisms to manage such situations (Bridges, 2004; Martin-McDonald et al., 2002).

As changes in life are inevitably relevant, ritual theorists have identified transition rituals as a specific category with distinctive features. A widespread definition of transition rituals (rites of passage) was developed by Van Gennep (1961), who defined transition rituals as rituals that take place at various transitions: transition of location, condition, position or age group. This definition includes major life events like birth and death, the making and breaking of love relationships and overcoming major medical conditions such as cancer. However, this definition also allows including smaller transitions like those between workplace and home or between day and night.

Well-known, culturally determined transition rituals are, for example, weddings, baptisms or funerals. However, transition rituals are subject to change, which is often referred to as ritual dynamics (Kapferer, 2004). Changes in ritual practices may range from small, subtle

changes to newly appearing transition rituals. Especially in life transitions where no culturally determined transition rituals are available, people tend to appropriate and apply the mechanisms of transition rituals to suit their momentary needs. Examples of such ritualistic appropriations or emerging transition ritual-like activities are putting up love locks on bridges (Nord, 2017) or the design and realisation of cancer survivor tattoos that aid in transitioning from being ill to being healthy again (Eschler et al., 2018). Despite not being culturally determined, the practices around cancer survivor tattoos share many features of more popular transition rituals, such as their structure, support in coping with life transitions and meaning-giving role.

While the performed activity of a transition ritual itself might be mundane (e.g., lighting a candle), the relevance of it unfolds in the meaning that is ascribed to it (e.g., a symbol of a new life during baptism ceremonies). Thus, a ritual perspective can help us understand the ways in which technologies are appropriated to support life transitions and the role they play in doing so. Applying this ritual perspective to the example of reorganising a smartphone's home screen, it becomes clear that this is not a mundane activity, but a self-invented, meaningful ritual expected to ease the transition into a more adult phase of life. In the following, we also include the above-mentioned ritualistic appropriations and newly appearing ritual-like activities when writing about transition rituals.

P1.2.2 Technology Appropriation During Life Transitions

As interactive technologies permeate everyday life, they also take on roles during life transitions and respective meaning-making processes such as transition rituals. For example, wedding celebrations use various interactive technologies (Massimi et al., 2014): couples browse websites for inspiration, digitally design wedding invitations, take photos with their smartphones and share them via social media afterwards. Also, when no culturally determined transition ritual is at hand, people tend to ritualistically appropriate technology to serve their needs, as in the example of social media use to support gender transition (Haimson, 2018). Understanding how technologies get (ritualistically) appropriated and influence coping strategies during life transitions becomes vital for dedicated interaction design (Light et al., 2017).

Reviewing the related literature in HCI in search of design insights on technologies supporting life transitions, we found studies covering smaller and larger transitions of different types and contexts. Several studies focus on the transition of weddings in which technology can take on quite differing roles. Massimi et al. (2014), for example, demonstrated that technologies such as websites or emails are used to solve weddings' pragmatic problems by allowing couples to browse for inspiration or organise meetings more efficiently. Here, technology is used to simplify utilitarian processes. In contrast, Stark (2017) described the use of interactive garments to reinforce and express values such as equality during weddings. Here, technology supported rather non-utilitarian aspects and seemed to have a greater significance to the transition ritual. Despite concerning the same life transition, the two examples seem somewhat unrelated or contradictory in their description of technology's task, usage and design insights (to simplify a process vs. to express personal values).

When looking at less culturally determined transitions and rituals, the variety of insights seems almost limitless and confusing at first glance. Social computing research has generated insights into social media use during gender transition (Haimson, 2018). People undergoing gender transition tend to use different accounts on social media to represent multiple identities at once, facilitating the transition (Haimson, 2018). Eschler et al. (2018) investigated the ritual of cancer survivor tattoos and suggested a tool to support joint tattoo design practices. Massimi and Neustaedter (2014) documented how video chat technology eased remote participation in major life events, stressing the careful consideration of atmospheres or group sizes. Further examples concerned less public settings such as family rituals surrounding sleep (Cherenshchykova & Miller, 2019) or individual grief (Eriksson & Hansen, 2017). To support family rituals, Cherenshchykova and Miller (2019) suggested designing technologies that would aid in transitioning from time for family to time for individuals in the evening hours, also reinforcing healthy sleep habits. To address individual grief after losing a loved one, Eriksson and Hansen (2017) designed the HeartBeats prototype that vibrates in the heartbeat of a deceased when being hugged.

Despite these examples' diversity, a closer look reveals some shared characteristics of technology's involvement in life transitions. Such characteristics are, for example, the kinds of tasks taken over by the technology (e.g., to ease or to embellish a process), how technologies were approached by their users (e.g., in a routine manner or as something out of the ordinary) or how users judged the technology's value and importance (e.g., technology is exchangeable or special). As it was not its focus, previous work hardly reported details on the commonalities and differences of how technology got appropriated and supported people during life transitions across contexts. Besides, proposals for future design approaches are rarely derived beyond very concrete examples, such as the suggestion to develop a tool for collaborative tattoo design (Eschler et al., 2018). Questions such as how to best approach the design of technologies supporting people's life transitions or what aspects to focus on when investigating technology appropriations during life transitions are left open. On the one hand, answers to such questions depend on individual contexts; on the other hand, ritual theories suggest that it might be worth focusing on patterns, as ritualistic appropriations share joint structures and mechanisms across contexts and technologies. An example of such overarching patterns of technology use in rituals more generally was given by Grimes (2013), who categorised examples of technology use from a ritual studies perspective. He suggested eleven overarching functions of technology, such as documentation or presentation. This example supports the general idea of focusing on overarching patterns of technology use during life transitions. However, it does not aid with understanding (ritualistic) technology appropriations in detail (e.g., at the interaction level) or designing for it, as both were not of interest to a scholar of ritual studies.

A further limitation of the previous literature is their predetermined focus. Researchers often pre-established a context or life transition (e.g., wedding (Massimi et al., 2014), gender transition (Haimson, 2018) or cancer survivors (Eschler et al., 2018)) or a technology (e.g., video chat (Massimi & Neustaedter, 2014) or social media (Haimson, 2018)). In doing so, they failed to grasp life transitions and technology appropriations they had not previously thought of. However, several reports on rituals more generally suggest that ritualistic appropriation of technology appears again and again. For example, Gayler et al. (2020) reported that participants ritualistically appropriated new technology capable of 3D printing previ-

ously co-designed flavours. Participants integrated the technology in structuring their day and extended their intimate communication ritualistically through the technology by, for example, enabling novel focal activities as they transitioned from days spent individually to evenings spent together. Taylor and Harper (2002) reported that teenagers used messages in a ritualistic, gift-giving way rather than just sharing information. In both examples, the ritualistic appropriation of technology was more of a chance finding. More open, explorative methods must be employed to uncover existing ritualistic appropriations and identify their commonalities and differences.

Therefore, we see an untapped potential in exploring technology appropriations during life transitions and comparing experiences across different transitions and technologies. Such an approach would take existing experiences seriously, advance our understanding of ritualistic technology appropriations during life transitions, contribute to a more dedicated design and better integrate previous insights. Towards this aim, we conducted an online survey on technology use during life transitions, including 84 participants whose responses were analysed.

P1.3 Materials and Methods

Transition rituals can be created and conducted without conscious intention or reflection (Schnell, 2010), so we had to get participants to become aware of their experiences and verbalise them. Thus, we decided to collect data from past experiences using the critical incident method (Flanagan, 1954). The critical incident method was originally invented to systematically collect direct observations of human behaviour that meet predefined criteria (Flanagan, 1954). Since then, however, the method has been adapted to allow for the systematic collection of data through self-observation and documentation of past experiences in offline and online studies (e.g., Mekler & Hornbæk, 2016; Zeiner et al., 2018). In this self-documentation variant, a description of the research-relevant event is formulated as simply and precisely as possible, and the participants are asked to describe an experience that matches it. The method is deliberately used to capture the participants' understanding and concept of the researched topic: participants share a story that they consider appropriate and thus also reveal their understanding and concept of the questioned topic. In this study, we used this adapted version of the critical incident method to allow participants to self-document their experiences. To give participants more time for reflection and afford anonymity, especially as they were asked to share their personal experiences, we decided to collect data online. Furthermore, we offered participants to take their time by, for example, saving partial results and allowing them to resume the survey later. As we were interested in the characteristics of entanglements between technologies and people during life transitions rather than a specific technology, our survey questions were not restricted in terms of technology, similar to previous studies in HCI (e.g., Hassenzahl et al., 2010; Mekler & Hornbæk, 2016).

P1.3.1 Participants

As we wanted to explore real-world experiences of rituals in transitional phases where interactive technologies were involved, we needed to ensure that the chosen population would most likely have had such experiences. Students in subjects related to interactive technologies in their Bachelor's degree were most likely to have been or are in the middle of a life

transition (from childhood to adulthood, e.g., leaving their parental homes and settling into rented accommodation, breaking up with old friends and forging new friendships) and have an affinity for interactive technologies. We discussed recruiting other populations, such as people turning to retirement. However, in Germany, the site of this study, knowledge and use of technology is much less common among the population of the late '60s (Statistisches Bundesamt, 2022), which reduces the likelihood of finding examples of technology being incorporated into rituals. Given that this research was the first attempt to document such real-world experiences and that we were not interested in identifying particularly exceptional examples, we wanted to make sure to find any examples most likely. Therefore, we chose Bachelor's degree students in HCI and media communication as a population that met our criteria and was within reach.

A total of 91 participants were recruited using the local university's participation system. All participants received a course credit of 0.75 hours in return. Course credit could be granted automatically when a survey was completed, thanks to a corresponding function of the participation system. As a backup, we also stored identification numbers transmitted by the participation system to ensure all course credits were awarded. This list was deleted after the award. To be included, the answers had to follow the instructions and be detailed enough so that we could understand the phenomenon described. No further exclusion criteria were employed. From the initial number of participants, we had to exclude seven participants as they did not follow the instructions (e.g., they did not report on an experience during life transitions with interactive technologies). The resulting 84 participants were, on average, 20.61 years old ($SD = 2.17$): 64 participants indicated to be female and 20 to be male.

P1.3.2 Materials and Procedure

We implemented the online survey using LimeSurvey 3 hosted on a local server. The online survey was developed and improved in an iterative process. Three researchers and four non-researchers commented on the initial wording of the critical incident description and subsequent questions. After the iterative improvement of the online survey, we performed two think-aloud sessions with non-researchers, leading to further improvements. For example, participants could not relate to the wording 'ritual' and suggested asking for 'symbolic acts' instead, which we adopted.

In the actual study, participants received a link to the online questionnaire upon sign-up. The survey started with basic information about the study content, procedure and data handling, emphasising the voluntary nature and the possibility of cancelling the survey at any time. After participants gave consent to the overall procedure, the main page with 13 questions followed that asked participants to detail one specific transition experience where technology was involved. The initial question described the critical incident we were interested in (an experience involving interactive technology that the participants themselves found ritualistic). The twelve following sub-questions asked for greater context, such as where the incident happened, who took part and why it was performed. Each question had to be answered with at least one character (no upper limit). Participants were informed to spend ~20 minutes answering the critical incident questions to stay within their time limits determined by their compensation. By this, we intended to generate a homogenous dataset regarding the level of detail of the experience reports. Despite these efforts, the answers ranged from a few words

to more extended abstracts. In addition to the questions directly relating to technology appropriations, we also included questions regarding life transitions more broadly and quantitative measures of experience. Since these questions did not directly target appropriations of technology, their results are not included in the present paper and will be reported elsewhere. The survey continued with questions on basic demographic information and ended with thanking and contact information of the researchers.

P1.3.3 Analysis

The aim of our analysis was to gain a comprehensive understanding of how interactive technologies were used and appropriated to support life transitions. As we had hoped, the data analysed were quite diverse, ranging from reports of technology use during culturally determined transition rituals such as weddings, to self-invented ritual-like activities such as reorganising a smartphone's home screen, to activities that only indirectly contributed to transition rituals such as website usage to find the first own apartment. We included answers to all questions and all answers independent of their length in our analysis. The paper's first, second and third authors with different backgrounds (HCI, social anthropology, psychology) were involved in data analysis. To analyse the data, we conducted an iterative analysis inspired by Grounded Theory (Emerson et al., 2011). The overall process of analysis is shown in Figure P1.1.

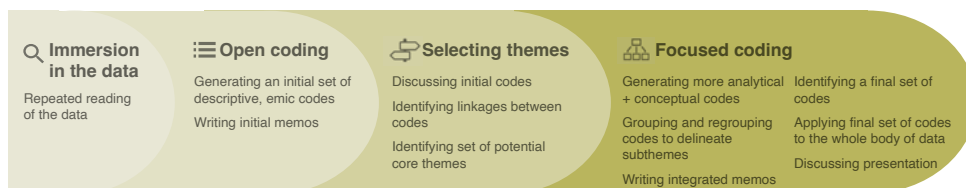


Figure P1.1: Our process of analysis, inspired by Grounded Theory (Emerson et al., 2011).

We jointly used software for qualitative data analysis to support and facilitate the data coding and analysis process (MAXQDA 20.0.8). The first three authors reviewed the data, and the first author generated an initial set of emic codes, i.e. data-induced code categories. During initial coding, the smallest unit of analysis were answers to single questions, and multiple codes could be assigned. Linking these codes, we identified initial, overlying themes. Two such themes, for example, reflected the range of different topics and technologies that participants' transition experiences related to. We found that each experience could be assigned an overarching topic. For example, experiences about birthday parties were assigned the topic of *growing up*. In contrast, experiences could sometimes be assigned multiple technologies. For example, when participants reported using a smartphone and specifically a particular app, we assigned *smartphone* and *app* to the story as both were important. From these rather descriptive codes, we developed a more analytical perspective on the data that resulted in conceptual codes. The codes were grouped and re-grouped over several weeks, and the first three authors then reviewed and amended the initial codes to develop a final set of codes. Overall, the final code tree consisted of three overarching themes composed of multiple sub-themes that express each theme's characteristics. We present our findings illustrated by data

from our survey labelled with participant numbers that were randomly assigned numbers between 1 and 200. Quotes are translated into English to the best of our ability and double-checked by all co-authors.

P1.4 Findings: Three Roles of Technology in Life Transitions

First, we provide an overview of the topics and contexts into which our participants embedded their perspectives on life transitions and the interactive technologies at play. This descriptive introduction to our results vividly showcases the multiple layers where ritualistic responses to transitional life phases included the use of interactive technologies. Subsequently, we illustrate how these multiple layers acuminate to three roles that interactive technologies take during life transitions: (i) technology as facilitator, (ii) technology as enabler and (iii) technology as social actor.

P1.4.1 Transitions Involving Technology

In our survey, we asked participants not only to describe a ritual but also to tell us more about the larger context of the ritual, such as when it took place, what triggered it and what it meant to them. Thanks to this approach, which allowed participants to detail what was essential to them, we captured various transitions, topics and technologies involved. We briefly detail this variety in the following, presenting our participants' perspectives on life transitions.



Figure P1.2: Distribution of technologies and topics in our data. Participants' experiences could relate to more than one technology, but only to one topic. If participants described using a smartphone and, more particularly, a specific app that was of importance, we captured *smartphone* and *app*.

The data analysis revealed that coming-of-age transitions not only refer to aspects of *growing up* but also to all existential areas of human life, such as *relationships*, *relocation*, *health* or *grief* (see Figure P1.2, middle). The most prominent topic among our participants was *transitions in relationships*. Such transitions occurred in intimate relationships with a partner or close friends and family. Many of the relationship transitions involved highly personal and individualised activities that included both the people involved and the objects, places or technologies available at the time (e.g., smartphones, unique places, local products). Sometimes, the objects, places or technologies invited a particular ritual and sometimes, the need for a ritual triggered the search for suitable means.

'My ex-boyfriend posted an Instagram photo showing the two of us together to make the relationship public and to prove it. When we broke up, the picture was deleted.' – (48)

'When I was on vacation with my two best friends, we all bought a friendship necklace that we still wear today. [...] We wanted to have something in common that would connect us. [...] It was just something between the three of us and was nobody else's business. We took photos of us and the bands with our smartphones because we wanted to capture the close friendship and the beautiful atmosphere on the beach.' – (114)

As we allowed participants to detail stories without predetermining the technologies being used, we could capture what kinds of technologies are most prominent in our sample regarding transitions and transition rituals. Of course, the technologies involved correspond to technologies available to our participants and relevant to their current lives. The technology named most often was smartphones and frequently smartphones in connection with specific apps. Smartphones were used in transitions to help with more practical organisational work or create meaning. We will turn to this range of tasks accomplished with technologies and meaning created later in the paper. However, at this point, it is essential to understand that this different range of tasks to accomplish with technology and subsequent types of interweaving technologies into rituals were present in all examples with various technologies, such as PCs or laptops, and less widespread technologies, such as smartwatches, ticket machines or video projectors (see Figure P1.2).

A second prominent topic among our participants was *relocation*, mostly involving moving out of the family home and into a first apartment or room of their own in a shared apartment. To our participants, the transition of relocation was always part of transitioning from childhood towards adulthood: the move from the security and familiarity of the parental home to an unknown, non-pre-structured place that they could shape themselves and for which they had to take responsibility was a big step. For some participants, this step was accompanied by a perceived obligation to overcome even unpleasant challenges themselves and assume responsibility. Some participants even seemed to seek out such challenges actively, for example, by moving to a foreign country.

'As strange as it sounds, I didn't have Instagram during school. This was because I was very shy and had little self-confidence. After school, I did a volunteer service in Canada. For this, I had a Skype call that acted as a job interview, where I was told that my job would require me to be familiar with social media and Instagram in particular. Just getting an acceptance from Canada encouraged me and led me to create an account just to symbolically prepare myself for this new stage. Over the past year, I have become more and more self-confident, which you can see in my Instagram account.' – (162)

Stories about *education* and *work* tended to relate to more vocational aspects of life. Our participants reported various transitions related to either the completion or the beginning of training or employment. Many participants reported externally or self-organised celeb-

rations that people ‘just do’ during such transitions. Transitions in education or work were perceived as being more externally structured and pre-determined than, for example, transitions in *relationships*.

‘I celebrated the first day in the new company with a buffet. [...] As a new employee, I brought different food to work and thus had a joint breakfast with my new work colleagues. [...] That’s what you do when joining/starting a new company/position, and it helps to facilitate the start of the new employment. [...] [Technology played] a rather subordinate role - the invitation was sent via Outlook so that everyone knew I was bringing something to eat.’ – (107)

Most of the time, transitions in the *course of the day* detailed the struggles and challenges of questions such as how do I want to live? Before, the structures of the day were somewhat predetermined by external factors such as school or parents. But by now, many participants were required to explore and define their way of living, and small transition rituals helped them move from one part of the day to another. Transition rituals that accompanied the course of the day were self-invented and highly individualised. However, participants built on known activities and developed them into their own rituals.

‘Turning on flight mode every night before I go to bed. The flight mode symbolises to me that it is now night and that, finally, no one can reach me, and I don’t have to worry about anything until the next morning. [...] It’s a bedtime ritual after which I sleep better, also because I can put my smartphone out of my mind. [...] It was known to me before that some people take their cell phones offline at night. My mom does that too because of the radiation.’ – (102)

The last topic the data touched upon was transitions in *health* and *grief*. Such transitions referred to the experience of not being in complete control or being confronted with the finitude of life. They were neither planned nor predictable moments, but sudden ones accompanied by intense feelings of fear and uncertainty. Rituals performed at these transitions sought to restore a measure of control, predictability and a sense of self-efficacy.

‘In 2017, I had a hard stroke of fate, and after the mourning period, I changed my hairstyle completely (new cut, new colour) to dare a kind of “new beginning” and to finish with the past. [...] I wanted to come to terms with the past and make a new start. It meant a lot to me because it allowed me to start from scratch. [...] I got the idea from the apps Instagram and Pinterest and then got inspired by them.’ – (17)

The examples of the use of interactive technologies in life transitions and the corresponding ritual actions were initially coded in close linguistic and contextual alignment with the raw data (e.g., the technologies used such as smartphones, apps or websites and the topics described such as relationships or grief and health). By repeatedly reading and comparing the raw data on the individual uses of technology across the different domains, we were able to identify commonalities and differences and take a more analytical perspective. The data then showed a clear difference in terms of the intended goals of technology use. Some examples highlighted usage patterns motivated by the functional capabilities of technologies,

such as the ability of a photo app to document the performative act of a wedding or the efficiency with which one can invite colleagues to a work buffet. In other examples, however, a different motivation became apparent, where the functional features of the technology were of secondary relevance compared with the broader (symbolic and performative) meaning inscribed into the action, such as the registration of an Instagram account as a manifestation of the transformation from a pupil among others towards a more visible and therefore more self-confident (almost) adult person. These different layers of motivations and goals of technology use have distinctive characteristics, e.g., in terms of the tasks that are accomplished, the relationship between users and interactive technologies, or the modes of use, and we propose to subsume these characteristics in a classification schema of three roles of interactive technology. The three roles correspond to the different levels of meaning ascribed to the use of technology in life transitions: (i) technology as facilitator, (ii) technology as enabler and (iii) technology as social actor.

P1.4.2 Technology as Facilitator

The focus of technology as facilitator is on its capacity to simplify a part of the ritual that would otherwise have been accomplishable as well.

‘The object of my symbolic action was a key. More precisely, my first own house key, which I got when I had to move to a new city for my studies. The change was between living at home with my family and living alone in a small room and your own household. The interactive technology involved is the website Wg-Gesucht.de, which I used to find my apartment, and that thereby initiated the change.’ – (16)

The website, representing interactive technology in this example, ‘[...] helped me to find my apartment’ (16). Hence, it supported and simplified the utilitarian accomplishment of transitioning to a new location. The website played a minimal role in meaning-making compared with the key to the new apartment. While the activity of being handed over a key is rather mundane, the relevance permeates in the participant’s description of the meaning it had for him: the key carried the distilled manifestation of the participant’s beginning transition from childhood towards adulthood, from depending on his parents when living in the family home to now living (relatively) independently in his own household. While such a transition is a longer process, moving into the apartment was, for this participant, a moment of such high relevance that he chose to report it in the survey. Our data indicate that the use of technology in a facilitating role, as in this example, was coined by a strict utilitarian goal orientation, and any technology leading to the desired result would qualify for usage. Thereby, technologies as facilitators for transition rituals are indifferently exchangeable. If a tool (website with apartment advertisements) better serves the utilitarian goal (quickly finding a flat), it replaces former tools (newspapers with apartment advertisements). A user’s relationship with technologies as facilitators is characterised by pragmatism and utility. Users do not connect unique, valued properties with facilitators and do not attach to them. This is also mirrored in the following example of technology as facilitator to a wedding event.

‘To organise the whole thing at all (meeting point, who gets roses/balloons, etc.) you need a smartphone. Before the wedding, a WhatsApp group is created where everything is organised. After the wedding, this group will also be used to exchange the pictures that were taken.’ – (111)

Facilitators were used several times during life transitions and often accompanied the whole operational process rather than a specific, extraordinary moment. The routine character of interacting with facilitators was also mirrored in participants’ affective descriptions of their felt experiences. Participants labelled the use of facilitators in transition rituals as routine or everyday technology interactions rather than ascribing a notion of uniqueness to the technology-related actions (e.g., searching for an apartment, WhatsApp communication to organise balloons for a wedding), although the event they used it for was indeed perceived as unique and out of the ordinary.

P1.4.3 Technology as Enabler

Technology as enabler in transition rituals focused on technology’s capacity to allow for new, primarily self-invented transition rituals.

‘[I did] digital tidying up for a more adult stage of life: At the beginning of my studies, I changed some things on my smartphone. I dragged games from “Start” to the app overview and productivity apps like Trello, Mail, etc. to the start screen. I put widgets for the calendar and ToDo-lists on the start screen, and I also chose a more neutral background and lock screen.’ – (163)

The quote above poignantly exemplifies technology’s role as enabler. The participant’s transition from high-school student to university student was strongly marked and expressed by changing the smartphone’s functional and visual features. By making productivity apps more easily accessible than games, the participant responds to the need for support and for respective coping mechanisms to manage the transitional phase he was going through. The enabling role of technology is further reflected in the choice of a ‘more neutral [...] lock screen’ (163), which serves the need to communicate and reinforce the status change to a broader public: the screen is visible to friends, parents and fellow students and therefore a direct, managed expression of the ‘more adult’ self. The action of rearranging the screens was not primarily about utilitarian values such as efficiency but about non-utilitarian ones corresponding to the transition of becoming an adult, such as autonomy, self-efficacy or competence. While the activity of reorganising the smartphone’s home screen appears similarly mundane as other interactions, the decisive point is the far-reaching meaning the participant ascribed to it, which links it to the broader context of his transitional phase and thus delineates a ritualistic action. As enablers, technologies moved more into focus and held key roles within transitional life phases and transition rituals. Similarly, the following quote highlights how technology as enabler was central to expressing and reinforcing change in transition rituals performed not primarily for one’s own sake, as in the first example, but for the sake of relevant others.

'In the past, my boyfriend and I had an open relationship. From this time, I have had a few [dating] contacts on my smartphone. After we switched back to a monogamous relationship, I kept these contacts on my smartphone. [...] After my boyfriend and I had several conversations about the time of the open relationship, I decided to delete the contacts. I hadn't contacted them for a long time and had not really intended to do so, but I wanted to keep them on my smartphone as a "backup". [...] Anyway, I decided to delete my dating contacts because I definitely wanted to keep my partner's relationship. I wanted to finally get rid of the feelings of uncertainty that I sometimes felt during and after the open relationship. My partner and I have been working on our relationship and wanted to continue life positively and together. As a last step, I deleted the [dating] contacts and pictures sent.' – (118)

Deleting former date contacts and pictures was a way to symbolise and 'prove' that the participant wanted to deepen her relationship with just one partner and the symbol was relevant not just to her but to the partner as well. The quote also expresses the uncertainty associated with the open relationship status, an emblematic notion of transitory phases, which persists until a stable status is established again. To support the participant's notion of the monogamous status as more stable, the deletion of the dating contacts delineates a ritualistic action chaperoning the transition.

Both examples, typical for technologies as enabler, show that enablers were ritualistically appropriated or led to the invention of own transition rituals. During transitional life phases, insecurities due to a seemingly unmanageable change, unsatisfied needs and a vague idea of what new stage in life to reach led to the search for more manageable actions that might contribute to the aimed-at state. Following this, the described transition rituals that involved enablers were goal-oriented most of the time (e.g., aimed at reaching the state of 'being more adult' (163)). People chose a particular technology because of its ability to satisfy their needs. Like with facilitators, they could have chosen any technology satisfying their needs, and technology became exchangeable. However, the goals accomplished with enablers differed from those accomplished with facilitators as they were less concerned with utilitarian and more with non-utilitarian values.

A second factor rendering enablers meaningful was the participants' focus on recognising the meaningfulness within the actions. Rearranging a smartphone's screen or deleting photos might be experienced as less meaningful and mundane at other times and contexts. However, the fact that the action was performed at that particular transitional moment and with an own focus on recognising the multidimensional meaning within it (e.g., new smartphone screen but also new focus in life, new interests and new responsibilities) rendered it meaningful, even though the technology did not foster the specialness and meaningfulness by design.

P1.4.4 Technology as Social Actor

The role of technology as social actor focuses on a user's essential relationship with a unique technology.

‘After moving several times, I can say: “Home is where my PC is!”. As a big gaming fan, I also take my PC with me when I’m at home for a few weeks over the holidays. [...] it is a symbol of security for me, the last place of retreat, and also a kind of “Safe Space”.’ – (43)

In this example, technology is ascribed the capability to provide a layer of continuity and stability during a phase of life coined by the unsteadiness of the transition towards adulthood. Ritual theories define this moment in life transitions as the liminal stage, where the previous social status (child) has been left, but the new status (adult) has not yet been fully reached. In Western contexts, this full membership in the group of adults is mostly connected to the completion of educational training (university/apprenticeship) and the ability to earn one’s livelihood. The participant’s notion of liminality is expressed in his need for security and a ‘Safe Space’ (43). Here, the participant’s PC delineates the proverbial bridge over troubled water, the constant element during the unsteady time as a student. This role of technology is fundamentally distinct from the enabling or facilitating roles previously described. When technology fulfils the role of a social actor, coping mechanisms for transitional life phases position technology at the centre of ritualistic action.

Within participants’ stories, we found further examples that put a user’s relationship with a unique technology into focus. For example, participants reported on technologies such as ‘my first smartphone’ (6) or a specific smartphone ‘as a symbol of independence’ (130) that had essential value to them beyond the technical capabilities. One participant described the quasi-ceremonial act of going into the shop after a presumably long time of convincing the parents and finally holding the long-longed-for object in his hands. As a symbol of independence and responsibility (to communicate and act virtually beyond parents’ control), the first smartphone marked an essential step in transitioning from the child to the adult world. Technology was thus not valued for specific functionality but for the technology itself. ‘[My] first smartphone’ (6) is not exchangeable anymore to any other technology because the values are attached to that specific, unique piece of technology. As the reported moment was almost a decade ago, this phenomenon highlights the time stability within the emotional relationship between users and technology. The uniqueness of it or unique experiences with it led to an emotional relationship with technology that rendered it and the interaction with it meaningful and worthwhile.

P1.5 Discussion

Despite the relevance of life transitions and subsequent transition rituals, there have been few investigations into technologies’ roles. Our study addresses this gap and provides a classification scheme of technologies’ major roles during life transitions.

In pursuing a rigorous user-focused approach to the lived praxis of coping with life transitions, we have eschewed taking the literature-informed understanding of rituals from psychology or social sciences as a basis for this study. Instead, we have employed an exploratory and open-ended inquiry into what participants perceived as a ritual or ritualistic activity. Through this approach, our results feature a more comprehensive range of ritualistic actions from the participants’ perspective than a more focused view on rituals might have considered. Only in this way could we capture participants’ differing notions of life transitions that are

not accompanied or mediated through prescribed rituals in their social setting. Our results vividly illustrate how partially self-invented rituals arose or how the few existing rituals in German society, such as weddings, have been enhanced or altered to accommodate the need to cope with life transitions. Through documenting and describing (ritualistic) appropriations of technologies, our study uncovers user needs during coming-of-age life transitions that are currently unmet or unnoticed by technology design. Participants in our study appropriated technology to satisfy these needs, like the participant who reported on the digital tidying up of his smartphone for more adult patterns of use, which he associated with other apps and a different appearance of the lock screen. In this example, the smartphone enabled the transition ritual of digital tidying up but did not foster the interaction or essential aspects of it through corresponding interaction design. We see the need to reflect on how a particular interaction design supports, changes, affects, enables or undermines respective transition ritual experiences. Because whether or not we design for a specific use, technology use (and its alienation) always results in an experience, and we have the power and the responsibility to shape that experience through technology design. Our classification provides a good starting point to reflect on technology's involvement in life transitions. In the following, we will discuss the classification scheme of the three roles in terms of its application and opportunities for design, limitations and future work.

P1.5.1 Application and Opportunities for Design

To ease the application of our results, we summarised them in the two left columns of Table P1.1. The second column contains each role's main characteristics, highlighting the differences between the three roles. The three roles' characteristics are intended to give guidance when applying our classification scheme of the three roles to other examples of technology use during life transitions. Classifying interactions with technology during life transitions according to the three roles seems useful for design and evaluation as it may aid in better understanding and considering the users' various needs and expectations during life transitions. When applying, we strongly encourage others to adjust and complement this initial classification and the three roles' characteristics.

Within our data, we found differences in interaction descriptions across roles. Initially, we could only vaguely grasp the differences, but recourse to theory enabled us to clearly describe the differences and derive corresponding design and evaluation recommendations. One way to interpret the differences in interaction descriptions is by seeing them as the users' different needs and, thereby, views of interaction (Hornbæk & Oulasvirta, 2017). If we understand the users' views of interaction, we can consider the same views when designing or evaluating technologies, potentially leading to more suitable designs. In the following, we present this theoretical perspective on interaction along the three roles, show how the three roles are reflected in the related literature and derive corresponding opportunities for design.

Facilitators Simplify Participants' descriptions of interacting with technologies as facilitators emphasised their negligibility. '[Technology] had a rather subordinate role. The invitation was sent via Outlook so that everyone knew I was bringing food' (107). Outlook, the technology, stayed out of focus during the ritual—as long as no breakdown appeared. Such a description suits the view of *interaction as tool use* (Engeström, 2015; Hornbæk &

Techno- logy as	Main characteristics	Examples from previous work	Design + evaluation approaches
Facili- tator	Simplification of tasks, utilitarian, goal-oriented, exchangeable, routine use, is useful	e.g., Cherenshchykova and Miller (2019), Eschler et al. (2018), Massimi and Neustaedter (2014), Massimi et al. (2014) and Wu et al. (2018)	Focus on pragmatic aspects of interaction: metrics of usability, breakdown analysis
Enabler	Non-utilitarian, goal-oriented, exchangeable, use out of the ordinary, enables (novel) transition rituals, is appreciated	e.g., Eriksson and Hansen (2017), Gayler et al. (2020), Haimson (2018), Huck et al. (2015), Klüber et al. (2020a), Mao et al. (2020), Pallay et al. (2009), Sas et al. (2016) and Stark (2017)	Focus on experiential aspects of interaction: metrics of user experience, experience design methods, ritual theories
Social actor	Non-utilitarian, process-oriented, unique, unexchangeable, time-stable relationship, is valued or even loved and thereby causes a desire to perform a transition ritual	e.g., Keay (2012) and Knox and Watanabe (2018)	Focus on social aspects of interaction: metrics of user experience, experience design methods

Table P1.1: Summary of the three roles interactive technologies can play during life transitions, their main characteristics, related previous work in HCI, and suggestions for how to approach each role in interaction design and evaluation.

Oulasvirta, 2017). Users use tools to act in the world and amplify their capabilities. These notions of tool use also seem in line with our main characteristics of technology as facilitator. Facilitators support and *simplify utilitarian goal-focused tasks*. In reviewing previous work, we also came across descriptions of technologies we would now interpret as taking facilitator roles. For example, Eschler et al. (2018) investigated cancer survivor tattoos and suggested a tool to support joint tattoo design practices. According to this suggestion, the technology emphasised *utilitarian goal-orientedness* (designing a tattoo) and the tool's *exchangeability*, as any tool supporting the tattoo design process would be appropriate. In the example of video chat use during major life events, the *utilitarian* aspects of technology use were also emphasised: video chat technology *simplified* remote participation (Massimi & Neustaedter, 2014). Similarly, a work on how technology was used to plan, conduct, and remember a wedding focused on technology's use for *utilitarian* parts of a wedding (Massimi et al., 2014). Besides, the paper highlighted the *routinised use* of technologies such as websites or emails used by couples in other contexts before (Massimi et al., 2014). Inspired by tool use theories, we suggest that good facilitators should strive to amplify human capabilities and be transparent and *useful*. Therefore, when evaluating or designing facilitators, it seems most essential to prevent breakdowns and provide good usability (Table P1.1).

Enablers Create Friction and Extraordinary Experiences While participants' descriptions of technologies as facilitators focused on simplifying utilitarian pragmatic tasks, such focus was almost irrelevant in the descriptions of technologies as enablers. In contrast, usability measures (e.g., efficiency measured by task completion time) might even be inappropriate. We found an example in the literature that explicitly illustrates this inappropriateness. El Corazón is a prototype mediating relationship transitions that focus on values such as caring (Klüber et al., 2020a). El Corazón can record two people's heartbeats and converts them into a joint light animation. In the evaluation phase of the project, users asked for the interaction to be more complicated to prolong the time spent together in the ritual. When technology took on the role of an enabler, participants expected it to amplify the special and to create friction, which would, in turn, emphasise the importance and value of the action. Goals that enabler technologies should emphasise were *not utilitarian*, but rather emotional, such as 'security and a positive feeling' (10) or 'more fun and closeness' (35) and enablers were *appreciated* for their support. Such goals correspond to the view of *interaction as experience* that focuses on *non-utilitarian* qualities, emotions or need satisfaction (e.g., Hassenzahl, 2010; Hassenzahl et al., 2000). From an experience perspective, good enablers should thus contribute to support *extraordinary*, ritualistic experiences and the emotional values and meaning attached to them. Examples of enablers within previous work shared more design-oriented approaches and loosely followed a research through design process, an approach that might also be appropriate for future designs of enabler technologies (Zimmerman et al., 2007). Examples are DataVows, which employs biometric sensors and lights attached to wedding clothes to express values of equality (Stark, 2017), or HeartBeats, which vibrates in the heartbeat of a deceased person when being hugged (Eriksson & Hansen, 2017). When evaluating or designing enablers, user experience metrics and experience design might allow us to uncover essential aspects (Table P1.1).

Social Actors Take Centre Stage Participants' descriptions of technologies as social actors overlapped with descriptions of technologies as enablers in many ways. For example, participants described psychological needs satisfied by interacting with technology as social actors such as 'security and freedom' (43). However, the importance of the relationship towards technology seemed more pronounced for technology as social actor, reflected in its ascribed *uniqueness and irreplaceability*. Within the literature, we found an example that reflected this pronounced relationship: Keay (2012) described the phenomenon that robots are given names during robot competitions, similar to when a child is born. The distinct relationship towards technology evoked the *desire to perform a transition ritual*: to embrace the relationship and render it visible to the community, robots were officially introduced to a relevant community with an identifying name similar to a baptism. A more anecdotal example is the remote shutdown of JIBO, a small social robot. The robot was identified as *loveable* by its owners, and some people entered into a closer relationship with it as it was living side by side with them. As JIBO was to be shut down forever by its producer company, *users developed coping strategies (e.g., transition rituals) to accompany the transition* (Krotoski, 2019). Similarly, many owners of the AIBO robot in Japan held official funeral services when the robot could no longer function adequately (Knox & Watanabe, 2018). These examples demonstrate that solid emotional bonds established with technology as social actors *remain stable* during a 'technological life cycle'. Moreover, such emotional bonds bring ethical ques-

tions into focus beyond mere questions of interaction: if we design technologies that people connect with emotionally, shouldn't not we also consider how we can support letting go? In reviewing the different *views of interaction* (Hornbæk & Oulasvirta, 2017), we think that none reflects the social component emphasised in the role of technology as social actor and therefore suggest that the views of interaction should be extended by *interaction as social experience*. Related theories introducing notions of *interaction as social experience* are, for example, postphenomenology, especially alterity relations that describe technology as counterpart (Hassenzahl et al., 2020; Ihde, 1990), the media equation theory (Reeves & Nass, 1996) or the computers are social actors hypothesis (Hohm et al., 2021; Nass et al., 1994).

How the Three Roles Matter in Interaction Design While one can question why technology should be developed for such areas of life charged with meaning in the first place, our data clearly show that interactive technology has long since arrived in transition rituals—whether we design it specifically for that purpose or not. With this paper, we wanted to raise awareness about this previously undiscussed use of technology and provoke thought about the types of experiences we want to invite or support through our design. We do not assume one can design a particular experience with absolute certainty. Instead, we argue that certain experiences are more or less invited or supported by technology design (Desmet & Fokkinga, 2020; Hassenzahl, 2010). We highlight this argument with two examples from our data and previous literature showing how designing for the wrong technology role can diminish the user experience in a life transition.

Several participants reported announcing a new love relationship by sharing a picture of the new couple on social media. Publicly demonstrating a new relationship status is an action that can be expected to be of high emotional significance, which to most people is an extraordinary event that can even spark new transition rituals like putting up love locks on bridges (Nord, 2017). However, participants in our study often described the interaction experience as merely routine. This contrasts the hoped-for values and feelings in relationship transitions like extraordinariness, celebration or relatedness. Looking at the interaction design of sharing a picture on social media, we see a dominant facilitator design focusing on ease of use and efficiency: one can post a picture with just two clicks. In addition, users potentially have performed the posting interaction with different, less significant pictures numerous times before. To exaggerate, posting the new relationship status is like (and feels like) putting a sofa up for sale. While other explanations are conceivable, this example should make us think about our power and influence when designing interactions and that 'ease is not [always] serving us' (Light et al., 2017, p. 7). A similar argument was pursued in a recent publication that questioned the dominance of the pursuit of usability goals in current digitisation processes (Hansen & Koefoed Hansen, 2022). Hansen and Koefoed Hansen (2022) suggested that online divorce forms, currently designed with a focus on usability and efficiency in interaction (facilitator), could better be designed with a focus on the transitional experience that requires coping strategies such as rituals and careful curation of the overall experience (enabler). We argue that explorations into how interactive technologies can be designed to support special moments are needed that attend to the importance of the extraordinary and carefully curated performance.

P1.5.2 Limitations and Future Work

The present work has several limitations, as well as opportunities for future work. First, the sample included in the present work consisted of students enrolled in study programs related to interactive technologies. These students belong to the group of digital natives, which we expected to be advantageous when collecting data on the use of interactive technologies in transition rituals. Nonetheless, this sample is not representative and has little variation in age, education and cultural background, limiting our results. Accordingly, we intend our results to serve as a first step towards understanding the roles of interactive technologies in life transitions that should be adapted and revised in future work. We think the discussion of our results alongside previous work has demonstrated their relevance and suitability, rendering them insightful and valuable.

Second, our investigation focused on developing an initial classification scheme for technology use and appropriation during life transitions. Although we identified three different roles and their unique characteristics that also applied to previous work, future work needs to extend, refine and test this initial suggestion.

Third, the role of technology as social actor was described less frequently than the other roles—within our sample and the related literature. While this shows that technologies as social actors are least designed for and not yet widespread, future work should deliberately search for more examples to refine our understanding of technology as social actor and its implications in transition rituals. A field that could contribute to understanding this role might be social robotics.

P1.6 Conclusion

Although being described as a phenomenon vital to human meaning-making and social existence, the interest in rituals in general and transition rituals in particular within HCI just recently increased. While transition rituals are expected to share similar structures and mechanisms across contexts, previous work rarely considered this joint dimension and focused on specific contexts or technologies instead. Thereby, previous work failed to grasp (ritualistic) appropriations of technology previously not thought of. Through the qualitative analysis of participants' responses to an online survey ($N = 84$), we gained a deeper understanding of how technologies are used and appropriated during life transitions across contexts. The analysis uncovered three roles that technologies take, each with a different focus. (i) The role of technology as facilitator emphasises utilitarian values, is goal-oriented, and technologies are exchangeable. Good facilitators simplify. (ii) The role of technology as enabler emphasises the mediation of non-utilitarian values and the enabling of new transition rituals. Good enablers allow users to express or mediate non-utilitarian values relevant to their transition. (iii) The role of technology as social actor emphasises the emotional relationship towards technology which is so important that transition rituals may be initiated. Being facilitated, influenced, changed, mediated or even triggered by technology, transition rituals offer many design and research opportunities. We reflected on the three roles, the design challenges that arise for each role, and the respective design opportunities by comparing them with differ-

ent views of interaction (Hornbæk & Oulasvirta, 2017) to identify matching approaches for design and evaluation. We hope our findings will spawn new research into the different roles of technology for and in transition rituals.

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Data Availability Statement

Due to ethical concerns of privacy and deanonymisation associated with the very personal and intimate research topic, the qualitative raw data cannot be made entirely available. However, please note that we present various carefully selected extracts from the raw data in the paper, particularly in the *Findings* section.

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Publication 2

Spirituality at the Breakfast Table: Experiences of Christian Online Worship Services

This work has been published as follows:

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Abstract

Since the COVID-19 pandemic, we have witnessed an increase in online worship services. Nevertheless, HCI has little insight into how technological mediation influences religious experiences and how technology should be designed for use in religious contexts. Therefore, we see a unique opportunity to understand better real-world experiences of technology use in religious rituals and, more specifically, in online worship services. Inspired by contextual design, We virtually observed and interviewed eight persons during and after participation in online worship services. We identified a field of tension between faith, everyday life, individuality, and community. The data suggests that current online worship service systems do not account for believers' needs for community, faith, or extraordinariness. We discuss opportunities for future research and design, and aim to contribute to the understanding of online worship service experiences and the design of technology-mediated religious experiences.

Keywords

Religion, spirituality, ritual, prayer, extraordinary, community, faith

P2.1 Introduction

We have witnessed dramatic changes to everyday life due to the COVID-19 pandemic. New rules and restrictions have come into effect to avoid spreading the virus and religious communities decided to provide alternative formats to regular worship services to lower the danger of infection in face-to-face meetings in enclosed spaces. They appropriated existing technologies such as video conferencing, streaming platforms, or social media for religious purposes (Nord & Luthe, 2020; Nord et al., 2021). In Germany, the context of this study, the increase in available online worship services during the pandemic was tremendous. About 65% of pastors surveyed in Germany offered online worship services, and only 4% of those did so prior to the pandemic (Nord et al., 2021; Schlag & Nord, 2021).

The appropriation of interactive technologies for religious purposes has long been observed and documented in the field of digital religion (e.g., Campbell, 2012) but also in HCI (e.g., G. Bell, 2006; Wyche et al., 2006). A prominent finding of previous work based on interviews with protestant Christian pastors in the U.S. is that online versions cannot replace worship services as being able to meet in person, experience community, and perform rituals that require touch are essential (Wyche, 2010). Following that, online worship service experiences received only little attention within the HCI community, with some exceptions (e.g., Struzek et al., 2019; Uriu et al., 2021b). In addition, Buie and Blythe (2013b) pointed out a lack of research across the variety of real-world applications and highlighted that HCI-related scientific insights on spiritual uses of technology are specifically under-researched. Given the enormous increase in available online worship services and the increased number of believers participating, we see a unique opportunity for HCI to gain an in-depth understanding of real-world experiences of online worship services and the elements that do (or do not) support believers' religious experiences. By spiritual and religious experiences we understand experiences that people associate with something greater than themselves or the transcendent. Religious experiences, however, have the particularity of being interpreted in the light of a specific religious belief system such as Christianity. We note that someone who is religious can have spiritual experiences - it depends on the particular interpretation and context of their experience. So when we use the term 'religious experience' in this work, this also includes notions of spiritual experiences.

This paper presents findings from an initial phase of a larger, interdisciplinary project involving protestant theologians, psychologists, and HCI researchers. Within the project, we explore novel designs for technology-mediated religious rituals and experiences. We report our findings from a contextual design study (Holtzblatt & Beyer, 2017) where we (virtually) observed and interviewed eight persons during and after participation in protestant online worship services. The findings provide a more detailed picture of online worship service experiences and the elements that do (or do not) support believers' religious experiences. We expect these findings to serve as a starting point for designing religious ritual and worship service technologies.

P2.2 Background

P2.2.1 Christian (Online) Worship Services

Christian worship services are communicative gatherings of believers who invoke an external power and seek to make it tangible for those gathered (Meyer-Blanck, 2011). All worship services are structured but the exact sequence and content vary between faith traditions (e.g., catholic and protestant), type of worship service (e.g., sermon service, devotion, prayer service, communion), and local communities. This paper focuses on protestant ‘normal case’ worship services in Germany. In Germany, the Sunday worship service is often referred to as the ‘normal case’. It takes place every Sunday at the same time and place and follows a structure familiar to the religious community. Sunday worship services typically follow a structure of three to four interrelated steps. Each step includes several types of respective prayers, songs, or bible readings, and their content is chosen and prepared by the pastor according to the topic for the given Sunday. Following this structure, protestant ‘normal case’ worship services follow a regulated dramaturgy, describable as the staging of a ‘threshold and interruption’ of space and time (Meyer-Blanck, 2011).

The aspect of independently choosing content for a specific worship service is connected to the structure of protestant communities in Germany. Religious communities and their pastors are independent but united under one organisation, and they share their confessions. Nonetheless, worship procedures are very similar across communities. It is part of Protestant understanding that there is a priesthood of all believers, meaning that every believer can be a pastor. Nonetheless, the independent pastoral role, often taken by a nominal church employee, is essential to the communities.

Participation in church services from a distance is not a new phenomenon. In Germany, for example, worship services have been offered on television or radio for several decades (Thomé, 1991). However, the primary type of worship services at a distance experimented with in Germany during the COVID-19 pandemic were different from earlier ones: For example, they were provided or streamed online, so they were available at any time, and they allowed interactivity (e.g., comments, reactions or video chats). Also, the amount of different online worship services was new. Believers had a myriad of alternative offerings from which to choose. Since the length of the paper is limited, we will not provide a historical account of worship services at a distance but rather focus on experiences of online worship services and their specific characteristics (e.g., being always available, allowing to pause or skip, allowing to see viewer numbers).

During the COVID-19 pandemic, many protestant pastors in Germany provided online worship services that roughly followed ‘normal case’ worship service structures and elements (Nord et al., 2021; Schlag & Nord, 2021). Figure P2.1 shows a typical online worship service with all the usual elements and interaction options hosted on YouTube by a protestant church.

P2.2.2 HCI and Religious Use of Technology

HCI has long recognised that it is worth taking a closer look at religious uses of technology. For example, Wyche and Grinter (2009) found that American Protestant Christians distinguished between secular and faith-related artefacts, routines, and technology uses (Wyche &

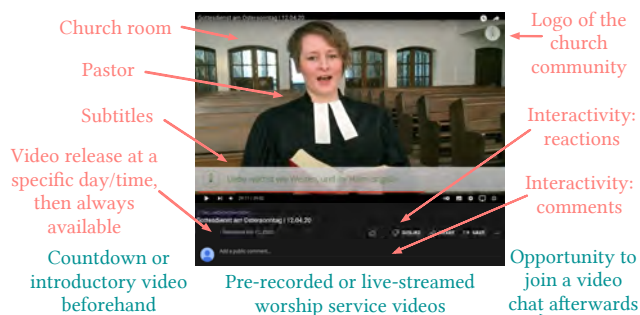


Figure P2.1: An example of a typical online worship service and its main visual and interactive elements (permission obtained).

Grinter, 2009). They concluded that a valuable perspective when designing future technologies might be *extraordinary computing* that takes into account and honours the special in everyday life. However, not only HCI researchers and designers have thought about adapting technology for religious and spiritual purposes, but believers themselves adapt and adopt available technologies such as YouTube. For example, Buie and Blythe (2013a) identified the need for a more in-depth analysis of spiritual technology-mediated experiences in context and as they take place based on their analysis of spiritual meditation videos and respective comments on YouTube. The comments suggested that many details add to the overall experience as it unfolds. For example, loud, disturbing advertisements or racist diatribes in the comments turned positive experiences with meditation videos into negative ones. Within the past few years, a whole range of products (e.g., apps, websites, interactive technologies) for religious and spiritual purposes has emerged, and already in 2013, Buie and Blythe (2013b) noted that the HCI community would benefit from analysing the many real-world spiritual applications.

Apart from spiritual and religious applications and technologies more generally, HCI researchers have also looked into the topic of participating in religious rituals from a distance or home. Especially in the Buddhist context, several artefacts have been designed that enable remembrance rituals for closely related deceased ones (e.g., Uriu & Okude, 2010; Uriu et al., 2018) or public memorials (Uriu et al., 2021a) from home. The designs are closely related to existing Japanese Buddhist funeral and remembrance rituals. For example, the Sense-Censer is an interactive device that senses incense smoke and displays photos of deceased ones, thereby meditating typical Japanese remembrance rituals technologically (Uriu et al., 2018). Another example is ThanatoFenestra, which technologically enhances typical family altars that support memorial rituals for the deceased. An artefact designed explicitly for connecting physically isolated individuals of a virtual faith community in their prayers is AltarNation (Hlubinka et al., 2002). AltarNation was developed in response to mourning practices following the 11 September terrorist attacks in the United States, where lighting candles and exchanging prayers were two predominant forms of mourning. As indicated by the name, AltarNation consists of an altar niche interconnected with altar niches of community members. Believers could enter their AltarNation and lighten up a candle when wanting to pray

together. The system then recognised the lightened candle and made it visible to other believers. The visualisation of other ‘active’ believers was displayed as a dot of light on a display mounted on the ceiling of the AltarNation niche, which looked like a starry sky. Again, the design focused on augmenting existing practices by merging the tangible and digital (Hlubinka et al., 2002).

In addition to the concrete design of technologically-mediated religious rituals, there is also some preliminary work on worship services in HCI. Previous research has looked into special worship services such as Buddhist funerals or the participatory development of a streaming platform within a rural area for online worship services. Uriu et al. (2021b) set up a funeral webcasting during the pandemic and learned about the importance of allowing remote mourners to actively hold rituals and say farewells to the deceased instead of only passively viewing a live stream. Similarly, Struzek et al. (2019) set up a streaming platform for worship services, but with an emphasis on the participatory process involving older parishioners. They identified the need to overcome local problems such as poor internet connections or support various devices with their streaming platform (Struzek et al., 2019).

Summarising previous work, we learned that paying close attention to existing practices, focusing on the extraordinary aspects of religious rituals, and taking into account pragmatic issues are essential aspects to be considered when designing for religious contexts. This paper aims to add insights about online worship experiences to the existing body of knowledge and show what elements are essential to technologically-mediated religious experiences and should be considered in their design.

P2.3 Methods

To understand experiences of online worship services in detail and to inform subsequent design concepts, we followed the contextual design approach (Holtzblatt & Beyer, 2017). Due to Germany’s COVID-19 rules and restrictions at the time of the study, we adjusted the approach to be suitable for observation at a distance as inspired by rapid, virtual ethnography (Mörke, 2021). For this study, we received clearance from the local ethics committee. However, recruiting believers who were willing to be accompanied virtually while participating in online worship services was more challenging than initially expected. It was not until we spread our invitation through the communities’ established mailing lists that we found believers willing to participate. In the recruitment process, we also learned that it is better to give little information in written advertisements and instead try to make people curious and lower the barriers to contacting us (e.g., by providing a phone number for more information). People were somewhat ambivalent about our study: On the one hand, the topic was sensitive, and people initially had many questions on how the data would be gathered and published. On the other hand, they were also very curious and happy to contribute to research and the further development of online worship services. The eight participants of this study were members of several church communities (see Table P2.1).

The meetings were scheduled to accompany participants as they participated in an online worship service. Participants needed to have access to two internet-connected devices. One device was used for a video call with the researcher, and the other was used to access the online worship service. The device with the video call was positioned so that the researcher could observe the participants. In addition, the researcher also accessed the respective on-

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Visit No.	Setting	Type of online worship service	Participants	Participation (per month)
1	Couple watching in their living room using a laptop	Livestream on YouTube from their church community	B1 (female, mid 50's) B2 (male, mid 50's)	1-2 times 1-2 times
2	Individual watching while sitting at a desk via a desktop PC	Recorded video from his church community	B3 (male, 40)	5 times
3	Flatmates watching in B4's room using a smartTV	Recorded video on YouTube from a local church community of which participants are not members but which is appreciated for its video formats	B4 (female, 23) B5 (male, 24) B6 (female, 51)	4 times 1-2 times 1-2 times
4	Individual watching in her living room using a laptop	Recorded video on YouTube from her church community	B7 (female, 64)	4 times
5	Individual watching in his living room using a tablet	Livestream on his church community's website	B8 (male, 69)	2-3 times

Table P2.1: Details on the five visited online worship services.

line worship service (video or stream). Each session started with standardised participant information, and consent was obtained. We refrained from asking questions during the online worship services (which is otherwise typical for the method) but instead took notes on observations we wanted to ask participants about. In a subsequent conversation, we asked participants to rethink the experience step by step and to detail their thoughts and feelings about, for example, why they performed specific actions (e.g., pausing or skipping, laughing, talking). We captured the data by taking notes. Overall, each session took between 1.5 to 2 hours. We then performed interpretation sessions within 24 hours each and analysed the data using iterative affinity diagramming and identity modelling (Holtzblatt & Beyer, 2017). The affinity diagram and the identity model were then used in extended wall walk sessions with a team of HCI students, HCI researchers, and collaborating protestant theologians. As a result, we formulated key insights and generated initial design ideas. Over several weeks, the paper's first author went through the data and key insights to identify central themes and sub-themes that will be presented in the results section. In addition, we present a shortened identity model that aggregates the core motivations and values of our participants (see Figure P2.2; see supplemental materials for detailed version). Note that the identity model does not represent specific persons but aggregates identity elements to help uncover sources of pride, self-expression, and core values in a way useful for design (Holtzblatt & Beyer, 2017).

P2.4 Findings: Believers in a Field of Tension Between Faith, Everyday Life, Individuality and Community

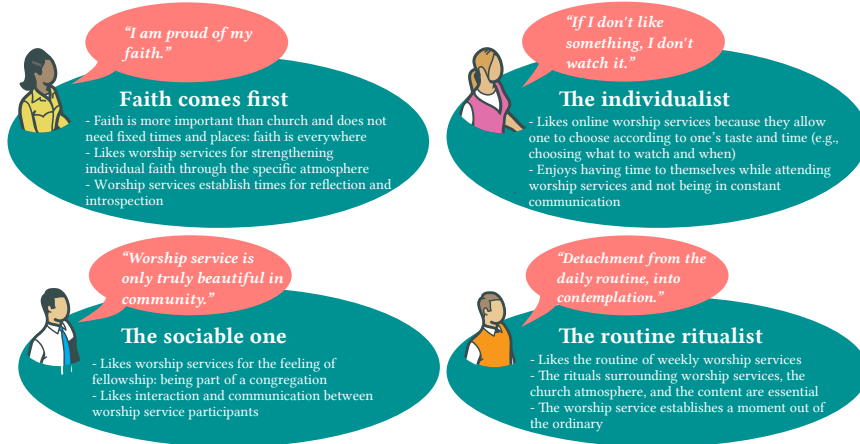


Figure P2.2: The shortened identity model with four identities reflecting our participants' sources of pride and core values related to their worship service attendance.

P2.4.1 Faith Comes First

Our participants described faith as a central motivation for attending online worship services, but it was seen as distinctly separate from the church as an institution. In the notion of the participants we accompanied, faith comes first (see Figure P2.2; Faith comes first). One participant said, 'church and faith are two different things for me' (B7), and faith was the more critical aspect. For our participants, 'faith became evident through life in everyday life' (B7), and the worship services were just one way to strengthen individual faith. 'The church atmosphere has a strong effect on me, and worship services strengthen my faith' (B3).

However, this empowering atmosphere was not always conveyed virtually: 'It is about the experience itself, which is unfortunately weakened in online worship services' (B1). While one participant expressed that 'our prayers don't lose their power just because the service is online' (B2), the sense of faith was not fostered by the current online worship service systems. Instead, the interactive elements available, such as pausing, skipping, commenting, and responding, were associated with infotainment rather than worship experiences and resulted in what was perceived as an inappropriate emotional state for worship services.

Moreover, the production quality led participants to question the centrality of faith in online worship services in some cases. Many pastors put much work into the production and use the novel possibilities comprehensively. For example, they fade in lyrics and display titles of prayers (see Figure P2.1). However, this did not necessarily improve the worship service experience but even led to the opposite: 'Streamed online worship services quickly become

self-dramatisation if one focuses too much on production quality instead of content' (B7). In the online worship services we accompanied, the pastors were at the centre, which was reinforced by the camera perspective, the empty church, and the low interactivity. However, putting the pastor at the centre contradicts the principle of the priesthood of all, which, according to Protestant understanding in Germany, suggests more interactive forms of worship. In addition, the high production quality was seen as 'inhuman' because 'mistakes are missing' (B2).

P2.4.2 Individualism vs. Communal Experience

The theme of individualism vs. communal experience integrates two contrary perspectives present among our participants. First, our participants expressed that the sense of community is a vital factor of a successful worship experience (see Figure P2.2; The sociable one). In analogue worship services, the sense of community was especially present when people sang or prayed together. However, there was no such experience in online worship services for our participants. One participant said: 'recorded online worship services are more of an individual or personal experience rather than a community one for me' (B8). While longing for a communal experience in online worship services, our participants also expressed the need for individualisation (see Figure P2.2; The individualist). Some participants explained that online worship services offered great opportunities to mix and match various worship services available online. For example, one could listen to the music of one church community and the sermon of the pastor of another. While this approach was more wish than fact at a higher level, our participants pursued customisation at a lower level. Often, our participants used the option to stop or even skip parts of the online worship services that they did not like. This contradicts the established practice of analogue worship services that follow a clear structure but underscores the need for and potential of individualised online worship experiences combined with a greater degree of agency on the part of the believers.

P2.4.3 Online Worship Services Between the Ordinary and the Extraordinary

The third theme also ties in with the previous ones but primarily reflects the ambivalence of online worship services in terms of their situatedness. We found a discrepancy between what believers indicated they were looking for by the attendance of the online worship service and the observed behaviour of what they actually did. The believers in our study described their experiences and expectations of worship services as being something extraordinary - or as one participant said: 'Detachment from the daily routine, into contemplation' (B7). Worship services are not an everyday occurrence for believers but something special, and they usually invest some effort to mark the worship service experience as distinct from everyday life and routines, e.g., dressing up, changing places, and taking the time (see Figure P2.2). In contrast, online worship services promote values like continuous accessibility or flexibility. Most online worship services we accompanied were pre-recorded and could be watched any time after they were uploaded. The tension resulting from expectations that are not met by momentary online worship services is best demonstrated with an example: During the first visit, a couple (B1, B2) expressed several recent experiences about which they were annoyed.

For them, worship services are something special, and it is important to them to follow a worship service from beginning to end. However, they woke up later than usual on one of the last Sundays and were in the middle of breakfast when they realised that the online worship service was about to start. Invited by the flexible and accessible design of current online worship services, they decided to watch it using a laptop at the breakfast table. This was practical, but they quickly became annoyed with themselves. They realised that they had turned what had been a formerly extraordinary experience into something ordinary. They even felt like ‘falling for consumerism’, which others perceived as well (B1, B2, B3, B7). This discrepancy between what is wanted and what is done was also reflected in smaller interactions throughout the online worship service: The same couple expressed that, on the one hand, they found it convenient to be able to skip ‘bad’ songs but did not like the feeling of slipping into consumerism in the process. The same applies to both examples: It is possible, and therefore it is done, even though it feels terrible.

In addition, experiencing the online worship service as something extraordinary was made even more difficult for our participants through the home context. While participating in the online worship services, they were physically in their everyday environment, full of distractions. Participants described that others who are not participating in an online worship service often enter the room and interrupt the experience with everyday things. Overall, the greater context created an atmosphere as if one were at home and not in a worship service.

P2.5 Discussion and Future Work

Our findings suggest that participation in online worship services was a unique experience, quite different from participation in on-site worship services and that observing online worship services from an experiential perspective yielded many valuable insights. Below, we discuss the various insights along the four identities (see Figure P2.2) and in relation to prior literature, and suggest possible ways for future design. To begin with, we think it might be valuable to shift the perspective from compensating for ‘normal’ worship service experiences to creating new kinds of experiences in online worship services, taking better account of the new opportunities that arise.

Comparing our findings, especially all aspects relating to the routine ritualist, to previous ones, it becomes clear that the idea of *extraordinary computing* (Wyche & Grinter, 2009) is very relevant to the context of online worship services and has not yet been designed for. Many artefacts described in previous work, like AltarNation (Hlubinka et al., 2002) or ThanatoFenestra (Uriu & Okude, 2010), suggested to establish special places within peoples’ homes (= ‘altar’) for spiritual and religious purposes. This could be one way to address the need for extraordinariness. To further support the design and address the complexity of *extraordinary computing*, a fruitful approach might be to integrate theoretical perspectives from the social sciences and religious studies, such as the extensive body of work relating to ritual theories (e.g., C. Bell, 1997; Grimes, 2013). Ritual theories, for example, suggest wearing unique clothes, meeting at special times/places, or deliberately restricting options but carefully curating what activity or element to integrate to render rituals extraordinary. Novel online worship service systems could integrate such elements by, for example, requiring small rituals such as lighting a candle and prayer before access is granted. In doing so, it is vital to reflect on the experiential perspective and existing practices in order to turn such ad-

ditional interactions into valuable practices rather than ‘necessary evils’ (Löffler et al., 2021). If this succeeds, an objectively costly interaction (e.g., an interaction that is time-consuming or even exhausting) can turn into something valued and important (Klüber et al., 2020a).

As documented above, the systems used for online worship services in Germany do not necessarily support feelings of faith but actually ‘violate’ them by creating feelings of consumption through the given options such as pausing, skipping, or participating anywhere and anytime. These findings relate to findings of Buie and Blythe (2013a) who identified the need for a more in-depth analysis of spiritual technology-mediated experiences in context and as they take place. Our finding underlines that when designing for spiritual purposes, or more precisely for online worship services, not only the content (= the what) is essential, but also the context and the system with its visual design and interaction possibilities (= the how). In light of our findings, it does not seem best to import all designs and interactions from other areas, such as infotainment. Instead of simply using the same player and response options, all elements should be examined for their contextual fit and contribution to feelings of faith and adapted if necessary. More appropriate reaction possibilities than symbols for ‘I like’ or ‘I don’t like’ in the context of worship services could be, for example, symbols of praying hands or candles.

The finding that a sense of community is vital in worship service experiences is in line with previous findings that suggested that online worship services could not replace analogue ones as the experience of community is vital (Wyche, 2010). Nonetheless, our participants managed to develop a sense of community in online worship services when they planned to attend in advance and arranged with others to watch the service live (see Figure P2.2). Another way to support a sense of community might be to visualise other participants, like in the concept of AltarNation that visualised other praying community members through star-like lights (Hlubinka et al., 2002). In addition, it might be worthwhile to look more closely at the results of telepresence research and research on relatedness at a distance or religious TV services to identify further design guidelines for supporting a sense of community in online worship services.

Overall, our findings can be interpreted as somewhat controversial from a theological perspective. For example, skipping parts of a worship service contradicts the very idea of worship services that consist of interrelated content and a pre-determined structure that is carefully curated but highlights the dynamics and agency of the performing actors inherent to rituals in a broader sense. This, in turn, demonstrates the importance of a detailed understanding of the topic, the greater context, and the different perspectives (e.g., believers, HCI, theologians) when designing for online worship services. We need to consider the effects of a design carefully (e.g., the impact of a skipping button on worship services) and find ways to participatory decision-making in the context of designing for technology-mediated religious experiences.

A limitation of our study is the small, homogeneous sample consisting of eight Protestant, German believers (albeit from different church communities and of different ages). Furthermore, online worship service experiences are highly culture-dependent, so the results presented in this paper are not globally applicable. Nonetheless, we hope that our work inspires future work in the area and that it highlights the urgent need to better understand technologies’ influences on religious experiences.

In future work, we plan to refine and implement our ideas for possible online worship service systems that better value the extraordinary, foreground faith, and enable a sense of community while also considering participants' need for individuality and theologians' concerns about worship services. Following this process, we will evaluate our prototype in the wild to refine our findings on online worship service experiences. Ultimately, this will contribute to the development of HCI-specific knowledge for central religious rituals and provide answers about how HCI designs can meet specifically human existential needs for reassurance, revision/balancing of one's life, and impulses for current and future living.

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Supplementary Material



Figure P2.3: The first and second identity of the detailed identity model reflecting our participants' sources of pride and core values related to their online worship service experiences.



Figure P2.4: The third and fourth identity of the detailed identity model reflecting our participants' sources of pride and core values related to their online worship service experiences.

Publication 3

The God-I-Box: Iteratively Provotyping Technology-Mediated Worship Services

This work has been published as follows:

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Abstract

The COVID-19 pandemic accelerated the development of alternative formats for religious rituals, such as Protestant online worship services. However, current design approaches focus on problem-solving, and the resulting online solutions merely imitate the offline status quo. To overcome these limitations, we suggest adopting a provotype approach that allows for a more holistic, open-ended dialogue with those affected. To test whether and how provotypes can trigger productive impulses for exploring future technology-mediated worship services based on existing experiences and perspectives, we iteratively developed a first provotype in response to tensions found in observation-based field research. The resulting God-I-Box exaggerates individuality and allows congregants to act almost like liturgists. An analysis of congregants' and pastors' (online) first encounters with the God-I-Box revealed three reaction modes: spontaneous emotions, reflective coping, and exploratory imagination. We conclude with reflections and recommendations for provocative research and design in this context and beyond.

Keywords

Provotyping, provocation, method, ritual, prayer, faith, religion, online worship service

P3.1 Introduction

Everyday life changed dramatically due to the COVID-19 pandemic when novel rules and restrictions emerged to avoid spreading the virus. In response, religious communities provided alternative formats to regular worship services to lower the danger of infection in face-to-face meetings. They appropriated technologies such as video conferencing, streaming, or social media for religious rituals (Cambpell, 2020, 2021; Nord & Luthe, 2020; Nord et al., 2021). In Germany, the context of this study, about 65% of surveyed Protestant pastors offered online worship services, and only 4% of those did so before the pandemic (Nord et al., 2021; Schlag & Nord, 2021). Most often, these Protestant online worship services followed the structure and procedure of Sunday worship services, focusing on preserving the existing ritual. Fixing the problem of not being allowed (or able) to meet in person was the primary concern in developing such online worship service formats. Similarly, recent HCI examples focused on preserving existing religious rituals and fixing problems Struzek et al., 2019; Uriu et al., 2021b.

This approach is rather short-sighted as it neither acknowledges that rituals change when celebrated online and within everyday life (Cambpell, 2020; Claisse & Durrant, 2023; Claisse & Durrant, 2022; Wolf et al., 2022c), nor does it take seriously technological capabilities or traditionally grown community values such as the Protestant ‘priesthood of all’ emphasising that ‘not a particular ministry but faith alone qualifies a person for pastoral witness’ (Karle, 2020, p. 135) (Nord & Luthe, 2020). To overcome these limitations, we initiated an interdisciplinary project between theology and HCI dedicated to exploring possible futures of technology-mediated worship services together with those affected and based on a thorough understanding of existing experiences and perspectives.

Searching for a suitable methodological approach, we came across provotypes. Theoretically, provotypes allow for participatory involvement of various stakeholders (Boer & Donovan, 2012), make tangible and thus discussable emerging tensions (Boer & Donovan, 2012; Boer et al., 2013), invite taking a stand and thus bring comprehensive, design-relevant knowledge to light useful in early project stages (Boer et al., 2013; Mogensen, 1992; Shorter et al., 2022), and enable a more holistic, open-ended dialogue that goes beyond an overtly simplistic problem-fixing perspective (Raptis et al., 2017). However, introducing the provotype approach into our context of German Protestant worship services is delicate. The rituals and liturgies of this institutionalised community are long-grown and follow a 500-year line of tradition that is agreed upon by all semi-independent church congregations. They cannot simply be changed. While the umbrella organisation, the Evangelische Kirche in Deutschland (EKD), recognises that changes in church practice are necessary given that religious feelings and beliefs are not static and can change over time (Bedford-Strohm et al., 2015), there are contradicting views on the nature of these changes. Any attempt to productively explore possible futures of technology-mediated religious rituals must carefully weigh the different positions and avoid ignoring or offending religious feelings and convictions (Utsch, 2022). While the provotype approach seemed to fit our objectives well theoretically, no practical accounts of its use in the context have been documented, and it was unclear whether the approach could be used productively. So, as a first step and before actually using provotypes in broader participatory workshops in this context, we wanted to understand whether and how

provotypes could trigger productive impulses for exploring possible futures of technology-mediated worship services together with those affected and based on a thorough understanding of existing experiences and perspectives at all.

In this paper, we make several contributions: We introduce the provotype approach to the sensitive context of religious rituals and contribute a first provotype, the God-I-Box (see Figure P3.1), that was iteratively developed based on observations and interviews of Protestant congregants' online worship service experiences Wolf et al., 2022c. In addition, we contribute an empirical account of congregants' and pastors' reactions to the God-I-Box, along with reflections on the reactions' productivity regarding our objectives and recommendations for future research and design in this context and beyond.

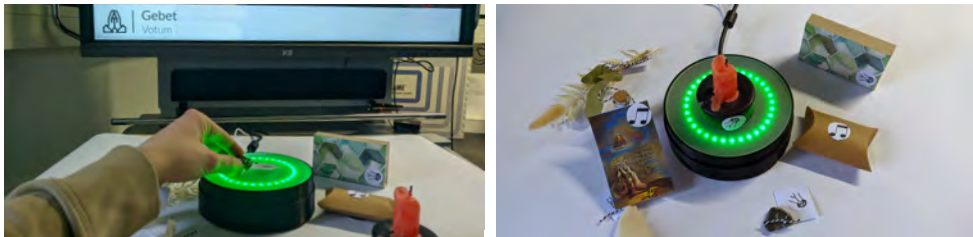


Figure P3.1: Left: The God-I-Box in use in front of a TV set. Everyday tangible objects are enhanced to allow access to parts of an online worship service when placed on top the God-I-Box. Right: The God-I-Box and multiple tangible objects.

In the Background section (see Section P3.2), we introduce the two relevant strands of literature: Work on technology-mediated religious rituals and provotypes as a research tool in HCI. We then describe the study's context, our initial field research, and how we iteratively provotyped for technology-mediated worship services ending with a description of our provotype, the God-I-Box (see Section P3.3). We present congregants' and pastors' initial reactions to the God-I-Box in online first encounters. These can be summarised as three distinct modes of reactions: spontaneous emotions, reflective coping, and exploratory imagination (see Section P3.4). In the Discussion section (see Section P3.5), we reflect on the productivity of the reactions triggered by the God-I-Box and conclude with recommendations for future provocative research and design in this context and beyond.

P3.2 Background

P3.2.1 HCI and Technology-Mediated Religious Rituals

Apart from being relevant to many people worldwide, technologies for the religious or spiritual context place novel demands on technology design, pose exciting methodological challenges to HCI and can bring new impetus to other areas of HCI (e.g., Blythe & Buie, 2021; Buie, 2016; Wolf et al., 2023a; Wyche & Grinter, 2009). However, while HCI has long recognised the value of research in this context (Wyche & Grinter, 2009), most technological examples originated from within the practice (e.g., from congregants, pastors) and go largely unnoticed by HCI research (Buie & Blythe, 2013a). The pandemic reinforced this trend:

More and more religious and spiritual rituals, such as online worship services, were mediated by interactive technologies (Nord et al., 2021). Consequently, few HCI scholars have explicitly addressed technology-mediated worship service experiences in their research, and we expand our review of previous research to cover technology-mediated participation in religious/spiritual rituals more generally. The previous research can be categorised into two broad strands, (1) exploratory work focused on designing novel technology-mediated rituals and (2) participatory work focused on solving pragmatic problems.

Much of the more exploratory work is based on Buddhist remembrance rituals for closely related deceased ones (e.g., Uriu & Okude, 2010; Uriu et al., 2018) or public memorials (Uriu et al., 2021a). Researchers took inspiration from existing Japanese rituals to develop novel artefacts. A first example is the SenseCenser, an interactive artefact that senses incense smoke and displays photos of deceased ones, thereby meditating typical Japanese remembrance rituals technologically (Uriu et al., 2018). The researchers imagined the SenseCenser to be used within everyday life to support Japanese remembrance rituals. The SenseCenser's design draws on many elements from existing rituals, such as incense smoke, light, sound, and photos. The unusual combination of these elements creates a novel ritual (Uriu et al., 2018). Once smoke is detected, light, sound, and photos are activated. A similar design approach was used for ThanatoFenestra, an artefact that technologically enhances typical Japanese family altars for remembering the deceased (Uriu & Okude, 2010). Like SenseCenser, ThanatoFenestra aims to support remembrance within everyday life and uses light and photos of deceased loved ones (Uriu & Okude, 2010). ThanatoFenestra was further developed into Fenestra, a more consolidated and robust artefact deployed in the field (Uriu & Odom, 2016). Fenestra also fused and expanded existing elements of memorial rituals in new ways and thus enabled completely novel rituals, which was observed in a field deployment (Uriu & Odom, 2016). The above artefacts were designed without much participation of those affected and for individual, domestic use only. Therefore, the design did not need to consider the conflicting perspectives of various stakeholders or the institutional structures of a religious community.

Community was considered in two further examples, AltarNation and SenseVase (Hlubinka et al., 2002; Uriu et al., 2021a). AltarNation was developed to connect physically isolated individuals of a virtual faith community in their prayers (Hlubinka et al., 2002). It is an altar niche where congregants can light candles to pray together. All lightened candles are visible in community members' AltarNations as dots of light to create a sense of community while praying. Again, the design was inspired by existing practices such as lighting candles and exchanging prayers but merged and enhanced these elements to create an entirely novel ritual (Hlubinka et al., 2002). Similarly, SenseVase took inspiration from existing floral tributes and online memorials (Uriu et al., 2021a). The concept roughly comprises placing flowers in a vase at home and thus adding a floral tribute at a virtual memorial (Uriu et al., 2021a). It was presented online to various experts using a video for validation and should serve as an example of how virtual reality communities could conduct memorial rituals in a more embodied way (Uriu et al., 2021a). Both examples addressed communities, but they did not report on how pre-existing structures or the (conflicting) perspectives of various stakeholders were dealt with.

In summary, it seems common practice in the first strand for designers to get inspired by, adopt, and merge existing ritual elements. All examples are innovative and focus on exploring possible futures rather than solving current problems. However, their scope is limited to personal, highly individualised rituals within domestic environments rather than existing rituals within formally organised communities (e.g., online worship services) that require consideration of existing (power) structures and traditions going beyond individual experiences. Designing for technology-mediated rituals of formally organised communities such as Protestant worship services comes with additional requirements: The communities must be involved early on since simply imposing a new ritual from the outside will not work given the existing structures and traditions. Decisions about emerging rituals cannot be left to the power of individual designers.

The second research strand focused more on solving (pragmatic) problems and involving those affected. Interestingly, the respective examples also cover technology-mediated worship services directly. The first example is a case study of funeral webcasting in Japan. Uriu et al. (2021b) spontaneously set up a webcasting system in response to travel and meeting restrictions that prevented people from attending their loved one's funerals. The setup consisted of various cameras streaming the funeral's activity for remote mourners (Uriu et al., 2021b). The project was initiated by the deceased's wife, who had asked the researchers for help when relatives were not allowed to attend the funeral in person. So some persons affected were involved in the process early on (Uriu et al., 2021b).

Another example is a co-design project on social participation involving elderly citizens of a rural area that resulted in setting up a streaming platform for worship services (Struzek et al., 2019). Here, various local actors, such as the pastor or citizens, were involved in all phases of the two-year design process. In realising the streaming platform, much effort went into solving problems such as the area's poor internet connection or the variety of devices that needed support (Struzek et al., 2019). The problem-solving approach to designing technology-mediated worship services often opened up new problems, like various distractions that only arose due to the novel context or setup (Claisse & Durrant, 2023; Claisse & Durrant, 2022; Wolf et al., 2022c). Overall, the second research strand highlights the importance of involving affected parties early when designing technology-mediated worship services. Unfortunately, no paper in this strand shared details of the design processes, e.g., how they recognised and worked with (potentially conflicting) perspectives of the various stakeholders involved. Also, all technological solutions presented in the second research strand were less exploratory and more dedicated to fixing existing problems.

In this paper, we want to combine the two strands of research: working with those affected and allowing for a more exploratory perspective beyond problem-solving. This is essential for our project as we work in a domain where rituals have evolved over centuries, are managed by institutions, and affect various stakeholders. In this context, simply imposing new rituals from the outside will not work. In addition, we expect more exploratory approaches to lead to more significant and novel contributions because, in practice and research, it is mainly the problem-solving perspective that has been applied to technology-mediated worship services. These considerations require an approach combining all objectives: understanding and building on existing experiences, involving various stakeholders and potentially contrasting perspectives, enabling dialogue, and allowing for open-ended exploration.

P3.2.2 Provotyping as a Research Tool

The DIS community⁵ has a long history of engaging with various forms of provocation as a means to challenge existing norms, engaging with design spaces ‘where asking questions is as important as solving problems’ (Ozkaramanli & Desmet, 2016, p. 2), or applying provocations in various contexts (e.g., Bardzell et al., 2012; Boer & Donovan, 2012; Bruun et al., 2020; Raptis et al., 2017; Shorter et al., 2022). The spectrum of approaches to provocation ranges from extreme, ‘hyper dystopian’ (Shorter et al., 2022, p. 1514), to moderate ones. In critical design, deemed more extreme, provocation is a means to critique the status quo with the ultimate goal of initiating reflection rather than satisfying needs (Bowen, 2007; Dunne, 2008). While initiating reflection resonated with our endeavour to overcome current technology-mediated worship service perspectives, we also wanted to better understand existing experiences and perspectives and initiate participatory exploration of possible futures. So our goals and focus were diverse and resembled the various perspectives that researchers often take in RtD design projects (engineers, anthropologists, behavioural scientists) (Raptis et al., 2017; Zimmerman et al., 2007).

A seemingly suitable approach is the provotype (provocative prototyping) approach that emerged in the systems development context (Mogensen, 1992). Inspired by Activity Theory and prototyping, Mogensen (1992) used provocation in prototypes to provoke the taken-for-granted of existing practices. Thereby, system designers could eventually understand better tacit aspects of practices and ultimately design better systems (Mogensen, 1992). Since then, provotypes have become more popular and have been applied in various contexts such as homes (e.g., sustainable behaviours (Boer & Donovan, 2012; Raptis et al., 2017), mobile phone usage (Bruun et al., 2020), new parenthood (Durrant et al., 2018), family life (Christensen et al., 2019)), or workplaces (e.g., unequal pay (Als et al., 2022), sensitive conversations in hospitals (Thomsen et al., 2018)).

The numerous studies consolidated several key characteristics of the provotype approach: Provotypes are functional artefacts rooted in ethnographic work and embodying or exposing existing tensions (Boer & Donovan, 2012; Boer et al., 2013). As such, provotypes share the characteristic of deploying functional artefacts with other approaches such as technology probes (Hutchinson et al., 2003) or material speculation (Wakkary et al., 2015). However, provotypes put a unique emphasis on actively addressing tensions found in fieldwork to initiate participatory discussions on the subject matter (Boer & Donovan, 2012; Boer et al., 2013). Often, such tensions can be traced back to discrepancies between different goals, different elements of a practice or prescribed and actual practices (Mogensen, 1992). Therefore, provotypes are particularly helpful in the early design phases when it comes to gaining a comprehensive understanding of the context, uncovering conflicting goals of various stakeholders, and working constructively with emerging tensions (Boer et al., 2013; Shorter et al., 2022). It is essential to understand that provotypes are not final products that satisfy user needs or merely support users in completing tasks but means to gain a deeper understanding of a context and explore possible future (Raptis et al., 2017). As such, provotypes can be understood as designerly approaches to engaging with and understanding contexts (Boer & Donovan, 2012), similar to cultural probes (B. Gaver et al., 1999). In addition, provotypes

⁵refers to the community around the ACM Conference on Designing Interactive Systems where the paper was published

can be applied in RtD projects and participatory settings such as participatory workshops (Boer & Donovan, 2012; Raptis et al., 2017; Shorter et al., 2022). In summary, the provotype approach closely aligned with our goals of learning more about existing experiences, perspectives, and tensions, and exploring possible futures with those affected.

Apart from these key characteristics, the previous literature has also compiled guidelines for designing provocations. First, designers of provocation need a ‘critical sensibility, [which] at its most basic, is simply about not taking things for granted, to question and look beneath the surface’ (Dunne & Raby, 2009). With this attitude in mind, the task is then to design a technology that is ‘slightly strange’ (Dunne & Raby, 2001, p. 63) and a bit ‘mysterious’ (Boer & Donovan, 2012, p. 396). Approaches that support slight strangeness and mystery are ambiguity (Bardzell et al., 2012; W. Gaver et al., 2003) or defamiliarisation (G. Bell et al., 2005; Durrant et al., 2018). Also, previous work highlighted the importance of design authorship when designing provocations, meaning that not all design decisions have to be rooted in users’ needs but can originate from designers’ intuition (Pierce et al., 2015; Raptis et al., 2017). Although not applied in their project, Raptis et al. (2017) suggested integrating stakeholders iteratively during provotype design to make provocations of the final provotype more targeted. Provotypes are expected to trigger provocations in three different moments, in first encounters, in use, and upon reflection, each requiring different sorts of provocations (Boer & Donovan, 2012). For example, provocations in first encounters, such as presentations of provotypes in exhibitions or workshops, can be extreme. In contrast, provocations in use should be more subtle to allow adoption over time (Boer & Donovan, 2012). Provotypes should ‘provide handles for exploration’ (Boer & Donovan, 2012, p. 396) to get people to engage with them in the first place and provoke at various levels such as conceptual, functional, or aesthetic (Bardzell et al., 2012; Raptis et al., 2017).

The above summary provides a valuable starting point for applying the provotype approach to the unique domain of technology-mediated religious rituals. However, given that no previous work designed provotypes for this sensitive context, it was essential for us first to understand whether and how provotypes could be designed so they would trigger productive impulses for exploring possible futures of technology-mediated worship services together with those affected and based on a thorough understanding of existing experiences and perspectives. Thus, the paper at hand focuses on the careful, iterative development of a provotype, the God-I-Box, and the initial reactions it triggered in congregants and believers to ensure that it can trigger productive impulses in this next step (e.g., participatory workshops) without ignoring or offending religious feelings and convictions.

P3.3 Iteratively Provotyping for Technology-Mediated Worship Services

The broader project to which the work of this paper contributes is dedicated to exploring possible futures of technology-mediated worship services with those affected. It was established in response to the increase of online worship service formats during the COVID-19 pandemic in Germany and brings together Protestant theology and HCI (Nord et al., 2021; Schlag & Nord, 2021). All steps reported were planned and guided by an interdisciplinary team of one HCI researcher and one Protestant theologian and pastor in training. In addition,

several HCI students supported individual activities. To include many different perspectives, we recruited new participants for each step who fit the respective objectives. In this way, we could integrate 25 people during the development of the provotype while keeping their effort as low as possible, given that we could not compensate them on a larger scale (e.g., monetarily).

P3.3.1 Understanding Experiences of Online Worship Services

Our initial literature and online searches and the exchange with Protestant theologians provided many insights into the pastoral and institutionalised perspective on Protestant online worship services. Protestant worship services are communicative gatherings of believers who invoke an external power and seek to make it tangible for those gathered (Meyer-Blanck, 2011; Wolf et al., 2022c). While the basic structure of worship services builds on a long tradition, the details can vary between communities or types of worship services. This flexibility is due to the particular structure of the German Protestant Church: All communities share their confessions and are united in one organisation (EKD) but still independent as a community. Pastors usually plan the worship services, sometimes with congregants. However, there is a general understanding of the priesthood of all, meaning that every believer can preach and is invited to take active roles.

To understand congregants' experiences and perspectives better, we virtually observed and interviewed eight congregants during and after participation in online worship services (reported in more detail in Wolf et al., 2022c). We recruited congregants of various ages (range: 23-69 years), from different church communities, and with varying online worship service participation rates (1-5 times per month) through targeted invitation emails to established mailing lists of various communities. In each session, we informed the congregants about the study, obtained their consent, and then (virtually) observed them during participation in an online worship service. Subsequently, we asked the congregants to talk us through their experience and detail their feelings about actions performed such as pausing, skipping, or talking. Our findings, presented in more detail in (Wolf et al., 2022c), can be summarised as follows.

Overall, we uncovered a series of tensions emerging from current online worship service experiences that position 'believers in a field of tension between faith, everyday life, individuality, and community' (Wolf et al., 2022c, p. 4). These tensions arose from the discrepancies between different goals and elements of the practice (Mogensen, 1992). They often became evident from the discrepancy between what the participants said and how they behaved during our observations and can be summarised in three central themes.

First, we observed a tension between the desire to experience something extraordinary when participating in worship services and the ordinariness of the actual experiences. Congregants appreciated the extraordinary nature of worship services that interrupt everyday life (e.g., taking place at a dedicated place and time, wearing neat clothes). However, with online worship services, they could participate at any time - even from the breakfast table - which did not evoke the desired extraordinary experience. In onsite worship services, rituals and procedures are prescribed 'from the outside', whereas online worship services do not support this structure in any way, especially not if they remain online forever after the first trans-

mission. Instead, congregants were invited by the flexible and accessible design of current online worship services and, accordingly, participated as one would participate in watching any other online content (i.e., pausing, skipping, watching at another time).

The second tension concerned the perceived contradictions between the centrality of faith and an infotainment atmosphere. The systems used for online worship services did not necessarily create an atmosphere supporting faith. Instead, they contradicted it through their infotainment and consumerism character, triggered by interactive options such as pausing, skipping, or participating anywhere and anytime. These elements were associated with infotainment rather than worship service experiences and triggered what was perceived as an inappropriate emotional state for worship services. In addition, some participants questioned the centrality of faith and content when online worship services were produced with high quality. 'Streamed online worship services quickly become self-dramatisation if one focuses too much on production quality instead of content' (B7). Accordingly, the lack of mistakes (B2) led to the assumption that the quality of the infotainment-like videos was the main focus, not the content and faith.

Third, we found a tension between community and individuality. Community was described as essential to worship service experiences, but the flexibility of online worship services was appreciated as well or at least frequently used. Some participants found it convenient to be able to skip 'bad' songs but did not like the feeling of 'falling for consumerism' (B1, B2, B3, B7). It was possible, and therefore it was done, even though it felt terrible when consciously reflecting on it.

Overall, these three tensions demonstrated how congregants often looked for something else but were 'seduced' by the possibilities of online worship services. The few participants who reflected on this 'seduction' felt very bad. After identifying these tensions, we were unsure how to proceed with the project. Previous approaches applied in the sensitive context of technology-mediated rituals focused on either exploring potential futures or closely involving those affected, and they seldomly detailed how tensions were dealt with. So we looked for an approach combining these different requirements.

As stated in the previous section, the provotype approach seemed to offer what was needed - at least theoretically: It (1) is useful for early design-phases (Mogensen, 1992; Shorter et al., 2022), (2) allows to involve various stakeholders participatory by confronting them with a provotype and learning about their perspectives (Boer & Donovan, 2012), (3) makes emerging tensions tangible and therefore discussable (Boer & Donovan, 2012; Boer et al., 2013), (4) invites taking a stand and thus brings design-relevant knowledge to light (Boer et al., 2013; Mogensen, 1992; Shorter et al., 2022), and (5) is useful for both, better understanding current practices and future opportunities and engaging in a more holistic, open-ended dialogue that goes beyond a problem-fixing perspective (Raptis et al., 2017). In theory, the provotype approach was a perfect match. However, as there is no documented practical experience of provotypes in the sensitive context of religious rituals, we first had to understand whether a provotype could trigger productive impulses in this context at all without offending religious feelings and beliefs.

P3.3.2 From Tensions to Provotype

To design a provotype reflecting the tensions identified, we roughly followed the guidelines summarised from the literature (see Section P3.2.2). In line with our decision to first explore the suitability of the provotype approach for the sensitive context of religious rituals, we followed the suggestion from Raptis et al. (2017) and developed the provotype iteratively to ensure that it would (1) invite open exploration, (2) be easy to understand, and (3) trigger productive reactions. Given that we wanted to present the provotype to various stakeholders in different settings in the future, we focused on designing provocations for first encounters (Boer & Donovan, 2012).

Supported by various HCI students, we performed several ideation sessions to create provocative ideas based on our theoretical and empirical understanding of the context and respective tensions. We then clustered the ideas by commonality and recognised, for example, that most involved tangible objects or unique devices. This is common for provotypes (e.g., Als et al., 2022; Boer & Donovan, 2012; Raptis et al., 2017) and also had content-related reasons. Introducing unique devices to worship especially picked up on the first tension because it materialised the extraordinariness of worship services. The idea of using tangible objects was also rooted in the existing practice of pastors who often use everyday tangible objects in their worship services to illustrate connections between Bible texts and everyday life. Another central theme among the ideas was integrating everyday tangible objects and making them interactive to reach a slight strangeness based on the familiar (Dunne & Raby, 2001) and creating an atmosphere less connected to high production quality (tension 2). Thus, by integrating everyday tangible objects, an alternative atmosphere could be created that emphasises individuality, personality, care, and everyday life. A third theme among the ideas addressed the flexible and individualised participation patterns, such as only participating in the parts of an online worship service that one likes. Many ideas imagined splitting online worship services into meaningful parts (e.g., one part = one prayer) and making those parts accessible through dedicated tangible objects. Thus, the individualised behaviour of only participating in parts of an online worship service would be exaggerated, made tangible, and even invited by the provotype, while community would be neglected (tension 3).

Guided by these themes, we developed a first provotype vision through joint discussion. We envisioned a dedicated device, such as a transformed living room table, that would allow access to parts of online worship services by placing appropriate tangible objects on it. These tangible objects could not only serve as a means of access but also arouse curiosity and guide congregants' attention to some aspects of the connected, 'hidden' content. For example, a cut-out newspaper article on Ukrainian war refugees could be used to give access to respective intercessions. To leave parts mysterious (Boer & Donovan, 2012), we envisioned including 'loose ends' in the overall concept and leaving parts open to speculation, such as how or when tangible objects would be provided if the God-I-Box was actually in use.

Based on this vision, we created a first provotype that consisted of an interactive table made from cardboard and a set of 15 tangible objects (see Figure P3.2, left). The pastor in training involved in the project curated an entire worship service for the provotype by choosing everyday tangible objects and respective content of an online worship service video produced

by him. The table detected tangible objects placed on it and played the corresponding parts of an online worship service on a connected screen. In this way, congregants could act almost like liturgists by deciding which parts to experience when.



Figure P3.2: The evolution of the provotype over three iterations. Left: The first provotype made from cardboard resembling an interactive table. Middle: The second provotype consisting of a transformed wooden coffee table and an additional attendance indicator. Right: The third provotype consisting of a small, 3D-printed, pedestal-like enclosure.

We performed two iterations of testing and adapting to understand whether the provotype would invite open exploration and be easy to understand regarding its basic interaction mechanisms. For the first iteration, we invited four students with different academic backgrounds interested in encountering a novel technology for worship services. After giving informed consent, participants freely explored the provotype while thinking aloud and learned about several usability-related issues. For example, participants expected the playback to pause when removing tangible objects from the table, which was not the case. These usability-related issues proved particularly problematic because they led participants to reflect on interactions only instead of the more conceptual provocations. Also, we recognised that the cardboard version was too provisional for participants to consider its adoption and, thus, potential consequences and provocations.

Therefore, we produced a second provotype with a more sophisticated and unobtrusive design and transformed a wooden coffee table to contain and conceal all the electronics (see Figure P3.2, middle). Also, we adapted the interaction to match participants' expectations better. We added additional content to explore further opportunities for provocation, such as an attendance indicator of (simulated) other congregants to support a sense of community and more experimental worship service content like meditative experiences with peaceful forest scenes. We presented the novel provotype to another seven participants after two pilot tests. Participants gave informed consent and then freely explored the provotype while thinking aloud. Thereby, we learned about novel usability-related issues. For example, participants struggled to understand the interaction of placing tangible objects in a dedicated area, given that the area was designed less conspicuously than the first version. In addition, some participants deemed the table's style unsuitable for their homes, dismissed it as impractical, and thus seldomly imagined its adoption. The attendance indicator of (simulated) other congregants was rarely noticed, making the overall concept too complex to understand in first encounters. The more experimental content was received controversially, something we considered positive from a provocation's point of view.

Based on the two iterations' results, we adapted the provotype again. Given that the table design was inappropriate in several respects, we ideated on a different form and aesthetic. Most importantly, it should have an explicit affordance for placing tangible objects on it and be abstract, small, and inconspicuous to invite imagination about its adoption. In the end, we came up with a device resembling a small pedestal that is 3D-printed and looks unlike any familiar object. In the following, we describe the final provotype that we named God-I-Box (see Figure P3.2, right), with a focus on its conceptual, aesthetic and functional provocations (Bardzell et al., 2012; Raptis et al., 2017).

P3.3.3 The God-I-Box

The God-I-Box consists of a black cylindrical 3D-printed enclosure with a frosted acrylic glass plane on top (see Figure P3.3). The enclosure houses an RFID reader to recognise the tangible objects and a ring of 32 RGB LEDs underneath the glass to signal different states, either a green pulse effect for playback or a static yellow light for idle. All the electronics are connected to and controlled by a Raspberry PI 4 running Raspberry OS. The custom software is written in Python and uses open-source libraries for video playback and interfacing with the LEDs. The God-I-Box comes with a set of everyday tangible objects, each providing access to a specific part of an online worship service when placed on the God-I-Box (see Figure P3.1). Each tangible object is tagged with a symbol (e.g., notes) to indicate the sort of content that is 'hidden' behind it and can be accessed with it (e.g., music). Again, the pastor in training involved in the project curated the content and respective tangible objects.

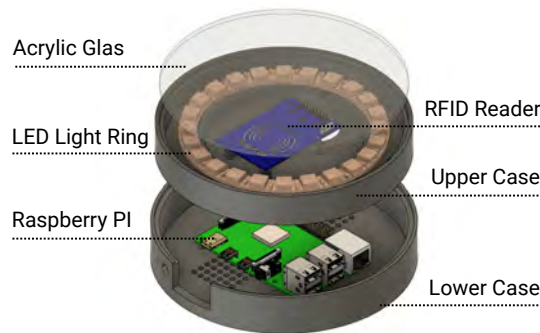


Figure P3.3: Schematic depiction of the God-I-Box.

Conceptual provocation refers to the ideas or concepts that will be challenged or stimulated (Bardzell et al., 2012; Raptis et al., 2017). The God-I-Box concept challenges the traditional worship service liturgy by breaking with some key elements. It breaks with the traditional structure and replaces it with the freedom to create one's worship service, which is a strong provocation from a theological perspective. By dividing the online worship service into small sections of a few minutes each, the God-I-Box also stimulates reflection on its fit into the everyday. The openness of the concept in terms of who/when/how the tan-

gible objects and their content are chosen or exchanged stimulates reflection on the concept of a worship leader: Congregants could exchange their tangibles among themselves or even add some themselves. This is further supported by the unusual content elements, such as the meditative experiences that are equally integrated with tangible objects and thus challenge existing conceptions of worship service contents and who determines them. With the chosen name, God-I-Box, we wanted to highlight the concept's openness while connecting it to current practices. 'GoDi' is a commonly used abbreviation for worship services (German: 'Gottesdienst') amongst German pastors. Using the changed spelling ('God-I'), it can be read differently, e.g., 'God I' or 'God Interaction'. We explicitly do not give a reading here.

Functional provocation describes how far from the norm a design operates (Bardzell et al., 2012; Raptis et al., 2017). The God-I-Box allows congregants to control an online worship service by placing tangible objects on its surface. Thereby, congregants take more active roles than in current worship service formats. In addition, the tangible objects have a thought-provoking relationship to the 'hidden' content, expanding their functionality. They are not only triggers but may guide attention and influence how the content is perceived. Also, the physical presence of the God-I-Box functions as a visible cue so others can see that someone participates in an online worship service.

Aesthetic provocation pertains to manipulating the design's visual style to challenge or stimulate the viewer's perceptions and expectations of what is considered normal (Bardzell et al., 2012; Raptis et al., 2017). The God-I-Box is a pedestal-like 3D-printed device designed to be unobtrusive to fit seamlessly into various congregants' homes. The aesthetic style of the device, with no reference to religious content, deviates from an expected aesthetic and instead has a more abstract, minimalist appearance. In addition, the 3D-printed material hints at a do-it-yourself-culture and should thus stimulate reflection on its production and potential adoption. We deliberately kept the design abstract to encourage reflection on customisation and adaptation.

P3.4 Initial Reactions to the God-I-Box

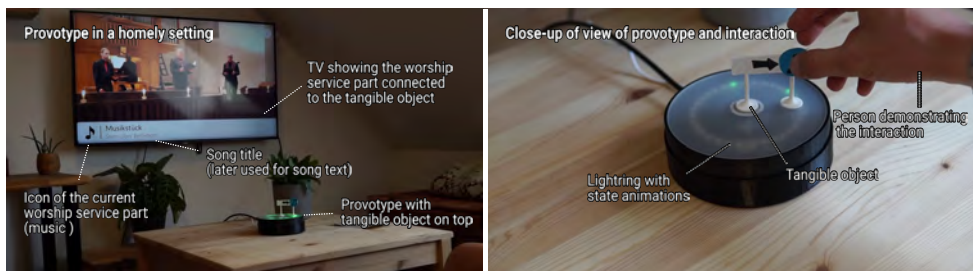


Figure P3.4: Two annotated video stills that were shown to participants in online first encounters to demonstrate the God-I-Box's concept, function, and aesthetics. Left: Still of the God-I-Box in use in a homely setting to demonstrate its concept. Right: Still of a closeup to demonstrate the God-I-Box's function and aesthetics.

So far, our primary focus in developing the provotype was whether it invited exploration and was easy to understand, which we researched using open exploration and think-aloud sessions. However, we also wanted to understand how various stakeholders would actually react to the God-I-Box in first encounters and whether or not these reactions would be productive in terms of our greater goal to explore possible futures of technology-mediated worship services together with those affected and based on a thorough understanding of existing experiences and perspectives. This step was essential before the actual use of the provotype in participatory workshops (will be reported elsewhere) because there the provotype can only trigger productive impulses if it does not hurt religious feelings or merely triggers rejection without further discussion, but if it succeeds in getting various stakeholders to reveal their perspectives and values and to speculate about future possibilities. Therefore, we chose a less interactive method for the next iteration's test that better reflected the original conception of provocations in first encounters as 'provocations in the presentation of provotypes with complementary textual and verbal comments' (Boer & Donovan, 2012, p. 396). We expected this adaptation to allow participants to focus more on the God-I-Box's provocation and concept rather than interaction (as in the previous iterations). To learn about the potential reactions of various stakeholders to the God-I-Box (e.g., pastors, congregants) at an early stage and keep the effort for participants, especially the hard-to-recruit group of full-time pastors, as low as possible, we decided to present the God-I-Box in online meetings. Inspired by Uriu et al. (2021a), we produced a short video of the God-I-Box presenting its basic concept, function, and aesthetics (see Figure P3.4). The video presents the God-I-Box similarly to how one would present it in offline first encounters (Boer & Donovan, 2012). We did not add voiceovers to the video but described it personally in the online meetings.

After an arduous recruitment process through public appeals and emails to church communities and pastors that produced little to no response, we finally recruited six participants for online first encounters with the God-I-Box by directly addressing individuals within the collaborating theologian's extended network. Four active members of various Protestant communities and two pastors with experiences in both offline and online worship services encountered the God-I-Box online (see Table P3.1).

ID	Age	Gender	Number of online worship services
C1	50	Male	10-20 visited
C2	35	Female	none visited
C3	46	Female	1-10 visited
C4	39	Male	1-10 visited
P1	37	Female	1-10 organised and visited
P2	46	Male	50+ organised, 1-10 visited

Table P3.1: Details on the six participants, congregants (C) and pastors (P), who first encountered the God-I-Box online.

After a date was settled, participants received information and consent forms via e-mail. All meetings lasted about 30 minutes and were audio-recorded for data analysis. Each meeting began with a brief introduction and confirmation of consent. We then asked participants about basic demographic data and visions of a perfect online worship service before present-

ing the God-I-Box using verbal descriptions and the above-described video (see Figure P3.4). The central part of the meeting was dedicated to talking about participants' perceptions of the God-I-Box and exploring potential futures with (or without) it. Participants did not receive any compensation. We transcribed all audio files (one was broken, so we used our backup notes) and thematically analysed the data inductively using MAXQDA (Braun & Clarke, 2006). Guided by our research objectives, we were particularly interested in understanding the nature of responses to the God-I-Box and their productivity concerning our overarching goals. We found three overarching themes reflecting distinct modes of reactions that the God-I-Box triggered in online first encounters.

P3.4.1 Mode 1: Spontaneous Emotions

As a first reaction, the God-I-Box triggered spontaneous emotional responses, often the entry point and prerequisite for more reactions. This was particularly evident in the most common spontaneous emotional reactions *curiosity* and *surprise*.

'Um, I find it interesting. So it's such a surprise effect. [...] Yes, so you didn't expect it like that. I would have expected that we would have a screen and that someone would present the worship service. So, the usual form. In principle, like when I sit in the pew at church or at the cinema, but that I then also become active [pause, thinking,...] so at least I understand it that way: It's there and you become active yourself and intervene in what's happening.... and yes, that you put a note [a tangible object shown in the video, a lyrical greeting] on it and then the bells ring - yes, that's something special, yes.' – (P2)

Like P2, most participants were surprised because the God-I-Box did not match their expectations of what 'normal' technology for worship services should or could look like. For example, P2 expected a less active role for congregants to participate in online worship services. He was surprised by the opportunity to activate parts of an online worship service by placing tangible objects on the God-I-Box. Such forms of surprise sparked interest towards learning more about the God-I-Box's objective and concept and were an essential prerequisite for further engagement.

However, the God-I-Box also sparked feelings of *uncertainty* and *confusion* and, in a few cases, *rejection* and *resistance*. Such feelings were especially prevalent when participants discovered further provocations, tensions, or 'loose ends', such as the open questions of who decides on the tangible objects and their distribution. In some conversations, the ambivalence and evolution of initial feelings were reflected in the participants' statements:

'If there is actually, I'll say, a new sermon every Sunday that can be called up for a week via the sermon tangible object that you can put on it, then that definitely has, uh, an attraction. Because [...] you can choose which content you want, um [pause, thinking] Yes, I'm currently thinking about whether I really think that's good... So, according to the motto "now I'll just skip the intercessions because I can roughly imagine what's going to happen there". That does have some value if you want to fit it [the worship service] into less time. However, I think I'm a bit disturbed by the idea that you can just change the given framework that's always been there in worship services.' – (C4)

Although C4 was initially attracted by the flexibility of choosing one's own worship service content and order, this attraction vanished over time and turned into confusion and resistance. However, this resistance was helpful because it uncovered personal perspectives. Triggered by how the God-I-Box questioned the importance of structure and order of worship services through its flexibility, C4 shared that the long-evolved structure of worship services was vital to him personally.

P3.4.2 Mode 2: Reflective Coping

The spontaneous emotions were often followed by more cognitive, reflective reactions that reflected participants' various ways of coping with the God-I-Box. The most prevalent reactions of reflective coping were *appraisals (good/bad)* in combination with respective reasons. Participants either expressed more *general reasons for their appraisals* or *reasons tied to their perspectives on worship services*.

'What I find really cool about it is that you can determine the length of the bell ringing yourself [...] and if you want to have 20 minutes of bell ringing, then you just let it ring for 20 minutes! [...] I don't mind if the liturgy is interrupted [laughs, ...] It can also be in a different order. I don't have to stand up to say my creed or anything like that. So, I don't find that problematic.' – (C2)

This quote is an example of how participants initially shared appraisals justified with more general reasons (e.g., the God-I-Box is liked for allowing autonomy) that, over time, evolved into justifications tied to the context of worship services (e.g., the God-I-Box is liked for allowing autonomy because worship services do not necessarily have to follow traditional procedures). Both sorts of justifications, especially when they appeared together, were helpful in learning more about participants' perspectives.

Another common form of coping reaction was *asking questions*. Given God-I-Box's provocations, some participants felt insecure about whether they had understood the concept in its entirety 'correctly' and tried to *find out more about our intentions* by ending sentences with questions such as 'that's the idea, isn't it?' (C4). Also, some questions related more to *curiosity about technical details* such as 'how does the device recognise what is currently on it?' (C3). Such reactions were active invitations for us to enter into a conversation and detail or justify the design of the God-I-Box. However, while such conversations helped deepen the shared understanding of the provotype and the subject matter, there was also a danger that the conversation would only focus on the designer's perspective.

Yet another way of reflective coping was the search for *familiar associations and metaphors*. Participants used familiar metaphors and associations to describe or categorise the God-I-Box. Associations were searched for both concrete and abstract elements. For example, some compared the interaction with that of a widely used children's music player, and one participant came up with a unique association to describe his perception of being confronted with numerous hidden contents:

'I mean, that would be a bit like the Advent calendar principle. Um, but then maybe it's a bit like, well, as a little kid I know there's chocolate everywhere and when I'm really curious I take out all 24 and then I'm disappointed because I can't open any more.' – (C4)

As reflected by this example, the search for familiar associations and metaphors provided information about how the participants perceived the God-I-Box and which elements were particularly central to them. Moreover, such reactions gave us an insight into the participants' world of experience and cultural imprints.

A last way of reflective coping was *imagining the God-I-Box's fit into one's environment*. Participants frequently fused the description of the God-I-Box with concrete ideas of its application within their everyday life.

'And then I just thought it would also be something for the nursing home [...] one could also choose songs or prayers and if he [a resident] wants to use it, then he can choose for himself, I would find that interesting somehow. So for people who are no longer mobile and cannot come to the worship service. So it could also somehow expand worship spaces, because it's quite easy to transport.' – (P1)

As this quote demonstrates, such reactions were particularly helpful in learning more about the reality of the participant's life and their perspectives on the subject matter. For P1, for example, inclusivity was essential to implement in worship services. In addition, P1's quote shows how the imagined appropriation of the God-I-Box was often accompanied by the third reaction mode, the exploratory imagination of future possibilities.

P3.4.3 Mode 3: Exploratory Imagination

While the first two themes reflected reactions more oriented towards the status quo of the God-I-Box and participants' past experiences, the God-I-Box also triggered *exploratory imagination on adapted or novel features or entirely new concepts*. Adapted and novel features were invented on the fly in response to negative appraisals or the imagined appropriation of the God-I-Box. For example, our participants suggested small-scale changes such as changing the God-I-Box's light colour (C1, C2) or shape (C1), but also *specifications* concerning 'loose ends':

'So if you use it regularly, it would of course be practical if you could always use the same tangible objects. I mean, otherwise you would have to get a package with tangible objects every week. That would certainly be a bit too much in the long run.' – (C3)

In this quote, C3 weighs different options for one of the 'loose ends' that raises the question of when and how to access a new online worship service. In doing so, C3 bases his considerations pragmatically on his own possible use of the God-I-Box and thus provides information about what would be conceivable for him personally. Apart from such ideas generated in response to 'loose ends' that we explicitly included in the God-I-Box's concept, our participants also created more *exploratory ideas concerning its embedding* into their environments.

'But it might also work the other way round! Yes, that would also be funny! For example, if you make these tangible objects available [to congregants] and ask them to choose something [respective worship service content] and give it back - that would also be funny! So [...] ideas would come back to me from different parts of the community and we would then celebrate the service together. That would be fun too!' – (P1)

Novel ideas were not only developed at dedicated points, such as in response to ‘loose ends’, but participants also developed ideas concerning their own objectives more generally. For P1, for example, it was essential to celebrate worship services together in one place, so she imagined how she could use the God-I-Box to support this objective. While most ideas were connected to the God-I-Box, few moved beyond it and imagined entirely new concepts. Interestingly, all ideas connected to this category were about elements we deliberately did not address through God-I-Box’s design, such as community. One participant imagined an interactive photo wall that should be placed within the church to represent community members who participate from a distance (C1). Another idea aimed at increasing the interaction between community members:

‘Something like, uh, an exchange about the sermon, about the worship service, that at a fixed time [...] you have the opportunity to come together in the context of a zoom conference with the participants who want to talk about the sermon.’ – (C4)

Through inventing novel engagements with worship services at a distance like the ones described here, participants explored potential future technology-mediated worship services independent of the God-I-Box and communicated topics of importance to them concerning the subject matter, such as exchange with community members.

P3.5 Discussion

Although technology-mediated religious rituals such as Protestant online worship services are widespread and impact millions of congregants, scholarly reflection on their design and impact is still rare in HCI. To move the field forward, we sought to explore whether the provotype approach can be used productively in this sensitive context to explore possible futures of technology-mediated worship services with those affected based on a thorough understanding of existing experiences and perspectives. Introducing the provotype approach into the context of German Protestant worship services is a delicate matter, given that contradicting perspectives exist on whether and how religious rituals should change in light of technological developments and that it might risk offending religious feelings and convictions. Thus, we iteratively developed the God-I-Box, presented it to congregants and pastors in online meetings, and analysed their initial reactions. In the following sections, we summarise and reflect on what we learned for the future use of provotypes. We believe these insights are also relevant for other applications of provotypes in first encounters (Boer & Donovan, 2012) that aim to explore potential futures with various stakeholders based on a thorough understanding of existing experiences and perspectives. In addition, we reflect on some preliminary insights we have gained on technology-mediated worship services.

P3.5.1 Provotypes: Reflections and Recommendations

Consider Different Reactions for Different Purposes First encounters with the God-I-Box triggered three distinct modes of reactions in pastors and congregants: (1) spontaneous emotions, (2) reflective coping, and (3) exploratory imagination. Each reaction mode led to

unique productive impulses, contributing to our greater goal of exploring possible futures of technology-mediated worship services based on a thorough understanding of existing experiences and perspectives.

The first mode of reactions showed a range of different, spontaneous emotions with which people reacted to their first encounter with the provotype. Especially emotions such as curiosity and surprise demonstrate that the God-I-Box sparked interest in congregants and pastors. These reactions show that the God-I-Box successfully '[provided] handles for exploration' (Boer & Donovan, 2012, p. 396), which is a crucial prerequisite for further engagement and participatory stakeholder involvement (Boer & Donovan, 2012; Boer et al., 2013). Furthermore, spontaneous emotional reactions were often a useful starting point for further insights into participants' perspectives on the subject matter. For example, C4 became increasingly resistant to the God-I-Box over time. Reflecting on this emotion, he shared that the long-evolved structure of worship services was vital to him personally. Spontaneous emotional reactions are not always automatically meaningful information. They indicate how a person feels about a provotype at a particular moment, but only in combination with further reflections on why they occurred can they help bring out the otherwise invisible views of stakeholders (Burmester et al., 2010). Especially regarding negative emotions as a reaction to a provotype, it is essential to create an atmosphere in which doubt and resistance are welcome, and the provotype can be questioned at any time.

The second mode of reactions, reflective coping, most clearly responded to the God-I-Box's invitation to take a stand, share their perspectives, and thus react to tensions made tangible (Boer et al., 2013; Mogensen, 1992; Shorter et al., 2022). For example, the God-I-Box was designed to make tangible existing tensions such as community vs individuality (Boer & Donovan, 2012; Boer et al., 2013; Wolf et al., 2022c). All participants took up this tension in their reflective coping reactions through, for example, arguing with themselves about the importance of both values (e.g., C4). In addition, the concrete, provocative artefact often served as a trigger for appraisals with corresponding reasons. It thus allowed conclusions to be drawn about what was essential to the participants. When interested in better understanding stakeholders' perspectives on a subject matter, focusing on reflective coping reactions seems helpful.

The usefulness of exploratory imagination reactions seems obvious regarding our greater goal to explore future technology-mediated worship services. We expected the God-I-Box to invite engagement in a more holistic, open-ended dialogue beyond problem-solving (Raptis et al., 2017), and participants exploratory imaginations demonstrated God-I-Box's capacity to do this in principle. However, not all ideas concerned possible futures, and many suggested fixing problems of the God-I-Box or changing small features like its light (C1, C2) or shape (C1). The imagination of more exploratory ideas was relatively rare in participants' expressions but worked particularly well when participants speculated on the God-I-Box's integration into their life. For example, P1 imagined using it 'the other way round' (P1) for crowd-sourcing content for her next worship service to be put together and celebrated in the church. When interested in an open-ended exploration of possible (technological) futures using provotypes, it seems helpful to encourage stakeholders to imagine the potential integration of the provotype into their lives.

Develop Provotypes Iteratively with Changing Foci While Raptis et al. (2017) suggested developing provotypes iteratively, we are unaware of any previous work reporting on the iterative development of a provotype involving stakeholders early on. Therefore, our work can serve as a guide for others who want to develop provotypes iteratively. As guiding principles for the iterations, we focused on whether the provotype would (1) invite open exploration, (2) be easy to understand, and (3) trigger productive reactions. Given that the first two principles are somewhat preconditions for the third principle (Boer & Donovan, 2012), we decided to focus on those first in iterative testing. This allowed us to quickly identify and solve small-scale usability issues that distracted participants and left no space for conceptual reflections. This iterative approach also allowed us to get a feel for what provocations can be perceived in first encounters and where the boundaries lie (Raptis et al., 2017). For example, we quickly learned that integrating a reference to (the absence) of community through a simulated attendance indicator in the second iteration rendered the concept too complex to be understood in first encounters.

Only after revising the provotype several times did we focus on whether the provotype could elicit productive reactions in first encounters. To do this, we presented the God-I-Box online using a short video and verbal descriptions to demonstrate its basic concept, functionality, and aesthetics. We deliberately chose this less interactive format to better match original conceptions of provocations in first encounters (Boer & Donovan, 2012) and in the hope that participants would think more about the concept itself than the interaction's features (as in the first two iterations). Overall, this strategy worked well, and we quickly learned more about the provocative potential of the God-I-Box - especially concerning its functional and conceptual provocations. Nevertheless, offline encounters with the God-I-Box could trigger discussions that were not possible online. One example is its aesthetics, which played a rather subordinate role in participants' comments. We assume a setting where the interaction can be tested, and the God-I-Box can be looked at and touched would elicit more aesthetics-related comments. Overall, we recommend developing provotypes iteratively, focusing on their potential to invite exploration, their comprehensibility, and the reactions they trigger.

Design Provocations Context- and Goal-Based So far, the literature suggests that provocations in first encounters should be extreme (Boer & Donovan, 2012; Raptis et al., 2017), but the case of technology-mediated religious rituals presented here demonstrates that this principle might not be applicable in all first encounters. In our project, we deliberately decided against rather extreme ideas, such as a provotype that only integrates content produced decentralised (without pastors' authority) since we wanted to integrate all stakeholders in the discussion (e.g., congregants and pastors). If we had made the provocation too extreme, this could have been perceived as ignoring or offending religious feelings and convictions, leading to closed-mindedness or mere rejection. However, when working towards participatory innovation, as in our project, it is essential that everyone feels invited to share their perspective. Therefore, we believe that more extreme forms of provocation are not necessarily beneficial for all first encounters and all domains but are more valuable for exhibitions or projects without the aim of participatory innovation. A thorough understanding of the context is necessary to understand what exactly is an extreme or less extreme provocation in a particular domain. In our case, having a domain expert (a Protestant pastor in training)

within the team was very useful to at least get a sense of provocation in this context. Thus, we recommend designing the level of provocation based on a thorough understanding of the context and according to a project's overarching goals.

Consider the Individuality of Perceived Provocation and Strangeness Throughout the iterative development, we recognised that our provotype was not similarly provocative or similarly 'slightly strange' (Dunne & Raby, 2001, p. 63) for everyone. Both aspects highly depended on individual experiences, values, and perspectives. For example, the God-I-Box might not be provocative for some - like for HCI researchers and designers who know little about the domain and only see a (technically not spectacular) device. However, from some congregants' viewpoint, the God-I-Box was very provocative - especially when it was reflected in the light of the century-old tradition and structure of worship services. However, while some highlighted the importance of the given form, others considered it less important and thus felt less provoked by the God-I-Box. It would be exciting to examine this connection between perceived provocation and subsequent reactions more closely in future studies.

Reacting to the provotype and confidently raising one's voice not only depended on being provoked but also on whether the provotype was (only) 'slightly strange' (Dunne & Raby, 2001, p. 63). In our case, it turned out that the degree of perceived strangeness varied between participants and that the God-I-Box, which we expected not to be too strange or unusual, nevertheless posed a challenge for some. For example, one participant was overloaded when being asked how she would adapt it: 'I have never seen anything like this before! So this is completely new to me' (C3). If, as in our project, the focus is on integrating various perspectives (e.g., also those of less tech-savvy people), it is just as crucial as provocation that a provotype is not too unusual and strange, but is oriented towards the ordinary so that everyone can have a say and feels able to respond to it. We, therefore, recommend that when designing provotypes and their deployments, it is vital to consider various possible perceptions of provocation and slight strangeness early on.

Consider the Political Dimension of Provotype Deployments We designed the God-I-Box to exaggerate individuality and allow congregants to act almost like liturgists. To do so, we divided the usual structure of worship services into parts like music, prayer, sermon, or blessing. P2 highlighted that worship service structures and content are currently under debate within the Protestant institution. The topicality of the issue and the existence of an ongoing debate within the institution made us reflect on the importance of the broader political dimension of deploying provotypes. Because who exactly we involve and how not only impacts our research but could also impact existing societal debates. For example, presenting the God-I-Box to congregants and pastors at a public church day might contribute to initiating a debate on future worship services outside institutionalised structures. In this way, the God-I-Box could potentially broaden the debate space to include congregants who, prompted by the God-I-Box, might reflect on the topic, form an opinion, and perhaps even share it. We therefore recommend considering the broader impacts that (non-)deployments and encounters with provotypes might have.

P3.5.2 Technology-Mediated Worship Services: Reflections and Recommendation

Although this paper focused on the methodological contribution of transferring provotypes to the domain of technology-mediated religious rituals such as online worship services, we also gained domain-specific insights that we briefly share and discuss.

Conceptualise Online Worship Services as Extensions or Novel Rituals So far, in practice and HCI research, online worship services are thought of more in terms of replacements or preservations of existing rituals (e.g., Struzek et al., 2019; Uriu et al., 2021b). Accordingly, the focus in design is often on recreating ‘the same’ experience from a distance. We do not consider this approach helpful because participation from a distance is not the same (Wolf et al., 2022c). Participants’ ideas of how they would integrate the God-I-Box into their life demonstrated that it is helpful to think about online worship services not in terms of replacing traditional worship services but in terms of extending them or being novel rituals. Doing so also dissolved the often encountered online/offline duality and established a culture of digitality (Stalder, 2016) as reflected by P1’s idea to invite community members to choose content for specific tangible objects that is then put together and celebrated in the church. Thus, we recommend conceptualising online worship services as extensions or novel rituals.

Consider Community and Individuality as Legitimate, Relevant Needs Through participants’ expressions, we learned about an existing tension between community and individuality. Initially, this tension seemed to encompass irreconcilable opposites. While community is a significant focus in traditional worship services, online worship services seem to foster individuality through their design. Interestingly, both pastors indicated that they see community and individuality not as contradictions but legitimate needs for each of which there should be offers. A more individuality- or community-oriented approach might be preferred by congregants, depending on the setting, mood, or personality. The pastors saw the expansion of contact points or maintenance as an important goal for which new technological means could and should be developed. However, both stressed that ‘a completely isolated, individual approach would not necessarily be the goal or what I wanted to convey’ (P1). Moreover, P2 highlighted that it is essential to ensure ‘that they [online congregants] feel accepted. [...] In other words, that a relationship is established. This is actually the point, that they know they are being addressed and that they are important’. Thus, we recommend considering community and individuality not as contradictions but as legitimate needs that should both be addressed in technology-mediated worship services.

P3.5.3 Limitations and Future Work

Since the present work’s focus was on transferring the provotype approach to the novel domain of technology-mediated religious rituals such as online worship services and on gaining first insights into whether and how a provotype could trigger productive impulses, we did not yet report on participatory workshops with multiple stakeholders with the final provotype and insights gained about the subject matter. For the contributions presented in this

paper, we involved 25 people, yet we aim to use the final provotype in more extensive participatory workshops. Therefore, we are currently using the God-I-Box in various settings, such as a pastor's convention and a formal pastoral training workshop, and are planning to present it at a public church day. This will allow us to learn more about the type of setting's influence on the kind of findings gained with the provotype approach. In addition, these participatory workshops will allow us to compile insights on the subject matter: What can future technology-mediated worship services look like?

Participants in this study imagined interesting adoptions of the God-I-Box like P1, who imagined using it in traditional worship services to fuse online and offline participation or C2, P1, and P2, who suggested using the God-I-Box in educational contexts (e.g., school or confirmation classes). We think such ideas are worth exploring, so we currently search for communities that would be open to exploring the God-I-Box for their worship service practices. Also, exploring provotypes' potential for educational settings seems highly interesting for future research given that provotypes' goals, such as reflection and discussion, suit the goals of religious education quite well.

P3.6 Conclusion

What should the worship services of the future look like? In this paper, we proposed adopting a provotype approach to technology-mediated religious rituals such as Protestant online worship services to overcome the limitations of previous approaches that focussed on problem-solving or top-down decision-making only. Provotyping allows various stakeholders' participatory involvement, making existing tensions tangible and thus discussable. It invites taking a stand, elicits design-relevant knowledge, and enables to engage in a more holistic, open-ended dialogue going beyond a problem-fixing perspective. However, introducing the provotype approach into the context of German Protestant worship services is a delicate matter, given that contradicting perspectives exist on whether and how religious rituals should change in light of technological developments. Thus, this paper explored whether and how a provotype approach can trigger productive impulses for exploring possible (technological) futures in this sensitive context. We iteratively developed the God-I-Box, a provotype that reflects existing tensions between faith, everyday life, individuality and community. It allows access to parts of an online worship service through dedicated tangible objects, thus dividing the worship service into small units and allowing congregants to act almost as liturgists of their online worship service. To learn more about the initial reactions the God-I-Box might trigger in first encounters, we presented it to six congregants and pastors in online meetings. An analysis of their first encounters with the God-I-Box uncovered three modes of reactions, namely (1) spontaneous emotions, (2) reflective coping, and (3) exploratory imagination. Knowing about these different reactions and their respective contributions to a better understanding of stakeholders' perspectives and the exploration of possible (technological) futures is useful for the future applications of provotypes. To ease the application of our results, we present reflections and recommendations for future work concerning provotypes and technology-mediated worship services more generally. Ultimately, we hope to contribute to advancing the design approaches to technology-mediated rituals so they can be designed with relevant stakeholders and better fit their values and contexts while inspiring them to explore entirely new forms.

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Publication 4

Designing Ritual Artifacts for Technology-Mediated Relationship Transitions

This work has been published as follows:

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Abstract

Rituals are ubiquitous but not commonplace, help people to make sense of their life, and cultivate personal or social meaning. Although secularisation and digitalisation impact the occurrence of formal rituals, the need for marking life's transitions remains unchanged. New rituals emerge, such as marking relationship status by hanging love locks on bridges. Tangible technologies hold great potential for augmenting, changing, or enhancing ritual practices which often involve enactments and symbolic props. In this paper, we analyse individual stories of hanging love locks and derive six pointers for designing technology-mediated relationship transition rituals. We applied the pointers in the design of El Corazón, a tangible artefact for relationship transition rituals. The results of an evaluation with 20 sweethearts show that relationship rituals can be designed deliberately, that tangibles can shape ritual experiences and that technology-mediated rituals can provide people with new means of coping with relationship uncertainty.

Keywords

Ritual, love, relationship, interaction design, human-centered design, design for well-being

P4.1 Introduction

Human life is full of transitions: we are born and die, mature, gain and lose friends and partners, get injured and cured. Such fundamental changes pose a threat to our well-being and increase our need for security (Ozenc, 2014). A powerful mechanism of meaning-making to cope with transitions is to engage in ritual practice. Rituals are focused actions imbued with symbolism (Sundermeier et al., 2010) that form structural forces organising society. Being performed everywhere in the world and throughout history (Cooke & Macy, 2005), rituals generate emotions, and their symbols are the basis for shared beliefs, thinking, morality, and culture in groups (Summers-Effler, 2006). Rituals differ from routines, although the words are often used interchangeably in everyday language, and the boundaries are blurred. For example, engaging in a hand-washing ritual before entering a temple can serve the goal of inner cleansing and not hygiene, as opposed to the routine of hand washing in the bathroom (Legare & Souza, 2012; Rossano, 2012). Thus, the performed symbolic actions in rituals transcend the immediately visible and bring higher meaning to experiences as well as psychological and social benefits (C. Bell, 1997; Soeffner, 2010).

Rituals also play a role in relationship transitions. When relationships are characterised as ‘liquid’, i.e. kept open, without obligations, and with fewer people getting formally engaged or married (Bauman, 2013), the need for new ritual practices to instantiate a sense of stability via a new relationship status is amplified (C. Bell, 1997). Consequently, people seek and develop new and less formal means to cope with transitions such as becoming a couple by, for example, hanging love locks on bridges, updating their relationship status on social media or simultaneously deleting their profiles on dating platforms. As shown by these examples, artefacts and technology play a mediating role. The conscious design of technical artefacts mediating RTR, however, has largely been neglected in HCI in general, and tangible user interfaces in particular, although physicality plays a central role in rituals.

The main objective of this paper is to outline the design space for technology-mediated RTR. To this aim, we follow an RtD approach (Zimmerman et al., 2007) and first combine insights from social science theory about RTR with own ethnographic explorations about the specific practice of hanging love locks. The theoretical and ethnographic insights are then distilled in a set of six pointers for designing technology-mediated ritual artefacts. Second, we exemplarily apply the pointers in the design of *El Corazón*, a tangible artefact for RTR. Third, we explore how the artefact’s characteristics impact ritual practice in a field test with 20 sweethearts. We close with a discussion on how designers can use our pointers to design for RTR mediated through technology.

P4.2 Background

P4.2.1 HCI Research on Transition Rituals

Whereas most disciplines such as sociology, theology, or philosophy, study the phenomena of RTRs from a descriptive viewpoint, HCI takes a design perspective actively shaping artefacts and related practices. Regarding the design for technology-mediated ritual practice more broadly, some work has been done to identify design implications for the class of calendrical rituals (e.g., annually repeating rituals) (C. Bell, 1997). For example, Petrelli and Light (2014)

investigated family rituals carried out at Christmas. Drawing on a field study with eight families, they identified design challenges such as design for the harmonisation of contrasting attitudes or Christmas as a time for constructing the family. Rituals accompanying individual's transitions (rites of passage), however, might have distinct requirements for supporting technology than annual rituals.

Scholarly work directly focusing on such transitions has almost exclusively addressed rituals in the context of death and letting go. With HeartBeats, Eriksson and Hansen (2017) aimed at speculating how digital data may be used for remembrance of the deceased. Heartbeats is a pillow that starts vibrating in the heartbeat rhythm of the deceased loved ones whenever hugged. Similarly, Sas et al. (2016) identified a lack of digital rituals for times of letting go (e.g., death, breakup). The authors proposed design implications for digital data disposal based on rituals developed in grief therapy that involve disposing of personal possessions (e.g., burning, burying). Grief mechanisms were also of interest in the works from Uriu and Okude (2010), who developed a photographic family altar to support praying for the deceased, and from Uriu et al. (2018), who developed an interactive device for supporting Japanese funeral and memorialisation rituals. Another life transition was studied by Eschler et al. (2018), who investigated the specific ritual of co-designing tattoos after surviving cancer to initiate, accompany, and mark transitions which they identified as holding great potential for digital support. As the diversity in details of the above examples already indicates, all authors conclude that designed ritual artefacts for life transitions need careful curation according to the particular needs of each transition. Accordingly, the above examples do not provide support for the design of RTRs.

Work that specifically focuses on supporting RTRs is scarce and only targets one of the most significant transitions: the wedding ceremony. For example, Stark (2017) proposed to enhance wedding garments by incorporating a way to exchange 'sacred' personal data like heartbeats to incorporate societal values of equality. Another work investigated the role of technology during the wedding ritual in general, e.g., how people used technology to organise and document the happening (Massimi et al., 2014). These examples show that researchers are just beginning to understand the requirements of technology-mediated transition rituals in relationships. So far, existing rituals have been studied and the role of technology within these rituals has been described and partly altered. However, the design space for ritual artefacts has not been made explicit and current work offers no guidance in creating new artefacts - or even stimulating new, possibly lightweight, ritual practice for relationship transitions.

A topic closely related to RTRs that has been extensively studied in HCI is 'couple technologies' for sweethearts that temporarily live apart (for an overview: (Hassenzahl et al., 2012; H. Li et al., 2018)). In contrast to rituals, these technologies focus on supporting routine relationship maintenance activities and communication, such as drinking a glass of wine together over the distance (Kirk et al., 2016) or clicking on virtual intimate objects in a computer taskbar to create a sense of abstracted presence (Kaye, 2006). Others have looked to design daily exchanges between mothers and sons to enable lightweight routine actions (Hoog et al., 2004). Specifically, Hoog et al. (2004) designed Gustbowl, consisting of two bowls remotely connected, that is activated whenever a key is placed in one bowl to signal a family member's presence. Similarly lightweight, the concept of Whisper Pillow aimed at giving couples with different schedules the possibility of intimate communication (Chien et al., 2013). To support routine relationship activities, 'the action to be performed as a response should neither be too

symbolic [...] nor too demanding' (Chien & Hassenzahl, 2020, p. 41)[6]. As such, they mark an essential difference to RTRs, which do not focus on the everyday, but on the extraordinary. Rituals are, in contrast to routine actions, imbued with symbolism (e.g., hanging love locks that symbolise bonding, eternity) rather than pragmatism (e.g., whispering into a pillow to communicate and feel connected). Rituals focus on the process, often requiring considerable effort and preparation (e.g., hanging up a love lock together at a particular place and time), rather than the pragmatic goal (e.g., establishing common routines in order to achieve a joint everyday life). Given the vague understanding of design requirements for RTRs in HCI, a necessity arises to identify the characteristics essential to RTRs to inform design. We therefore briefly report on related social science theories regarding definitions and design guidance for ritual actions.

P4.2.2 Relationship Rituals in Social Science Theory

According to Sundermeier et al. (2010), rituals are situated and embodied actions, repeated over time and people, often accompanied by words that may interpret and explain the action, and are symbolic with multidimensional meaning. Thus, unlike routines which are strongly aligned with the goals to be achieved (e.g., establishing communication between couples), ritual actions and goals become uncoupled (e.g., putting up a love lock that symbolises, but not directly affects, stability). This characteristic is often referred to as causal opacity and goal-demotion (Legare & Souza, 2012; Rossano, 2012). Rappaport (1999) further points out that the ritual is not about manipulating the physical world, but about creating or manipulating meaning. Concrete actions are employed to demonstrate and experience abstract values and concepts.

Transition rituals are one specific type of rituals (C. Bell, 1997). Van Gennep (1961) identifies four human transitions where transition rituals may occur. These include transition of location (e.g., moving from one city to another), condition (e.g., from being sick to being healthy), position (e.g., from being single to being in a relationship) and age group (e.g., from childhood to adulthood). Rituals accompanying such transitions, in turn, consist of three general phases: separation, liminality, and incorporation (Turner, 2017). In the separation phase, people withdraw from their previous status. They are separated from people that do not fulfill the specific prerequisites for the transition (e.g., only invited persons may participate in the ritual of weddings). The liminal phase marks the transition from the previous to a new status. This phase is existential and of considerable ambiguity, sometimes even anarchy, as the old status is not valid anymore and the new status is not yet reached (Turner, 2017). For example, throughout a Western wedding ceremony, the new status as husband and wife is within reach but not yet reached until the specific words are spoken and rings are exchanged. In other words, the new state may not be reached unless a specific procedure has been followed. Thus, processes or procedure, receive very high priority in a ritual. The incorporation stage closes the ritual by bestowing the new status, allowing re-entry into society. A physical artefact often marks the new status, such as a wedding ring, but there may also be specific artefacts and symbols for the other phases.

RTRs are, again, a subtype of transition rituals and are often shared across cultures, such as the transition ritual of weddings. Here, an order is established concerning the relationship by making the relationship status visible, by making it memorable, and by separating the couple

from other person's desires (Soeffner, 2010). Thus, a relationship ritual constructs and consolidates the couple as an entity and their togetherness. It makes visible and accompanies an essential transition of position within a greater community (Grimes, 2013; Turner, 2017; Van Gennep, 1961). In some cases, greater investment in such relationship rituals is associated with more positive relationship quality and closeness (Crespo et al., 2008) and has even therapeutic effects (Imber-Black, 1999; Van der Hart, 1978). Taking part in a RTR has psychological (e.g., removing relationship uncertainties or channelling emotions), sociological (e.g., constructing and consolidating the status of individuals in groups and society) and even cultural benefits (e.g., composing a cultural memory of relationship values through symbolic practices/artefacts) (C. Bell, 1997; Soeffner, 2010). Despite the importance of rituals in relationship transitions, it remains to be explored how technology could adequately support or even enhance ritual transition practice. As people become creative looking for new ways to satisfy their ritual needs (e.g., couples that simultaneously delete their dating app accounts), we should be prepared to design interactive technology supporting these needs. As rituals are multisensory and participative and make the abstract visible, audible, graspable, smellable, or kinesthetically accessible, tangible user interfaces might even hold greater potential than purely digital technology. In this paper, we aim to define the design space for RTRs: symbolic actions performed only as special occasions, marking the transition from one relationship status to another. Following our RtD approach (Zimmerman et al., 2007), we validate the insights from ritual theory with our own ethnographic explorations about couples that have engaged in the actual practice of hanging love locks. The insights are then distilled in a set of six pointers for designing technology-mediated ritual artefacts. We exemplarily apply the pointers in the design of *El Corazón*, a tangible artefact for RTRs and report on a user study with 20 sweethearts. The paper concludes with a discussion on how ritual experiences change depending on how the pointers are materialised.

P4.3 The Design Space of Relationship Transitions

P4.3.1 Ethnographic Explorations into Love Rituals

To flesh out our theoretical understanding of RTRs with rich empirical data, we conducted a small ethnographic exploration on the example of putting up love locks. This secular ritual was considered an ideal study example as it is frequently performed on bridges or 'love spots' in public spaces in many cultures, is temporally and spatially accessible, and does not require familiarity with a specific cultural setting. The insights were later aligned with the theoretical knowledge from social science theories to arrive with design pointers for RTRs.

For our ethnographic exploration, we conducted seven Contextual Inquiries (Holtzblatt & Beyer, 2017), semi-structured one-on-one interviews and observations of people who previously put up a love lock with their partner. The aim was to capture both, common grounds and individual nuances, which in turn may give insights into the construction of technology-mediated ritual practice and artefacts. Since hanging a love lock is a practice intimately shared by two people, we conducted retrospective interviews. We visited the site where the locks had been put up if it was in town and reenacted the performance to bring participants closer to the time and situation when the love lock was put up. For this purpose, the interviewer had brought a lock and keys. Subjects were tasked to tell their love lock story at

their own pace and with the amount of detail they felt comfortable to share. Participants also talked about the time after the lock was hung and its long-term meaning. The interviews took 1.5 to 2 hours and ended with a summary by the interviewer to validate the details of each story. Seven participants were recruited through announcements in local social media, the university's participant recruiting system, and poster announcements on local bridges. All participants are presented below (names changed):

Tobi, 25, received the lock as a Christmas gift from his girlfriend. It took the couple several months before they finally put up the lock in their hometown – on the day they got back together after a short break-up. At the time of the interview, Tobi and his girlfriend had broken up again four months earlier, but the lock was still hanging.

Bianca, 37, and her husband received the lock as a present from her husband's sister at their wedding. They had hung the lock in the town they had lived in at the time. By the time of the interview, Bianca and her husband had moved to a different city, but they still held a picture of their lock in their living room. When the couple and their two children occasionally visit the town today, they always pay a visit to the bridge and try to find the lock to show it to their children.

Lucas, 23, got the lock as a present from his girlfriend for their third anniversary. They had hung the lock shortly after. Hanging a lock was not a big deal and not very emotional for Lucas. However, he would do anything to make his girlfriend happy, and hanging a lock seemed to be very special to her. By the time of the interview, they were in a relationship.

Tom, 22, received the lock as a present from his 'travel-girlfriend'. She gave it to him on the last weekend of travelling together before separating (as they were from different nations and ran out of visas). They immediately had hung the lock while another friend was waiting for them. By the time of the interview, they still sometimes communicate through social media, but the lock was not a topic.

Susi, 19, had hung a lock with a close female friend. The idea to hang a lock came spontaneously, and they had bought and hung the lock on the same day during a shopping trip to a city. Susi said that she prefers hanging a lock with a good friend that she believes will be a good friend forever rather than with a boyfriend whom she might separate from after some time.

Jane, 22, gave the lock to her former boyfriend as a present for Christmas. She intended the lock to be a statement of everything that they achieved together, especially that they had decided to move away into a foreign town together. Therefore, they had hung the lock in their new hometown. By the time of the interview, they were separated, but the lock was still hanging.

Abby, 18, gave the lock to her boyfriend on the day of their first anniversary. Both were born in the same town; however, he had moved away. During school holidays, she came to his town to hang the lock. By the time of the interview, they were in a relationship while living in different cities.

Following Contextual Design methodology (Holtzblatt & Beyer, 2017) data from the interviews and observations were analysed through the construction of an affinity diagram. For this, each interview was retold by the interviewer based on the notes, and another team member captured key issues and insights on sticky notes. Revealing quotes and sketches of

the environment where the love lock was hung were recorded on affinity notes as well. In total, 400 individual notes made up the data basis from which six key insights were formulated and linked to ritual theory.

P4.3.2 Six Pointers for Designing Ritual Artefacts

Common and contrasting experiences from our ethnographic explorations with hanging love locks are reported below, embedded into ritual theory and clustered into six pointers that define a design space for RTRs: *privateness & publicness, customisation & uniqueness, symbolism & transcendence, structuring & extraordinariness, physical & psychological accessibility, and stimulation & participation fostering join in*. Because rituals are linked to autobiographical memories, we include individual statements as proposed by Wojtkowiak (2018).

(1) Privateness & Publicness. Jane explained that being alone as a couple while performing the ritual was important to her: ‘It was crucial that it was just the two of us and it would have disturbed the intimate moment if someone had stopped to watch.’ Moreover, Abby expressed the meaning of the love lock hanging in a public space: ‘Because of the love lock hanging in a public space I think that more people recognise our relationship and recognise both of us as a couple.’ This feeling of affiliation towards the lock was even stronger in Tobin’s case, who had already broken up with his girlfriend and who described a situation of unexpected reminiscence due to the lock’s accessibility within public space: ‘I have met three or four times with a new girl, and I really start to like her. I would not tell her about the love lock, but the very idea that we might stroll past the lock together is awful. It would be odd for her to know about a love lock that declares the love between another girl and me. Just as one would not have pictures of former girlfriends hanging on the wall when inviting a new girlfriend, one should not have an old love lock hanging. I think I would owe a new girlfriend to remove the old love lock. Also, that would be a strong sign towards the past and the future.’

The above statements make clear that a RTR takes place at the intersection between private and public space. On the one hand, the lock is hung by two people, and other participants are not welcomed, neither physically nor virtually. On the other hand, the physical manifestation of the more stable relationship status in the form of the lock is perceived as powerful because it is hung in public space. Some official acknowledgment of an otherwise more private relationship status is achieved through the acquisition of public space. While the ritual takes place in a public space and leaves an artefact that makes the relationship visible, the action itself includes two people and excludes others. The aspect of self-determination towards questions of privacy and publicity is vital: Each couple deliberately decided on whom to involve in the procedure or where to put the love lock. This finding strongly complements with the social function of constructing and consolidating social structures, space, and time stabilising the status of the relationship publicly (C. Bell, 1997; Soeffner, 2010).

(2) Customisation & Uniqueness. Although the basic structure of a specific ritual and the artefacts involved are similar, they leave room for perceived uniqueness as may be inferred from a statement by Susi: ‘When I pass love locks, I often take some time to look at them and read the engravings of nice-looking locks. An important criterion for our lock was that it had to stand out from the crowd. As the common golden-coloured lock does not do so, our lock had to be red. Also, that’s the colour that is often associated with love, and it’s one of my favourite colours. I did not think of any other colour for the lock.’ And Jane said: ‘The

lock needs to be very special. It, therefore, has to be red and needs a proper engraving!’ We conclude that relationship rituals should provide minimal structure and opportunities for customisation to allow expressing the uniqueness of each relationship story, e.g., in material, location, words spoken. As the variety in padlocks is limited, most participants felt an urge to individualise their love lock through engravings, form, or colour. While some locks were self-made, most of them were commodities, in either red or golden colors. Although these locks did not look markedly different to an outsider, participants perceived their locks as suitable representations of their unique relationships. The tendency to individualise the artefact (and the procedure) are strongly tied to the sense of structuring and stabilisation (Soeffner, 2010). By having the possibility to decide on form, colour, engraving, etc., participants were given the power to make decisions, to control the situation. The artefact manifests this control visibly in public and is thought to be traceable to the respective individuals through its individualisation. The lock, therefore, is an individual commitment to joint action. Additionally, individualisation leaves space for dedicated meaning-making (Grimes, 2013; Turner, 2017; Van Gennep, 1961). While some may prefer to express themselves via the choice of materials, others may find sounds or movements more appropriate.

(3) Symbolism & Transcendence. Ritual procedures and artefacts embody essential societal values. Tobi stated: ‘The lock symbolises something binding, something that does not get off easily.’ Participants also noted that the ritual was more than expressing their love because it stressed the essential values of their relationship, they both agreed on. Jane said: ‘The lock stands for everything that connects us.’ The lock changes over time and even decay was accepted by for example Bianca: ‘When I last saw the lock, I almost couldn’t read the letters anymore, and it started getting rusty. But still, it’s our lock that is hanging in exactly that location, and that’s all that matters.’ The RTR does not only express the mutual affection between two individuals but represents a multidimensional symbolic system (Legare & Souza, 2012; Rossano, 2012; Sundermeier et al., 2010). Symbolism can be found both in ritual practice as well as in the lock itself as a ritual artefact. For example, the eternity of love may be symbolised through the choice of solid materials like metal. Thus, the lock embodies solidity, constancy, and resilience that represent desirable attributes of the relationship as seen by the individual and the society they live in. The lock as a ritual artefact is further made of a material that is subject to change over time, carrying the symbolism of change. For example, Jane recognised that her love lock lost colour after only one year. However, also relationships and people change, so materials that change over time reflect this appropriately. The various symbols are the basis for a transcendent experience, as the sweethearts cannot guarantee that their relationship will last for years to come. Also, the pragmatic choice of specific locations like bridges, which are usually close to water, support romantic intentions, as the water is needed to let the keys disappear forever as a symbolic expression of commitment. A more symbolic interpretation is made by Nord (2017): While the gushing waters may be seen as an insecure space, the bridge stands for security.

(4) Structuring & Extraordinariness. All participants noted that hanging a lock was very special, unusual, and not everyday – hence extraordinary. It was perceived as a breakout from daily routines and from conventional ways of expressing their love. Jane said: ‘Now, I would not put up another love lock. It was just our thing, and I connect it far too much with that relationship. If I would ever hang another love lock, the reason would need to be something extraordinary, such as a wedding.’

Furthermore, the lock is usually handed over to the couple or to one of the partners as a gift on a special occasion like a relationship anniversary. Lucas: 'The lock was a present from my girlfriend on the day of the third anniversary of our relationship.' The unique and special meaning that a love lock carries for its owners is also expressed in the fact that all but one participant hung only one love lock and that only Tom was willing to hang another one: 'Call me a love-lock floosie, but I would do it. Yes, I would put up another lock, if circumstances allow.' Ritual procedure and artefacts are extraordinary and mark the end of the liminal phase, and the couple celebrates the event as a manifestation of their love and everything that has bound them together so far, marking the next phase of their relationship. The ritual provides structure to the continuous stream of time and marks a particular state within society and in the relationship (C. Bell, 1997; Van Gennep, 1961). This transition should be expressed through the unique nature of the interaction and choice of artefacts. For example, love locks have an element of irreversibility as the key is thrown into the water, not allowing the lock to be opened again (without using extra force). This element represents the end of the liminal phase and the beginning of the incorporation (Van Gennep, 1961).

(5) Physical & Psychological Accessibility. All participants explained their moments of reminiscence, as for example Tobi: 'I never visited the lock intentionally, but often accidentally. This also happened with friends, so I told them and showed them the lock.' And Bianca: 'We now moved away from our former hometown where the lock still hangs. When we visit the town, we always go to the bridge and try to find our lock.' Abby wanted to make sure to find her lock during later visits, so she took photos from all perspectives: 'After the lock was hanging, I took plenty of pictures from the lock and its surroundings. Of course, some should serve as memory, however, the primary intent was to make sure to be able to find the lock again.'

During data analysis, we recognised two different strategies to access that stabilising moment: Participants wanted to make sure they will find the lock again which they left at a public space (physical accessibility) as well as take something with them as a memento, e.g., pictures or in one case even the keys (psychological accessibility). Most participants came back to their love lock several times, even after several years. Some participants explicitly planned to revisit their lock. Others just walked by, immediately recognised the place and stopped for some minutes to look for their lock – taking them out of everyday life again. Physical and psychological accessibility is essential for reminiscence. Remembering the relationship ritual by assessing photos or seeking out the artefact in the environment allows the lovers to revisit positive memories. Seeing the love locks of other couples can also trigger these memories. The structuring and stabilising component of rituals hence may be accessed beyond the specific action of putting up a love lock (Soeffner, 2010).

(6) Stimulation & Participation. The stimulation aspect has several different facets. For example, Tom explained their first 'love lock sight' as follows: 'We had only talked once about love locks before. That day we were on our way into the city and passed a bridge full of love locks. We couldn't even see the metal railings anymore! So, our conversation shortly included the love locks and I remember that she mentioned how lovely they are.' Jane described a media report: 'I think I first heard of love locks in some report, TV or newspaper article, about a bridge where the number of love locks made the whole bridge unstable, and the only way to restore stability was to remove all love locks.' Lucas explained the initial reason that

kept him from initiating the ritual of love locks: ‘The lock was golden-coloured and kitschy. It was not at all a silly present; one may certainly do something like this. However, I think she was far more interested in putting up a lock than me, I don’t really mind.’

Love locks rarely hang alone. They are an observable mass phenomenon that invites others to join in and repeat the ritual (Sundermeier et al., 2010). They exceed individual symbolism and create a collective cultural memory, sometimes even embraced by municipal authorities as tourist attractions. All our participants had seen love locks and reports on the topic before. Spreading joint rituals nowadays is neither bound to specific communities nor religions: modern media became an essential factor that engages people all over the world. Media reports on love locks usually focus on the ritual as vandalism or litter, as love locks can damage bridges because of their weight and the costs incurred in removing them. These adverse effects are rarely addressed by the interviewees but may prevent others from imitation. Designs that are not perceived as vandalism may have the potential to engage more people. The other reason that might keep people from imitating the ritual is that love as an intimate topic can involve feelings of shame, so less kitschy designs should be a readily available alternative. An aesthetic, unusual design encourages participation and a collective cultural memory through embodied practice (Sundermeier et al., 2010).

P4.4 Designing Ritual Artefacts for Relationship Transitions: The Case Study of El Corazón

P4.4.1 Concept and Prototype Development

In the design process we investigated whether the pointers facilitated the design of digital artefacts for RTRs that are different from current physical objects (such as love locks). Certainly, other design constraints are conceivable for future use of the pointers such as specific transitions, couples, or materials. The design process consisted of three phases: (1) brainstorming and sketching with designers, psychologists, engineers, and HCI researchers, based on the pointers, (2) developing a high-fidelity prototype and (3) evaluating the prototype in a field study with ten couples.

Within the first brainstorming phase, we iteratively discussed each pointer and several ideas on how to materialise them in an artefact for relationship transitions. Resulting from that brainstorming, a concept named El Corazón emerged: El Corazón is a tangible artefact that first needs to be opened by unscrewing its lid. Next, the couple can place their fingers on heartbeat sensors to record their heartbeats. This process, by purpose, takes several seconds where no feedback is given. The heartbeats are then saved and transformed into individual, visible flickering light effects. We intended to create excitement and surprise when, after several seconds, the light suddenly starts to flicker. A rechargeable battery allowed continued use, if charged regularly. After the recording, the lid needs to be closed, and the artefact can be placed or hung at a preferred location. Moreover, the artefact allows for customisations, e.g., by decorating its body. We chose to name the artefact El Corazón because during every ritual procedure, a new virtual heart (Spanish ‘corazón’) is created from two previously independent hearts (Figure P4.1).



Figure P4.1: Left image shows components of El Corazón. Middle image shows the moment ending the liminal phase: recorded heartbeats are transferred into light. Right image shows El Corazón in real setting during one evaluation session.

The six pointers, together with the idea of creating a ritual artefact different from love locks, were realised in El Corazón as follows: The tension between *privateness* & *publicness* was translated into an action that requires to be performed together (two heartbeat sensors that would need to be held simultaneously) and into flickering light, which attracts attention. This pointer affected the action and interaction with El Corazón and was materialised in light animations (rather than sound or vibrations) – but not in the final placement of the artefact as in love locks. The aspect of *customisation* & *uniqueness* was considered in the usage of individual heart rhythms, individual placement, and the possibility to decorate or paint the artefacts' body. The aspect of customisation could, in future work, be further strengthened by incorporating the manufacturing phase into the ritual to enable couples to create their own, unique El Corazón. The *symbolism* and values expressed through the materiality of El Corazón differed from those of love locks (representing eternity and stability). We aimed at emphasising values such as continuous care, fragility, togetherness, and dynamism, e.g., through recharging the battery after a specific time, through the dynamics of pulsing lights, and through the need to perform the procedure in pairs. *Structuring* & *extraordinariness* characteristics were achieved by stretching the liminal phase of the ritual compared to love lock rituals: it required some time to open the artefact, do the recording, decorating, and closing compared to hanging a love lock. The beginning of the flickering light marks the end of liminality that may only be reached when both people work together. Moreover, the aesthetics of the artefact as well as the involved procedure were not comparable to any everyday object or process (in contrast to love locks), thus creating an extraordinary experience. To allow for *physical* & *psychological accessibility*, we made use of rechargeable batteries that would require couples to get back to the artefact. Additionally, we did not imply a location where to place the artefact, but instead left that choice to each couple and therefore added eyelets for hanging up the artefact and constructed El Corazón as weatherproof as possible (e.g., by placing the electronics inside). The aspect of *stimulation* & *participation* was considered in the artefact's ability to attract attention with its aesthetic light animation that could be seen at day and at night, and its unusual design that stands off from backgrounds – in contrast to collecting many El Corazóns in public places (as with love locks).

In the second phase of the concept development, we prototyped El Corazón and made use of several components to realise the intended functionality (Figure P4.1). Five 3D printed forms were used that are held together with screws covering all electronic parts and giving El

Corazón its shape. Additionally, two acrylic glass panes, one transparent and one translucent, completed the outer form above an LED ring and made the emitted light diffuse. To allow for recording and transforming heartbeats into flickering light, several electronic components were necessary: two heart rate sensors and one electronic push button that, when pressed, triggers recording; one Arduino Micro Pro on which the software, written in C, runs; several cables that connect the Arduino with all other components; one printed circuit board; one rechargeable battery; and one Adafruit neopixel light ring to display the heartbeats.

P4.4.2 Evaluation of El Corazón

Participants We evaluated the ritual experience of El Corazón with ten couples. Participants were recruited using the university's participant recruiting system, local social media, and by direct inquiries of couples on local bridges where love locks were put up. Unfortunately, we could not recruit participants that had put up a love lock before, but as it was our primary aim to evaluate El Corazón and the corresponding experience, we considered this circumstance to be acceptable. The couples and their demographic data are depicted in Table P4.1. Their level of education ranged from high school graduation to master's degree. Seven participants were catholic, two were protestant, one was atheist, and ten had no religious affiliation.

Name	Age	A couple since...
Greta & Michael	25 & 28	8 years
Mary & Tino	19 & 19	1 month
Linda & Jan	21 & 20	1 year
Nina & Nick	32 & 35	1 year
Anna & Erik	20 & 24	1.25 years
Rachel & Chris	21 & 22	2 years
Mia & Fynn	22 & 23	2 years
Frida & Paul	25 & 25	2.5 years
Laura & Liam	30 & 34	10 years
Carlos & Jimmy	30 & 31	4.5 years

Table P4.1: Basic demographic data of couples that performed a ritual using El Corazón. Names are changed.

Procedure The couples were asked whether they felt comfortable meeting in a quiet area inside or outside a café or somewhere else (e.g., nearby the bridge close to the café or any other place significant to their relationship). Most couples were comfortable meeting in a café. Two couples preferred to meet in their flats. After consent was given, participants shared basic demographic data as well as their thoughts on RTRs in general and their own RTRs. They were then given a package including El Corazón, a short written tutorial (e.g., Step 1: Unscrew El Corazón), and material to individualise the prototype if desired (e.g., pens, ribbons, tapes, foils). They were asked to imagine a scenario where they would use the ritual in their past or future relationship transitions. The researchers then left the couple

alone but were still within sight while couples performed their idiosyncratic ritual with El Corazón. Afterwards, a semi-structured interview aimed at understanding the couples' ritual experiences. The questions related to researchers' observations, the experience of the ritual, and the prototype itself. All interviews were audio-recorded, and researchers took notes to remember the details. Overall, one session took around 45 minutes.

Results: Ritual Experience with El Corazón The data was transcribed and thematically analysed by three researchers along the pointers from the first study. Below we report on emerging themes, including individual statements, structured along the six pointers.

(1) Privateness & Publicness. Surprisingly, 18 out of 20 sweethearts could not imagine performing the ritual in public space. Additionally, they would store it in a private rather than in a public space after usage. Rachel, for example, said: 'Yeah, well, I think it's better to do it privately. It would be strange to see others watching you, so you can't really put yourself in the moment. They would certainly think: What does it mean? or what do they do?, and then it's a bit... well, then you think of the others all the time.' And, amongst others, Jan and Linda were of the same opinion. Jan started: 'I think I'd rather use and store it privately, even if many of them were in public space.' And Linda agreed: 'Yes, definitely!' When asked why, Jan said: 'Then you just get something out of it [both laughing]. It would be a pity if it would disappear or break, then it would not look good anymore. And if you have it at home, then you can look at it every day, remember the moment. Otherwise, you may just walk by and look for it and then maybe it would be gone some time, and that would be a pity!'

As the above statements indicate, participants would choose to use and store the object in a private space, as the moment was to be shared amongst two people being highly emotional that would need and want to fully concentrate on the process rather than the surrounding. Thus, one learning is that the materialisation of the relationship status in the tension between private and public is, first and foremost, essential for the couple itself, and then for people they know, but not for strangers.

(2) Customisation & Uniqueness. All couples decided to individualise El Corazón with drawings, writings, tapes, or ribbons. This act was either performed to assign El Corazón to a specific occasion (e.g., Anna & Erik painted a house to assign the heartbeat visualisation to the moment of moving to their first shared flat) or to make clear whom the heartbeats belong to (e.g., Mary & Tino painted a heart with their initials in it). Michael, for example, explained: 'On the other hand, I don't like this whole heartbeat, heart metaphor, metaphor of heartbeats synchronising. I take a very clinical view on that data and think: Okay, that is just as binding as if I were using the pH of my urine, for example, and it's supposed to feel binding when it's aligned with my partner's [laughs]. But maybe that's just a very personal thing for me, that it feels somehow clinical.'

Other than expected and as may be seen in Michael's example, not all of our participants could relate the heartbeats to themselves. Customisation took further place in the scenarios chosen: While each couple could individually decide in what context to perform the ritual, nine out of ten decided to perform it in a special moment rather than every day. Carlos and Jimmy, for example, chose to use it to end a fight, which they said was not too easy within their relationship before. Jimmy started: 'So we'd definitely use it after a fight.' And Carlos continued: 'Yes, that came to us as our first idea, so that we could then come together again and then you can calmly and with control work on something together, or well, repair it. So

repairing is more the word that I was looking for. But it's really cool to use in such situations, yes! [...] Yeah, so you first need to apologise. But well, you can also apologise with the object!' Jimmy carried on the idea: 'Yes, exactly, and the object then simply helps you to get rid of the negative thoughts. So that you don't have to deal with them and can finish it.' And Carlos finalised: 'So that you just don't carry the anger any further because with this process you kind of bind the trouble and close it.' Given the above idea to use El Corazón in order to overcome a dispute, the decision towards the private rather than the public space becomes even clearer.

(3) Symbolism & Transcendence. Carlos identified a specialness in the way that El Corazón required the combination of different skills: 'So it was good to have something motoric on the one hand and something electronic on the other. We've got the coarse unscrewing I would say, and then also there is still an electronic part. That's as if there are different aspects of characters brought in again. He's an electronic engineer, so to speak.' Another couple, Rachel and Chris, expressed their feelings towards the process and the artefact in a short dialogue. Chris said: 'It was nice screwing it open together anyway.' Rachel continued: 'Exactly, I thought that was nice too - so even when we unscrewed it. So one of us did that one [points at a screw] and I loosened the other two screws - that was really cool. [...] If we were to use it after a fight, it would remind us that we are actually one or that we are just one unit or that we hold together. And because the fingers are so easily side by side, you can feel peace, calmness and you even may hear the heartbeat. Exactly, and that reminds me that we are a unit and that already meant a lot to me in that moment.' And Chris finalised: 'Exactly, this mutual relationship is quite symbolic and becomes very clear and visible with both fingers on the sensors, if you do something together.' As can be seen in the above quotes, couples especially valued that the object required joint actions to function. For most couples, this experience of togetherness started with unscrewing El Corazón. This experience was special to the couples and was manifested in the artefact that later on reminded them of the moment and the individual symbols they saw in it.

(4) Structuring & Extraordinariness. The overall experience with El Corazón was described as positive, exciting, and unusual by 18 out of 20 sweethearts. Anna noted: 'I would say it was very positive, just that we had to do it together, that was fun. I think I would have been overwhelmed with the wires already [both laughing].' And Erik continued: 'I found it exciting that you couldn't really see what was going to happen. Then there was the aha-effect when it started to pulse and you noticed: Oh, you measure the heartbeat while putting your fingers on it and that's our heartbeat now that's in it, I thought that was very cool! When thinking about when we would use it, we thought about the time when we moved into our first flat together.' The ritual procedure inscribed to El Corazón required some time to open, activate, and close it. Every single subject welcomed this effort. Nick said: 'Actually, the moment passed almost too quickly. So that was a special moment when we both put our fingers on it. It had something like a symbiosis with the light that put it together. Maybe everybody likes something different, so maybe you have to choose yourself what happens with the heartbeat. For me, the moment could last much longer. For example, like a small radio that you have to assemble yourself. So, there would need to be some mechanism that you would have to do it together, but that would be much better!' A factor contributing to the experience of specialness and shaping the ritual experience as extraordinary was within the

process itself. The effort that couples had to put in and that the artefact required both lovers to interact throughout the whole process in a structured way created space for meaning and gave marked the liminal phase.

(5) Physical & Psychological Accessibility. Almost all participants chose to place the artefact in a frequently visited place in their flats. For example, Erik told us: ‘Then almost everyone can see the moment we experienced back then again, that’s really great [both laughing].’ Anna finalised: ‘Yes, guests would simply see the moment when we moved into our apartment and they would surely ask and that would be nice if they asked and were interested. Then it’s just nice to tell our story about it!’ The decision to store El Corazón within the private space uncovered two aspects: Physical and psychological accessibility are of great importance and reminiscence is achieved through this easy and direct access. This immediate accessibility provides a visualisation of what the couple achieved (e.g., moving together, overcoming a dispute) and may support couples in keeping these achievements in mind and reinforce their significance instead of taking them for granted. Another aspect is that of quickly sharing a special moment with visiting friends.

(6) Stimulation & Participation. Tino and Mary described engaging with El Corazón as a stimulating new experience. Tino said: ‘It was really exciting when you had to look for the sensor, it’s down there, and then you had to take it out and turn it around, that was cool!’ And Mary said: ‘The cool thing about it was that you have to build it together and only that process gives the object the meaning, that was really important!’ Tino continued: ‘Yeah, it’s like a gesture of being together. It’s also much cooler than, for example, a love lock. I’m not a person for something so kitschy! I’m more into electro stuff and the design of the object is also not kitschy – so that’s great!’ Performing a RTR with El Corazón, Mary and Tino were stimulated and engaged through El Corazón’s unusual design. The aspect of attracting attention to stimulate others to get interested into the artefact became clear in a conversation started by Carlos: ‘That [El Corazón] would be placed on the shelf next to the candles and the decorations. Yeah – that’s a good place! And if visitors would ask me what it is, I would certainly tell them. Meanwhile, our friends know that we have problems in our relationship just like others do. And then you can say: Yes, this is relationship ritual we perform after a fight which helps us to better deal with it.’ And Jimmy continued: ‘Yeah, I see that openly, too. We always talk to other people when we argue, the object fits in very well. It initiates the conversation about our struggles in order to process them!’ Similar to the above, most of our participants stated that they would expect visiting friends to be curious about El Corazón and that they would certainly explain it and its meaning to them. Overall, it seems difficult to design relationship ritual artefacts that do not appear kitschy, but with its mechanical-electronic part, El Corazón was able to counteract kitschiness. Nonetheless, the metaphor of heartbeats was considered to be kitschy by some.

P4.5 General Discussion

Studying rituals from an HCI perspective challenges the design of technology in two ways: First, digital technologies may be developed that engage people to participate and to re-establish certainty through order, commitment, expression, and solidification of cultural values (C. Bell, 1997; Soeffner, 2010; Watson-Jones & Legare, 2016). Second, it raises awareness of the ongoing appropriation of existing digital technologies by their users, who start to use

technologies in ritualistic ways. When aware of the users' need for ritual behaviour, technology designers may incorporate possibilities for ritualistic use. To support the design of technology-mediated RTRs, we developed six pointers based on ethnographic explorations and ritual theory. The pointers mark the design space for technical ritual artefacts, and their consideration impacts the resulting ritual experience. In the design of El Corazón we deliberately chose to vary considerations of pointers compared to the ritual of hanging love locks to speculate on how we might shape and change transition rituals within relationships, and to explore which tradeoffs occur. Figure P4.2 visualises an estimation of these variations as rated by three researchers. We do not intend to directly compare both experiences, but rather to point out possibilities and variations that emerge.

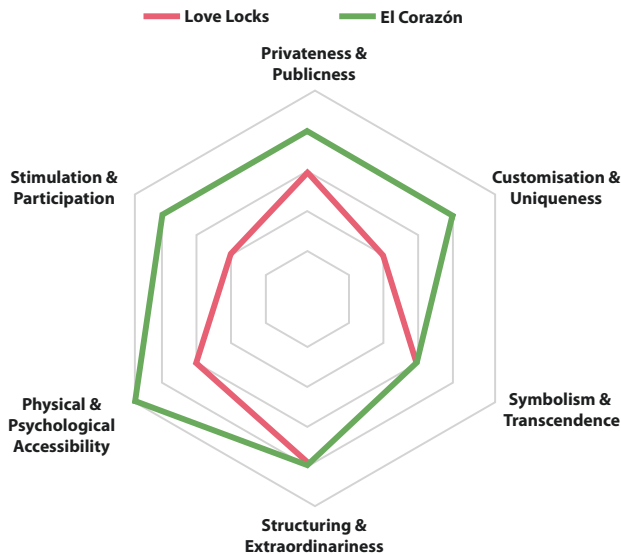


Figure P4.2: Comparison of the rituals of love locks and El Corazón in terms of how much they realise each pointer.

Being situated at the intersection of *privateness* & *publicness*, love locks hang in public space but with a deliberate choice of place, participants involved, and whom to show it later on. All participants performed the ritual of love locks in pairs; however, the design of the lock did not foster joint action. Hanging in public spaces, the locks were felt to make the relationship status visible to everyone. In the design of El Corazón we aimed at changing focus by requiring couples to perform joint actions and by integrating more personal data (heartbeat) than written initials on love locks. Taking the tangibility aspects of embodied facilitation and expressive representation into account (Hornecker & Buur, 2006), El Corazón with its focus on twosomeness in interaction and representation created a very intimate moment that, for example, Rachel would not tolerate spectators in as she wanted to concentrate on the moment. Moreover, almost all couples decided to use and store El Corazón within the private space with the option to deliberately show it to visitors. In line with previous research, this aspect highlights the importance of taking the greater context (*publicness*) into

account: The tangible shaped emerging social configurations (Ambe et al., 2017) and functioned as a ‘ticket to talk’ (Hoog et al., 2004). However in contrast to previous research on tangibles, where spectators were tolerated or desired after and during the (everyday) interaction (Ambe et al., 2017; Brereton et al., 2017; Kirk et al., 2016), participants using El Corazón refused spectators and emphasised privateness (twosome) so that the ritual became more intimate and lightweight than love lock rituals.

The aspect of *customisation & uniqueness* also varied between both rituals: To couples performing a RTR it is essential to establish a reference towards the artefact through its (perceived) uniqueness. In the design of El Corazón, we introduced individual heartbeats to create an even more unique and personal artefact. However, the use of heartbeat data was discussed controversially among couples, in line with previous research that described two major interpretations of shared heartbeat data: heartbeat data as being informative or heartbeat data as establishing connectedness (Slovák et al., 2012). While some described heartbeats as somehow clinical and not relatable to (e.g., Greta & Michael), others strongly related heartbeats to themselves (e.g., Anna & Erik). The disconnection may have led to the phenomenon that all couples decided to individualise their artefact further. It remains to be explored what personal information might make additional individualisations unnecessary (e.g., breathing (J. Kim et al., 2015), fragrance, voices), and what further factors (e.g. previous experiences, context, relation (Slovák et al., 2012)) lead to the different interpretations of (heartbeat) data.

As shown in Figure P4.2, we evaluated *symbolism & transcendence* as being equally considered in both ritual artefacts. While love locks strongly realise their symbolic meaning through materiality that symbolises eternity or everlasting commitment, El Corazón emphasised the procedure that may symbolise togetherness, caring, or achieving more together. Although they contain different implementations of symbolism, both rituals were considered adequate, which demonstrates that different ways to ‘implement’ symbolism are feasible and appropriate. While previous research on technology individuation has focused on augmenting existing interactions (Soro et al., 2016), RTRs may require specific interactions as the process rather than the rational outcome is central.

In terms of *structuring & extraordinariness*, love locks were described as more of a pragmatic experience performed quickly. The moment chosen to hang a love lock was, for most participants, a practical choice as well (e.g., a nice summer day when both had time). The structuring component resulted from the symbolism that the relationship is perceived to be stable from then on. El Corazón involved similar structuring components through its symbolism (e.g., togetherness). However, El Corazón additionally made couples decide to use it only for specific transitions, which may have resulted from the emphasis on the ritual procedure. Structuring in El Corazón therefore also involved a more graspable temporal component (e.g., after a fight, when moving into the first flat). The importance or the weight of the transition that the ritual was used in differed between the locks and El Corazón: While the locks were used for purposes similar like an engagement (macro-level), El Corazón was also considered at meso-level transitions, e.g., after a massive fight. Overall, the aspect of *structuring & extraordinariness* expands previous findings on lovers’ phatic communication intended for everyday (sometimes ordinary) use (Brereton et al., 2017; Chung et al., 2006; Kirk et al., 2016).

Physical & psychological accessibility were evaluated as being lower in love locks than in El Corazón. While participants who had hung a love lock rarely visited or remembered their lock within everyday life, almost all participants would have stored El Corazón within their flat, making the ritual moment (through the situated tangible displaying the heartbeat data from the time of the ritual) readily accessible. Leaving the choice of place to the couples uncovered the importance of access for reminiscence and may support long-term technology individuation (Ambe et al., 2017).

Stimulation & participation in love locks is fostered by their visibility in public space and could thus reach a wider audience. Most of the couples participating in the evaluation of El Corazón, however, described that leaving something in public space was too intrusive for them. El Corazón, therefore, does not foster joining in by being present in public spaces but by its ability to attract attention through flickering lights. Additionally, a curiosity towards new technical artefacts was seen in all couples, which needs further explorations.

P4.6 Conclusion

Based on literature research and ethnographic explorations on the transition ritual of hanging love locks, we formulated six pointers for designing technology-mediated RTRs. We exemplarily applied these pointers in the design of El Corazón, a tangible artefact for RTRs, which was used by 20 sweethearts. As El Corazón set a different focus than love locks, the resulting experience of the transition ritual changed: While love locks fostered publicity, symbolism, and structuring with their emphasis on the placement and materiality resulting in pragmatic experiences, rituals with El Corazón were described as being private and intimate, imbued with symbols of belongingness, equality, and togetherness, and particularly suitable as structuring component for special transitions through its emphasis on procedure (joint actions), intimate data, and aesthetic light design. As demonstrated, the design pointers may be used to guide design for RTRs. It remains to be seen how the artefact may shape relationship transitions over time and how individualised designs for specific couples or transitions may look like. Taken further, we would like to investigate how our approach may be translated to other rites of passage that accompany transitions like death, getting a child, coming of age, or transitioning through different career stages.

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Publication 5

Designing for Uncontrollability: Drawing Inspiration from the Blessing Companion⁶

This work has been published as follows:

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Abstract

This paper presents an inspirational concept for companion technology design, *uncontrollability*, and a corresponding artefact, the Blessing Companion. Both originated from a research through design project exploring companion technologies for blessing rituals. We established an exchange with Protestant theologians, explored believers' experiences of blessings, co-speculated on potential technologies, and refined the resulting ideas through ideation, prototyping, and testing. Inspired by believers' descriptions of blessing experiences as not plannable, predictable, controllable, or enforceable, we adopted the concept of *uncontrollability*, explored how it might be implemented in companion technologies, and designed the Blessing Companion. The Blessing Companion embodies *uncontrollability* through its ambiguous appearance and (partly) uncontrollable behaviour. It thus stands in contrast to the prevailing on-demand and user-driven interaction paradigms. We discuss how *uncontrollability* can be reflected in content, form, and interaction, highlight respective possibilities for companion technologies, and reflect on the Blessing Companion as an example of designing for religious rituals.

Keywords

Research through design, religion, ritual, companion technology, techno-spirituality, transcendent experience

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P5.1 Introduction

In 2017, at the World Reformation Exhibition in Wittenberg, the Protestant Church in Hesse and Nassau presented BlessU2, an experimental art project of a blessing robot designed to initiate discussion among believers (Meltwater, 2017). BlessU2 pronounced more than 10,000 blessings to visitors and has since been repeatedly exhibited in religious and non-religious settings (Meltwater, 2017; Schlag et al., 2022). The exhibition of BlessU2 sparked considerable media echo and polarised reactions (Meltwater, 2017). Besides theological questions, BlessU2 also raises questions for HCI: What does technology look or behave like to which spiritual or religious competence is attributed? What role can technology experienced as a companion take in religious rituals? These questions differ from those previously addressed in HCI in the context of spirituality, religion, and technology. So far, technologies were understood (and accordingly investigated and developed) more as facilitators, as a means to an end, and as tools to be used that solve problems or enhance existing religious rituals (e.g., O’Leary et al., 2022; Rifat et al., 2022; Uriu et al., 2021b; Wolf et al., 2022c). BlessU2 promotes a different interaction paradigm: It highlights technology not as a tool but as a counterpart or social actor to enter dialogue with (Hassenzahl et al., 2020; Ihde, 1990; Nass et al., 1994; Wolf et al., 2023b). A metaphor often used for such technology is companion technology (Niess & Woźniak, 2020). With companion technologies, more than the immediate interaction comes into focus, like its perceived character, social relationship with users, or reflections on the human self (Niess & Woźniak, 2020).

So far, various religious companion technologies like BlessU2 (Meltwater, 2017) have been proposed: For example, a Pepper robot programmed to perform Buddhist funeral rites (Sherwood, 2017), or an Alexa skill that enables Alexa to pronounce blessings (Evangelische Kirche Deutschland, 2021). These companion technologies took up existing religious rituals and made them more readily available, accessible, controllable, or efficient to take part in. Instead of seeking and asking another person to pronounce a blessing, one can ask Alexa for a blessing at any time and from home (Evangelische Kirche Deutschland, 2021). In addition, these companion technologies took over pre-existing roles and modes of interaction almost ‘as it has always been done’. BlessU2 imitates a pastor in church pronouncing a blessing (Meltwater, 2017), and Pepper performs funeral rites like a Buddhist monk (Sherwood, 2017).

While efficiency and accessibility are (rightly) the most important criteria for designing successful interactions in many contexts, HCI increasingly recognises that these criteria alone are insufficient in other contexts, such as rituals or life transitions (Hansen & Koefoed Hansen, 2022; Klüber et al., 2020a; Wolf et al., 2022c). Hansen and Koefoed Hansen (2022), for example, suggested that digital divorce forms should not only be designed according to usability criteria but could also be inspired by theories of ritual, thereby resulting in an unusual form that takes into account the feelings, meanings, and uncertainties present during a divorce. Similarly, a project designing for relationship transition rituals documented that couples wished for even more extended and less efficient interaction with their ritual-mediating prototype (Klüber et al., 2020a). We argue that this perspective can also be applied to religious rituals and that it is worth questioning the focus on simply making religious rituals more readily accessible, efficient, and controllable by imitating existing rituals through companion technologies. Approaching the complex and sensitive topic of religious

blessing rituals in a more holistic and exploratory way, we identified a novel concept, *uncontrollability*, that might be a suitable guiding principle for technology design in the context of religious rituals.

We conducted an RtD project, exchanging ideas with Protestant theologians and using design fiction methods to get Protestant believers to think about their blessing experiences and speculate about future companion technologies. Through this process, we learned about an essential experiential component of blessings - their *uncontrollability*. Blessing experiences are neither plannable, controllable, nor predictable. They are essentially contingent and thus fundamentally open and uncertain. Believers detailed how blessing experiences can happen anytime, anywhere, and can take the form of small, positive, often surprising experiences in everyday life. We distilled these insights into the inspirational concept of *uncontrollability* and developed the Blessing Companion to explore how the concept can be approached in design. With *uncontrollability*, we refer to the experience that something or someone is not fully controllable, accessible, plannable, visible, available, traceable, graspable, enforceable, or knowable. The Blessing Companion seeks to provide such experience by implementing *uncontrollability* at various levels, namely form, interaction and content. It is a contingent companion that wants to fascinate by reminding us of the good in life, the blessed.

We contribute by introducing the inspirational concept of *uncontrollability* grounded in our RtD process and by presenting the outcomes of our design exploration of *uncontrollability*, which eventually resulted in a conceptual artefact that integrated *uncontrollability* at several levels: the Blessing Companion. We thereby contribute to research on technology-mediated religious, spiritual or transcendent experiences specifically and companion technologies more generally. We provide an account of designing for *uncontrollability* and connect it to previous examples from HCI and sociological theories. In the next section, we situate our work in the context of religious (blessing) rituals mediated by interactive technologies. We then describe the design process of the Blessing Companion and our growing understanding of the concept of *uncontrollability*. Finally, we present an extended discussion on *uncontrollability* and the Blessing Companion.

P5.2 Background and Related Work

P5.2.1 Religious Rituals Supported by Interactive Technologies

There has been an ongoing interest in how interactive technologies and religious rituals are entangled within HCI. Years ago, Wyche and Grinter (2009) described how studying Protestant Christians' uses of technology inspired them to reframe the design of domestic technologies to support *extraordinary computing* - to take into account and honour the special in everyday life. Since then, various HCI projects have investigated the intersection between interactive technologies and religious rituals. For example, Rifat et al. (2022) ethnographically studied the production of Islamic sermon videos in Bangladesh and traced the videos' influence on creating a political and moral counterpublic. Other recent work looked into how streaming worship services or Buddhist funeral rituals during the COVID-19 pandemic impacted the resulting experiences of believers (Uriu et al., 2021b; Wolf et al., 2022c). Besides research into interactive technology's appropriations, HCI has also designed for the religious

context. For example, Wyche et al. (2008) designed a smartphone application to support Muslim prayer, O’Leary et al. (2022) designed a digital health tool for religious communities that included a feature for mutual prayer support, and Häkkinen et al. (2019) developed a virtual reality app allowing for virtual grave-visiting rituals. In the above examples, technology was often adopted or designed to solve (non-religious) pragmatic problems (e.g., because communities were not allowed to meet in person (Uriu et al., 2021b; Wolf et al., 2022c), or grave sites were inaccessible (Häkkinen et al., 2019)). In doing so, technology was used to make religious rituals more easily accessible and controllable. Technology thereby became a means for pre-defined ends, a tool to access religious rituals.

Other HCI projects adopted a more exploratory perspective, not focusing on solving pragmatic problems but on creating possibilities for new rituals and practices. For example, Hemmert et al. (2020) designed seven tangible artefacts reflecting specific Catholic beliefs like ‘all humans are equal’, enabling novel confrontations with those beliefs. Analysing their process and the artefacts, they suggested a design recipe combining everyday objects with a belief and an *unknowable element*. Inspired by Buddhist traditions, the two artefacts SenseCenser (Uriu et al., 2018) and Fenestra (Uriu & Odom, 2016; Uriu & Okude, 2010) were designed to explore how interactive technology could support memorial rituals in Japan. Both artefacts display photos of departed loved ones and are inspired by traditional Japanese practices of memorialising with a home altar (Uriu & Odom, 2016; Uriu & Okude, 2010; Uriu et al., 2018). A last exploratory example is the Prayer Companion, a device displaying a stream of news information designed for cloistered nuns (W. Gaver et al., 2010). It was not designed for a specific usage scenario but was deliberately open-ended so that it could be explored and adopted by the nuns in a way that was useful to them, e.g., as inspiration for prayers or conversation starter (W. Gaver et al., 2010). All exploratory examples were based on a thorough understanding of existing practices. However, the resulting technologies did not imitate these practices or solve problems. Instead, they explored new possibilities, which is what we wanted to adopt for our project.

The last set of relevant examples from HCI literature is connected to the perspective of interactive technologies as companions. Trovato et al. (2018) presented SanTO, a Catholic robotic saint statue that provides company during prayers, cites parts of the Bible, and should be seen as a sacred object embodying divinity (Trovato et al., 2016, 2018). Another example is BlessU2, the Protestant blessing robot that was studied compared to the small robot QT programmed to pronounce blessings as well (Löffler et al., 2021; Meltwater, 2017). The authors found that believers preferred, for example, loud voices in humanoid robots that pronounce blessings (Löffler et al., 2021). All religious companion technologies implemented a precise usage scenario only allowing for a set of pre-defined tasks (e.g., asking for a prayer or a blessing), making them efficient, predictable, and controllable, and drew (more or less) on existing rituals. In this paper, we want to combine the more exploratory approaches with the topic of companion technologies, speculating on the (novel) roles they may assume in blessing rituals.

P5.2.2 Blessing

Blessing in Protestant Theology Tracing the etymology of the word *blessing*, we found two different backgrounds and meanings: *Berakah*, (Hebrew) means strength, fertility, successful life, or the good encountered by man, understood as the gift of the blessing Creator God. A second origin of *blessing* is the Greek word *eu-logein* and the Latin word *bene-dicere*, expressing the transmission of the good, often accompanied by a reference to God that is believed to make the blessing come true. Here, blessing still refers to the good in life, but the focus is on the social practice of assuring the good. People can decide on the specific blessings to pronounce, but they cannot make the blessings come true themselves. Instead, Christian believers trust God to fulfil the blessings. When we speak of blessing in this paper, it is in this sense. Believers exchange blessings in various rituals and refer (more or less obviously) to God. These rituals serve as encouragement, remembrance, and recognition. A well-known blessing ritual is the Aaronite Blessing, pronounced by a pastor at the end of every worship service. According to Protestant understanding, however, it is by no means only the pastor who can pronounce blessings. The pastor is seen as a mediator, just like anyone else could be. Apart from such institutionalised blessing rituals, there are also less formalised ones that occur within everyday life, like greeting or farewell rituals (Gutmann, 2017).

In recent years, religious scholars have noticed a rise of interest in blessing rituals (Bederna, 2015; Frettlöh, 2002). Many church communities developed and offered novel benedictions for specific target groups, such as blessing services for pregnant women or bikers (e.g., Bederna, 2015; Evangelisch-Lutherische Kirche in Bayern, 2015; Grethlein, 2020). In addition, blessing rituals moved into everyday environments, such as transition rituals performed in schools rather than staying within church buildings. Furthermore, blessing rituals received increased interest in those groups that had been refused blessings before (e.g., same-sex couples) or in more secular groups that nevertheless want to enjoy blessing rituals (Domsgen, 2006). This trend has led to novel jobs such as ritual designers or blessing agencies (e.g., Evangelisch-Lutherische Kirchenkreise Hamburg-Ost und Hamburg-West/Südholstein, 2022; Evangelisch-Lutherischer Kirchenkreis Lübeck-Lauenburg, 2021) that offer individualised blessing rituals and novel digital blessings.

Transcendent Experiences in HCI and Digital Blessings Blessing experiences, as introduced above, can be concrete examples of transcendent experiences, ‘the individual experience of connection or unity with transcendence’ (Buie, 2019, p. 8), a type of experience that has gained increased attention in HCI. Like transcendent experiences, blessing experiences engage with that which is intangible and greater than oneself and can trigger feelings such as awe, wonder, peace, and happiness (Blythe & Buie, 2021). Transcendent experiences contribute to well-being and mental health but can neither be forced nor guaranteed (Garcia-Romeu et al., 2015). Thus, interactive technologies can only facilitate, support, or invite transcendent experience (Blythe & Buie, 2021). Recent, widely used examples are the smartphone apps Headspace or Calm or the virtual reality application TRIPP. While the focus within HCI is often on profound, mystical experiences, awe, and virtual reality (e.g., Chirico et al., 2016, 2018; Glowacki et al., 2020; Wanick et al., 2018), transcendent experiences can

also be light, focus on components other than awe, and involve other technologies (Blythe & Buie, 2021). It is precisely these latter elements that we wanted to pay more attention to in our work.

Since there is only little scientific reflection on the topic of blessing rituals in the field of HCI, in contrast to a large number of existing religious technologies ‘in the real world’ (Buie & Blythe, 2013b), we have also searched for digital blessings outside academia. We searched online and in app stores using English and German search terms such as ‘blessing’, ‘blessing technology’, or ‘blessing app’. Most online services and apps provided blessing inspiration (e.g., Sweet Quotes Studio, 2021) or blessings regularly or on demand (e.g., Johan Maasbach World Missio, 2020; Obied, 2021). An example is the online service *segn.jetzt* (English: *blessing.now*), invented by a German pastor and implemented by several churches (Evangelisches Werk für Diakonie und Entwicklung e.V., 2019). Upon entering the webpage, the service displays written blessings, and one can order analogue QR codes to spread blessings. A similar blessing service is *blessing greetings*, a newsletter service that sends a blessing each day (Evangelisch-Lutherischer Kirchenkreis Lübeck-Lauenburg, 2021). The blessings are composed of stock images and a written blessing, and anyone can sign up for the service (Evangelisch-Lutherischer Kirchenkreis Lübeck-Lauenburg, 2021). One app stood out because of its different functionality: The *Blessing Tracker App* (Biggerstaff, 2019). This app encourages users to set goals for how many blessings they want to pass on each day and to keep a record of the blessings passed on, almost like a fitness tracker (Biggerstaff, 2019).

While the previous examples focused more on supporting interpersonal blessing practices, we also found examples where the technology became more of a (blessing) companion, like the already mentioned *BlessU2* (Meltwater, 2017) and the blessing Alexa (Evangelische Kirche Deutschland, 2021). Another example was the *Benedicti-o-mat* invented by an artist to make the blessings of her homeland controllable at a distance (Iglesias, 2008). The *Benedicti-o-mat* consists of a wooden box that can be attached to walls. When standing in front of it and pressing a button, a beam of light from inside the box casts a cross outside. Not only believing individuals (e.g., Iglesias, 2008) but also communities of believers and church institutions (e.g., Evangelische Kirche Deutschland, 2021; Evangelisches Werk für Diakonie und Entwicklung e.V., 2019) started to develop blessing technologies, some of which were interacted with by thousands of people (e.g., Meltwater, 2017). Comparing the various blessing technologies, we identified two key elements: First, blessing technologies make blessings available faster, easier, and on demand. If one wants a blessing immediately, one can get it. This element is similar to what is documented within HCI on how streaming worship services or funerals made these rituals more readily available and accessible (Uriu et al., 2021b; Wolf et al., 2022c). Second, many blessing technologies use previously existing elements, like pronouncing a blessing. They extend, imitate, or reproduce existing rituals with novel technologies, much like the HCI examples do.

Overall, prior work in HCI and outside academia has focused on making religious rituals more readily available through technology. Technologies, especially companion technologies and technologies within blessing rituals, often imitated existing rituals for this purpose. In this paper, we follow the more exploratory approaches, speculating on novel companion technologies for blessing rituals.

P5.3 The Blessing Companion: Discovering *Uncontrollability*

To explore blessing experiences and speculate on future technologies with a holistic and experience-based perspective, we drew on three related approaches, namely RtD (Zimmerman et al., 2007), design probes (Mattelmäki et al., 2006; Wallace et al., 2013), and design fiction (Lindley & Coulton, 2015). Throughout the overall process, we aimed to produce future-oriented design knowledge, anticipate possible consequences of future companion technologies in the context of religious rituals, and allow for challenging status quo thinking. Thereby, our focus was not on solving specific problems in existing blessing rituals but on exploring how companion technologies might take roles in novel blessing rituals that can be fulfilling and meaningful to those involved.

To realise such a project at the intersection of religion, design, and HCI, we assembled a team from different disciplines, including design, ethnography, HCI, psychology, and Protestant theology. The first author of the paper, trained in HCI, guided the overall process, and all co-authors participated according to their expertise. In this paper, we report on how believers' accounts of blessing experiences uncovered the concept of *uncontrollability* and how a subsequent design process helped us to concretise the abstract concept in form, material, interaction, and content of a companion technology - the Blessing Companion. We present our inquiry's major steps and insights, focusing on *uncontrollability*. Our exploration began with (1) a reading of Protestant theory on blessing (see Section P5.2.2 for a summary), followed by (2) a design probe study with believers, (3) an exploration of how *uncontrollability* could be implemented in design through material exploration and sketching sessions, and (4) an integration and refinement of various elements of *uncontrollability* into the Blessing Companion concept through prototyping and a study. When we write of blessing technology in the following, this implies the perspective of technology as a companion. We highlight key insights in *italics*.

P5.3.1 Design Probe Study: (Future) Blessing Experiences

After the theoretical engagement with blessings, we wanted to understand the experiential perspective and co-speculate on the possibilities of blessing technologies together with believers: How does a blessing experience feel like? How could companion technologies look or behave when taking roles in blessing rituals? We invited interested believers to reflect on blessing experiences and speculate on blessing technologies supported by design probes and speculation workshops (Mattelmäki et al., 2006; Wallace et al., 2013).

Method Having obtained ethical clearance for the study, the collaborating theologians distributed the call for participants in their networks. We were searching for a variety of Protestant believers who had already dealt with the topic of blessing before the study (e.g., because being in training to become a pastor or preparing for confirmation) and were open to speculate on novel technologies. We restricted the recruitment to Protestant believers for several reasons: Most importantly, blessing takes on different meanings in different religions. Working with Protestant theologians enabled us to understand the perspective of Protestant

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ID	Age	Gender	Connection to blessing
P1	35	Male	Professional theologian, trains to become a pastor
P2	17	Female	Recent reflections while preparing for her confirmation, is active in a Protestant youth group
P3	34	Female	Recent blessing experiences, reflects on blessing in an ‘ideologically neutral view’ through consciously perceiving surroundings and feelings as inspired by yoga-practices
P4	16	Female	Blessings as a ubiquitous topic within her family and church community, recent preparation for her confirmation
P5	34	Female	Frequent encounters with the topic of blessing in everyday life
P6	30	Male	Professional theologian, likes to pass on surprising, magical moments (blessing rituals) in everyday life

Table P5.1: Details on the six participants of the design probe study.

Christians, but not that of other religions. In addition, Christianity was also the most widespread religion in the study’s context. Still, finding people meeting the above criteria was challenging, and we were lucky to recruit six people (Table P5.1).

Since the study was affected by COVID-19 distancing regulations, we sent the study material to participants (Figure P5.1) and performed all workshops online. The two most essential items were the blessing artefact and kinetic sand. The blessing artefact, a non-functional textile object which we claimed could bless, was designed to serve as a reminder of the task within everyday life, a placeholder for anything that could be, and a support for speculations that go beyond the initial idea of imitating existing rituals (e.g., beyond a humanoid robot imitating human roles). Participants were tasked to imagine how, where, or when the artefact blesses and how it should be adapted to facilitate a meaningful blessing experience. The collaborating theologians suggested the kinetic sand as a metaphor that should challenge participants’ conceptions of blessing. Like blessings, kinetic sand can take specific forms or no form and is tangible and intangible.

After participants received the packages and gave informed consent, we individually met online for a kick-off workshop to clarify our goals, the method, and the kinds of experiences we were interested in. To demonstrate our understanding of blessing technologies in the sense of technology as a companion and communicate our idea of exploring technologies beyond an imitation of existing rituals, we showed a short video of the blessing robot BlessU2 (Rahn, 2017). Participants then observed themselves, reflected on their blessing experiences, and speculated on potential ways of engaging in blessing rituals with the design probe for as long as they wanted (times ranged between 7 and 17 days). During this time, participants documented their thoughts on blessing experiences and sent us individual messages (text, voice, or images) via anonymised chat accounts. The study ended with a concluding workshop in which we validated our understanding of the messages, elaborated on essential aspects of blessing experiences, and speculated on novel blessing technologies. Participants each received 40€ to compensate for their time and effort.



Figure P5.1: Items of the design probe packages.

Overall, we collected an array of participant-produced data in the form of sketches (Figure P5.2) and messages, building the core of the analysis. For triangulation, this data was enriched by qualitative data from the workshops and interviews, such as field notes, audio recordings, and transcriptions. We organised the data roughly following an affinity diagramming process by grouping and re-grouping the data, connecting participants' ideas of novel technologies with their conceptions about blessings and essential experiential elements. Reading through the resulting data clusters repeatedly, we generated a set of key insights.

Findings *Small positive moments in everyday life that remind of an omnipresent blessing and make it tangible.* Participants expressed various conceptions of blessings, reflecting the complexity and multi-layeredness. Nonetheless, their initial associations were often alike: 'The first thing you think of, of course, is being blessed by the pastor in a church' (P4). Apart from this, most of the participants' blessing experiences related to places, encounters, or events within everyday life, like 'being spontaneously hugged by a colleague' (P5), learning about 'the birth of my niece' (P4), 'drinking a coffee with my mother' (P4), or consciously experiencing and enjoying life, e.g., how the sun was 'shining on my head and my face' (P1). To our participants, blessing experiences related to concrete, *positive experiences* in their everyday lives that *reminded* them of and *strengthened their basic assumption that there is (unconditional) good in the world*. One participant described the experience of this basic assumption as follows: 'Um, a blessing is a feeling for me. A feeling that is given to me, or a protection and a companionship that is given to me along the way' (P3). Here, blessing refers to a particular, positive view putting the good in life into focus. These descriptions have shaken our original, theory-based assumption that blessings are mainly tied to formal rituals. We recognised that blessings can be consciously perceived in formal, institutional rituals and in multiple ways in everyday life and are associated with strong, positive feelings.



Figure P5.2: A selection of participants' sketches and ideas of future blessing technologies with our annotations (brown). The annotations refer to three recurring themes within participants' ideas that inspired the following design process: natural materials, light as materials, and surprising materials.

Blessing experiences can potentially happen anytime, anywhere, with almost any content.

'Hm, another moment when I felt very blessed was when I was raking leaves in our garden, so a nature-related blessing experience, I would say, there are many of them anyway. I was raking leaves, and then I was walking along our apple trees, and I saw in the one tree above me about 50 birds sitting pecking at the apples that were still there, and then I started picking the good apples [...]. And all the time, I was thinking how great it is that this is just growing. So it's just there! It's a huge abundance that is just a gift. I find that very impressive.' – (P1)

The participant described a blessing he experienced suddenly, within everyday life through the conscious, appreciative seeing of the unique and extraordinary in the everyday. The participant might have been in the same situation many times before, barely noticing the surroundings. However, a change in perspective allowed him to consciously look at the self-evident with awe, astonishment, fascination, and admiration. The feeling took him away from everyday life for a moment and allowed him to realise and enjoy the good in life.

Participants suggested that if novel blessing technologies were to be effective, they would need to create sudden times and spaces perceived as out of the ordinary:

'And then I thought, if it [the design probe] had something like this now, something unpredictable. For example, it opens without you knowing when. Then I thought, wow, that would be something like that, that would totally surprise you! [...]. So I

think technology could become so unpredictable that it surprises and emotionally touches. And that would also have a quality for me that stylises technology not just as dead matter, but as something alive, sudden, unexpected.' – (P6)

A related idea suggested implementing unpredictable behaviour through shape-changing artefacts (P1; Figure P5.2, top row second from left). Participants transferred the idea that blessing can *take place at any time, anywhere, and with any content*, as long as the exact time and content are *not known or planned*, to the design of blessing technologies. This mixture of the potential occurrence of blessings at any time and the simultaneous lack of clarity about the exact experience creates the *delightful tension, friction, and finally surprise* that participants described as essential for the experience of blessing in everyday life.

Giving up control: Blessing experiences do not occur on demand. Another participant echoed this idea of tension, describing how the element of *unplannability and untraceability* makes the blessing experience what it is:

'Blessing technologies need to fascinate me [...] since it [blessing] has a little bit of a magical component to it, I've noticed. So um, it's more than rational. Um, so even if I find something rationally really cool, then I find it really cool at most, but it's not an experience of blessing yet. Um, exactly - so blessing still has a magical, spiritual, supernatural, you can use different terms for it, component.' – (P5)

Looking at this quest for magical, supernatural experiences from a design perspective, we noticed a striking element that was also reflected in most of the participants' ideas (Figure P5.2, surprising materials). To realise *magic and surprise* with blessing technologies, a *shift in control* was always required: away from the user to the technology. The described blessing experiences were not consciously initiated or planned by participants but always *triggered from the outside* and attributed to a transcendent power.

'Yes, very often I have had the feeling when the sun is shining, shining on my head and on my face, and I have had the feeling that I had something planned and the weather suits it. That is, somehow, such a blessing! It somehow fits, um, yes, as if the good God wanted it to work out today.' – (P1)

Again, the participant had no control over the experience. He had no way of ordering good weather or being sure that everything would go exactly as he wanted - it just happened. This element of *having little control* created space for a *positive surprise* and a blessing experience, something we summarised using the term *uncontrollability*.

Following this perspective, participants imagined that blessing technologies should decide on the interaction's when, how, what, or where. Blessing technologies could, for example, 'require patience' (P6) and could behave in a way that no predictable pattern would become recognisable (P5). Thus, *uncontrollability* could be reflected in technology's interaction design and behaviour. Participants suggested placing blessing technologies as a constant background presence in daily life that, from time to time, could attract attention.

'So I think the core of this technology would be to put people in touch with something transcendent [blessing], let's say. Or taking them out of their everyday contexts for a brief moment. You could also say creating a brief moment of pause and pointing to it [blessing is everywhere].' – (P1)

Here, blessing technologies should serve as a brief, sudden *reminder* of blessing and the good in life or as ‘a thought-provoking impulse’ (P5) that would trigger to take a different, positive view on life. Participants’ ideas highlighted that technologies could refer to essentially *uncontrollable* content, like a blessing or the good life. Interestingly, several participants expressed that the non-functional object associated with blessing had already changed their view in everyday life. ‘I was very curious and had the feeling that I was being lured onto a new track [by the design probe]. So somehow something new came up for me, and yes, it was kind of exciting’ (P6). Summarising the above findings, we recognised that blessing technologies do not necessarily need to take the role of a counterpart pronouncing blessings but could serve as a *physical reminder* of blessing or a *surprising, idiosyncratic companion* that embodies the core of blessing experiences, their *uncontrollability*, in form, behaviour, interaction, and content.

P5.3.2 Initial Design Development: Exploring *Uncontrollability* in Design

We were particularly intrigued by the concept of *uncontrollability*. Although it is an obvious concept of religious rituals since they often deal with *uncontrollable*, inaccessible contents, it is often overlooked in technology design, which prioritises ease of use and user control. Consequently, we saw a significant contribution in exploring how to design for *uncontrollability*. We (two HCI and one design person) engaged in various ideation activities to concretise the concept of *uncontrollability* for the design of interactive technologies. The starting point for our design process was blessing experiences as described by our participants: surprising, fascinating, small moments in everyday life that allow perceiving the everyday with an appreciative view.



Figure P5.3: A selection of the materials, sketches, and concepts we collected and generated to explore and concretise the concept of *uncontrollability* for blessing technologies. The three sections correspond to the design process from broad exploration (left) to integration (right), reflecting *uncontrollability* in content, form, behaviour, and interaction.

Material Exploration and Sketching We began by exploring how *uncontrollability* and further aspects of blessing experiences like awe, holism, divine, or peace are reflected in the environment and existing materials, performing a material exploration workshop. Within the workshop, we tasked ourselves to respond to prompts (e.g., ‘Describe a positive yet unexpected experience in one item!’) by collecting materials from an art store and nature (Figure P5.3, left). Analysing the resulting material collection, we found some recurring features related to *uncontrollability*. For example, clouds or shade from trees shared an abstractness and ambiguity: Everyone can see something different in them depending on individual associations or perspectives. Another outstanding feature was change: Shadows of trees changed depending on one’s own or the sun’s movements; reflections from glass spheres changed depending on light, position, or the changing environment.

After we had more sense of how *uncontrollability* could be expressed through material and form, we explored how the identified elements could be integrated into a blessing technology. To do so, we performed repeated individual and joint sketching sessions over several weeks (Figure P5.3, middle). In a subsequent meeting, we reviewed, clustered, and discussed all ideas and identified shared elements across sketches. The sketches showed that *uncontrollability* could be reflected simultaneously at different levels, such as the form (e.g., material, appearance, shape, visual representation) but also the interaction (e.g., input, output, perceived behaviour). One prevalent idea concerning perceived behaviour and interaction was technologies that take on the character of *uncontrollability* and behave as if they are idiosyncratic and have something to hide. To this end, the interaction could be intentionally designed to be uncontrollable or unpredictable to some degree. For example, the interaction could be initiated by the technology and not by the users, or the technology could decide when to reveal something (e.g., a blessing). Another idea to integrate *uncontrollability* concerning form was ambiguity and openness. Technologies could provide contradicting affordances or lack information, consist of abstract shapes, materials, or visuals, or invite open-ended exploration rather than providing hints on tasks to be solved. Given that our ideas were based on the previous steps, many previously identified elements were integrated into our sketches, like the light as a material that could change slowly or create fascinating reflections.

Concept Ideation and Prototyping To narrow down and concretise the abstract elements identified above (e.g., ambiguity and openness through abstract shapes), we continued with concept ideation sessions and prototyping (Figure P5.3, right) and developed an early idea of the Blessing Companion. The Blessing Companion is a technology that seeks to support people in becoming more aware of blessings and to create small moments in everyday life dedicated to fascination, reflection, and the conscious perception of the good in life - the blessed life. Following participants’ suggestions (Figure P5.2) and our ideation activities (Figure P5.3), the Blessing Companion is a physical artefact that can be placed at a fixed location in a person’s home, so it functions as a physical reminder without requiring constant interaction. Nonetheless, the Blessing Companion is interesting to look at even when it is not currently interacted with and invites exploration, almost like a piece of art.

The Blessing Companion’s form and appearance reflect *uncontrollability*. For example, it has an abstract round shape that does not allow direct associations with its essence. In addition, it has an ever-changing appearance, achieved by using shaped transparent material that can refract and distort light (like we found in our material exploration, Figure P5.3, left).

Through iterative prototyping, we found that a hemisphere-shaped glass filled with water and mounted onto a bright screen creates fascinating visuals. Visuals displayed look different each time, depending on the perspective, ambient light conditions, and reflections, inviting open-ended exploration. Visuals look distorted, magnified, blurred, or fused with the surrounding's reflections. To initiate a reflection on and conscious perception of the good in life, the Blessing Companion searches for and presents images of the good when a person approaches and looks at it more closely. The display of these images is gradual over days, requiring patience and relinquishing of control from humans, resulting in a somewhat *uncontrollable* interaction. The time to reveal and the content itself is not controllable by users but decided upon by the Blessing Companion. Users can explore the Blessing Companion but cannot simply request and receive a blessing on their own terms - it is *uncontrollable* to them.

The 'what' of the concept was relatively straightforward, but the 'how' was less clearly defined. For example, it was unclear how much *uncontrollability* in interaction might be too much, leading to pure frustration rather than excitement and anticipation. For example, we imagined the Blessing Companion to initially obscure the images of the good through haze that slowly vanishes over time or through macro shots zoomed out over days. Also, we imagined various ways of where and how the Blessing Companion could search for and select images of the good, like using a user's photo database, generic images found online, or a mixture of both. Each of these possibilities had advantages and disadvantages: A selection from online databases emphasises *uncontrollability*, private images emphasise the focus on personal blessing experiences, and the mixture might allow for both personalisation and *uncontrollability*.

P5.3.3 Design Refinement: Balancing *Uncontrollability* and Controllability

The more we were invested in designing for *uncontrollability*, the harder it became to keep a sense of when *uncontrollability* was implemented too drastically, rendering interaction impossible and leading to pure frustration in users. We recognised that designing for *uncontrollability* does not simply mean pushing *uncontrollability* to the limit but striking a careful balance between controllability and *uncontrollability*.

Wizard-of-Oz Study To find such a balance for the Blessing Companion in form and interaction, we invited persons familiar with technology design (e.g., students from media studies or HCI) to interact with different versions of the Blessing Companion and discuss their experiences with us. To do so, we produced a prototype of the Blessing Companion (Figure P5.4) that could be controlled in a Wizard-of-Oz manner, so it would be perceived as acting autonomously. Throughout the studies, one researcher controlled the prototype's interaction (e.g., reacting to a participant approaching it). The researcher sat 2.5 metres away from the prototype and out of the participants' immediate field of view when they interacted with the Blessing Companion. We prepared various alternative behaviours and visual designs, like different ways of alienating images of the good (e.g., haze or macro shots) or dif-

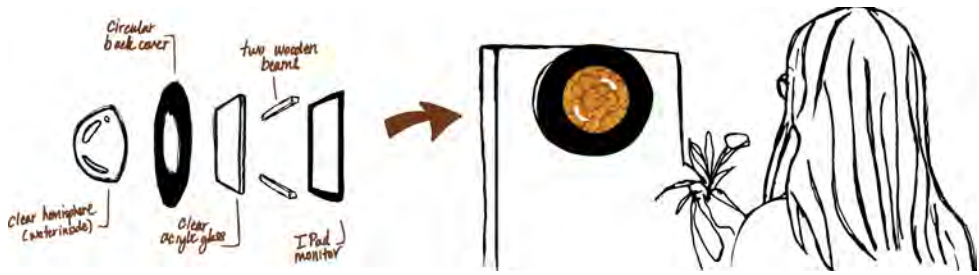


Figure P5.4: The assembly of the Blessing Companion prototype and a typical scene from the study in which a participant approaches the Blessing Companion.

ferent ways of reacting to a person approaching the Blessing Companion (e.g., turning visual elements in circles faster and faster or lighting them up and down), and different examples of the good to be revealed (e.g., a forest scene or a cup of coffee inspired by participants' stories).

Since, at this point, we were mainly interested in the interaction design details concerning *uncontrollability* and the emotions evoked when interacting with it (e.g., interaction perceived as too uncontrollable and frustrating), we advertised the study among students of technology-related subjects, inviting those interested in exploring a blessing technology (ethical clearance obtained). We did not exclude anyone due to religious background and included everyone who wanted to experience a blessing technology. Nonetheless, all participants were raised in the same cultural context and had a general understanding of blessing. Overall, seven interested students, all aged between 18 and 24 (Table P5.2), encountered the Blessing Companion in a living room-like university room.

Participants individually explored the Blessing Companion with various alternative behaviours and visual designs while thinking aloud. At the beginning of each interaction cycle, participants stood away from the Blessing Companion and were asked to explore it at their own pace to mimic a home environment. When participants came close enough, the Blessing Companion began revealing an (initially distorted or alienated) image of something good. To make the temporal dimension of the interaction comprehensible, we used small vignettes asking participants to imagine returning to the Blessing Companion several minutes (or hours or days) later. Participants interacted with the Blessing Companion, paused, received a vignette, and interacted again with the Blessing Companion. Subsequently, participants expressed their emotions supported by the PrEmo cartoon characters (Desmet, 2018, 2019), and we performed a semi-structured interview focusing on the perception of the Blessing Companion, the interaction, and the attitude and opinion towards it. Each session lasted about an hour, was audio-recorded, and one researcher took notes of participants' expressions. Using our notes, we built an affinity diagram and supplemented them with transcriptions of participants' expressions. In the following, we present the key findings concerning *uncontrollability* in form and interaction.

Findings What was striking in the participants' descriptions of the Blessing Companion was that the abstract, unusual form invited diverse associations and interpretations. Participants saw, for example, a divination sphere (P4-2, P7-2), a universe (P2-2), an eye (P7-2),

ID	Gender	Religious affiliation	Blessing is...
P1-2	Female	Raised Christian, nowadays spiritual without feeling connected to any specific religion	A feeling of security and happiness, contentment, all positive feelings
P2-2	Female	Raised Buddhist, nowadays spiritual without feeling connected to any specific religion	To be lucky with something or to get some kind of acknowledgement
P3-2	Male	Raised Christian, nowadays Atheist	Something that I do not know from a church perspective but only from a personal perspective; something that triggers feelings of security and safety
P4-2	Female	Christian believer	A feeling where I am reassured and sure that all is well and I don't have to worry
P5-2	Male	Christian believer	The small and big positive things in life (e.g., being healthy or winning the lottery) for which one can be grateful
P6-2	Female	Atheist	Expression of the religion to describe things that are positive, but I do not have a positive association with religion and thus with blessing
P7-2	Female	Raised Islamic and Atheist, nowadays Atheist	The positive things in life for which one should be grateful

Table P5.2: Details on the seven participants that explored the Blessing Companion.

or a symbol for infinity (P1-2, P5-2). The openness in form design triggered diverse associations and interpretations - even some we had not previously considered. However, the abstractness also led to no associations being found, highlighting that a general openness to speculation and association is required. Two participants (P3-2, P6-2), who could not imagine living with a Blessing Companion, found no associations. They described it rationally and more in terms of its elements, such as an artefact consisting of a screen and a (strange) glass hemisphere mounted on top, almost like an enhanced digital picture frame (P2-2). In terms of the Blessing Companion's interaction and resulting perceived behaviour, the macro zoom-out version led to more confusion, tension, and surprise than the slowly vanishing haze.

'At first, it [the Blessing Companion revealing a macro zoom shot] was more like this: I couldn't do much with it; I didn't know what to expect. Then approaching it for the second time, I found it more interesting when I realised what it might be, also hypnotising. And then I was thrilled when it zoomed out completely.' – (P2-2)

Participants explained that the macro zoom shots were so abstract and incomprehensible that they triggered constant associations and interpretations, 'like when looking at clouds' (P5-2), making the Blessing Companion more interesting for open-ended exploration and hence more *uncontrollable*. Some participants were even initially repulsed because they had negative associations such as mould (P3-2) or small eyes (P5-2) with the macro shots used

in the study (e.g., macros of a cup of coffee). This build-up of tension had not worked with the vanishing haze because the recognisable shadows had already hinted at the content beforehand. In addition, the zoom effect was perceived as a more appropriate metaphor for the context that ‘connects me with the small and big things in the world and that you can change and expand your view. There is not only black and white, and you should not only focus on one aspect but the whole’ (P2-2).

Some participants were confused about the openness of the interaction and the lack of any overarching task to perform, leading to the initial quest for a more framed interaction.

‘This [the openness] frustrated me the most. Normally I am told what to do, but having complete freedom of choice was weird because I didn’t know what was expected. I didn’t know if I was doing it right or not - I was afraid I was doing something wrong.’ – (P7-2)

The openness differed from what the students had previously experienced when interacting with technology and thus perhaps expected (e.g., a clear goal to achieve). Nonetheless, participants also felt spurred on by the openness and developed a curiosity toward the Blessing Companion (P3-2, P5-2, P7-2). The interaction over days was perceived in ambiguous ways. Participants suggested that it might lead to frustration if one was searching for something positive and unable to receive it on demand (P6-2) or to boredom when only minor changes appear over time (P7-2). The extended interaction was also appreciated for stimulating reflection (P1-2, P2-2) and lasting curiosity (P1-2, P3-2, P5-2), aligning with our goal of promoting *uncontrollability*. The results show that the interaction’s slowness gave more control to the Blessing Companion and thus integrated *uncontrollability* in interaction. However, careful design is needed to ensure the interaction is neither too frustrating (e.g., *uncontrollable*) nor too dull (e.g., transparent, controllable).

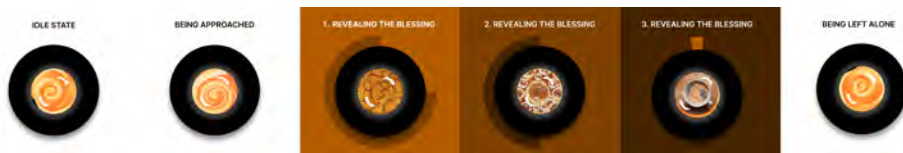


Figure P5.5: The Blessing Companion and its behaviour when being approached and left alone. The part with coloured background shows the same step of revealing something good from everyday life but at different times (e.g., day 1, day 2, day 3).

The Refined Behaviour of the Blessing Companion Concluding what we learned through the process and study, we decided to implement the following behaviour for the final Blessing Companion: As long as the Blessing Companion is left alone, it stays idle, communicating its presence through abstract visuals like slowly moving circles (Figure P5.5, left). When approached, it slowly increases the visual’s speed, which has an almost hypnotic effect as the user concentrates on the centre (Figure P5.5, second left). When users stay close, these visuals slowly vanish from the centre and uncover a macro zoom shot of a blessing (i.e., something good from the everyday; Figure P5.5, middle). This shot slowly zooms in and out,

producing intriguing visuals in the hemisphere and encouraging viewers to take slow breaths and reflect on its meaning. Users can look at it for as long as they like. There is no right or wrong way of doing it. When touched, the Blessing Companion emits a small flash to indicate awareness but does not permit increased control (e.g., fast-forwarding the zoom-out). When approaching it again immediately, it most likely uncovers the same macro shot again. Only after some time, which varies and is determined by the Blessing Companion, will it display a macro shot with less zoom (Figure P5.5, middle). This process continues over days until the Blessing Companion finally presents the good in a comprehensible way showing all shots up to the point where one can recognise it (e.g., a cup of coffee, Figure P5.5, middle). Thereby, an interaction cycle is terminated, and a novel cycle begins. In terms of finding and selecting the blessings, the Blessing Companion searches in both personal and online photo databases but presents a greater share of generic images. It searches for images using a set of keywords (that can be adapted and expanded), and the algorithm is designed so that users do not know what keywords are being used for the next search.

P5.4 Discussion

This paper presented an RtD project on companion technologies for blessing rituals. For our participants, blessing experiences encompassed more than institutionalised blessing rituals like the Aaronite Blessing. Participants encountered blessings in the form of small positive moments in everyday life. Once perceived consciously, these positive moments reminded of, strengthened, and made tangible the omnipresent blessing - the good in life. Most essential to the experience of blessing was its *uncontrollability*: Blessing experiences were triggered from outside, and believers could neither plan nor force them. This *uncontrollability* created friction and positive surprise. Intrigued by these descriptions of *uncontrollability*, we embarked on a design process that explored how *uncontrollability* could be implemented and concretised in design, leading to the Blessing Companion. The Blessing Companion is a contingent companion that serves as a reminder of the good in life by slowly revealing images of the good. However, users have no control over the disclosure's speed or the content. Thereby, the Blessing Companion seeks to support people in becoming more aware of blessings and create small moments in everyday life dedicated to fascination and the conscious perception of the good.

Although we started by studying the experiences of Protestant Christians, our artefact strongly aligns with the notion of 'lived religion' (Gutmann, 2017). This perspective emphasises the significance of religious practices in people's everyday lives beyond institutionalised contexts. The transcendent perspective on everyday things and the conscious perception of the good in the everyday are elements to which equivalents can be found in many religions. An example is the Jewish blessing spoken before meals, which creates an appreciative awareness of the origin of food and gratitude in the face of the *uncontrollability* of (access to) food. We aspire to promote discourse on shared values and ritualistic similarities among diverse religions by encouraging scholars and practitioners from different faiths to engage with and respond to the Blessing Companion.

We expect the Blessing Companion to invite light transcendent experiences within everyday life, a type of transcendent experience that has received less attention in previous work (Blythe & Buie, 2021). In addition, the concept of *uncontrollability* might invite a new per-

spective on the design of transcendent experiences and respective technologies, given that it seems to be an element that is often integrated but seldomly reflected. For example, apps like Headspace or Calm often involve audio guides and moments of surprise, requiring a transfer of control to technology. In addition, surprise has been used to support feelings of awe in virtual reality studies (Chirico et al., 2018). In the following section, we discuss *uncontrollability* in relation to sociological theories and design, presenting the more general lessons that *uncontrollability* and the Blessing Companion may hold for HCI.

P5.4.1 *Uncontrollability: From our Data to Sociological Theory*

The Blessing Companion's behaviour is coined by *uncontrollability* and increased control over essential interaction elements representing a fundamentally different approach from today's companion technology designs. For example, Alexa pronounces a blessing on demand (Evangelische Kirche Deutschland, 2021), *segen.jetzt* (German for blessing.now) displays a blessing upon entering the website (Evangelisches Werk für Diakonie und Entwicklung e.V., 2019), and the *Benedicti-o-mat* delivers a blessing light beam on button press (Iglesias, 2008). Our work questions whether simply making blessings available, accessible, and efficiently controllable is the proper focus in design and whether it fits the context of blessing experiences and religious rituals. From our RtD project, we learned that blessing rituals are not about an easy solution or instant need satisfaction (push of a button = blessing). Instead, they are about creating a safe space to reflect on what remains *uncontrollable* to human beings and about requiring trust in the performative power of rituals. We believe companion technologies that take on roles in religious rituals need to take up this perspective and should not simply make the *uncontrollable* faster or easier accessible. Therefore, the focus of our design work was not on making everything accessible and controllable as easily and efficiently as possible; instead, we focused on the exact opposite. In this sense, the resulting concept, the Blessing Companion, can be understood as a counter-design to previous companion and blessing technologies that make controllable and understandable on demand or immediately satisfy needs. However, this is not necessarily bad, as one participant highlighted about BlessU2: 'We had seen this robot last time, that would be too boring for me. [...] because it always happens in the same way. But I wouldn't want to know what's coming. Um, I would like to be surprised by it' (P5). Interaction on demand can become boring quickly, especially in contexts where magical, supernatural experiences are sought.

However, why should people be open to companion technologies that do not (immediately) satisfy their needs and limit human agency? It is part of the human experience that there is uncertainty and openness and that not everything can be controlled, planned, and predicted. Life is contingent, and parts of what we experience always remain *uncontrollable* to us (Luhmann, 1987; Rosa, 2020). The social sciences have summarised such experiences under the terms *contingency* and *uncontrollability* (Luhmann, 1987; Rosa, 2020). Contingency is a term used to reflect the fundamental openness and uncertainty of human experiences (Luhmann, 1987) and *uncontrollability* is an essential component of a sociology of the good life (Rosa, 2021). Sociologist Hartmut Rosa suggests that aimed at resonant experiences can only arise in interactions with counterparts that are not entirely controllable (e.g., human beings, nature, art, artefacts) - meaning visible, accessible, available, or usable (Rosa, 2020). Only when one cannot entirely know, plan, see, or control a counterpart's intention,

reaction, or meaning can one experience resonance, a mode of relationship in which mutual ‘vibrations’ are generated (Rosa, 2021). The opposite, making a counterpart entirely visible, accessible, controllable, and usable, prevents such relationships. However, *uncontrollability* does not simply mean arbitrary, random action. Instead, a counterpart is perceived as having its own character (or inner logic), which remains *uncontrollable* (Rosa, 2020).

For Rosa (2020), a resonance experience is only possible if a counterpart speaks to me with this *uncontrollable* character (figuratively) and if something in me reacts to it. We think the Blessing Companion might correspond to this description of a counterpart with an *uncontrollable* character and can trigger intimate reactions in its human counterparts. Perhaps, this is best reflected by participants’ reactions in the second study. The mixture of feelings described, such as frustration and tension, but also curiosity and surprise, fits with not fully knowing or controlling the intention or meaning of a counterpart. Participants did not react only frustrated or dismissive, nor only positively, but experienced both simultaneously. This mixture led to curiosity towards the Blessing Companion and speculation about his intention, meaning, or reaction over time. The experience of *uncontrollability* is essential in religious practices and rituals since, at their core, they deal with the *uncontrollable*, e.g., eternal life or the transcendent.

The quality we want to refer to with *uncontrollability* has a unique word in our native language (German: ‘Unverfügbarkeit’), but there is no corresponding word in the English language. Every related English word we had considered (e.g., unavailability, elusiveness, unpredictability, uncontrollability) lacks parts of what we wanted to express, a problem that had been described before (see the preface of Rosa, 2020). In the end, we decided to use *uncontrollability* following Rosa (2020) and to avoid associations with the context of mobile communications (e.g., when using unavailability). However, this word fails to cover certain aspects of ‘Unverfügbarkeit’, such as not being visible or tangible. Nonetheless, we believe this difficulty is not a problem but a great opportunity for international research communities like HCI since coming from different countries, cultural backgrounds, and languages broadens perspectives.

P5.4.2 Designing for *Uncontrollability*

While it has been argued that *uncontrollability* cannot be engineered or designed (Rosa, 2020), we think the concept can nevertheless be stimulating for the context of technology-mediated religious rituals, transcendent experiences, and the design of companion technologies. As demonstrated with the Blessing Companion, we expect that there may be possibilities to design for the *uncontrollability*. One way to approach the design for *uncontrollability* might be to adopt what Rosa (2020) finds in art or poems. Art or poems are manufactured as well, but Rosa (2020) expects them to be *uncontrollable* in a valuable way as long as one has not yet fully grasped them and they seem to hide something (Rosa, 2020).

Reflecting on the Blessing Companion, we recognise that we made many design decisions relating to this art perspective. The Blessing Companion is designed to be constantly present but should remain interesting and fascinating over time and allow for new perspectives and interpretations - like a piece of art. To achieve this ongoing fascination, we have, for example, opted for a particular shape and materiality that a classic, usability- and efficiency-oriented design would probably not choose, such as a hemisphere on a screen that distorts the screen’s

light and at the same time reflects the surrounding. Thus, the Blessing Companion's appearance constantly changes depending on the lighting conditions or the viewer's position. In addition, the abstractness and openness of the Blessing Companion's shape allowed participants to find individual associations, such as a divination sphere (P4-2, P7-2) or symbol for infinity (P1-2, P5-2) - just as viewers of artworks would find individual interpretations. Again, this approach of using abstract shapes and lacking a clear metaphor by design represents a very different design strategy than those pursued in previous blessing technologies, such as the humanoid robot BlessU2 (Meltwater, 2017), or more generally in the design of companion technologies that often use animal or human metaphors (Löffler et al., 2020). We thus expect the Blessing Companion and the concept of *uncontrollability* to be a stimulating counter-design to currently prevailing design approaches.

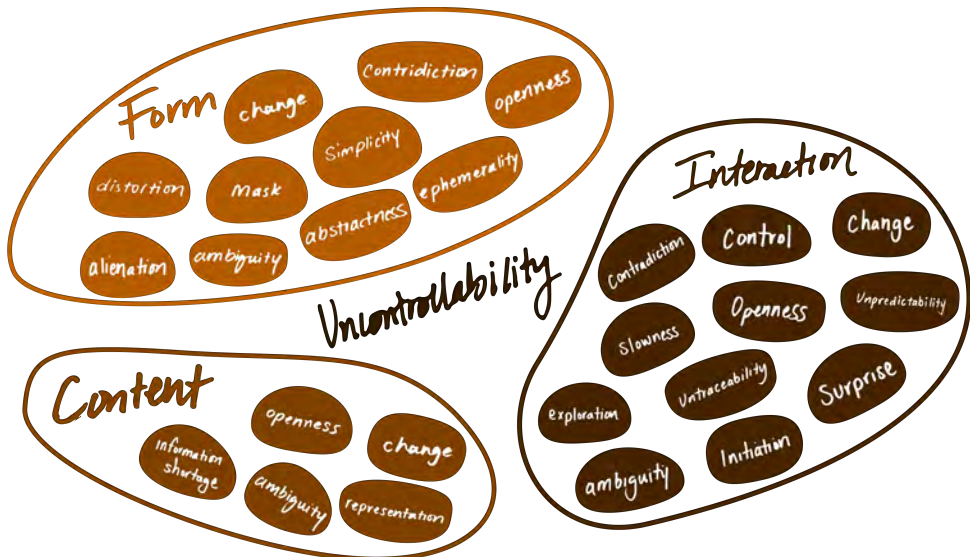


Figure P5.6: A summary of the approaches to designing *uncontrollability* explored in the RtD process.

Apart from designing for *uncontrollability* at a form level, the design process of the Blessing Companion revealed that *uncontrollability* could also be reflected through technology's interaction. For example, the Blessing Companion integrates *uncontrollability* in interaction by extending the interaction over days on its own terms (slowness). Also, it creates opportunities for surprise by deciding when to present something good in recognisable ways, not at the push of a button. Other elements to design for *uncontrollability* are summarised in Figure P5.6. It was helpful to break down our thoughts on *uncontrollability* to various levels (content, form, interaction), as these levels bring different requirements and design opportunities. We included a content level to make clear that designing for *uncontrollability* might not make sense in every context (e.g., in production process contexts). However, whenever something essentially *uncontrollable* is to be addressed by companion technologies, like blessings, happiness, well-being, meaningfulness, or the good life, our summary of approaches to

designing *uncontrollability* might be helpful (Figure P5.6). The summary is intended to serve as an inspiring starting point and is neither complete nor applicable in just one way. We hope that future work in HCI will experiment with and extend the various approaches.

Using our *uncontrollability* lens, we went back to previous work in HCI and analysed existing examples with this novel perspective. Although previous work did not explicitly design for *uncontrollability*, we found individual elements of previous designs that can be interpreted as relating to design for *uncontrollability*. For example, the concept of *unknowable elements* proposed by Hemmert et al. (2020) seems to correspond to our understanding of *uncontrollability* in interaction. Unknowable elements are, for example, designs that are not entirely transparent and conceal underlying mechanisms such as who/what determines the balancing in an interactive seesaw representing ‘all humans are equal’ (Hemmert et al., 2020). The authors suggested that the unknowable element opens up space for believing since it could be random, determinism or God (Hemmert et al., 2020). We think the concept of unknowable elements corresponds with our approach of untraceability in interaction (Figure P5.6): a human counterpart cannot trace who/what is responsible for a particular behaviour of technology. Similarly, W. Gaver et al. (2003) suggested using *ambiguity in design* through distorting or presenting contradicting information, thereby opening up space for users’ interpretations and beliefs (W. Gaver et al., 2003). These are elements that we also used to approach design for *uncontrollability* at a form level (Figure P5.6).

Yet another way to design for *uncontrollability* could be *openness in design*. Openness can mean deliberately not becoming too specific in design to create space for appropriation (W. Gaver et al., 2010), which we realised in the Blessing Companion through, for example, its abstract, round shape. Our work on designing for *uncontrollability* complements previous work by proposing a novel, overarching perspective, namely *uncontrollability*, relating and integrating previously unconnected design examples within this perspective. In addition, we provide further approaches and examples of how to design for *uncontrollability* (Figure P5.6) and relate *uncontrollability* to sociological theories (Luhmann, 1987; Rosa, 2020) that highlight the concept’s essential meaning for human existence and experience. In addition, our description of *uncontrollability*, especially of interaction (see Figure P5.6), could be an inspiration to the recently posed question of how companion technologies can be designed to be perceived as ‘minded’ (Niess & Woźniak, 2020). The elements we identified, such as initiating interaction, surprising human counterparts, or slowly changing over time, can provide novel inspiration for designing companion technologies that are to be perceived as ‘minded’. However, balancing controllability and *uncontrollability* remains essential. We believe that *uncontrollability* can be an inspiring concept for companion technologies, especially in contexts where the focus is on reflection, stimulation, or meaningfulness.

P5.5 Conclusion

In this paper, we described how our inquiry into blessing experiences and speculation on future companion technologies led to the identification of *uncontrollability* as a valuable resource for design. In addition, we presented the Blessing Companion, a contingent companion that reminds us of blessings, understood as the good in everyday life, and embodies *uncontrollability* through its ambiguous, abstract appearance and unique behaviour coined by an intensified technology’s control over essential interaction elements. Not mak-

ing everything controllable (visible, accessible, available, usable) with companion technologies contrasts the prevailing interaction paradigms striving for transparency, traceability, and comprehensibility. In this paper, we suggest that *uncontrollability* might be a valuable concept for companion technology design for religious rituals or, more generally, when it comes to contexts where the focus is not on the efficient completion of tasks but stimulation, reflection, or meaningfulness. We argue that the Blessing Companion is an example of *uncontrollability* design. In future work, we aim to expand our research on *uncontrollability*, exploring other ways to design for it. Also, we will look into further concretising the sweet spots of *uncontrollability* - creating friction, excitement, and appreciation without making companion technologies seem too arbitrary or dull. We think the Blessing Companion can serve as an example of what one might call an ‘epistemological instrument’. An instrument used to explore experiences and understandings of religious concepts in today’s plural and interreligious world. As such, it is helpful for designers to understand technology’s role in religious rituals. However, it is also helpful for believers who are challenged to think about their religion’s concepts and practices. In future work, we aim to deepen this notion of ‘epistemological instruments’ and outline how design can be approached for the complex, sensitive context of tradition-rich religious rituals that need to respond to contemporary technological innovations.

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Appendix A

1 Note on the Use of AI-Supported Tools

I declare that AI-supported tools were used to improve my self-written manuscript. I used deepL to translate German words into English, grammarly to improve my grammar, and ChatGPT to shorten or rephrase individual sentences written by me.

2 List of Publications

In addition to the publications included in this dissertation, I contributed to other projects during my time as a PhD student. The following list contains these additional publications in ascending chronological order.

1. Klüber, S., Maas, F., Schraudt, D., Hermann, G., Happel, O., & Grundgeiger, T. (2020b). Experience matters: Design and evaluation of an anesthesia support tool guided by user experience theory. *Proceedings of the 2020 ACM Designing Interactive Systems Conference*, 1523–1535. <https://doi.org/10.1145/3357236.3395552>¹
2. Reinhardt, D., Baur, C., Klüber, S., & Hurtienne, J. (2020). MindPeaks: Formative evaluation method of mindfulness meditation apps. *Companion Publication of the 2020 ACM Designing Interactive Systems Conference*, 37–42. <https://doi.org/10.1145/3393914.3395855>
3. Maas, F., & Klüber, S. (2020). “Lasst uns Gesichtserkennung auf dem Marktplatz einsetzen”: Warum Dystopien PD Projekte voranbringen [“Let’s use facial recognition in the marketplace”: Why dystopias drive PD projects]. <https://doi.org/10.18420/muc2020-ws109-329>
4. Zimmerer, C., Wolf, E., Wolf, S., Fischbach, M., Lugrin, J.-L., & Latoschik, M. E. (2020). Finally on par?! Multimodal and unimodal interaction for open creative design tasks in virtual reality. *Proceedings of the 2020 International Conference on Multimodal Interaction*, 222–231. <https://doi.org/10.1145/3382507.3418850>²
5. Maas, F., Wolf, S., Hohm, A., & Hurtienne, J. (2021). Requirements for local civic participation tools. *i-com*, 20(2), 141–159. <https://doi.org/doi:10.1515/icom-2021-0013>

¹won the Dieter W. Jahns Student Practitioner Award 2020 (1000€)

²received the best paper nominee award at ICMI 2020

6. Wolf, S., & Luthe, S. (2021). Segen: erfahren, erleben, erproben - VR-Erlebnis im außerschulischen Lehr-Lern-Szenario für den Religionsunterricht [Blessing: Experiencing, testing - VR experience in an extracurricular teaching-learning scenario for religious education]. In *Wettbewerbsband avril 2021* (pp. 27–33). Gesellschaft für Informatik e.V.. https://doi.org/10.18420/avril2021_04
7. Maas, F., & Wolf, S. (2021). Und dann kam Corona: Ein Technikentwicklungsprojekt zwischen Partizipation und Wirklichkeit [And then came Corona: A technology development project between participation and reality]. <https://doi.org/10.18420/muc2021-mci-ws06-334>
8. Wolf, S., & Luthe, S. (2022). Unavailability and holism: Rethinking HCI with concepts from theology. <https://sites.google.com/view/faithchi/accepted-papers>
9. Wolf, S., Luthe, S., Nord, I., & Hurtienne, J. (2022a). Unavailability: Food for thought from Protestant theology. <https://interactions.acm.org/blog/view/unavailability-food-for-thought-from-protestant-theology>
10. Mucha, H., de Barros, A. C., Benjamin, J. J., Benz Müller, C., Bischof, A., Buchmüller, S., de Carvalho, A., Dhungel, A.-K., Draude, C., Fleck, M.-J., Jarke, J., Klein, S., Kortekaas, C., Kurze, A., Linke, D., Maas, F., Marsden, N., Melo, R., Michel, S., ... Berger, A. (2022). Collaborative speculations on future themes for participatory design in germany. *i-com*, 21(2), 283–298. <https://doi.org/doi:10.1515/icom-2021-0030>
11. Wolf, S., Maas, F., Künzl, P., Hohm, A., & Hurtienne, J. (2022b). UNeedS: Development of scales to measure the satisfaction and frustration of 13 fundamental needs. *Proceedings of Mensch Und Computer 2022*, 539–544. <https://doi.org/10.1145/3543758.3547572>³
12. Wolf, S., Weber, M., & Hurtienne, J. (2023d). Virtual tourism, real experience: A motive-oriented approach to virtual tourism. *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*. <https://doi.org/10.1145/3544549.3585594>
13. Maas, F., Wolf, S., Weber, M., Fiedler, M. L., Zottmann, N., Lester, M., Hohm, J., Sessler, L., Schmitt, K. P., Balser, A., Heinisch, M. J., Hofmann, T. C., Maier, S., Ölschläger, A., Popp, A., & Hurtienne, J. (2023). "hubbel": A hybrid letterbox that stimulates civic participation through local information sharing in neighbourhoods. *Proceedings of the 2023 ACM Designing Interactive Systems Conference*, 1826–1841. <https://doi.org/10.1145/3563657.3596116>⁴
14. Bott, M., & Wolf, S. (2023). SustainTourism – Experiencing tourism from home. <https://doi.org/10.18420/muc2023-mci-src-401>⁵
15. Wolf, S., Nord, I., & Hurtienne, J. (2024b). Exploring virtual reality for religious education in real-world settings. *2024 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*. <https://doi.org/10.1109/VRW62533.2024.00273>

³received an honorable mention award at MuC 2022

⁴received an honorable mention award at DIS 2023

⁵won the student research competition at MuC 2023

16. Markum, R. B., Wolf, S., Claisse, C., & Hoefer, M. (2024). Mediating the sacred: Configuring a design space for religious and spiritual tangible interactive artifacts. *Proceedings of the Eighteenth International Conference on Tangible, Embedded, and Embodied Interaction*. <https://doi.org/10.1145/3623509.3633353>⁶
17. Wolf, S., Friedrich, P., & Hurtienne, J. (2024a). Still not a lot of research? Re-examining HCI research on religion and spirituality. *Extended Abstracts of the 2024 CHI Conference on Human Factors in Computing Systems*. <https://doi.org/10.1145/3613905.3651058>
18. Nord, I., Wolf, S., Luthe, S., Hurtienne, J., & Schleier, L. (2024). Segen interaktiv: Die interdisziplinäre Entwicklung eines außerschulischen Lernortes zu interreligiösen Segensräumen [Interactive blessing: The interdisciplinary development of an out-of-school learning centre for interreligious blessing spaces]. In A. Fütting-Lippert, M. Eisenmann, S. Grafe, H.-S. Siller & T. Trefzger (Eds.), *Digitale Medien in Lehr-Lern-Konzepten der Lehrpersonenbildung in interdisziplinärer Perspektive. Ergebnisse des Forschungsprojekts Connected Teacher Education [Digital media in teaching-learning concepts of teacher education in an interdisciplinary perspective. Results of the Connected Teacher Education research project]*. Springer. https://doi.org/10.1007/978-3-658-45088-5_8

⁶received an honorable mention award at TEI 2024

3 Materials for Publication 1

3.1 Critical Incident Questions

Critical Incident: Übergangsritual mit interaktiver Technologie

Initiale Frage: Kennen Sie das auch? Im Leben reihen sich viele Veränderungen aneinander. Mit diesen Veränderungen gehen zwangsläufig Übergänge oder Wechsel zwischen dem Alten und dem Neuen einher. Diese Übergänge können dabei alles Mögliche sein: Der Übergang zwischen Tag und Nacht, der Wechsel zwischen unverheiratet und verheiratet, oder der Wechsel zwischen krank und gesund. Solche Übergänge werden häufig durch symbolische Handlungen begleitet. Diese Handlungen folgen keinem praktischen Nutzen, sondern haben einen symbolischen Wert (etwa ein Liebesschloss aufhängen, um die ewige, feste Verbindung zwischen zwei Personen auszudrücken und nicht, um etwas (z.B. ein Fahrrad) praktisch festzuschließen). Symbolisch bedeutet also als Zeichen für etwas Anderes stehend. In der heutigen Zeit sind wir umgeben von interaktiven Technologien (z.B. Smartphones, Software, Apps, Webseiten, digital Spiele, usw.), die auch bei symbolischen Handlungen Verwendung finden. Wir bitten Sie nun, sich eine solche symbolische Handlung in Erinnerung zu rufen, die einen ihrer persönlichen Übergänge begleitet hat und in die interaktive Technologie involviert war. Hierbei kann es sich um Übergänge zwischen Orten (z.B. Wohnorten, Arbeitsstätten,...), Zuständen (z.B. Gesundheit, Beziehungsstatus,...), Positionen (z.B. Arbeit, Spielstatus,...), oder Altersgruppen (z.B. Volljährigkeit, Rente,...) handeln. Beschreiben Sie im Folgenden einfach die erste symbolische Handlung, die Ihnen in Erinnerung kommt und geben Sie dieser einen eindeutigen Titel: (Falls Sie die Handlung mehrfach erlebt haben, rufen Sie sich eine ganz Bestimmte davon in Erinnerung und beschreiben Sie diese.)

Hilfestellung: Sie können diese Frage nicht falsch beantworten, es geht um Ihre eigene Erfahrung und Ihr eigenes Empfinden. Eine symbolische Handlung, die Sie als bedeutsam einschätzen, kann von jemand anderem ganz anders eingeschätzt werden.

Kontextfrage 1: Wer hat an dieser symbolischen Handlung teilgenommen?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 2: Waren Objekte in diese symbolische Handlung involviert? Wenn ja, welche?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 3: Was genau haben Sie gemacht? (Bitte geben Sie eine Schritt für Schritt Beschreibung der symbolischen Handlung).

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 4: Wann ist diese symbolische Handlung passiert? (zu welchem Übergang in ihrem Leben & kalendarisch)

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Übergang: Wechsel zwischen Orten (z.B. Wohnorten, Arbeitsstätten,...), Zuständen (z.B. Gesundheit, Beziehungsstatus,...), Position (z.B. Arbeit, Gruppe,...), oder Altersgruppen (z.B. Volljährigkeit, Rente,...).

Kontextfrage 5: Wo haben Sie diese symbolische Handlung durchgeführt?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 6: Woher kannten sie die symbolische Handlung? Haben sie sie selber entworfen oder hatten Sie sie zuvor bereits erlebt oder von ihr gehört?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 7: Warum haben Sie diese symbolische Handlung durchgeführt?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 8: Was hat diese symbolische Handlung für Sie bedeutet?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 9: Was genau war an dieser symbolischen Handlung so bedeutsam?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 10: Welche Rolle hat interaktive Technologie bei dieser symbolischen Handlung gespielt?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Interaktive Technologie: Könnte Smartphones, Software, Apps, digitale Spiele, usw. umfassen.

Kontextfrage 11: Was hat diese symbolische Handlung ausgelöst?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

Kontextfrage 12: Wurde die symbolische Handlung durch etwas gestört? Falls ja, wodurch wurde sie gestört?

Hilfestellung: Symbolische Handlung: Eine Handlung, die für etwas anderes steht. Der praktische Nutzen der Handlung tritt in den Hintergrund (z.B. ein Liebesschloss hängt nicht aus praktischem Nutzen an einer Brücke).

3.2 Demografic Questionnaire

Wie alt sind Sie gemessen in Jahren?

Welchem Geschlecht ordnen Sie sich zu?

Weiblich – Männlich – Divers

Welcher Nationalität gehören Sie an?

Welcher Religion fühlen Sie sich zugehörig?

Christentum – Islam – Hinduismus – Buddhismus – Judentum – Keiner – Sonstiges

Was ist Ihr bisher höchster Bildungsabschluss?

Kein Schulabschluss – Volksschulabschluss – Mittlere Reife – Fachgebundene Hochschulreife – Allgemeine Hochschulreife – Abgeschlossenes Studium – Meister – Techniker – Sonstiges

Welcher beruflichen oder berufsqualifizierenden Tätigkeit gehen Sie derzeit hauptsächlich nach?

Derzeit keine Tätigkeit – Schüler:in – Auszubildende:r – Student:in – Angestellte:r – Selbstständige:r – Sonstiges

Wie würden Sie ihre Vorerfahrung mit interaktiven Technologien einschätzen?

Keine Vorerfahrung – Geringe Vorerfahrung – Normale Vorerfahrung – Viel Vorerfahrung – Sehr viel Vorerfahrung

Wie viele Stunden nutzen Sie einen PC durchschnittlich pro Tag?

Weniger als 1 Stunde – 1-3 Stunden – 3-5 Stunden – 5-8 Stunden – Mehr als 8 Stunden

Wie viele Stunden nutzen Sie das Internet durchschnittlich pro Tag?

Weniger als 1 Stunde – 1-3 Stunden – 3-5 Stunden – 5-8 Stunden – Mehr als 8 Stunden

Wie viele Stunden nutzen Sie ein Handy oder Smartphone durchschnittlich pro Tag?

Weniger als 1 Stunde – 1-3 Stunden – 3-5 Stunden – 5-8 Stunden – Mehr als 8 Stunden

4 Materials for Publication 2

4.1 Demografic Questions

Wie alt sind Sie gemessen in Jahren?

Welchem Geschlecht ordnen Sie sich zu?

Welcher beruflichen oder berufsqualifizierenden Tätigkeit gehen Sie derzeit hauptsächlich nach?

Welcher Religion fühlen Sie sich zugehörig?

Wie würden Sie ihre Vorerfahrung mit interaktiven Technologien einschätzen?

Wie häufig besuchen Sie typischerweise einen Gottesdienst?

Wie häufig besuchen Sie Onlinegottesdienste?

5 Materials for Publication 3

5.1 Study 1: Demografic Questionnaire

Wie alt sind Sie gemessen in Jahren?

Welchem Geschlecht ordnen Sie sich zu?

Weiblich – Männlich – Divers

Was ist Ihr bisher höchster Bildungsabschluss?

*Kein Schulabschluss – Volksschulabschluss – Mittlere Reife – Fachgebundene Hochschulreife –
Allgemeine Hochschulreife – Abgeschlossenes Studium – Meister – Techniker – Sonstiges*

Wie sicher fühlen Sie sich generell im Umgang mit interaktiven Technologien?

Unsicher - Meist unsicher - Mal sicher, mal unsicher - Meist sicher - Sicher

Wie viel Erfahrung mit Gottesdiensten haben Sie?

Keine - Wenig - Mäßig - Viel - Sehr viel

Welcher religiösen oder nicht-religiösen Weltanschauung fühlen Sie sich momentan zugehörig?

Christentum – Islam – Hinduismus – Buddhismus – Judentum – Atheismus – Weitere

5.2 Study 1: Interview Questions

Wie fanden Sie das Exponat?

Welchen Eindruck hatten Sie vom Exponat?

Was gefiel Ihnen besonders gut/schlecht?

Wie fanden Sie die Objekte, die Sie auf den Tisch gestellt haben?

Wieso gefallen Ihnen die Objekte/Wieso nicht?

Gäbe es aus Ihrer Sicht passendere Objekte?

Welche Funktion und Bedeutung hatten die Objekte aus ihrer Sicht?

Wie fanden Sie die Interaktion mit dem Exponat?

Wie war das Objekt auf Tisch legen?

Wie war die Benutzung der Buttons?

Was gefiel Ihnen besonders gut/schlecht?

Wie haben Sie die Inhalte wahrgenommen?

Was gefiel Ihnen besonders schlecht/gut?

Hatten Sie das Gefühl einen Gottesdienst besucht zu haben?

Wie könnte das Exponat aus Ihrer Sicht erweitert werden?

Könnten Sie sich vorstellen das Exponat in einer Gruppe zu benutzen?

Idee 1: Eigene Inhalte in den OGD integrieren

Idee 2: Vorschau der Inhalte

Idee 3: Inhalte greifen Objekte mehr auf

5.3 Study 2: Demografic Questionnaire

Wie alt sind Sie gemessen in Jahren?

Welchem Geschlecht ordnen Sie sich zu?

Weiblich – Männlich – Divers

Was ist Ihr bisher höchster Bildungsabschluss?

Kein Schulabschluss – Volksschulabschluss – Mittlere Reife – Fachgebundene Hochschulreife – Allgemeine Hochschulreife – Abgeschlossenes Studium – Meister – Techniker – Sonstiges

Wie sicher fühlen Sie sich generell im Umgang mit interaktiven Technologien?

Unsicher - Meist unsicher - Mal sicher, mal unsicher - Meist sicher - Sicher

Wie viel Erfahrung mit Gottesdiensten haben Sie?

Keine - Wenig - Mäßig - Viel - Sehr viel

Welcher religiösen oder nicht-religiösen Weltanschauung fühlen Sie sich momentan zugehörig?

Christentum – Islam – Hinduismus – Buddhismus – Judentum – Atheismus – Weitere

5.4 Study 2: Interview Questions

Wie würden Sie einem/einer FreundIn oder Familienmitglied das Exponat, das Sie heute benutzt haben, beschreiben?

Weshalb?

Was führt zu dieser Beschreibung?

Welche Meinung haben Sie zu dem Exponat?

Warum?

Was löst diesen Gedanken aus?

Könnten Sie sich vorstellen so etwas zu benutzen?

Gibt es Designvorschläge?

Welche Gedanken haben Sie zur Interaktion mit dem Exponat?

Warum?

*Wie hat die Interaktion mit dem Tisch funktioniert?
Gab es Probleme?*

Was löst das Exponat (besonders: der Tisch) bei Ihnen aus?

Warum?

Gibt es kritische Gedanken zum Tisch?

Was hat besonders gut/schlecht gefallen?

Was denken Sie über den Lichtring?

Warum?

Welche Bedeutung könnte der Ring haben?

Erklärung: Symbolisiert Anzahl an aktuellen GottesdienstteilnehmerInnen

Was denken Sie darüber?

Könnten Sie sich vorstellen in Ihrem alltäglichem Umfeld mit dem Exponat einen Gottesdienst zu besuchen?

Warum?

Blick auf Gottesdienst also Ritual:

Würde ein Gottesdienst zuhause ähnlich funktionieren wie ein normaler Gottesdienst?

Was wäre anders?

Gibt es noch etwas Wichtiges, das Sie bisher nicht mit mir teilen konnten und das Sie noch zu der Erfahrung sagen möchten?

Gibt es Veränderungsvorschläge?

Weshalb?

5.5 Study 3: Demografic Questionnaire

Wie alt sind Sie gemessen in Jahren?

Welchem Geschlecht ordnen Sie sich zu?

Weiblich – Männlich – Divers

Wie sicher fühlen Sie sich generell im Umgang mit interaktiven Technologien?

Unsicher - Meist unsicher - Mal sicher, mal unsicher - Meist sicher - Sicher

Wie viele Stunden nutzen Sie einen PC durchschnittlich pro Tag?

Weniger als 1 Stunde – 1-3 Stunden – 3-5 Stunden – 5-8 Stunden – Mehr als 8 Stunden

Wie viele Stunden nutzen Sie ein Handy oder Smartphone durchschnittlich pro Tag?

Weniger als 1 Stunde – 1-3 Stunden – 3-5 Stunden – 5-8 Stunden – Mehr als 8 Stunden

Wie viele Stunden nutzen Sie das Internet durchschnittlich pro Tag?

Weniger als 1 Stunde – 1-3 Stunden – 3-5 Stunden – 5-8 Stunden – Mehr als 8 Stunden

Wie viele Onlinegottesdienste haben Sie bisher in etwa besucht?

Keine - 1-10 - 10-20 - 20-30 - Mehr also 30

Für Pastor:innen:

Wie lange sind Sie schon in der Gottesdienstgestaltung tätig?

Wie lange als Pastor:in?

Wie viele Onlinegottesdienste haben Sie bisher in etwa gestaltet?

5.6 Study 3: Interview Questions

Wie würde für Sie der perfekte Onlinegottesdienst aussehen?

Warum?

Wie in Bezug auf Elemente, Interaktion, Technik, Gemeinschaft, Integration in Alltag?

Was gefällt Ihnen gut/schlecht an bisherigen Onlinegottesdiensten?

Videodemo des Prototyps

Was ist der erste Gedanke, der Ihnen nach dem Betrachten des Prototyps nun durch den Kopf geht?

Was gefällt ihnen an dem Prototypen am besten und warum?

Was gefällt ihnen an dem Prototypen am wenigsten und warum?

Was würde der Einsatz dieser interaktiven Technologie aus Ihrer Sicht für das Ritual Gottesdienst bedeuten?

Warum?

Probe: Tradition des Rituals (z.B. feste Zeit/Raum/Ablauf)

Probe: Integration in Alltag

Probe: Gemeinschaft, Individualisierung, Glauben

Was sollten wir Ihrer Meinung nach auf jeden Fall am Prototyp verändern?

Warum?

Idee 1: Ambientes Licht (stark/schwach) andere Gottesdienstteilnehmer:innen

Idee 2: Open Source, selbst bauen und gestalten

Wie können Sie sich die Einbettung in den Alltag vorstellen?

Warum?

Wie könnten Sie sich vorstellen, dass die Objekte zu Ihnen kommen?

Wie wäre der zeitliche Verlauf? Alle auf einmal, über die Woche verteilt?

Wir würden die Technik als *provokativen Prototyp* bezeichnen – denn er hebt bestimmte Elemente hervor und lässt andere bewusst außen vor. Eine solche Technik verwenden wir, um mehr über den Kontext zu erfahren. Was denken Sie über dieses Vorgehen?

Beispiel: Aufteilung des Gottesdienst in Stücke macht greifbar wie Gläubige an Onlinegottesdiensten teilgenommen haben (nicht unbedingt nur weil sie das wollten aber weil es möglich war).

Warum?

Was gefällt Ihnen an dieser Methode gut? Warum?

Was gefällt Ihnen an dieser Methode weniger gut? Warum?

Könnten Sie sich vorstellen, mit dieser Technik Gottesdienste zu feiern?

Warum (ja/nein)?

Würden Sie gerne selbst eine solche Technik besitzen? Warum? Unter welchen Umständen?

Gibt es noch etwas Wichtiges, das Sie nicht angesprochen haben?

6 Materials for Publication 4

6.1 Study 1: Demografic Questions

Wie alt sind Sie gemessen in Jahren?

Welchem Geschlecht ordnen Sie sich zu?

Welcher beruflichen oder berufsqualifizierenden Tätigkeit gehen Sie derzeit hauptsächlich nach?

Was ist Ihr bisher höchster Bildungsabschluss?

Was ist Ihr Familienstand?

Welcher Religion fühlen Sie sich zugehörig?

6.2 Study 2: Interview Questions

Beziehungsrituale generell

Habt ihr eigene Beziehungsrituale? Wenn ja: Welche, wann, warum, was war involviert, was hat es euch bedeutet?

Probe: Denkt z.B. speziell an den Beginn eurer Beziehung: Wann und wie war klar, dass ihr zusammen seid?

Probe: Gab es weitere Schritte, die das Zusammensein noch verstärkt haben?

Ritual mit El Corazón

Fragen entsprechend den Beobachtungen/Erfahrungen

Wie war das Ritual für euch? Langweilig? Spannend? Positiv? Negativ?

An welchem Punkt in der Beziehung hättet ihr das Ritual verwendet? Warum?

Wer wäre in eurem Szenario mit dabei gewesen?

Was wäre nachher mit dem Objekt passiert? Wo hättet ihr es deponiert/mit hingenommen?

Warum habt ihr euch für diese Art der Individualisierung entschieden & was bedeutet sie?

Breakdowns?

Emotionale Regungen?

Wurde etwas gesagt?

Wie habt ihr euch währenddessen gefühlt? Welche konkreten Schritte haben diese Gefühle ausgelöst?

Würdet ihr das Ritual nochmal durchführen//es durchführen, wenn es das Objekt wirklich geben würde?

Fragen zu den Pointern

Wie habt ihr den Aufbewahrungsort festgelegt und warum war es genau dieser?

War es für eure Entscheidung wichtig, dass ihr das Objekt nochmal sehen könnt?

Was hat das Ritual in dem Moment oder jetzt nachher (entsprechend des gewählten Szenarios) für euch bedeutet? Für was steht das Objekt jetzt?

Wäre es wichtig, das Ritual an einem bestimmten Punkt durchzuführen oder hätte man das an einem beliebigen Zeitpunkt machen können?

Hätte der Prozess auch kürzer sein können (z.B. Sensoren außen und man muss nur den Finger kurz auflegen)? Oder hätte er länger sein sollen?

Wie wichtig war das Gemeinsame bei der Durchführung des Rituals?

Würdet ihr den Prototypen noch verändern, wenn ihr könntet?

Würdet ihr den Prototypen nach dem Ritual verstecken oder gezielt Leuten zeigen? Oder irgendwas dazwischen?

Wenn ihr das Objekt bei Freunden (oder irgendwo im öffentlichen Raum) gesehen hättet, hättet ihr gefragt was das ist?

Fragen zum Prototyp

Was gefällt euch besonders gut? Warum?

Was gefällt euch eher weniger? Warum?

Was würdet ihr verändern?

Würdet ihr das Ritual nochmal durchführen?

6.3 Study 2: Demografic Questionnaire

Wie alt sind Sie gemessen in Jahren?

Was ist Ihr Geschlecht?

Weiblich – Männlich – Keine Angabe

Was ist Ihre Staatsangehörigkeit?

Was ist Ihre Religionszugehörigkeit?

Was ist Ihr bisher höchster Bildungsabschluss?

Mittlere Reife – Abitur / Fachgebundene Hochschulreife – Abgeschlossene Meister-/Technikerausbildung – Berufsakademie/Fachhochschulabschluss – Universitätsabschluss – Promotion – Sonstiges

Was ist Ihr Familienstand?

ledig – verheiratet – verwitwet – geschieden – Sonstiges

Wie lange sind Sie schon ein Paar?

Haben sie bereits ein *Liebesschloss* aufgehangen?

ja – nein

7 Materials for Publication 5

7.1 Study 1: Introductory Workshop Guide

Zielsetzung

Ziel der gesamten Studie: Herausfinden, wie interaktive Objekte gestaltet werden müssen, damit sich in der Interaktion ein Gefühl von 'gesegnet sein' einstellt. Mein Interesse liegt also vor allem auf der Interaktion, in der Segen gespendet oder weitergegeben wird.

Beispiel für segnende Technologie: BlessU2 *Video auf Youtube gemeinsam schauen*

Ziel des heutigen Workshops: Die Methode und das Vorgehen verstehen, anzufangen sich mit der Frage nach dem 'Segensgefühl' auseinanderzusetzen.

Part 1: Vorstellung aller Materialien im Probe Paket

Einverständniserklärungen

2 x Einverständnis, 1 x Codewort generieren

Lesen, ausfüllen, scannen oder ein Bild machen, per Mail schicken

Fragen?

Brief

Hier kannst du jederzeit nochmal die Aufgabe & das Ziel der Studie nachlesen.

Stoffobjekt

Das wichtigste Objekt ist das Stoffobjekt. Wir behaupten: Dieses Objekt kann dich segnen. Warum machen wir das? Das Objekt ist Teil einer Kreativmethode, die wie folgt funktioniert: Das Objekt soll als Startpunkt für eigene Spekulationen dienen. Es hat bisher keinerlei interaktive Funktion oder Fähigkeit, alles was es tun könnten muss man sich selbst vorstellen. Es ist also quasi ein Platzhalter für alles was sein könnte! Man kann das Objekt selbst verändern (z.B. anmalen, bekleben, verformen,...) oder sich vorstellen dass es weitere Fähigkeiten hätte (vergrößern/verkleinern, warm/kalt werden, Text anzeigen, etwas aussprechen,...). Du sollst dir in der folgenden Woche die Fragen stellen: Wann würde sich bei mir ein Gefühl von 'gesegnet sein' einstellen? Wie müsste das Objekt dafür aussehen, sich anfühlen, was müsste es machen? Deine Gedanken sollst du ohne großes Format dokumentieren (z.B. in Videos, Bildern, Text, Tonaufnahmen) und an mich schicken. Wie das funktioniert – dazu später mehr.

Sand

Ansonsten lag im Paket noch ein Glas mit besonderem Sand: Hole ihn gerne aus der Verpackung und teste ihn aus. Auch damit kannst du Ideen Formen geben.

Brief (Chat-Zugang)

Im Brief befindet sich ein Account zu einem Chat-Server. Am einfachsten wird die Kommunikation funktionieren, wenn du dir die App Rocket.Chat herunterlädst und dich auf unserem Server anmeldest. Melde Dich doch nun einmal auf dem Chat-Server an. Ich habe Dir schon eine kurze Nachricht geschrieben, die Du jetzt sehen solltest! Ich werde Dir etwa alle zwei

Tage eine kleine Erinnerungsnachricht schicken, du kannst aber zu jederzeit selbst entscheiden wann, was, oder auch wie viel du mit mir teilen möchtest!

Papier mit 8 Feldern

Das brauchen wir gleich in der inhaltlichen Einführung.

Part 2: Segen ist für mich...

Ich würde jetzt die Audioaufnahme starten, um den ersten inhaltlichen Austausch für eine spätere Analyse festzuhalten. Bei der Studie geht es um Segen. Als erstes wollen wir also kurz überlegen was Segen für dich bedeutet: Wie fühlt es sich an, gesegnet zu werden? Das geht am einfachsten über ganz konkrete Erfahrungen. Schließe gerne kurz die Augen und erinnere dich zurück an die letzte markante Erfahrung, in der Du einen Segen empfangen hast. Wenn Du so weit bist, durchlebe den Moment noch einmal Stück für Stück! Frage dich selbst:

Wie fühlt es sich an gesegnet zu werden?

Welche Aspekte lösen diese Gefühle aus?

Was an Deiner Umgebung ist für die Erfahrung wichtig?

Öffne die Augen jetzt wieder und versucht Die Erfahrung kurz zu beschreiben. Was waren Deine Gefühle? Was hat diese Gefühle ausgelöst?

Sehr gut! Behalte diese ganz konkrete Erfahrung in Erinnerung wenn wir jetzt gleich mal festhalten was Segen für dich ist. Dafür benötigen wir eines der Papiere mit 8 Feldern und einen Stift. Wir verwenden aber als Erstes die Rückseite.

Kennst du die Methode Mindmapping? Es geht darum, Aspekte eines Themas festzuhalten und Verbindungen zwischen diese Aspekten zu visualisieren (z.B. hierarchische Abhängigkeiten o.ä.) Wir wollen jetzt eine kleine Mindmap zum Thema Segen erstellen. Nimm das Blatt quer und schreibe in die Mitte 'Gesegnet werden'. Als erstes wollen wir die linke Blattseite füllen. Ich frage dich: Was ist Segen für dich? Du kannst deine Gedanken in kleinen Skizzen oder auch in Stichworten festhalten. Nutze den Platz gerne auch um Verbindungen (über Linien) herzustellen oder einfach um frei verschiedene Aspekte festzuhalten. Wir nehmen uns dafür nur 3 Minuten Zeit und ich werde das Kommando zum Aufhören geben. Was also ist Segen für dich? Hast du noch Fragen? Stifte & Zettel bereit?

Jetzt möchten wir die rechte Seite noch für einen weiteren Aspekt zum Thema Segen verwenden. Wir werden wieder genauso vorgehen, dieses Mal stellt sich aber die Frage: Wann und wo erteilst oder empfangst du Segen? Wir haben wieder 3 Minuten Zeit. Gibt es noch Fragen? Stifte & Zettel bereit?

Part 3: Zukünftige Segenstechnologien könnten sein...

Jetzt haben wir uns viel damit beschäftigt was Segen für dich ist. Behalte das gut in Erinnerung wenn wir gleich in die letzte Übung gehen. Jetzt wechseln wir den Modus und wollen kreativ werden. In diesen Modus sollst du in der kommenden Woche auch immer wieder kommen. Wir wollen jetzt in eine mögliche Zukunft blicken, in der dich eine interactive Technologie segnen wird. Wir spekulieren also wild! Wir nehmen jetzt die Vorderseite des Papiers mit den 8 Feldern. Die Methode heißt Crazy8 (verrückte 8). Bei der Methode geht

es darum in kurzer Zeit 8 verschiedene Gedanken/Ideen festzuhalten. Pro Kasten nehmen wir uns nur 40 Sekunden Zeit. Es gibt kein richtig/falsch bei dieser Aufgabe und es kommt darauf an schnell verschiedene Gedanken zu Papier zu bringen.

Deine Aufgabe ist: Überlege Dir, wie ein Objekt aussehen könnte, das dich in Zukunft segnet, und wie die Interaktion mit diesem wäre. Denke daran, es geht nur darum schnell verschiedene Ideen festzuhalten. Pro Kasten sollst du also unterschiedliche Ideen festhalten und du kannst diese zeichnen oder in Stichpunkten festhalten. Ich werde immer Kommandos zum Weitergehen geben. Gibt es noch Fragen? Stifte & Zettel bereit?

Abschluss

Fast geschafft! In der kommenden Woche darfst du die weiteren Papiere gerne genauso verwenden, wie wir es gerade gemacht haben – das musst du aber nicht. Nimm' in der kommenden Woche immer wieder das segnende Objekt in die Hand und überlege Dir, wie es gestaltet sein müsste um ein Gefühl von 'gesegnet worden sein' in Dir auslösen zu können. Dazu kannst du das Objekt z.B. in der Hosentasche mitnehmen oder an einem bestimmten Platz deponieren – ganz wie du magst. Dir sind dabei keine Grenzen gesetzt und es gibt keine richtigen/falschen Antworten.

Wichtig ist, dass du das Stoffobjekt als Platzhalter verstehst. Es hat eine spezifische Form, Farbe usw und diese können durchaus als Startpunkt für eigene Überlegungen dienen, sollen aber nicht als festgesetzt gelten. Das Objekt könnte also auch groß, feste, metallisch oder sonst wie sein - eben einfach so wie es für dich am besten wäre wenn du es dir selbst aussuchen könntest. Es ist alles erlaubt! Wichtig ist, dass du deine Überlegungen dokumentierst. Du kannst dafür das Objekt verändern (z.B. bemalen, verformen, ..) oder Skizzen, Texte, Videos, oder Tonaufnahmen machen. Schick' einfach alles über den Rocketchat an mich, sodass ich mich auf unser Gespräch am Ende der Woche vorbereiten kann. Für uns ist jeder Gedanke wertvoll, schick' uns einfach alles was dir in den Sinn kommt!

Teste bitte im Anschluss das Versenden über Rocket.Chat und schicke mir die Dokumente aus der heutigen Session als Bilder! Am Ende der Woche Treffen wir uns noch einmal über zoom und sprechen über Deine Erfahrungen und Vorstellung. Darauf freue ich mich schon sehr! Gibt es noch Fragen bevor wir in die Woche starten? Du erreichst mich natürlich auch bei Fragen jederzeit über den Chat oder per Telefon oder Mail!

7.2 Study 1: Cultural Probe Package Overview



7.3 Study 1: Cultural Probe Letter



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Oswald-Külpe-Weg 82 · 97074 Würzburg

Würzburg, 29.10.2021

Segnende Objekte: Im Alltag gesegnet

Schön, dass Du uns bei der Suche nach dem (digitalen) Segen unterstützt und dieses Paket in Empfang genommen hast!

In deinem Segenspaket befindet sich neben einigem Papierkram auch ein Segensobjekt. Es soll Dir in der kommenden Woche als Startpunkt für Überlegungen dienen. Denn wir wollen von Dir wissen: Was ist es, was im Kern die Erfahrung des "Gesegnet Werdens" für Dich ausmacht? In welchen Situationen spielt Segen für Dich eine Rolle? Wann denkst du über Segen nach? Wann und Wie nutzt du das Objekt?

Wir behaupten: Das Objekt kann Dich segnen! Ausgehend von dieser Annahme ist es nun Deine Aufgabe Dir zur überlegen, auf welche Arten & Weisen das Objekt Dich segnet. Spricht es zu Dir, wird es warm oder kalt, verändert sich die Form, müsste es eigentlich größer sein, hat es eine bestimmte Farbe, bewegt es sich,...? Deiner Phantasie sind keine Grenzen gesetzt und es gibt keine richtigen oder falschen Antworten! Wichtig ist, dass Du Deine Gedanken & Ideen festhältst – z.B. durch Fotos, Videos, Text- oder Tonnachrichten.

Nimm' also in der kommenden Woche das Objekt zum Anlass, Dich zu fragen: Wie fühlt sich "gesegnet werden" für Dich an? Was müsste das Objekt tun/ wie müsste es aussehen/ wie müsste es sich anfühlen/ worin müsste es eingebettet sein (usw.), damit es Dir das Gefühl vermittelt, Dich zu segnen?

Wir sind gespannt Deine Gedanken & Ideen zu hören und zusammen auf der Suche zu sein!

Gesegnete Erfahrungen!
Sara & Simon

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7.4 Study 1: Cultural Probe Blessing Artefact



7.5 Study 1: Cultural Probe Kinetic Sand



7.6 Study 1: Cultural Probe Chat Login Data

Server-URL: <https://lehre.psyergo.uni-wuerzburg.de>
vp06-segen
PW: sichregenbringtsegen



7.7 Study 1: Cultural Probe Workshop Material

Segeen

7.8 Study 1: Concluding Workshop Guide

Zielsetzung

Mein Ziel heute ist es, deine Gedanken und Ideen der letzten Woche zum Segen nachzuvollziehen. Dabei gibt es 2 besonders wichtige Aspekte:

Zum einen möchte ich mit dir die für dich wichtigsten Aspekte des Gefühls 'gesegnet werden' herausarbeiten

Und zum Anderen möchte ich verstehen, welche Rolle interaktive Technologie im Segen aus deiner Perspektive haben könnte

Du kannst gerne zum Beantworten meiner Fragen heute alle deine Materialien (Notizen, Bilder,...) verwenden. Solltest du noch nicht alles geschickt haben, schicke sie mir bitte auch über den RocketChat noch zu. Ich habe einige Fragen vorbereitet, insgesamt möchte ich aber die für dich wichtigen Punkte erfassen und versuche so gut es geht auf dich einzugehen. Dabei werde ich vermutlich hin- und wieder Nachfragen, wenn ich etwas nicht verstanden habe oder sicher gehen will, dass ich es richtig verstanden habe.

Demografische Daten erheben

Übergangsfragen: Erfahrungen mit dem Objekt

Du hast jetzt etwa 1 Woche mit dem Objekt zusammengelebt. Wie war deine Erfahrung?

Was war gut/schlecht?

In welchen Kontexten hattest du es dabei?

Was hat es mit dir gemacht? Wie hat es deinen Alltag verändert?

Hatte es auch nach außen hin eine Wirkung (Irritation, angesprochen werden,...)?

Wie erging es dir mit dieser Kreativmethode allgemein? Was fandest du gut/nicht so gut?

Segen

Wenn du es in wenigen Sätzen auf den Punkt bringen müsstest: Was ist Segen für dich?

Was sind typische Situationen in deinem Alltag (vielleicht auch ganz konkret in der letzten Woche), in denen du gesegnet wirst?

Wann wirst du gerne gesegnet? (Warum?)

Gibt es einen Unterschied zwischen wann du gerne gesegnet werden würdest und wann du gesegnet wirst?

Was ist für dich wichtig, wenn du gesegnet wirst? (Warum?)

Segen und interaktive Technologien: Konkrete Ideen

Schauen wir gemeinsam mal über deine Ideen zu interaktiven Technologien in Segen. Welche Idee ist dein Favorit?

Was genau macht die Technologie?

Wie sieht sie aus?

Wie würde es sich anfühlen davon gesegnet zu werden?

Wo und wann wird sie eingesetzt?

Warum ist diese Idee dein Favorit?

Welche Idee ist für dich weniger gelungen? Warum?

Segen und interaktive Technologien: Gesamtmuster

Welche Rolle könnte interaktive Technologie nach deinen Vorstellungen in der Interaktion des Segnen-und-Gesegnet-Werdens einnehmen?

Was macht diese Rolle aus?

Warum genau diese Rolle?

Welche Rolle wäre für dich überhaupt nicht denkbar?

Nachdem du dir nun eine Woche Gedanken gemacht hast: Wo und in welchen Kontexten würde dich eine interaktive Technologie segnen?

Lässt sich ein Muster in deinen Ideen erkennen?

Warum?

Nachdem du dir nun eine Woche Gedanken gemacht hast: Wie müsste eine interaktive Technologie, die dich segnet, aussehen?

Lässt sich ein Muster in deinen Ideen erkennen?

Warum?

Nachdem du dir nun 1 Woche Gedanken gemacht hast: Was müsste eine interaktive Technologie machen, wenn sie dich segnet?

Lässt sich ein Muster in deinen Ideen erkennen?

Warum?

Wie würde eine interaktive Technologie für dich zur Segenstechnologie?

Anders gefragt: Wie kommt der Segen in die Technologie?

Wie wird sie klar erkennbar zu einer Technologie, der dich segnet?

Noch was offen?

Du hast eine Vielzahl an Ideen generiert, gibt es noch Ideen die du unbedingt hervorheben möchtest?

Wenn ja, welche? (Fragen s. oben)

Gibt es ansonsten noch etwas für dich sehr Wichtiges, das du bisher nicht erzählen konntest?

Zusammenfassung und Rückbindung

Kernpunkte wiedergeben zu

Erfahrung

Segen

Konkrete Ideen

Rolle Technologien

Muster: Wo? Wie aussehen? Was machen? Wie Segenstechnologie?

Abschluss, Danke, Vergütung

7.9 Study 1: Demografic Questions

Wie alt bist du?

Welchem Geschlecht ordnest du dich zu?

Welcher Nationalität gehörst du an?

Mit welcher religiösen oder nicht-religiösen Weltanschauung bist du aufgewachsen?

Welcher religiösen oder nicht-religiösen Weltanschauung fühlst du dich jetzt zugehörig?

Was ist dein höchster Bildungsabschluss?

Welcher beruflichen oder berufsqualifizierenden Tätigkeit gehst du derzeit hauptsächlich nach?

Warum und wie viel beschäftigst du dich (außerhalb dieser Studie) mit dem Thema Segen?

7.10 Study 2: Vignettes

Vignette 1: Offene Exploration

Vielleicht ist dir schon aufgefallen, dass wir diesen Raum wohnlich eingerichtet haben – fast wie ein Wohnzimmer! Bevor du mit der blessing machine interagierst möchten wir, dass du dir vorstellst, die blessing machine würde bei dir zuhause sein und die Interaktion würde dort in deinem normalen Umfeld stattfinden.

Du hast jetzt Zeit die Blessing Machine zu explorieren. Spreche dabei gerne laut aus, was dir durch den Kopf geht – ganz egal was es ist!

Vignette 2: Stunden vergangen Um das gesamte Verhalten der Blessing Machine zu verstehen, müssen wir uns jetzt noch etwas Neues vorstellen: Es sind nun mehrere Stunden vergangen, seit du das letzte Mal mit der Blessing Machine interagiert hast. Du kannst nun erneut mit der Blessing Machine interagieren. Denke daran, laut auszusprechen was dir durch den Kopf geht – ganz egal was es ist!

Vignette 3: Minuten vergangen Jetzt passiert etwas ähnliches nochmal: Stelle dir vor es ist erneut eine knappe Stunden vergangen. Du kannst jetzt wieder mit der Blessing Machine interagieren. Denke daran, laut auszusprechen was dir durch den Kopf geht – ganz egal was es ist!

Vignette 4: Tage vergangen Wir haben immer noch nicht das ganze Verhalten der Blessing Machine erlebt, deshalb müssen wir uns jetzt vorstellen, dass seit der ersten Interaktion nun Tage vergangen sind.

7.11 Study 2: Interview Questions

Was ist die Blessing Machine?

Wenn du nach der Studie heute einem Freund oder einer Freundin von der Blessing Machine erzählen würdest, was würdest du sagen?

Warum?

In deinen Worten: Was ist die Blessing Machine?

Was macht die Blessing Machine?

Wie würdest du den Charakter der Blessing Machine beschreiben?

Was hat dazu geführt, dass sie diesen Charakter hat?

Wie hat sich die Interaktion mit der Blessing Machine für dich angefühlt?

Reaktionen und Assoziationen

Welche Gedanken gehen dir zur Blessing Machine durch den Kopf?

Warum?

Was denkst du über das Design der Blessing Machine?

Was denkst du über die Interaktion mit der Blessing Machine?

Was denkst du über die zeitlich ausgedehnte Interaktion der Blessing Machine?

Welche Bedeutung hat die Blessing Machine für dich?

Bewertung

Wie hat dir die Blessing Machine gefallen?

Warum?

Was war gut/schlecht? (Design, Interaktion, Bedeutung)

Änderungen

Gibt es Dinge, die du an der Blessing Machine ändern würdest?

Welche? Warum?

Könntest du dir vorstellen noch weniger Kontrolle über die Interaktion zu haben? Dass du z.B. warten musst, bis die Blessing Machine dich zur Interaktion einlädt und erst dann kannst du für einen kurzen Zeitraum mit ihr interagieren?

Im eigenen Leben

Wenn die Blessing Machine bei dir zuhause leben würde, wo würde sie wohnen?

Warum?

Wie würdest du mit ihr umgehen/interagieren?

Wie häufig würdest du mit ihr interagieren?

Was würde sie für dich bedeuten?

Könntest du dir vorstellen, mit einer Blessing Machine zu leben?

Warum?

Vergleich der beiden Versionen

Wie hat dir die Blessing Machine im Vergleich zur ersten Version gefallen?

Warum?

Was war gut/schlecht? (Design, Interaktion, Bedeutung)

Gibt es Dinge, die du an der Blessing Machine ändern würdest?

Probe: Kombination aus versch. Elementen der beiden Versionen?

Wenn diese zweite Version der Blessing Machine zuhause bei dir leben würde, würde sich irgendetwas in deinem Umgang mit ihr zur vorherigen Version ändern?

Warum?

Probe: Wo, wie umgehen, wie häufig, Bedeutung?

Überliegende Fragen

Bevor wir noch einmal über die unterschiedlichen Varianten im Vergleich sprechen, haben wir noch ein paar allgemeinere Fragen:

Was ist Segen für dich?

Gibt es Situationen in deinem Alltag, in denen du dich gesegnet fühlst?

Falls ja: Was für Situationen sind das?

Falls ja: Wie würdest du deine Gefühle in diesen Situationen beschreiben?

Wenn du nun noch einmal an beide Varianten und alle Elemente denkst: Welches Element hat dir am besten gefallen? Element kann ein ganzes Konzept sein, aber auch eine Interaktion, ein Material, ein bestimmter Moment, ...!

Warum?

Welches Element hat dir am wenigsten gefallen?

Hat sich bei dir in der Interaktion mit der Blessing Machine an irgendeinem Moment ein Gefühl von *gesegnet sein* eingestellt?

Warum?

Ja: Bei welcher Version? Wodurch ausgelöst?

Nein: Was bräuchte die blessing machine, damit sich ein Gefühl von gesegnet sein einstellen kann?

Wenn du an den spirituellen und religiösen Grundgedanken der Blessing machine denkst, wie passen die Materialien zu diesem Kontext?

Warum?

Variante 1 und 2 im Vergleich?

Was würde besser passen?

Was müsste verändert werden?

Wenn du an den spirituellen und religiösen Grundgedanken der Blessing Machine denkst, wie passen die Interaktionen zu diesem Kontext?

Warum?

Variante 1 und 2 im Vergleich?

Was würde besser passen?

Was müsste verändert werden?

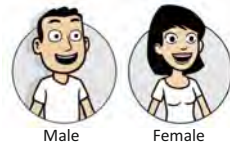
Welche der beiden Varianten der Blessing Machine hat dir insgesamt besser gefallen?

Warum?

Gibt es ansonsten noch einen Gedanken oder eine Assoziation, über die wir bisher noch nicht gesprochen haben?

Gibt es noch etwas Wichtiges, das du bisher nicht erzählen konntest und uns noch mitteilen magst?

7.12 Study 2: PrEmo



Pride

The feeling when you possess (or have accomplished) something that exceeds your own expectations, or that others find praiseworthy.



Shame

The feeling when someone knows something bad about you. You believe this to be true, so you also feel bad about yourself.



Admiration

The feeling when you look up to someone who has excellent abilities or impressive accomplishments.



Contempt

The feeling when someone is inferior or unworthy in your eyes; they have done something blameworthy.



Joy

The feeling when something good happens to you. You fulfil a need, achieve something, or make progress towards achieving a goal.



Sadness

The feeling when you have lost something that was important to you, and believe it cannot be undone.



Hope

The feeling when you believe (but are not certain) that something good or desirable may happen in the future.



Fear

The feeling when something can harm you or someone you care about, and you are not sure whether you can do anything about it.



Satisfaction

The feeling when something meets or exceeds your expectations.



Anger

The feeling when someone does something bad that harms or offends you, and you blame that other person.



Desire

The feeling when you anticipate that something will be beneficial once acquired or consumed.



Disgust

The feeling when you find something repulsive and want to avoid having contact with it in any way.



Fascination

The feeling when you encounter something new and interesting that you do not immediately understand.



Boredom

The feeling when there is nothing interesting or engaging to door experience.



PrEmo

Premo

www.premotool.com
www.diopd.org/premo

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 Pieter M.A. Desmet

Delft University of Technology
 Faculty of Industrial Design Engineering
 Delft Institute of Positive Design

Emotion Studio Rotterdam

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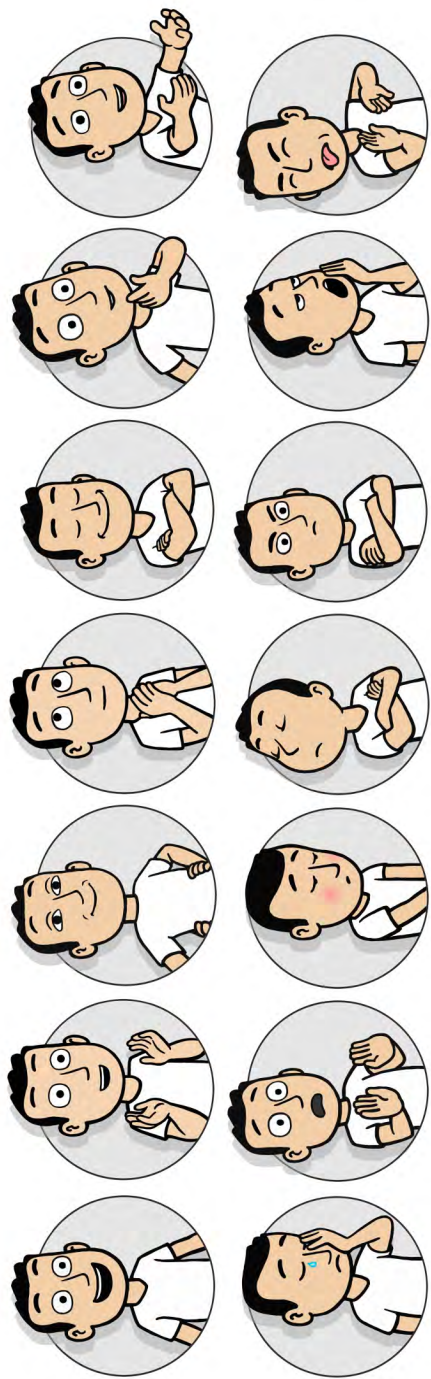
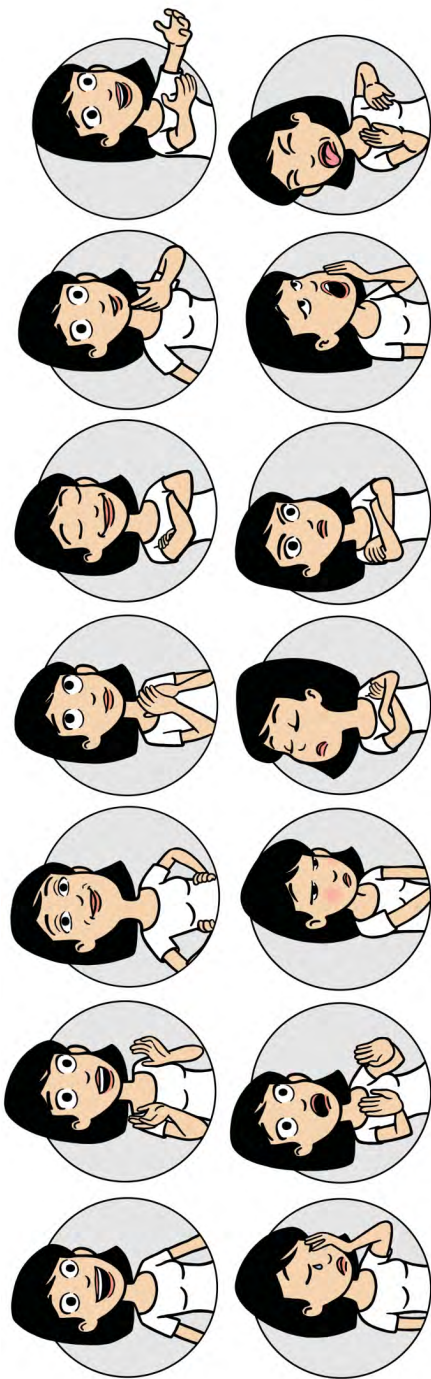
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Reference

In communication, please refer to the Premo characters as follows: Laurans, G. & Desmet, P.M.A. (2017). Developing 14 animated characters for non-verbal self-report of categorical emotions. *Journal of Design Research*, 15 (3/4), 214–233.

More Information

<https://diopd.org/premo/>



7.13 Study 2: Results PrEmo

Results of the PrEmo for the two versions, macro and haze. Question asked: ‘Kannst du uns nun noch die Figur oder mehrere Figuren zeigen, die dein Gefühl während der Interaktion mit der Blessing Machine am besten beschreiben?’

ID		E1*	E2	E3	E4		E1	E2	E3
P1-2	Macro	Satisfaction	Fascination			Haze	Desire	Fascination	
P2-2	Macro	Boredom	Pride	Fascination	Admiration	Haze	Admiration	Hope	
P3-2	Macro	Fascination				Haze	Fascination		
P4-2	Macro	Desire	Pride			Haze	Disgust	Admiration	
P5-2	Macro	Boredom	Desire	Fascination		Haze	Fascination	Disgust	Joy
P6-2	Macro	Boredom	Pride			Haze	Fascination	Anger	
P7-2	Macro	Fascination	Anger	Disgust		Haze	Fascination	Joy	

*E = Emotion

7.14 Study 2: Demographic Questionnaire

Wie alt sind Sie gemessen in Jahren?

18-24 - 25-34 - 35-44 - 45-59 - 60 und älter

Welchem Geschlecht ordnen Sie sich zu?

Weiblich – Männlich – Divers

Mit welcher religiösen oder nicht-religiösen Weltanschauung sind Sie aufgewachsen?

Christentum – Islam – Hinduismus – Buddhismus – Judentum – Atheismus – Weitere

Welcher religiösen oder nicht-religiösen Weltanschauung fühlen Sie sich momentan zugehörig?

Christentum – Islam – Hinduismus – Buddhismus – Judentum – Atheismus – Weitere

Bitte antworten Sie möglichst kurz und prägnant: Was verstehen Sie persönlich unter Segen?

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List of Abbreviations

EKD Evangelische Kirche in Deutschland
HCI Human-Computer Interaction
RTR Relationship Transition Rituals
RtD Research through Design

**RITUALS AND
INTERACTIVE
TECHNOLOGIES
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