Fictional space in participatory design of engaging interactive environments

PhD dissertation

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Abstract

This dissertation addresses the topic of designing engaging interactive environments and is positioned in the intersection between participatory design, design theory, and interaction design. This topic has been addressed through a research program on designing engaging interactive exhibition spaces for museums and science centres. The dissertation is composed of seven research papers framed by a general overview that summarises the arguments made in the papers and outlines related work and research method. The contribution reflects a dual yet intertwined concern for understanding engagement in exhibition spaces and shaping design inquiries around the notion of engaging interactive environments.

The first part of the contribution relates to conceptualising aspects of engagement in relation to interactive environments. The perspective of *participatory engagement* is presented as an overarching perspective on how people as resourceful individuals and groups invest their time, skill, and knowledge in interactive environments. Within this overarching perspective, the notion of *means of engagement* is presented denoting the intentional constructs that mediate engagement. The notion stretches beyond individual technologies and interfaces to encompass the multitude of interconnected aspects that are arranged through design and that, in concert, mediate engagement. Through a discussion of the issue of *motivation* it is argued that museums might spur visitors engagement by mediating between the everyday practices of visitors and museum knowledge.

The second and larger part of the contribution addresses the issue of shaping design inquiries. This part is summarized through the overarching notion of *fictional space* denoting a perspective on the creation of a design space where established norms and conventions are re-shaped or suspended in participatory design inquiries. The motivation for staging fictional space in participatory design is to invite participants in design to re-think existing practices and imagine what their practices might be like if established conventions were altered. This motivation is made tangible by relating it to the particular design challenge facing museums. It is argued that fictional space emerges as participants in design engage in *games of make-believe* mediated by *props* that give mandate to imagination and serve as both *anchoring-* and *transcending elements.* The notion of fictional space is traced through design theory and developed within the scope of participatory design. Fictional space and the notions presented within this perspective are not ready-made methods or techniques for conducting design inquiries. Rather, I suggest that they enable critical reflection and inspire action relating to three areas of design inquiries that deal specifically with re-shaping or suspending established conventions. First, it addresses how design inquiries are staged to meet particular ends and in particular how various props serve the purpose of anchoring and transcending current practices. Second, the notion of fictional space as emerging through games of make-believe provides concepts for reflection-in-action regarding the progression of particular design inquiries shedding light on how participants suspend and reshape particular aspects of established practices. This

provides the basis for more nuanced insights as to how participants envision that their practices might change and which particular aspects hold most potential and resistance. Third, the notion provides concepts for designers to reflect on how ideas, scenarios, or mock-ups developed during particular design inquiries are expressions based on participants re-thinking existing practices.

Resumé

Emnet for denne afhandling er design af engagerende interaktive miljøer, og afhandlingen er positioneret i krydsfeltet mellem participatory design, designteori og interaktionsdesign. Afhandlingens emne er blevet adresseret gennem et forskningsprogram vedrørende design af engagerende interaktive udstillingsrum på museer og oplevelsescentre. Afhandlingen består af syv forskningsartikler, sammenfattet i en generel oversigt, som sammenbinder argumenterne fra de inkluderede artikler og beskriver relateret arbejde og forskningsmetode. Bidraget afspejler et fokus på at forstå engagement i udstillingsrum og at forme designprocesser indenfor rammerne af ideen om engagerende interaktive miljøer.

Den første del af bidraget relaterer sig til at konceptualisere aspekter af engagement i relation til interaktive miljøer. Begrebet *participatory engagement* præsenteres som et generelt perspektiv, der belyser hvordan individer og grupper investerer deres tid, evner og viden i interaktive miljøer. Indenfor dette overordnede perspektiv præsenteres *means of engagement* som de konkrete midler, der medierer engagement. Dette begreb rækker ud over individuelle teknologier og brugerflader og favner den mængde af elementer, der arrangeres gennem design, og som i sammenhæng medierer engagement. Gennem en diskussion af begrebet *motivation* argumenteres der for, at museer kan skabe engagement ved at mediere mellem de besøgendes hverdagspraksis og den faglige viden præsenteret på museet.

Bidragets anden og største del beskæftiger sig med tilrettelæggelse af designundersøgelser. Denne del sammenfattes gennem begrebet *fiktionsrum* (*fictional space*), som er et perspektiv på skabelsen af designrum, hvori etablerede normer og konventioner ændres eller tilsidesættes indenfor participatory designundersøgelser. Motivationen for at skabe fiktionsrum i participatory design er at invitere deltagere i design til at gentænke eksisterende praksisser og forstille sig, hvordan deres praksis kunne være, hvis eksisterende konventioner blev ændret. Denne motivation gøres mere håndgribelig ved at relatere den til de designudfordringer, som museer står overfor. Der argumenteres for, at fiktionsrum skabes gennem *games of make-believe,* som er medieret af *props,* der bemyndiger forestillingsevnen og virker som både *forankrende og transcenderende elementer*. Begrebet om fiktionsrum udvikles med baggrund i designteori og udfoldes indenfor rammerne af participatory design. Fiktionsrum og de begreber, der præsenteres i relation til dette, er ikke metoder eller teknikker til at udføre designundersøgeler. Disse fordrer dog refleksion og handling i relation til især tre aspekter vedrørende designundersøgelser, der specifikt søger at ændre eller tilsidesætte etablerede konventioner. For det første belyser begrebet om fiktionsrum, hvordan designundersøgelser tilrettelægges, og specielt hvordan forskellige *props* bruges til både at forankre design aktiviteter i nuværende praksisser og til at transcendere disse praksisser. For det andet fordrer begrebet om fiktionsrum som et produkt games of make-believe refleksion over, hvordan specifikke designundersøgelser forløber, og hvordan deltagere ændrer og tilsidesætter elementer af etablerede praksisser. Dette giver mulighed for en mere nuanceret forståelse af, hvordan deltagere forstiller sig, at deres praksis kan ændres,

og hvilke aspekter der indeholder mest potentiale af modstand. For det tredje giver begrebet om fiktionsrum værktøjer, hvormed designere kan reflektere over, hvordan de ideer, scenarier eller modeller, der udvikles gennem specifikke designundersøgelser, er udtryk for deltagernes gentænkning af eksisterende praksisser.

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Part I – Dissertation overview

Table of contents

1 Introduction

The driving force behind the last three years of my research and the point of departure for this dissertation has been an academic interest in *designing engaging interactive environments*. The majority of my work and the core of my interest concern issues relating to the design process. My research has been motivated by an urge to understand and develop the ways in which *design* is accomplished and the ways in which particular design inquiries may be conducted. By using the term *engaging* I refer specifically to the design of situations and technologies that invite people to invest their knowledge, efforts, imagination, and capacities as resourceful individuals and groups. Throughout our everyday dealings it is clear that some situations are more successful than others in promoting our engagement. My interest relates to how we may design situations and technologies that are particularly conductive to engagement. The central material and scope of my work has been interactive technologies and how these might be designed to foster engagement. Technologies do however not exist in and by themselves; rather they are part of larger assemblies and *interactive environments* in which physical and digital material is blended in various ways. If we are to foster engagement through technology it is necessary to work more broadly with these environments.

I have pursued my overarching research interest through a more specific research program exploring the design of engaging exhibition spaces in museums and science centres. In response to societal, cultural, and technological developments, many museums find themselves in a time of change where existing styles of exhibition are re-envisioned. Moreover, museums are prompted to consider their role as institutions in society and the ways on which they connect to the lives of people (Hooper-Greenhill 2001). As such, museums are facing a highly complex situation with multiple interest, different paths to follow, and the uncertainty of stepping into new role. They are faced with a design challenge.

Through my work I have found inspiration in the Scandinavian tradition of design (Greenbaum & Kyng 1991) and its dedication to valuing the practices and skills of future users. In particular, I have dealt with the issue of participatory design inquiries where users and stakeholders are invited to participate in the design process. I have found this to be an inspiring area of research and a promising path to follow in addressing my research interest. Moreover, I believe that a

participatory design approach offers itself as an attractive approach for museums to pursue in their development.

The way to my contribution has been through reflection, discussions with colleagues, and literature studies. Primarily however, my research has been driven by experimental work where I have engaged in a number of research projects specifically in the domain of museums. In particular my work has been framed within two larger research projects that both deal with the design of technology for museums and science centres. The Interactive Experience Environments (IXP) project was a two-year research project within Centre for Interactive Spaces exploring novel technologies and concepts for interactive exhibition spaces. The cultural heritage project within centre for Digital Urban Living (DUL) is similarly aimed at exploring new concepts for exhibition spaces through the lens of interactive technologies. My work has been materialized in a range of research papers presented at conferences or published in journals. More specifically, I have chosen to structure this dissertation around seven research papers (P1-P7) that I believe best reflect my work and the contributions that I claim. The intent of this dissertation is to show how the included papers reflect contributions to a coherent research effort but also to reflect the diversity of the individual papers, concepts, and experiments.

1.1 The contribution

Considering the magnitude of my interest as presented above, my contributions do not, by any means, provide an exhaustive account. Rather, my interest has been a point of reference that has guided my academic inquiries and has led me towards a more narrow contribution. More specifically, I have pursued my overarching interest within a research program on designing engaging exhibition spaces in museums and science centres that have provided the experimental basis of my work. Museums and the academic field of museology has not been the main subject of my research; rather, they have provided a fruitful context in which to explore my research question. To qualify my arguments and contextualise my inquiries I have however engaged with museums on both a practical and a conceptual level. My contribution consists of two interconnected parts:

The first part of my contribution consists of theoretical and conceptual work on understanding engaging interactive environments. This issue is summarised through the overarching notion of *participatory engagement* denoting a perspective on how people as resourceful individuals and groups invest their time, skill, and knowledge in interactive environments. This part of the contribution is materialized in two research papers that, in different ways, deal with understanding engagement as an emergent phenomenon in interactive environments. In particular, the notions of *means of engagement* and *motivation* are developed as ways of reflection on how interactive environments may foster engagement.

The second and larger part of the contribution concerns the practice and understanding of conducting design inquiries when designing technologies for engaging interactive environments. This contribution is summarised through the overarching notion of *fictional space*, denoting a perspective on design inquiries that deliberately suspend or reshape conventions and established norms within a given practice. In my research, this second part of the contribution is materialized in the form of a concrete technique as well as concepts that provide means for reflection and action in relation to design inquiries. The notion of fictional space offers a perspective on design inquiries that aim at imaginatively transcending the given by inviting participants in design to re-think existing practices and imagine what their practices might be like if established conventions were altered. I provide an account of how fictional space is staged and constructed in particular design practices. Specifically, I argue that fictional space emerges as participants in design practice *games of make-believe* mediated by *props* that give mandate to particular imaginings and serve as both *anchoring* and *transcending* elements. These concepts provide means for design reflection and action concerning how design inquiries are staged and unfold.

The two parts of my contribution are tightly connected and have continuously informed each other during the course of my research as they are both fundamentally a product of a designerly engagement with my research program. My theoretical conceptualisation of engagement has shaped my approach and understanding of design inquiries and my design inquiries have in turn been central to articulating issues of engagement.

The contributions made in the included publications and summarised in this dissertation overview cross a span of abstraction ranging from overarching perspectives to concrete means and techniques. At the overarching level, the contribution consists of general concepts for reflecting on the nature of engagement and design inquiries. These concepts are developed primarily in P3 & P6 and P4-P5 where I outline the notions of fictional space and participatory engagement respectively. On a more concrete level, the included publications propose more specific concepts for design and reflection. These are materialised in a specific design technique, *Fictional Inquiry* (P1), reflections on particular means for spurring engagement (P5), and concepts for reflecting on the staging of participatory design inquiries (P2, P7). In chapters 4 and 5 I conflate these various contributions within the overarching notions of *participatory engagement* and *fictional space.*

My contributions are grounded in the intersection between the academic fields of design theory, participatory design, and interaction design. I do not see these as hermetically closed areas but rather as intertwined trajectories of scholarly inquiry and I believe that my work finds resonance within all these areas. In my work, there is however a particular focus on the issue of participatory design inquiries, reflected in the fact that four of the seven included papers have been published at venues that deal specifically with this area of research.

1.2 The dissertation

This dissertation consists of two main parts: a selection of research papers published during the course of my PhD work framed by a general overview. The overview serves to provide the necessary background for the included publications in terms of related work, the particular experimental work, and research method. Moreover, the overview connects, unfolds and provides perspective on the contributions made in the included papers.

1.2.1 Overview

The overview part of this dissertation consists of six chapters.

Chapter 1 provides an introduction to the dissertation by presenting the included papers and outlining the contribution.

Chapter 2 serves to position my contribution within established academic discourses. In particular, I address discourses within design theory, participatory design, and interaction deign. Moreover, this chapter deals with the domain of museums in order to motivate and contextualise the contribution and as a background for my experimental work.

Chapter 3 presents my research approach. The issue of design research is discussed through three sections that move progressively from an overarching discussion of the notion of design research to a discussion of the practice of doing design research before outlining the approach that best describes my work. My research approach is framed within the notion of a *science for design* realised as *exemplary design research* driven by *question, programs, and experiments*.

Chapter 4 begins the unfolding of my contribution by outlining the notion of participatory engagement as a perspective on understanding engaging interactive environments. The notion of participatory engagement is based on insights from the work of Albert Borgmann (1984, 1995), Arnold Berleant (1970, 1991), and pragmatist philosophy (Dewey 1934). In particular, I discuss the issues of *means of engagement* and *motivation* as central aspects in relation to the overarching notion of participatory engagement. Throughout this chapter I engage with both the overarching conceptualisation and provide examples from specific cases.

Chapter 5 turns the focus towards the design process and develops the notion of fictional space as a general perspective denoting design inquiries that deliberately suspend or reshape established conventions and norms within a given practice. The perspective of fictional space addresses design inquiries that aim at imaginatively transcending the given and providing participants opportunities for re-thinking and imagining future practices. The notion of fictional space is traced through design theory and developed within the context of participatory design practice. The final part of the chapter revisits some of the projects and experiments addressed in the included publications to develop and nuance the theoretical conceptualisations. Throughout the chapter, I show the connection between this

perspective on the design process and the perspective of participatory engagement presented in chapter 4.

Chapter 6 concludes the dissertation overview and presents directions for future work.

1.2.2 Papers included

The second part of the dissertation consists of the seven included research papers.

P1: Fictional inquiry – design collaboration in a shared narrative space

Dindler, C. & Iversen, O. 2007, *Journal of CoDesign*, Taylor & Francis, Vol. 3(4), pp. 213-234.

P1 presents Fictional Inquiry as a participatory design technique in which conventions and norms of established practices are re-shaped or suspended through the use of fictional elements. It is argued that the use of fictional elements in participatory design inquiries allows participants to explore novel aspects of their current or future practice. The paper explores how the technique has been used to inquire into existing practices, to explore future practices, and how it may work to initiate organizational change. The paper draws on case material from school projects as well as the Interactive Experience Environments project and discusses in detail the individual aspects of the Ficitonal Inquiry technique.

P2: Staging imaginative places for participatory prototyping

Brodersen, C., Dindler, C., Iversen, O. 2008. *Journal of CoDesign*, Taylor & Francis, Vol. 4(1), pp. 19-30.

P2 explores the places of participatory prototyping and in particular the staging of imaginative places for these design inquiries. It is argued that engaging with imaginative places provides participants with an extended space in which to explore future practices. The paper introduces the concepts of anchoring- and transcending elements, denoting the artifacts, narratives, and ploys that are used to both anchor the activity in established practices and to transcend these practices. The paper draws on case material from the Wisdom Well project concerning the design of interactive floors for school environments.

P3: Pursuing aesthetic inquiry in participatory design

Iversen, O. & Dindler, C. 2008. *Proceedings of Participatory Design Conference*, Bloomington (IN), ACM Press, pp. 138-145.

P3 introduces the notion of *aesthetic inquiry* in participatory design. Aesthetic inquiry is explored as a perspective highlighting design practices that stage off-line worlds for reflection and thus tip the scale towards transcendence in the process of design. The Fictional Inquiry technique (P1) is presented as a particular manifestation of this perspective and as a concrete way of pursuing aesthetic inquiry in participatory design. The paper draws on case material from the Interactive Experience Environments project.

P4: Motivation in the museum – mediating between everyday engagement and cultural heritage

Dindler, C. & Iversen, O. 2009. *Proceedings of Nordes* 2009, Olso.

P4 explores the issue of motivation in relation to designing engaging exhibition spaces. The paper draws on Cultural Historical Activity Theory to present a conception of motivation and its relation to museum engagement. An approach is proposed for creating engagement in museums by mediating between the everyday engagement of visitors, in terms of motives, and the knowledge presented in exhibition spaces. The paper draws on case material from the cultural heritage project within Digital Urban Living.

P5: Peepholes as means of engagement in interaction design

Dalsgaard, P. & Dindler, C. 2009. *Proceedings of Nordes* 2009, Oslo.

P5 presents and reflects on the concept of *peepholes* as a particular means for spurring engagement. The concept of peepholes is used to refer to the aspects of interactive artefacts and environments that utilize the tension between what is hidden and what is revealed to promote engagement. The concept of peepholes is framed within a general discussion on the notion of engagement drawing on the work of Berleant (1970, 1991), Borgmann (1984, 1995), and pragmatism (Dewey 1934). Peepholes are discussed as being one example of a *means of engagement*, denoting the intentional and diverse constructs of technologies and surroundings that in concert mediate engagement in a particular situation. The paper draws on case material from the cultural heritage project within Digital Urban Living.

P6: The construction of fictional space in participatory design practice

Dindler, C. 2010. Accepted for publication in *Journal of CoDesign*, Taylor & Francis.

P6 explores how fictional space is created in participatory design practice based on the notion of design space as the imagined field of work emerging from the situated

practices of participants in design. The notion of fictional space is inspired by work in literary theory and it is argued that the emergence of fictional space may be understood in terms of participants engaging in games of make-believe mediated by props. The paper draws on case material from the cultural heritage project within Digital Urban Living.

P7: Gaming the museum – inquiring into children's everyday engagement in cultural heritage

Dindler, C., Iversen, O., Smith, R., Veerasawmy, R. 2010. Submitted for publication.

P7 addresses the challenge of creating intersections between children's everyday engagement and museum exhibitions. Specifically, the paper proposes a designerly approach to inquiry where children's everyday engagement is taken as the point of departure in designing engaging exhibition spaces. The paper draws on case material from the cultural heritage project within Digital Urban Living.

2 Positioning the contribution

This chapter serves to motivate and contextualize the contributions that are claimed in this dissertation by both introducing museums as the primary experimental basis of my work and by introducing the academic discourses to which my work relates. I initially present my perspective on museums as the context of my studies, providing an outline of some of the challenges facing this institution and argue that these may be fruitfully understood and addressed as design challenges. From this discussion, I distil three points that have emerged as central to my work with museums. When needed, I will draw on arguments made from within the academic field of museology to substantiate my position. My perspective on the design challenge facing museums, serves as a motivation for my academic inquiries. Building on this discussion, the remainder of the chapter unfolds the academic context of my work and contextualises my contributions within the fields of interaction design, design theory, and participatory design. I will present these as a range of intertwined trajectories that deal with issues relating to interactive technology and design. I do so with the purpose of showing how my contributions fundamentally build on coherent strands of though that may be traced across a number of formal academic boundaries.

2.1 Museums

Museums are well-established institutions in society with a long history. According to Alexander (2008), the Museum may be traced to ancient Greek and Roman cultures and more or less public collections of objects that were deemed important for their aesthetic, historical, or religious qualities. During the Hellenistic period, the first museums appeared as centres of cultural, scientific, and artistic activities. In the Roman age, art collections were in high esteem and exhibited and appreciated for their aesthetic qualities. These collections were not explicitly termed museums but shared the central feature of being publically available (Maroević 1998). Through the middle ages, much of the collection activity was tied to the church and to Christianity and developed particularly as collections in monasteries and churches. The modern museum institution began to take shape in renaissance Europe, where *Wunderkammers* or *cabinets of curiosity* emerged as private collections of artefacts made available by the higher classes of society. These cabinets would contain collections of cultural or natural history and served as a

symbol of status, power, and wealth. The role of these collections did however gradually change towards an encyclopaedic function and towards becoming places of study. The museum as a public institution, as we know it today, took shape during the enlightenment, where private collections were gradually made public. Many collections where moved to universities and thus became available to students and the general public (Ibid.). The museums of modern society maintain this public commitment by collecting, preserving, and studying objects of particular scientific, artistic, or cultural significance and making these available and accessible. As noted by Vergo (1989), early public museums adopted the dual purpose and dilemma of both being places of study and preservation and as places of public display. This is still very much the case today. This dual purpose has been accentuated by the more recent trend where museums more actively engage in educational purposes beyond merely displaying objects. Guided tours are provided and museums are continuously exploring ways and formats in which their collections become accessible to a general public. Through my work I have primarily engaged with aspects of how cultural historical museums make their collections available in the broadest sense to the public. Moreover, a significant part of my work has been in the realm of science- and knowledge centres, which is a somewhat vague category of institutions that invite people to experience topics in science, natural history, and beyond. A typical trait of many of these institutions is a more playful and hands-on approach to communication. They are in some respects institutions that primarily deal with one side of the dual purpose of museums as sketched by Vergo (1989). Labelling these institutions as museum might, at best, raise eyebrows within the museum community. Yet these institutions do serve to highlight contemporary debates both within museology and society at large. In Denmark, the latest major revision to the law on museums was done in 2001. In a note to the 2001 bill it is stated that "*It is a goal that art museums and museums of cultural and natural history should develop their role as knowledge- and experience centres, contributing to the educational and cultural development of society*" (Danish museum Bill 2001, general remarks, my translation). The use of the term "*knowledge- and experience centres*" (op. cit.) has not gone unnoticed. As cited by Christensen (2007), during a 2001 debate in the national parliament in Demark a member of parliament noted "*I hope it doesn't become pure amusement park and profit making…*" (cited by Christensen 2007, my translation). Through my work with museums I have often heard similar concerns voiced, expressing that museums do acknowledge the need to provide means for visitors to engage with their collections, but that it should not all become roller coasters and candyfloss machines. The museum has a serious role as an education institution and as a communicator of natural and cultural heritage and this task should not be undermined. Keeping in mind that Pine & Gilmore's book "The Experience Economy" (Pine & Gilmore 2001) was published two years prior to the 2001 bill and that the notion of experience economy at this time was taking speed, the bill does seem to reflect a wider tendency. Yet the idea of re-thinking museum exhibitions might also be traced through the academic field of museology. As much as the museum is a well-established institution in modern society, many museums are facing a time of change, as the institution is challenged to adapt to new

generations of users, services, and expectations. As an example, the internet today provides a much more comprehensive repository of knowledge, debate, and research on areas within cultural or natural history than any single museum can muster. The role of the museum as a central repository and conveyer of knowledge is thus challenged. Moreover, the classical style of communication still found in many museums, where artefacts are displayed in showcases accompanied by factual information may seem at odds with an area where people are increasingly becoming producers of content and where participatory and more dialogical practices are common in many institutions of society. Critical voices from within the field of museology have argued that even most modern museums are still based on outdated transfer models of communication, that assume a linear transfer of information from a value free authority to a uniformed receiver (Hooper-Greenhill 2001). The problems with this model are many relating to the issue of communication, the role of the museum, and the role of the visitor. Providing answers and presenting knowledge from a privileged position may, in some respects, lessen the extent to which visitors engage critically with the topics of the exhibition. Moreover, a simple transfer model risks conceptualising the visitor as a lone receiver outside any socio-cultural context, merely absorbing what is provided. As shown by Falk & Dierking (1992) this is far from the case, as the museum experience fundamentally depends on contextual factors. Hooper-Greenhill's (2001) critique of the transfer model adopted in some museums finds resonance within a broader movement in museology, opting for a *New Museology* that revisits the methods and role of the established museum and opens up for a dialogical relationship between the museum, their visitors and society at large (Vergo 1989).

The challenge facing museums is inherently complex reflecting several dilemmas. What I have provided here is but a basic outline of a much richer discourse on museums. It does however serve to highlight the fact that many museums see a need for pursuing new ways of engaging with their audiences that transcend traditional styles of communication (Vergo 1989). In efforts to explore new exhibition styles, many museums have looked towards interactive technologies as a means for re-shaping exhibition spaces. Efforts within a variety of academic fields have begun to explore the potential of interactive technologies in exhibition spaces. These efforts reflect a broader concern for shaping the nature of the relation between the audience and the exhibition space. Adopting this broader perspective entails exploring and conceptualising the dynamics of the museum visit as it unfolds in the interplay between artefacts, technologies, visitors, and institution. In a seminal contribution to museology, Falk & Dierking (1992) propose a model for understanding how the museum visit is fundamentally shaped by the physical, social, and personal context. A substantial body of visitor studies within museology have further addressed the complex interplay between aspects of the museums experience. Regarding the issue of interactive technologies in exhibition spaces, studies within the area of Computer Supported Cooperative Work (CSCW) have begun to address the role of technologies in shaping the museum visit, exploring such issues as visitor participation (Heath & Lehn 2008), learning (Pierroux *et al.*

2007), and social interaction (Heath *et al.* 2005). These contributions reflect the wider concern for providing new ways for visitors to engage with exhibition spaces. As proposed within the New Museology, and exemplified by Hooper-Greenhill (1991), part of this challenge is to create exhibition spaces based on dialogue that frame the visitors as resourceful individuals and groups that can be invited to participate actively in the museum.

Within the academic fields associated with museums as well as in my own work it seems that that there are underlying dilemmas concerning the relationship between museums as institutions that preserve and maintain collections and their obligation to make these available to visitors. These are, in my view, not necessarily oppositions. They do however manifest themselves in a somewhat wicked problem of charting new courses for museums to pursue that provide visitors with meaningful ways of exploring exhibitions, yet refrain from trivialising the role of the museums. It is beyond the scope of this dissertation to provide an exhaustive account of the challenges and opportunities facing museums. Based on the discussion presented here I will however distil three key points that have emerged as central concerns in my own work with various museums and that circumscribe the perspective through which I have engaged with these issues.

- Exploring the means by which visitors are invited to participate and engage in exhibition spaces as resourceful individuals and groups.
- Exploring potential intersections between museum knowledge and the everyday life of visitors.
- Exploring concepts and practices for designing exhibitions in light of the two first challenges.

Through my work I have not made a definite distinction between museums and science centres. This is not to propose that such distinctions are not possible or necessary. Rather, as my academic interest primarily concerns the notions of designing engaging interactive environments I have pursued these across the boundaries of these categories, as I believe that they, in many respects, share an interest in engaging visitors in their exhibition spaces.

So far I have discussed some of the challenges facing museums specifically. These issues do, however, relate on a range of levels to current discourses within academic fields concerned with the design and understanding of technology. In the following sections I explore these challenges in relation to developments within academia. In particular I address the fields of interaction design, design theory, and participatory design. As my contribution in several respects crosses boundaries between these disciplines I will pay particular attention to sketching the relevant intersections between these disciplines.

2.2 Human-computer interaction and interaction design

Understanding human engagement with and through technology in museums calls upon general conceptualisations concerning the interaction between people and technology. This is in essence the scope of the academic field of Human Computer Interaction (HCI). The developments within HCI reflect the involvement of a diverse set of well-established disciplines that have shaped the basic notions of people's relations to technology. These range from influences from cognitive science (Card *et al.* 1983) to ethnomethodology (Garfinkel 1967) and activity theory (Bødker 1991) (see Rogers (2004) for overview). Developments in HCI have, however, to a large extent also been shaped by the developments in computing technology; from the mainframe computer to mobile and ubiquitous technologies of today. As technologies have begun to reach out into their surroundings the unit of analysis in HCI has been broadened in order to encompass contextual and socio-cultural aspects that fundamentally shape people's relation to technology (Grudin 1989). The notion of interaction design grew out of the HCI tradition and has been labelled in a variety of ways during the years (see Hallnäs & Redström (2006) for overview). Some accounts address the central role of digital artefacts as a key trait of interaction design (Löwgren & Stolterman 2004) whereas others stress the fact that interaction design fundamentally concerns how people relate to each other through the medium of artefacts (Buchannan 2001). The term was arguably first coined by Winograd (1997) in his reflection on the next fifty years of computing. Winograd (Ibid.) reflects on current and emerging trends within computing and identifies trajectories leading from computing to communication, from machinery to habitat, and from aliens to agents. These developments circumscribe interaction design as a "*shift from seeing the machinery to seeing the lives of the people using it*" (Ibid.: 160). The shift and broadening of focus entails addressing the "*complex interplay among technology, individual psychology, and social communication*" (Ibid.). Many of the core elements of Winograd's suggestion are traceable in the developments within HCI where research since the late 1980's have stressed the social and contextual factors critical to technologies in use and a move from aliens to agents, or "*from human factors to human actors*" (Bannon 1991). Moreover, the advent of mobile and ubiquitous technologies that imply the move from machinery to habitat has been a focal area of study within HCI. In the strict sense, interaction design may not rely on the use of digital technologies, yet digital technologies have clearly played a prominent part in the development of the field. As such, the developments in interaction design have been related to developments in technologies. In relation to HCI, interaction design is distinguished by virtue of being a *design* discipline. It has been argued that HCI may also be regarded as a design discipline (Fallman 2003), yet interaction design is marked by a particular attention to distinctly designerly ways of thinking, acting, and knowing. I will return to the issue of design in the next section.

In relation to the scope of this dissertation two developments related to HCI and interaction design are of particular interest and are closely related to my work. The first relates to the notion of ubiquitous computing, denoting a paradigm of computing where technologies and processing power have become distributed into

everyday objects and practices (Weiser 1991). As technology has begun to pervade most aspects of life it has become increasingly pertinent to explore the ways in which technologies relate to their surroundings. Ubiquitous computing has opened up for exploring novel ways for people to engage with technology through tangible and kinaesthetic forms of interaction. Although the issue of ubiquitous computing is not an explicit topic in my research, the prototypes that I have developed and evaluated during my work reflect this development towards creating novel configurations that blend physical and digital material and ways of interacting. A number of researchers have already begun to explore the potential of ubiquitous technologies in exhibition spaces, in the form of augmented reality (Woods *et al.* 2004, Wojciechowski *et al.* 2004), context aware museum guides (see Raptis *et al.* (2005) for overview), and various forms of mixed reality that blend physical and digital material in the exhibition space (Sparacino 2004, Ferris *et al.* 2004, Hall *et al.* 2002) and outside the museum (Dähne *et al.* 2002).

The second development that is of particular interest to my work is the move from considering technologies as primarily tools for work settings towards exploring how technologies blend into the fabric of other domains of everyday life. Public spaces, leisure environments, homes, and even museums have recently caught the attention of researchers in the fields of HCI and interaction design. Authors within HCI have talked of a *third wave* denoting that "*the use context and application types are broadened, and intermixed. Computers are increasingly being used in the private and public spheres. Technology spreads from the workplace to our homes and everyday lives and culture. New elements of human life are included in the human-computer interaction such as culture, emotion and experience*" (Bødker 2006: 1). As noted by Bødker (Ibid.), concerns have been raised regarding the extent to which traditional notions of convenience, effectiveness, and usability derived from work place settings might be sufficient in the face of this broader and more diverse scope of technology application. This development calls for fundamental reflections on the implications of not only working with but also living with technology (McCarthy & Wright 2004). Within the scope of ubiquitous computing, Rogers (2006) proposes a shift in agenda from mainly focusing on convenience and comfort towards exploring how ubiquitous computing can crate engaging experiences. More broadly speaking, the reactions to the broadened scope of HCI and interaction design have come from a range of traditions each addressing the issue from various propositions and perspectives. Udsen & Jørgensen (2005) propose that the reactions may be categorised within a cultural approach, a functionalist approach, an experience-based approach, and a techno-futuristic approach. The majority of the contributions within interaction design fall within the experience-based approach exploring such agendas as aesthetics of interaction (Blythe *et al.* 2003, Petersen *et al.* 2004) and lived experience (McCarthy & Wright 2004). Contributions within the experience-based approach do, however, adopt a variety of perspectives in the study of experiential aspects of technology. Among the prominent perspectives adopted, are pragmatist accounts (primarily represented by the work of Dewey (1934)), which have provided several authors with basic notions of experience and aesthetics. McCarthy & Wright (2004)

provide a relatively thorough examination of how we may think of technology as experience, suggesting four threads that are central to experience. Petersen *et al.* (2004) use notions from Dewey (1934) and Shusterman (1992) to coin the general notion of *aesthetic interaction*, identifying socio-cultural, instrumental, and kinaesthetic aspects and Forlizzi & Battarbee (2004) employ a pragmatist perspective to address specifically the notion of co-experience. Apart from the inspiration from pragmatism, authors have also found inspiration in phenomenology, stressing the central role of the body in experience (e.g. Davis 2003) and in more artistic traditions exploring such issues as post-optimal objects and parafunctionality (Dunne 1999). Although the work within the experience-based approach varies considerably in terms of scope and tradition, they share a concern for exploring new agendas and ideals for conceptualising and shaping peoples relations to and through technology. These developments are at the core of interaction design as they deal both with digital technology as the design material and with how people engage with each other and their surroundings through technology. The work presented in this dissertation continues this line of inquiry by addressing the notion of engagement as it might unfold in exhibition spaces.

Returning to the world of museums, and the three challenges that I sketched in the previous section, these are to a large extent mirrored within interaction design albeit on a more general level. Rogers' (2006) suggestion of a program for research in ubiquitous technologies that focus on how these might truly engage people is a suggestion that might well be pursued in the realm of museums and potentially address the first to challenges as sketched in the previous chapter. Regarding the third challenge concerning the design process, this requires an exploration of a distinguishing feature of interaction design, namely that it is a *design* discipline. Unravelling the notion of design is the focus of the next section.

2.3 Design theory

Apart from being a central component to the area of interaction design, the issue of design is central to my work in a number of ways. First of all, it is the subject of my research activities as I deal with the shaping of design inquiries. Secondly, exploring a notion of design will provide the basis for my proposition that the challenge facing many museums is fundamentally a design challenge. And thirdly, the basic elements of design theory form the basis for articulating my research approach. I use the terms *design theory* broadly, covering works that address and conceptualize fundamental issues of what constitutes designerly activity. Here, I shall provide a brief introduction to design theory, which will serve as a common basis for unfolding my research method, contributions, and reflections on the domain of study.

In his seminal contribution to design theory, Simon (1969) famously proposed that "*everyone designs who devises courses of action aimed at changing existing situations into preferred ones*" (Ibid.: 111). This is indeed a very broad definition, but it is useful in the sense that it underlines that design entails intentionally bringing about

change that is in some sense preferable or desirable. What these preferred situations are, how we come to know of them, and how one might devise courses of action are some of the issues addressed in design theory. Broadly speaking, design theory deals with conceptualising the nature and fundamentals of distinctly designerly activity. Extending the definition provided above, Simon (1969) proposed that design might be understood as a *science of the artificial* where the design problem delimits a problem space in which the designer, through rational processes, may search for a design solution. Contrary to science, Simon argued, that deals with understanding how things are, design is concerned with how things ought to be. Design is thus based on normative statements in contrast to the propositional statements of science (Krippendorff 2006). Simon's (1969) account of the nature of design ties the discipline closely to the disciplines of science and the methods applied in this tradition. As argued by Dorst (2003), Simon conceptualises design as a rational process of problem solving. Such an approach works quite well when applied to simple and structured problems. However, Simon's account of design entails that a design problem can be formulated from the outset and that design problems are indeed of a structured kind. This is however rarely (if ever) the case in design. This central issue of design problems was addresses by Rittel & Webber (1973) and their work on planning processes. Rittel & Webber (Ibid.) observed that important problems (such as planning problems) do not lend themselves to rational problem-solving procedures. Rather, these problems have a *wicked* nature in that they cannot be exhaustively defined and that every formulation is in itself a solution. These kinds of problems escape formulation and have an underdetermined nature (Dorst 2003). In the words of Coyne (2005), the apparent inadequacy of a science-based approach is fundamentally "*a problem of rationality*" (Ibid.). Among the most influential responses to this problem of rationality, is the account of design activity offered by Schön's notion of *reflective practice*. Schön (1983) specifically addressed professional practitioners dealing with undetermined or *messy* situations and argued that design activity develops as fluctuations between problem setting and problem solving and may be described as a reflective conversation with the materials of the design situation. The notion of *problem*, in this sense, relates to the designer's current understanding of the design situation rather that to a universal and stable phenomenon. Schön (1983) explicitly builds on ideas of pragmatism and thus fundamentally reconceptualises the dichotomy of theory and practice and the very idea of knowledge. Schön characterises competent professionals as reflective practitioners that display situated knowing in action and are capable of building on their repertoire of experiences. In later work, Simon (1973) addressed the issue of ill-structured problems, suggesting that these might be addressed by creating several and more manageable problem spaces and thus, in a sense, taming the problem. Schön's account on the other hand stresses the co-development of problem and solution through the designer's moves. Extending these ideas, Hallnäs & Redström's (2006) conceptualise the issue as pertaining to what is given from the outset of the design process. They argue that design is always design of something given yet what is initially given is changed through the acts of design. A circular process is thus created in which what is given is changed through the interpreting acts of design

that in turn change our perception of what is given. In this sense, Hallnäs & Redström's (2006) account provides a procedural understanding of Schön's notion of the inseparability of problems setting and problem solving.

The distinction between the perspective of Simon and that of Schön is often portrayed as a distinction between a rational approach and a constructionist or pragmatist approach. Mediating arguments have been put forward suggesting that the work of Simon and Schön may in fact be seen as complementary (Chuo so Meng 2008) and that design activity may display both aspects of reflective conversation as proposed by Schön and the structured search among alternatives as proposed by Simon (Heape 2007). Both Schön's work on reflective practice and Simon's proposal of a science of the artificial has had a major impact through design communities.

The fundamental uniqueness and complexity of design activity have fuelled a movement towards articulating design as a culture in its own right similar to science and humanities. The activity of design is, however, not necessarily set apart from the practices of other disciplines. As proposed by Simon's (1969) definition of design, the activity may be seen as a pervasive phenomenon that is central to most aspects of life and pervades most other disciplines. Nelson & Stolterman (2003) argue that design is such a natural human ability that almost everyone designs most of the time. This idea of design as a basic ability that pervades most parts of human existence, more than anything, opts for an account of design that deals with the basic notions of the activity. In many respects, the formulation of a design culture may be seen as working towards providing insights into the processes of dealing with wicked problems and design complexity (Buchannan 1992). As argued by Stolterman (2008), approaches for dealing with complexity based on technical rationality risk ending in various forms of paralysis. When faced with the wickedness and uncertainty of a design situation analysis may lead to paralysis, as the wicked problem does not lend itself to rational resolution. We may find ourselves in the odd situation of being confronted with too much information yet still needing information in order to make a rational choice. As noted by Nelson & Stolterman (2003), we are here literally "*bumping up against the limits of rationality itself*" (Ibid: 133). This situation of paralysis circumscribes the uniqueness of wicked problems and a need for an alternative to a rationalistic account of design.

A reasonable question is of course why the problems faced by design are of a wicked nature. Rittel & Webber (1973) observed that wicked problems arise from situations with multiple stakeholders with competing interests leading to an inability to adequately formulate the problem. Perhaps, however, a more satisfying answer is not found in the class of problems that designers engage with, but in the way designers approach situations. Such an account would suggest that not only do designers in fact take up situations of great complexity, but also that designers have a particular way of approaching problems – in a sense making problems wicked. Buchannan (1992) argues that the subject matter of design is potentially universal; that we have to discover or determine the subject matter, as this is not exhaustively provided a priori. Thus, even the simplest of problems are made wicked because

we, in design, consider the problem as something that has wider consequences – we do not limit ourselves to any given subject matter connected to the problem.

In terms of providing an account of design on its own terms, Cross (2007) argues that there are indeed designerly ways of knowing and acting that are in need of their own culture in order to flourish. Needless to say, however, the cornerstones, traits, and qualities of this culture do not lend themselves to trivial definition. A range of authors has however contributed significantly to establishing this culture. Krippendorff (2006, 2007) presents an interesting characterisation of designers' activity as compared to science and thus comments more or less directly on Simon's position. Krippendorff (2007) argues that fundamentally "*Science articulates the constructions that worked so far. Design articulates constructions that might work in the future – but not without human intervention.*" (Krippendorff 2007: 10) and elaborates on this position by considering the basic activities of design; among these that designers (1) consider possible futures that are inherently not predictable from laws of nature, (2) evaluate the desirability of these futures in relation to the people who are to inhabit them, and (3) search the present for variables that create a space of possible action. Elaborating on the distinction between science and design, Nelson & Stolterman (2003) argue that the two traditions address two different ends of a continuum; science moves from the particular to the general and universal whereas design deals with creating the particular. The creation of the particular takes departure in the complexity of what is given at the beginning of the process (cf. Hallnäs & Redström 2006). Often, design moves opposite compared to science, that is, from general ideas formulated in the beginning of the process to the particular design solution. Complementing Cross' (2007) notion of designerly ways of knowing, Nelson & Stolterman (2003) propose that design is a compound form of inquiry entailing true, real, and ideal ways of gaining knowledge. Inquiries into the *true* concerns understanding and come from description and observation. Scientific methods are extensively used to determine what is true. Inquiries into the *ideal* concern norms and values and deal with what ought to be in light of any particular idealistic system. Inquiries into the *real* are concerned with what is particular and are "*not only a form of reflective, abstract, or conceptual inquiry, but it is also action-oriented. Its focus, when used for design purposes, is on production and innovation*" (Ibid. 2003: 39). Nelson & Stolterman (2003) argue that this compound form of inquiry is achieved using a range of skills fundamental to design competence. These comprise imagination, interpretation & measurement, judgment, composition, production, and desiderata. These fundamentals are mirrored in Hallnäs & Redström's (2006) account of design as bridging the hermeneutical gap between the designers' understanding of what is given at the outset of the process and what is made to exist through design, by way of interpretation and judgment. As we bridge the hermeneutical gaps of design through interpretation and judgment, design is disclosed as a non-scientific discipline – in bridging the gap we are, as Hallnäs & Redström (2006) put is, "*lost for a moment*" (Ibid: 38). These fundamentals may of course be described and reflected upon, but they are eventually "*an open-and-shut case of 'learning by doing'*" (Nelson & Stolterman 2003: 131). The picture that

emerges from this outline of the fundamentals of design is in one sense that design has its own form of rigor and discipline (Wolf *et al.* 2006), but also that the fundamental abilities are closely tied to the designer. As argued by Cross (1999), design ability may be said to reside both in the process, the artefacts, and in people.

Returning for a moment to the realm of museums, the notion of design developed here provides the basis for arguing that the challenge facing many museums is fundamentally a design challenge. These challenges are indeed of a wicked nature; or rather, they become wicked as museum are forced to explore their relation to visitors, the style of their exhibitions, and their role in society at large. Museums are faced with the task of exploring and making concrete new aspects of their practice based on an intention of what they want their institution to become. This, I propose, may fruitfully be regarded and addressed as a design challenge.

Both Krippendorff's (2006) and Nelson & Stolterman's (2003) conception of design fundamentals deal with the concept of what is desired to be put into existence by those who are served by design. They suggest that design intention should build on such a conception. In my work, I have explored this issue through participatory design by involving museum professionals and visitors in parts of the design process. In the following section I provide an outline of the development and key aspects of this field of research.

2.4 Participatory design

The final strand of research that has been central to my work is the Scandinavian tradition of system development and more broadly participatory design. Participatory design may be defined broadly as an approach to design where the people who are to use the system play a critical role in its design (Schuler & Namioka 1993: xi). This is an extremely broad definition not providing specific details as to what is meant by *approach*, *the people who are to use the technology* or *a critical role*. This does however underline the fact that participatory design is not a uniform method, but rather a collection of principles, practices, and approaches to design. Participatory design has its roots in both Scandinavian as well as North American traditions. The Scandinavian tradition of system development derived from a range of research projects in the 1970's and 1980's dealing with the introduction of technology into work practices. Bansler (1987) provides an overview of this tradition, arguing that three major schools have been prevalent adhering to different social and historical contexts; the system-theoretical tradition, the socio-technical tradition, and the critical tradition. The system-theoretical tradition is characterised by Bansler (Ibid.) as aiming for profit maximization by rationalising work procedures through the introduction of technologies. The system theoretical school emerged in the 1960's building on rationalistic and scientific conception of how technology might improve organizations. The socio-technical tradition on the other hand is concerned with the interplay between technology and human factors and strives for a harmonious fit between the two. Based on observations of how technology was introduced in work settings and at

times failed to provide the intended improvements, it became clear that introducing technology was not only a technical issue, but also related in profound ways to social and organisational structures. Similar to the socio-technical tradition, the critical tradition emerged from the experiences of introducing technology into work practices. Researchers within the critical tradition did however side with trade unions that during the 1960's began to criticise the impact that technology was having. Researchers in the critical tradition were concerned about work quality and de-skilling of workers. As argued by Bansler (1987), the critical tradition does not accept the notion of mutual interest between capital and labour, but sees in this relationship as possible conflict and struggle. Hence, the critical traditional developed a strong focus on the political aspects of design. Historically as well as in current research, these traditions overlap and continue to inform each other (see Floyd *et al.* (1989) for more comprehensive discussion). In spite of these overlaps, the critical tradition may be said to have developed in opposition to the socio-technical- and system theoretical tradition. The critical tradition was fuelled by a range of projects (see Bjerknes *et al.* (1987) for overview) where researchers and trade unions joined forces to explore how future technologies might be developed with a particular sensitivity to the perspectives of workers. These projects had an explicit political agenda of democratizing the process of introducing technology into work practices and of respecting workers as skilled professionals. This was materialized in the direct involvement of workers in the design process and a dedication to taking seriously the skills and work practices of these people. This approach was later termed Cooperative design (Greenbaum & Kyng 1991). Through the Scandinavian cooperative design projects a range of design techniques and tools were developed that reflect a concern for developing technologies with and for the people who are to use them. These range from the use of ethnographically inspired fieldwork to gain detailed insights into work practice to the use of mock-ups and prototypes for co-designing with users (Ehn & Kyng 1991, see Muller *et al.* (1993) for overview).

Similar to the development in Scandinavia, researchers in North America voiced concerns that to often surrogate or imagined users would stand in the way of the people who were to use the system, and that stereotypical scenarios stood in the place of accounts of actual work activities (Suchman 1993). The development of participatory design in North America did, arguably, not to the same extent embody the political ideals embedded in Cooperative design, but reflected a more pragmatic approach (Greenbaum 1993). In 1990 the first participatory design conference (PDC) was held in Seattle, where experiences where shared among Scandinavian and American researchers. This conference was the first bi-annual event marking participatory design as a conflation between traditions from Scandinavia and North America. The research field has maintained its multiplicity and continues to display a range of approaches as well as both pragmatic and political arguments for participation (Kensing *et al.* 1996). Throughout this dissertation overview, I use the term Participatory Design to encompass both the Scandinavian and North American traditions – when nuance is needed I will refer to the specific works or traditions.

Today, the field of participatory design encompass a substantial body of literature that reflects a diverse collection of principles and practices for involving people directly in the design process. As suggested by Kensing & Blomberg (1998), the issues addressed by participatory design researchers may be summed up broadly as pertaining to the politics of design, the nature of participation, and methods, tools, and techniques for participation. From the initial focus on trade unions and blue-collar workers, researchers in participatory design have begun to explore diverse realms ranging from business (Kensing *et al.* 1996) to museums (Taxén 2004) and from schools (Iversen 2005) to health care (Sjöberg & Timpka 1998). Moreover, researchers within participatory design have begun to explore ubiquitous computing as their design material and the opportunities that this offers (Hornecker *et al.* 2006, Clement *et al.* 2008). Traditionally, as well as in contemporary participatory design, the field has close ties to the academic environments and has to a lesser extent proliferated into industry. More recently, concerns have been raised regarding participatory design's status and potential beyond the confines of research communities. In an oft-cited paper, Shapiro (2005) argued for a reformist participatory design agenda and suggested that the community should engage with large-scale project. In particular, Shapiro argued, that a range of failures of projects within public sectors shows the need and opportunity for participatory design. Several researchers have pursued this idea (e.g. Balka 2006, Simonsen & Hertzum 2008) suggesting, as Simonsen & Hertzum (2008), that it is time for participatory design to leave its teens and join the adult world (Ibid.: 1).

Similar to developments in HCI and interaction design, a range of societal and technological developments has come to challenge and inspire current research in participatory design. Of particular interest to my contribution is the proliferation of technology from the work place into domains of everyday life. As much participatory design work has dealt with work settings, the field is still in the beginning of a process of embracing new domains and exploring what challenges and opportunities these pose to participatory design research. Four of the papers included in this dissertation deal specifically with participatory design practice albeit from various perspectives and on various levels of abstraction. P1 develops a particular technique, Fictional Inquiry, and P2 deals specifically with how participatory design inquiries are staged using props and the roles these come to play. P3 and P6 reflect a more overarching concern for understanding and conducting participatory design inquiries that suspend or re-shape established norms and conventions within a given practice. In light of current developments in participatory design, my work provides both examples of how participatory design may be practiced in the domain of museums on a concrete level and reflections on these examples on a design theoretical level. In this dissertation overview I extend the notion of fictional space developed in P6 as a frame for encompassing my contributions to participatory design. This elaboration ties together notions from design theory as presented in the previous section with ideas from participatory design. In the following section I outline how I see the potential connection

between design theory and participatory design and thus form the basis for elaborating on my contribution.

2.5 Design theory and participatory design

My process and my contribution reflect a concern for design on several levels relating both to theoretical notions as well as more practical concerns. I have, throughout my process, been engaged in design activities where concrete artefacts were developed. Moreover, my work deals with both design theory and more specifically with the practice of participatory design. I believe it is worth dwelling for a moment on the potential connection that I see between participatory design and design theory more broadly. Participatory design can hardly be termed a theory about design; rather, it is a diverse collection of perspectives, approaches, and practices. My engagement with participatory design started with a somewhat idealistic conviction that a participatory approach was needed in order to take into account the needs, motivations, and aspiration of the people who where to live with the technologies that I helped design. It was (and still is) my belief that museums in particular might do well in establishing more permanent dialogues with their visitors as a part of addressing the design challenge that they face. It is the central tenet of participatory design to directly involve the people who are to use the technology in the process of designing it, and at face value, the notion of participation might seem reasonable and perhaps even admirable. As much as this tradition and the results achieved within this body of research has inspired and informed my work, I cannot help but feel that there are fundamental issues relating to the very notion of design activity that could be in need of more attention within participatory design. Such a substantial account of design activity is, I believe, pursued in the work of Simon (1969), Rittel & Webber (1973), Schön (1983, 1992), Nelson & Stolterman (2003), Hallnäs & Redström (2006), Telier (forthcoming) an others (see section 2.3). In this dissertation overview I have labelled this line of work *design theory*; a term covering works that address fundamental issues of what constitutes designerly activity. In my work, I have found that design theory has a rich vocabulary and discourse that is capable of addressing what is at stake in participatory design and of articulating more clearly the challenges that this approach faces. This discourse is not absent in the participatory design community, but I believe that its potential to inform research has not yet been fully utilised. As a meta-reflection on my work, I believe that it exemplifies what design theory and some of the ideas embodied in this rich discourse might do for participatory design. I believe that ideas from design theory could perhaps assist further in exploring the foundational issues of participatory design as the field begin to engage with new domains, users, and technologies.

2.6 Summary

In the preceding sections I have sketched the trajectories within academia as well as the domain of museums that serve to position and contextualize my contribution.

My contribution lies in the intersection between interaction design, design theory, and participatory design as I deal with both conceptualising the use and design of interactive technology. In many respects, the development and challenges that I have sketched within the domain of museums reflect general research concerns within these academic discourses and the museum thus provides one particular manifestation in which to explore some of these challenges. My contribution relates to these developments in a number of ways. It reflects a general tendency within the various fields to address new domains that stretch beyond work practice and to explore qualities of technology beyond utilitarian concerns. This relates to my exploration of the notion of engaging environments and to my work of shaping design inquiries. Moreover, my work reflects a general development towards exploring novel forms of interaction and various ways of blending physical and digital material in interactive environments. This is not only evident from looking at the prototypes that I have used in my work, but also in my conceptualization of engagement as emerging not only in the relationship between people and interfaces but in the complex interplay between people, assemblies of technologies, and other features of the environment. In this respect, my work continues a line of inquiry where the unit of analysis is broadened to encompass the wider social, cultural, and material circumstances in which people engage with technology.

3 Research approach

In this chapter I outline my research approach and introduce the experimental work that forms the basis of my contribution. I argue that my research may be understood within the notion of a *science for design* realised as *exemplary design research* driven by *question, programs, and experiments*. This approach underlines the experimental and interventionist character of my work and provides a coherent way for discussing how my arguments are connected to my design work and to academic discourses. The issue of academic research in design disciplines is indeed contested terrain and has been the subject of much debate in recent years. In many respects, this debate is an extension of the discourse regarding design that I introduced in the preceding chapter. In order to provide footing for the approach that I use to describe my work, I find it necessary to discuss and introduce central positions within the discourse of academic design research. The structure of this section is thus somewhat top-down; I will start of by discussing the issue of academic design research and practice and proceed to position my own approach within this frame of understanding.

3.1 Academic design research

The issue of design research is complicated and has been the subject of much debate and confusion. The discussion evolves around such issues as in what sense research can actually inform design, the nature of research in scholarly traditions and in design practice, and not least the nature and relevance of knowledge claims. The core of these discussions does however seem to evolve around what is meant by the notions of *design* and r*esearch*. Keeping in mind the discussion of design theory in the previous chapter, and in particular the noted discrepancies between science and design, the bringing together of these terms might in some respects be an *oxymoron*, as Krippendorff (2007) rhetorically suggests.

One reason for this state of affairs, is the fact that the very notion of *research* is used in a variety of ways; some use research to refer to the process where practicing designers gain knowledge as part of a practical design task. For example, a designer may do observational studies of a work practice as part of designing a new peace of office furniture. Elsewhere, the term research is used more specifically to refer to academic research where design in one way or another becomes the subject or

method of research activities. This situation is complicated even further when, often, people doing academic design research use research, in the first sense of the term, as part of their process. For example, the notion of doing research *through design* might imply doing designerly research as part of doing academic research. In a sense, this is of course a linguistic matter concerning the fact that design communities at times use one term to cover different activities. But the issue is not only a linguistic one. Returning to the notion of research through design, which is an often-used notion in current interaction design research, there seems to be a potential recursion at play. An example; if the subject of a study is a scholarly issue in design theory or practice and the method of exploring this is design (research through design) it seems that design becomes both the subject and method of the approach. In other words, design is used to explore what design is. This is not necessarily a disqualifying trait, yet it prompts considerations as to the relationship between design and research. Fallman (2007) provides a take on this discussion by distinguishing between design-oriented research and research-oriented design as two ends of a continuum reflecting whether design is a method for doing research or research is a method for doing design. In a much cited paper, Frayling (1993) provides concepts that help to distinguish the issue of the subject and method of design research by distinguishing between research *into* art and design, denoting research directed at exploring the objects produced through design, research *through* art and design, denoting research where design is used as the method for conducting scholarly inquiry, and finally research *for* art and design, denoting the research that goes into the production of design products. Ludvigsen (2006) provides an elaborate discussion of the notions proposed by Frayling (1993) and expands on the categories within the scope of interaction design. Interestingly, Ludvigsen (2006) provides a reformulation of Frayling's research *for* design, coining the term research *in* design. By this term, Ludvigsen accentuates research in the creative process where results to some extent are generalised and aimed at communities inside or outside of the design discipline. In contrast, Frayling's notion of research for design seems to refer more to the particularities of a given process that eventually becomes expressed in the product.

Frayling (1993), Ludvigsen (2006), and Fallman (2007) all provide handles for grasping the complex relations between design and academic research. In particular they address the issue of what constitutes the object and methods of the activities. There are however more persistent issues relating to the achievements and claims that can be made through design research. Stating that a particular research agenda is addressed as research through design does not in itself address the nature and relevance of the knowledge created. In the tradition of science, there are arguably more established notions of what constitutes proper knowledge generation. The field of design research in the broadest sense does not seem to enjoy such relative stability and the issue is subsequently the object of continuous re-articulation. In attempts to make design open to scholarly inquiry, there have been attempts to tie design to the practice of science. As noted in the previous chapter, the work of Simon (1969, 1973) was crucial in establishing the connection between these two disciplines. Simon's (1969) conceptualization of design as a

science of the artificial does not only suggest that design practice can be engaged through rational processes, but also lays the ground for academic inquiries into design as yielding "*a body of intellectually, analytic, partly formalizable, partly empirical, teachable doctrine about the design process*" (Ibid.: 58). These are two different, yet obviously related notions; the first referring to the fact that design may be engaged in through rational procedures and the second proposing that scientific principles may be used in the study of how design is accomplished. As argued by Cross (2001), the attempts to relate science to design can be traced back to the 1920's, but were perhaps most articulated in the 1960's with the work of Simon and the design methods movement working towards a more systematic set of methods for doing design (e.g. Jones 1970). Cross (2001) identifies three general categories describing the ways in which science has been related to design:

Scientific design, denoting design practice based on scientific knowledge but utilising both intuitive and non-intuitive design methods.

Design science, denoting and organized and rational approach to design, framing design as itself a form of science.

Science of design, denoting inquiries aimed at furthering the understanding of design through the use of scientific methods of inquiry.

As noted in the preceding chapter, the idea coupling science and design has received much critique by authors opting for an account of design on its own terms. As argued by Rittel & Webber (1973) in their characterisation of wicked problems, every solution to a wicked problem is a one-shot operation. As soon a particular solution is attempted, the situation is changed and because every design situation is unique, it is never possible to go back and try a different solution to the exact same problem. This seems to contrast to the fundamental principle of reproduciability in science. Stolterman (2008) argues that interaction design research needs to be based on a fundamental understanding of design practice and that although both disciplines fundamentally deal with complexity, they do so in very different ways. Science deals with complexity by producing universal, generalised, and reproducible knowledge and procedures derive from scientific method. Science is thus a move from the particularities of given phenomena to the universal. Design on the other hand, does not attempt to create scientific knowledge as laid out above. Design entails creating the particular in the form of an object for a specific client or group of people, with particular needs in particular situations. However, this does not mean that design is purely chaotic, subjective, and irrational. As argued by Stolterman (Ibid.), design has its own structure, procedures, and components that, when used by skilled designer, are organised. Pursuing this line of though, opting for a dislodging of design research from science does however entail that design research, as a discipline, needs to account for its nature, qualities and relevance. It is perhaps a common trait in emerging disciplines that they tend to define themselves in opposition to existing and more established paradigms. There is however a need for providing a positive articulation of design research. Krippendorff (2006) makes this point by arguing

that it is necessary to explore design research on its own terms and not surrendering to the criteria of science. Several authors have contributed to this project. Wolf *et al.* (2006) argue that design indeed has its own rigour understood as "*as a repeatable process, of a consensual standard of quality, in use by a professional community of practice*" (Ibid.: 522) and describe the qualities inherent in this practice as being: a non-linear process, the use of design judgment, the making of artefacts, and design critique. Nelson & Stolterman's (2003) discussion of a range of design fundamentals including judgment, interpretation, desiderata (addressed in the previous chapter) may be seen as complementing these constituents.

Extending the analysis of the relation between science and design provided by Cross (2001), Krippendorff (2006) proposes a *science for design*, denoting:

"*a systematic collection of accounts of successful design practices, design methods, and their lessons, however abstract codified, or theorized, whose communication and continuous evaluation within the design community amounts to the self-reflective reproduction of design practices."* (Ibid.: 35)

Krippendorff (2006) particularly accentuates the proactive nature of this discipline, arguing that:

"it cannot be limited to theories of what exists, to patterns that were observed in the past, and to generalizations of the limits in what can be done. It must provide the intellectual tools needed to realize that did not exist before, to introduce desirable changes in the world, to project the technological, social, and cultural consequences of a design into the future, and, above all, to provide compelling justification of design to those affected by and needed to bring about these futures, their stakeholder" (Ibid.: 209-210).

Central to the proposal of a science for design is that it works from within a discourse of design. It does not oblige to the principles of science but to the nature of design activity. Of particular interest is the idea of "*self-reflective reproduction of design practices*" (op. cit.). This idea relates closely to what can actually be communicated through scholarly design research and in what ways this might be of use to a practicing community. As I believe rightly noted by Brandt & Binder (2007), design practice and design research are not identical, and it is critical to that design research "*must be knowledge production in a form, which is accessible and arguable among peers*" (Ibid.: 3). The interesting question here is, of course, how knowledge production becomes accessible and arguable among peers. Brandt & Binder (Ibid.) suggest that this may be achieved through a traceable genealogy, an intervention in the world, and an argument for others to engage with. The notion of genealogy is used to express the way research is traced and connects itself to particular discourses. This may be realised in a number of ways; one might trace a genealogy by showing how a particular notion was developed through a range of interventions or one might show how notions are connected to established discourses within research communities. The notion of intervention suggests that

design research engages in particular contexts. From the point of view of research, an intervention may be an experiment in the sense that it informs research. By using the term intervention, Brandt & Binder stress the fact that design research engages with a reality that is in some sense beyond the research lab. As design deals with particular situations, design research must substantiate its claims within the realm of the particular. A similar point is made by Krippendorff (2006) in suggesting that a science for design should provide compelling justification for design to the stakeholder affected. I will return to this proposition in the next section. Finally, the notion of argument underlines the fact that design research, as other forms of research, must make novel proposition that are rooted in their interventions and in a traceable genealogy.

I suggest here, that Brandt & Binder's (2007) notion of experimental design research complements the overarching notion of science for design as an essentially proactive endeavour building not on science but on design on its own terms. Brandt & Binder (Ibid.) provide (among other things) very concrete concepts for how design research becomes communicable and arguable among peers and thus finds relevance among researchers and practitioners. They do this by stressing the interventionist and exemplary nature of design research. As proposed by Binder & Redström (2006), the nature of design research may be regarded as exemplary in the sense that:

"it enables critical dissemination through examples of what could be done and how, i.e. examples that both express the possibilities of the design program as well as more general suggestions about a (change to) design practice." (Ibid.: 3)

In line with the notion of a science for design, the exemplary nature of design research proposes an inside perspective where design is explored through an experimental interventionist approach.

Returning to the notions of research into, through, and for design, as presented by Frayling (1993), it seems relevant to ask how these basic handles for understanding the object and method of research inquiries relate to the notion of science for design pursued here and of what use these concepts might be within this frame of understanding. As research into design denotes an outside perspective, where objects of design and their consequences are studied from various academic disciplines, it seems at odds with the inside perspective promoted here under the heading of a science for design. Research through design seems more aligned with the perspective presented above as an inside perspective is adopted and the researcher engages in design activities as a mode of inquiry. Lastly the notion of research for design, or research in design as coined by Ludvigsen (2006), does also seem to resonate with the perspective of Binder & Redström (2006) by suggesting changes to design practice. A few issues do however emerge as this juxtaposition is attempted. Following the idea of a science for design as an interventionist discipline where the researcher engages in designerly activity, and the object of this activity is a change in design practice, is this then research through design or research in design? Both it would seem. Design is both the method of study and object of

study. If there is confusion here, it might stem from a mistake of category. It is not that the two conceptualisations are completely incommensurable as such, yet they seem to work from various propositions. There is however, I believe, a point in attempting this comparison. Although the concepts of research through design and research in design may not neatly map into the notion of a science for design, they might work to say something about what the aims of research efforts might be and the various levels of design research. Research *in* design indicates an interest in conceptualizing, reflecting on, and ultimately proposing changes to design practice. This may take on various forms. As suggested by Stolterman (2008) both overarching theoretical notions that enable critical reflection as well as more simple techniques, methods, and tools might be appropriate outcomes. If the interventionist perspective is adopted, as I have done here, then research *in* design seems to imply research through design. Not necessarily in the sense of engaging in full-fletched design projects but, as argued by Brandt & Binder (2007), by engaging with a reality beyond the research setting. Moreover, I am tempted to suggest, that within an interventionist approach, research through design also implies research in design. The *throughness* of course suggests that our interest might reach beyond the process perspective by proposing concepts or theories that for example deepen our understanding engaging interactive environments. Again, such contributions may take on various forms, stretching from overarching theoretical conceptions to detailed propositions for materials and their qualities. Yet these conceptual developments, although they do not explicitly say anything about the design process, are fundamentally tied to the practice of design. They are products of designerly inquiry (the *throughness*) and they are suggestive of particular ways of framing, interpreting, and making judgments and as such they constitute research in design. As argued by Hallnäs & Redström (2005), they are not so much concerned with being true or false as they are with being suggestive or in-suggestive. I will elaborate on this connection between theoretical constructs and design process in the final section of this chapter.

To sum up, the key characteristics of a science for design, as I have interpreted them here, are that it is suggestive, interventionist, and that it provides a perspective from within. It is not the study of what designers do per se, which could be accomplished through and outside perspective. Psychologist and sociologist may study what designers do and provide accounts of these practices. Design research, in the sense laid out here, is suggestive in that it attempts to find proper methods, techniques, tools, or concepts for reflection that will further design practice more or less directly. It is interventionist as it engages with designerly activity in a reality outside the research lab, and it thus provides a perspective from within. This is the basic notion of design research on which I build an account of my work. In the next section I explore from a practice point of view what it might entail to practice design research in this sense.

3.2 Practicing design research

Recent accounts of the practice of design research adopt a more pragmatic perspective and explore how design research might be accomplished. Returning to the work of Brandt & Binder (2007), they propose that design research may be understood through the related terms of *question, program, and experiments*. The notions of question and experiment are, at least on the surface, the most straightforward. Question denotes the overarching knowledge interest driving the research and experiments denote the concrete inquiries undertaken in order to illuminate the research question. The notion of program, adopted from practicing design communities, is introduced by Brandt & Binder (Ibid.) as an intermediary between question and experiment. The role of the program is to define an area of exploration and to act as a suggestion that must be substantiated through experiments. Through experiments, the researcher both challenges the program and works to show the potential and legitimacy of what the program suggests in relation to an overarching research question. The notion of program, and its position as an intermediary between question and experiment, is closely tied to the idea of design research as exemplary, in the sense that design research must demonstrate what can be done and how. As argued by Binder & Redström (2006), this does not necessarily mean that design research has to engage in full-fletched design work as in a professional setting, but it does mean that design research needs to engage with a reality beyond the research setting in order to demonstrate its legitimacy. Programs thus reflect a participant perspective and form the basis of staging concrete experiments in particular contexts. In this sense, experiments thus become closely tied to a designerly engagement within particular contexts.

Thinking about experiments in this sense means, that they may often be regarded not only as inquiries that inform academic interests but also as meaningful interventions in concrete situations. In my work, most experiments have been conducted in the realm of museums. These experiments may be regarded as interventions in the sense that I have engaged in concrete design cases that stretch beyond academia and have had an impact on stakeholder in various domains. Thinking of research activities as both addressing academic interests and intervening in particular context suggest multiple layers of design research practice. Fallman (2008) addresses this issue by proposing an interaction design research triangle. The triangle describes three basic areas in which interaction design researchers engage as part of their studies depicted as the three angles of the triangle. First of all, interaction design researchers engage in *design practice*; that is, design activities that stretch beyond the realm of academia - a proposition similar to that of Binder & Redström (2006). Secondly, *design exploration* describes, similar to the notion of design practice, a dedication to concrete design work. Contrary to design practice, the perspective of design exploration is that of the researchers own research agenda. Design exploration thus leans more towards idealistic solutions, manifesting the desirable, the ideal, or the alternative. Compared to the notions of Binder & Redström, design exploration may be said to explore the boundaries and potential of what the research program suggests. And finally, interaction design research is in some sense committed to *design studies*; that is, the intellectual and

analytical work to formulate and share insights within established academic discourses. This category may be said to correspond to notion of question, as denoting a research interest that stretches beyond the individual program. As argued by Fallman (2008), any particular research project will typically go through loops in which researchers engage in the various parts described in the triangle and allow for these to mutually inform each other. Indeed, Fallman (Ibid.) argues that the ability to continuously move between the perspectives represented in the areas of the triangle may be regarded as a distinguishing feature of interaction design research.

3.3 Research approach adopted

Building on the perspective presented through the work of Krippendorff (2006, 2007), Binder & Redström (2006), and Brandt and Binder (2007), I propose that my research process can be understood in terms of a science for design realised as exemplary design research driven by questions programs, and experiments. Conceptualising my contribution as such, leads me to elaborate on my research question, the programs in which I have pursued this question, and the experiments that have informed this process. I tie together these levels by discussing the notion of genealogy.

On an overarching level my work has been motivated by a question of how to *design engaging interactive environments*. This question is, in essence, broad and may potentially be pursued through a range of programs. The research question is above all tied to academic discourses within various disciplines as portrayed in chapter 2. In my work, I have primarily pursued this question within a program that might be formulated as *designing engaging exhibition spaces*. The program works both as a suggestion and as a contextualisation of the overarching research question. It is suggestive in the sense that it proposes that the notion of engagement might provide a fruitful avenue for museums and science centres and it contextualises the research question by providing a context of inquiry, exhibition spaces. Although this has been the primary program of my research, I have engaged in other more peripheral programs. In particular, my work draws on a program with the aim of designing interactive school environments (see section 3.4.3). This program does obviously not share the context of my main program, yet it shares a concern for the overarching research question through the topic of engagement and particular ways of shaping design inquiries. They have, in a sense, a family resemblance. The strength and potential of my main program has been explored through a range of experiments, in which various stakeholders and institutions have been involved. These experiments have often been part of larger research projects where my fellow researchers have explored similar or complementary programs. I maintain the distinction between the programs that I have pursued and the projects in which they have been pursued through concrete experiments. In many cases, I have not been engaged with all aspects of individual research projects or through the full duration of these projects. I see the notion of program as cutting across the boundaries of individual projects, denoting the research related

suggestion that I have pursued. Looking at the wealth of activities in which one might engage through a PhD process, the programs become the threads that make the research efforts coherent. As proposed by Binder & Redström (2006), the program comes to function as a knowledge regime that establishes standards for what should be known. In the projects with which I have worked, various aspects of my main program have been explored. As an example, my engagement in the design of a runic stone exhibition for Moesgård Museum (see section 3.4.2) did primarily address concerns about understanding and pursuing visitor engagement through the perspective of visitors' motivation. Other projects focused on different aspects. At the final level, my research has consisted of a range of experiments where I have engaged in designerly inquiries. As argued by Binder & Redström (Ibid.), we may understand the different experiments conducted as a way of exploring the design space that is suggested through the program. My experiments have both taken the form of the developments of design concepts and prototypes as well as various formats of design inquiries in the form of workshops involving museum visitors, staff, pupils, and teachers. As noted by Brandt & Binder (2007), the central capacity of experiments is to strengthen, challenge, and establish the scope of the program. Experiments thus reflect the suggestive nature of the program by showing what is possible within the program and gaining insights that substantiate and nuance the program.

As argued by Brandt & Binder (2007), it is critical for design research as knowledge production to connect itself to established discourses and thus allow for critical examination among peers. In the following section I explore the connections between experiments, programs, question and particular discourses and thus provide a basis for understanding how I have come to claim the contributions presented in this dissertation. I do this through the notion of genealogy.

3.3.1 Genealogy

Brandt & Binder (2007) use the notion of a traceable genealogy to suggest that design research must provide a clear statement regarding the discourses to which the research is connected. Genealogy thus denotes, in a sense, a kinship with similar approaches and related topics. In the introduction I presented the central areas of related work within interaction design, design theory, and participatory design. Moreover, I have also provided an introduction to developments within museums as the domain in which I have primarily engaged. By doing this, I suggest that I have not only partaken in and contributed to the academic areas associated with design of technology but also to some extent in the museum domain. In general terms, the former relates primarily to my research question as the contributions are generalised and suggests a relevance beyond the domain of study whereas the latter relates to the program by engaging more specifically with the domain. This is however a somewhat simplified picture. Throughout the included papers, I deal with both topics that lie within museum and topics that apply more generally to my research questions. For example, P4 explores engagement through the lens of motivation and addresses topics in interaction design. The paper is however introduced and motivated by a discourse more specifically tied to

museums and indeed some of the conclusions drawn from the paper reflect a particular concern for exhibition spaces. P3 on the other hand, also uses an example from the museum, yet the conclusions drawn and the concepts presented are not directed at museums in particular, but relate more generally to discourses within participatory design. Each of the papers included addresses both the specific context of the program as well as academic discourses. The weighing does however vary as illustrated through the example of P3 and P4. Generally speaking, the majority of my work is framed with academic discourses. I believe that my work can inform museums and their practices, but this is not the primary focus. In the notion of design research pursued here, there is however a fundamental interdependency between the two; design practice is inherently about what is particular and in doing design research that is suggestive in nature we must thus engage with what is particular if our claims are to be substantiated. I would argue that this is why design research communities often appreciate relatively rich descriptions of experiments that provide a sufficient amount of insight in order to convince peers of the viability of what is proposed. Again it must be stressed that this does not imply that academic research is simply rich description of design activity. Their proposals must be novel and show a traceable genealogy by connecting to academic discourses.

Applying the notion of genealogy to denote the ways in which arguments connect to various discourses is one interpretation. We might however also think of genealogy as stretching to the level of experiments. In this sense, a genealogy would account for the ways in which arguments are based on the experiments conducted. I see this as a critical aspect as is relates to the very grounds of which arguments are made and to an experimental notion of design research. If we are to make arguments accessible and contestable among peer researchers we must provide accounts describing to what extent and in what sense our experiments have lead to particular arguments. Moreover, if the arguments are to be contestable, it is necessary to provide sufficiently detailed accounts of the experiments so as to make transparent the paths chosen and the basis of interpretations. The publications included in this dissertation, I believe, reflect such a commitment by often providing relatively detailed accounts of individual design experiments and striving to make clear on what basis the arguments are made. Moreover, I have also strived to reflect this commitment in this dissertation overview by providing not only a summary of the arguments made, but by revisiting the experiments of my process and showing how these arguments are traced. As I address in more detail my contribution in chapters 4 and 5, I reflect on genealogy by both discussing how my arguments relate to various academic discourses and by exemplifying my arguments through particular interventions.

Using genealogy to account for the ways in which arguments connect to discourses within academia and within a particular context as well as a way of showing how arguments are based on concrete experiments, suggest three categories for the ways on which claims are grounded. The may be grounded in the context of the program as interventions prove their worth by bringing about desirable changes. They may also be grounded in theory, by showing that the ideas, concepts, or techniques

developed resonate with particular established academic discourses and that proposed theoretical notions are coherent. Moreover, grounding may be obtained by tracing arguments to the results of individual or sets of experiments. As I have discussed genealogy not only as a relation to established discourses but also in terms of the relation between argument and experiments, it is of course relevant to account for the extent to which experiments support particular claims.

Obviously, arguments suggesting a change in design practice or concepts for reflecting on the issue of engagement cannot be true or false. They can be more or less useful in any given context. My experiments cannot in a traditional scientific terminology prove an argument, as this would suggest that we are dealing with matters of truth. Experiments can however improve the quality of that argument by showing its strength within a particular program. This is in essence similar to relating arguments to established theoretical notions thus strengthening the position. Experiments may thus substantiate an argument in the form of a concept or a technique by showing the breath of its applicability and by delineating its boundaries. Doing multiple experiments to support an argument is not a way of proving its truth-value, but a matter of unfolding the richness and boundaries of what it suggests. As an example, both P1 and P2 address multiple experiments in developing the notions of *fictional inquiry* and *staging imaginative places*. However, these multiple experiments are used to substantiate the propositions made through these concepts and not as repeated experiments that show their truth-value.

Returning to the notion of experiment, these reflect a designerly engagement with what is suggested in the program. In my work, experiments may be identified as particular workshops that experiment with formats for design inquiries. Moreover, they may be identified as the introduction of prototypes into the domain of museums that suggest means for spurring visitor engagement. These experiments have been documented through observation and interviews using video, pictures, and note taking. As the majority of my work has taken place in collaboration with colleagues, discussions and sharing of interpretations have also been important aspects. Moreover, the experiments conducted have been the product of a broad range of activities that also fall within the category of designerly engagement. These include domain studies in the form of observations, contextual interviews, sketching, constructing mock-ups and prototypes, and coordination and discussion with stakeholders. These are perhaps not in the strict sense experiments, yet they are central activities that go into a designerly engagement in any context and are thus closely tied to the individual experiments.

Looking at the included publications, I do not provide an exhaustive answer to the research question. For this, the question is too broad and its nature does not seem to afford final answers. Rather, what I provide are more focused arguments that build on the program and the concrete experiments and has resulted in contributions regarding the notion of engagement as well as suggestions for design practice and concepts for critical reflection. The role of this dissertation overview, in relation to the included papers, is to summarize and explore the coherence of the included publications. The dissertation overview does not as such provide a single

meta-theory or position in relation to the contributions. Rather, it seeks to strengthens their coherence and develop the contributions in relation to academic discourses. The nature of my contribution is two-sided, reflecting a concern for developing concepts for understating engagement and its relation to museums, and for shaping design inquiries aimed at designing engaging interactive environments. These mirror, to some extent, the notions of research *in* and *through* design. However, as noted earlier, not in the sense that these are discrete categories or types of research. They are conflated under the approach of exemplary design research adopted here. Instead I use them to illuminate the fact that my work has been a constant transaction between developing the notion of engagement suggested in the program and shaping design inquiries. My initial notion of what might constitute engaging environments has been changed as I have engaged in design experiments, which, in turn, have changed my work on design inquiries. To elucidate this fundamental connectedness, it seem pertinent to explore in more detail the relation between engaging with theoretical notions of engagement and working with design inquiries. This is the subject of the following section.

3.3.2 Programs as appreciative systems

For the sake of presentation, I have chosen to distinguish between two parts of my contribution, reflecting a concern for understating the issue of engagement and shaping design inquiries that aim at designing engaging interactive environments. As I will strive to illustrate in chapters 4 and 5 in this dissertation overview, these two have gone hand in hand through my work and have continuously informed each other. However, this distinction does raise an issue about the relationship between theoretical arguments concerning engagement and the practice of conducting design inquiries as part of design research. In a sense, this is returning to the discussion of research in and through design.

The issue may be framed as follows. Accepting the notion from Schön (1983) that design develops as a conversation with the materials of the situation and that design must deal with what is particular (Nelson & Stolterman 2003), what then is the role of more general arguments about the nature of engagement in the form of theoretical constructs? As argued by Nelson & Stolterman (2003), theory cannot tell us what to design. By analogy, my work on the nature of engagement cannot tell anyone what to design in any particular situation. Yet, looking at the research within the area of interaction design, it seems that there is a relatively general consensus that, in some sense, theoretical accounts can inform design. Theories or conceptualizations about such things as technology and emotions (Norman 2005) and technology and experience (McCarthy & Wright 2004) are accepted contributions, yet they cannot in themselves tell us what to design as this emerges from the particularities of the situation at hand. The issue of theory in design has been dealt with on a range of levels in the literature. Bertelsen (1998) suggests that theory ranges form concrete tools such as Fitz's law that may be directly applied to particular problems to more general worldviews. Bertelsen (1998) sees this as a continuum between more applicable theories towards general theories. Nelson & Stolterman (2003) discuss the issue of theory in relation to design and argue that

theory can assist designers, not by prescribing action in any rational sense but by informing the designer's central capacity to make judgments and interpretations. Of course this may be interpreted in a number of ways. Experimental design research may rely heavily on theory in order to pursue particular theoretically inspired programs of research. In design practice it may however be the case, as suggested by Gaver (2006), that theory plays a more humble role. Schön (1983) provides a relatively nuanced account of how theory might come to bear on design practice. Although Schön suggested that design develops as a conversation with the materials of the design situation and thus seems to tie design to the particular rather than the general and theoretical, Schön did provide insight into how theory on various levels informs design practice. Schön (1983) distinguishes between several levels of knowing that all influence the conversation with the material but remain constant over extended periods of time. When faced with a design situation, experienced designers will draw on repertoires of examples, images, understandings, and actions from previous encounters with similar design situations. The designer sees the unique design situation as something already present within his or her repertoire. Moreover, Schön (Ibid.) argues that design always depends on the designers appreciative system. The notion of appreciative system is adopted from Vickers (1972), denoting a "*readiness to notice particular aspects of our situation, to discriminate them in particular ways and to measure them against particular standards of comparison*" (Ibid.: 102). The appreciative system of the designer fundamentally shapes what is noticed, valued and appreciated in the conversation with the material. When an architect engages with a new building site he or she might see potential for a building with round curves and large scenic spaces whereas another architect might see potential for making small spaces with nooks and crevices. Depending on the appreciative system, different things are appreciated and regarded as potential. Although appreciative systems may be said to represent personal beliefs and values, they may also be more or less shared with a community of practitioners who tend to have similar views on problems and potentials (Schön 1983). Whereas the appreciative system is closely tied to the conversation with the material, overarching theories are also relatively constant, yet resides on a more general level (Ibid.). An engineer will have knowledge of overarching theories about how different materials support building structures and the impact of various soil conditions. Overarching theories relate less directly to design action, but provide vocabularies and descriptions of relation and causality that shape the interpretations made. And importantly, overarching theories may come to shape appreciative systems that are central to the conversation with the material. In this view of the relation between theory and design, we may see such work as emotional design (Norman 2005) and technology as experience (McCarthy & Wright 2004) as residing in the realm of overarching theory. They do not in essence deal with what is particular and cannot tell us what to design. They may however shape our appreciative system and thus shape the interpretations we make in design. When engaging in a design situation we may begin to notice how particular artefacts prompt emotional responses or we may see a potential for the experiential aspects of technology. Returning to the notion of program proposed by Binder & Redström (2006), I suggest that a program works

by imposing a particular appreciative system in that it suggest a particular perspective to pursue. This suggestion echoes the notion of program as a form of knowledge regime (Ibid.). I suggest that we may understand the design research program as the deliberate and reflective adoption of a particular appreciative system. The appreciative system shapes our interpretations by bringing particular aspects into focus and hiding others. This is similar to Binder & Redström's (2006) notion of a program as "*a lens through which certain things will become enlarged and thus better seen, but where others will become hidden*" (Ibid.: 11). Schön (1983) argues that in design practice, appreciative systems are relatively constant over extended periods of time. Yet a distinguishing feature of design research is the fact that the researcher deliberately attempts to strengthen and challenge the program through experiments and reflection in relation to particular discourses. I suggest that, through design research, we deliberately adopt a particular appreciative system and systematically explore the potential of this system. The benefit of adopting the notion of appreciative system in relation to design research is that it bridges the span from overarching theory to design inquiries as conversations with particular situations. It provides a coherent way of conceptualising how theories might inform appreciative systems that in turn shape interpretation and judgment relation to the particular design activities. Moreover, it provides the account needed to propose that research *through* design, within the notion of a science for design as adopted here, is also research *in* design as the concepts that are developed through design come to bear on designerly judgments and interpretation through an appreciative system. What the concepts of research in and through design do is not to delimit two separate categories but to allude to the fact that design research may yield insights on various levels relating both to theoretical notions of, for instance, visitor engagement and to conceptions of issues relating to the process of design. More specifically in relation to my work, this conceptualisation shows the fundamental connection between the two parts of my contribution as presented in chapters 4 and 5.

To sum up, I have described my work within the overarching term of a science for design denoting a proactive perspective from within design. Through the work of Brandt & Binder (2007) and Binder & Redström (2006) I have suggested that my work may be understood as exemplary design research realised though the related notions of question, program and experiments. I have discussed the knowledge production within this approach to design research as fundamentally suggestive and interventionist and grounded in a notion of genealogy as describing how the arguments produced become accessible and contestable by relating to the domain of the program, to established discourses in academia, and the concrete experiments conducted. In the following section I provide the context for my work by presenting the various projects in which I have been involved and the central experiments that I have conducted within these projects.

3.4 Experimental design work

Through my work, I have been involved in a broad range of research projects in which I have explored various aspects of my program. In some cases my involvement has stretched throughout entire projects and in other cases my involvement has been on the level of individual workshops or events. Figure 1 provides an overview of my involvement in a range of research projects during my work. The figure illustrates the research projects as well as individual experiments that are specifically addressed in the included publications (below the line) and the publications (above the line). For each of the experiments, the figure specifies the papers in which this experiment is addressed. Figure 1 shows two types of experiments: evaluations of prototypes and workshops where various stakeholders were invited to participate in design. Apart from the concrete experiments listed, all projects have involved designerly engagement in the form of sketching, concept development, observations, interviews, and the construction of mock-ups or (more or less) working prototypes. In chapters 4 and 5 I draw on experiences from all of this project work but with a specific emphasis on the experiments listed in figure 1. In the following I provide an introduction and overview of the overarching research projects as well the individual experiments, which serves as a background for elaborating on my contribution.

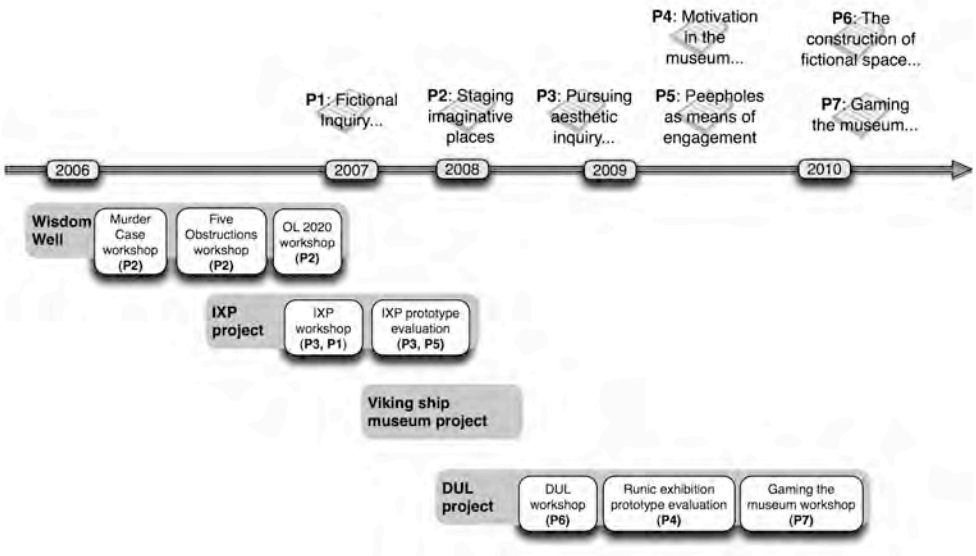

Figure 1. Overview of central project activities and included research papers.

3.4.1 Interactive Experience Environments

The Interactive Experience Environments project (IXP) was conducted within Centre for Interactive Spaces and was a two-year project exploring new technologies for museums and science centres. The project was a cross-disciplinary endeavour involving architecture, computer science, engineering, and the

humanities in efforts to develop concrete prototypes and concepts for understanding and designing experience environments. Throughout the project, four general research themes or programs, in the terms used here, were pursued. *Context sensitive interaction* focused on providing seamless access to information and services based on, for instance, location and profiles. In the realm of museums and science centres this led to a focus on the potential of tracking visitors movement and providing tailored content for visitors. *Aesthetic Interaction* marked a concern for exploring the role of technology beyond utilitarian ideals of functionality and ease of use, emphasizing the ways in which technology might promote aesthetic encounters with exhibition spaces. *Space as interface* was a theme derived from the idea of ubiquitous computing implying a focus on creating novel connections between physical and digital spaces. This concern, in effect, attempted to tie together approaches within architecture and computer science into coherent concepts for exhibition spaces. From the methodological perspective, the project explored how principles and practices from participatory design might be developed to encompass the challenges of designing novel technologies for exhibition spaces.

The IXP project was structured as a collaboration between Centre for Interactive Spaces and a range of companies in the business of providing technologies as well as museums and science centres. During the project, the design interventions were carried out at three different institutions. The first institution was Struer museum; a cultural heritage museum dealing with the cultural history of the Struer area. The second institution was AQUA; a marine centre displaying fish and marine life from fresh water. And the third institution was the Kattegat Marine Centre, displaying fish and marine life from local as well as tropical waters.

The progression of the IXP project was driven by events where participants gathered to develop concepts and technologies, conducted field experiments in the various domains, and evaluated prototypes. The material outcome of the project was two design concepts; one addressing the issue of cultural heritage communication in Struer and another addressing how visitors might engage with the topic of fish and marine life in novel ways. Although the software and hardware was developed, the concept for Struer museum was not deployed and evaluated. The concepts aimed at fish and marine life was evaluated in two iterations at the Kattegat Marine centre.

In P3 and P5 I address specifically two experiments in the IXP project relating to the collaboration with the Kattegat Marine centre. P3 addresses one of the early experiments in the project (the *IXP workshop*, figure 1), in the form of a workshop where a family was invited to explore new ways of experiences life in the ocean. This workshop was central to the remainder of the IXP project as a range of themes and concrete ideas were developed that impacted on the final prototypes. Moreover, the workshop became central to my work the notion of fictional space in design inquiries. This workshop is further addressed in chapter 5 of this dissertation overview.

P5 deals with the design and evaluation of the prototypes developed for the Kattegat Centre (*IXP prototype evaluation*, figure 1). The prototypes allow visitors to create their own species of fish by combining pieces from a physical construction kit containing a variety of heads, bodies, tails and fins from existing species. The parts of the construction kit are created from acrylic and have an embedded RFID tag that give each peace a unique identity. A table with a rounded display in the middle sets the stage for visitors to create their own fish (figure 2, left). Three RFID antennas embedded in the table surface track the individual acrylic pieces placed in front of the screen and allow visitors to experiment with various combinations from the construction kit; combining the head of a shark with the body of a cod or the fins of a whale with the body of a herring. As the visitors construct their fish, the screen in the centre of the table shows a digital representation of the fish and provides simple information about the specific parts being used and the overall characteristics of the emerging fish (strength, speed etc.). Having created a fish, visitors can release the fish into a digital ocean where it will live with the other fish that previous visitors have created. Depending on the characteristics of the fish, it will inhabit specific areas of the sea (shallow water, deep water, etc.). The digital ocean is mapped onto the physical floor surface of the exhibition space. The only way to explore the ocean is through the use of digital Hydroscopes that can be pushed around the floor (figure 2, right). The Hydroscopes provide a limited view into the virtual ocean according to their position on the floor surface. The prototypes are described in more detail in Dindler *et al.* (2007).

Figure 2. Left: the construction table where visitors assemble imaginary fish. Right: the Hydroscopes providing view into the virtual ocean.

3.4.2 Digital Urban Living

Digital Urban Living (DUL) is a four-year research project anchored at the Department of Information and Media Studies at Aarhus University, aimed at exploring new ways of digital life in urban settings prompted by the experience economy. The project consists of four interrelated research themes that are explored through four overarching case areas as depicted in figure 3.

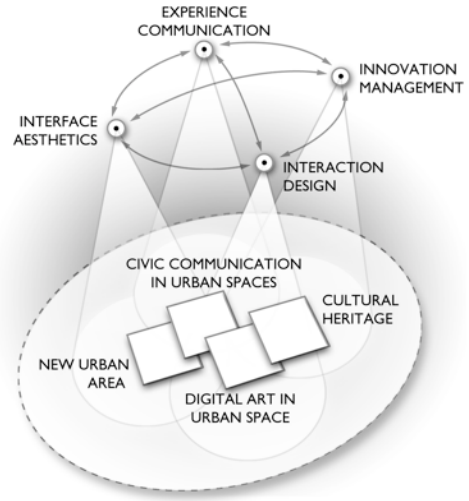

Figure 3. The research themes and case areas in the DUL project.

The DUL project brings together a number of public and private institutions that participate in the explorations of the various themes and domains of study. Moreover, the project is fundamentally cross-disciplinary as it brings together a range of groups within Aarhus University, Aarhus School of business, and the School of Journalism. Similar to the IXP project, DUL has progressed through events where participants have joined to explore new technologies, create prototypes, and do evaluations.

My engagement in the DUL project has primarily been within the theme of interaction design for cultural heritage. The central partner in this project is Moesgård Museum, which is a large cultural heritage museum close to Aarhus, containing a wide range of exhibitions relating broadly to Danish cultural heritage. Moesgård Museum recently received a grant for building a new museum that will replace the existing exhibition spaces. The focus of the cultural heritage project within DUL is on conducting research that will inform the design of this new museum. My activities in relation to this project include the design of an installation for a special exhibition on runic stones as well as activities relating more generally to process of charting directions for the new museum. The research focus within the project may be broadly characterised in two themes. First, the efforts have focused on exploring novel interactive technologies, concepts, and their application for engaging experiences. Second, the domain of cultural heritage has provided a setting in which to address the design process, exploring how design inquiries may be conducted and understood when addressing issues of engaging experiences. These concerns have been materialised in a range of workshops and in the design and evaluation of a concrete prototype for a special exhibition at Moesgård Museum.

P6 addresses the first workshop in the DUL cultural heritage project (the *DUL workshop*, figure 1) where all participants were invited for an initial exploration of future cultural heritage exhibition spaces. Participants included curators and exhibition designers from Moesgård Museum, professional storytellers, interaction designers, architects, and researchers. The workshop did not result in an overarching program for the project; rather a number of avenues were explored that were intended to become a shared point of reference for the remainder of the project. In relation to my academic work, I used this workshop to study in more detail how participants engaged in the creation of fictional space. The workshop is further addressed in section 5.8.1.

P7 addresses one the latest workshops conducted within DUL, where pupils where invited to explore how their engagement in computer games an online communities might inform the design of exhibition spaces (the *Gaming the Museum workshop*, figure 1). Through the workshop, pupils where assigned the task of reflecting on their engagement in computer games and online communities and making concrete concepts for how exhibition spaces might invite similar engagement. This workshop specifically experimented with merging qualities of everyday with qualities of the museum to form a design space for the participants.

Based on a study of an installation for a special exhibition about runic stones (*Runic exhibition prototype evaluation*, figure 1), P4 discusses engagement through the lens of motivation. Runic stones from various parts of Denmark have for years made up part of Moesgård's permanent exhibition. In 2008, Moesgård received at grant to create a special exhibition about the runic stones and about the runic language in general. As part of this exhibition, colleagues and I were invited to create an installation that would experiment with the linking of museum knowledge about runes with the everyday lives of visitors. A number of conditions and considerations guided the design of this installation. Apart from being a prototype that would allow us to study particular aspects of the intersections between the museum knowledge about the runes and everyday life of the visitors, the installation should promote tangible forms of interaction, as this is a much employed interaction style throughout the exhibition space. Furthermore, the installation should be an integrated part of the runic stone exhibition and connect to the other installations in the exhibition. The final prototype was an interactive table that allowed visitors to create and decorate their own runic stone and place this in a landscape alongside runic stones that other visitors had created. The installations consist of a large (165x135 cm.) interactive table with two touch screens used as input stations at the end (figure 4, left).

Figure 4. Left: the runic table. Right, visitors creating runic stones.

The table shows a map, where particular features are highlighted: cities, large roads, and forests (figure 5 left). Visitors create their own runic stone by picking up one of the small wooden model runic stones (figure 5, middle) found around the table and placing it in the backlit holder besides the input station. When a model stone is placed in the holder, the input station guides the visitor through the process of choosing what to write on the stone and how to decorate it (figure 4, right). When the stone is finished, the visitor can pick up the stone from the holder and place it anywhere on the map. When the model stone is placed on the map, a counter indicates that the stone is about to be placed at this particular spot (figure 5, right). After a few second (if the stone is not moved to another location on the map) a digital representation of the stone is shown on the map. Visitors can use a model magnifying glass to explore the content and placement of the stones created by other visitors. The Runic stone exhibition is addressed in section 4.2.2.

Figure 5. Left: the map projected onto the runic table. Middle: the miniature runic stones. Right: placing runic stones on the table.

3.4.3 Wisdom Well - interactive school floors

Besides the central museum projects, IXP and DUL, I have been engaged in a range of primary school projects conducted within Centre for Interactive Spaces. In the included publications, I report specifically from a range of workshops related to

the design of the Wisdom Well (Grønbæk *et al.* 2007) which is an interactive floor surface designed for a local school (figure 6). My engagement in the Wisdom Well project marks a slightly different program, as the context of the inquiries was not exhibition spaces. They do however have a certain family resemblance in what the programs suggest and as such they complement each other in addressing my overarching research question. This is particularly the case with regards to the design process, where new formats for design inquiries were explored that prompted participants to rethink some of the basic assumptions within their established practices.

P2 addresses one of the workshops conducted in relation to the design of the Wisdom Well (the *Murder Case workshop*, figure 1). At the time of the workshop, much of the hardware for the interactive floor surface had been set up. The applications that would run on the interactive floor had however not been designed. 12 pupils aged 11-14 and their teachers were invited to explore what kind of activities that might be envisioned using the interactive floor surface. The workshop was structured around a narrative of a murder case, where the pupils were assigned the task of detectives. The pupils had to use the floor to complete the task, and invent the functionality as they went along. In relation to my academic work, the workshop was an experiment in staging a highly unfamiliar space for the pupils to engage with in order to explore new ideas for the Wisdom Well. This workshop is addressed further in section 5.8.2.

Figure 6. Children using the Wisdom Well.

Another workshop addressed in P2 was the Olympics 2020 workshop (the *OL2020 workshop*, figure 1). This workshop was also part of the efforts to design applications for the Wisdom Well. At this workshop, teachers, researchers, and designers were invited to the university to explore how the floor surface might support various forms of full body interaction (figure 7, left). The workshop was framed round an Olympic theme. Participants were asked to develop new Olympic games that could be realised on a very small area (3x4 meter, matching the scale of

the Wisdom Well). Hence, the workshop was framed as the Olympics in Andorra. As the workshop took place at the university, the interactive floor was mocked-up using tape on the floor (figure 7, right). This workshop is addressed in section 5.8.2.

The final workshop relating to the Wisdom Well project was the Five Obstructions workshop (the *Five Obstructions workshop*, figure 1). At this workshop, teachers were invited to explore new educational programs within specific subject matters such as geometry. The workshop was in many respects similar to the DUL workshop and employed obstructions that would force participants to think beyond existing practices. Contrary to the DUL workshop, the Five Obstructions workshop was aimed specifically at particular educational topics.

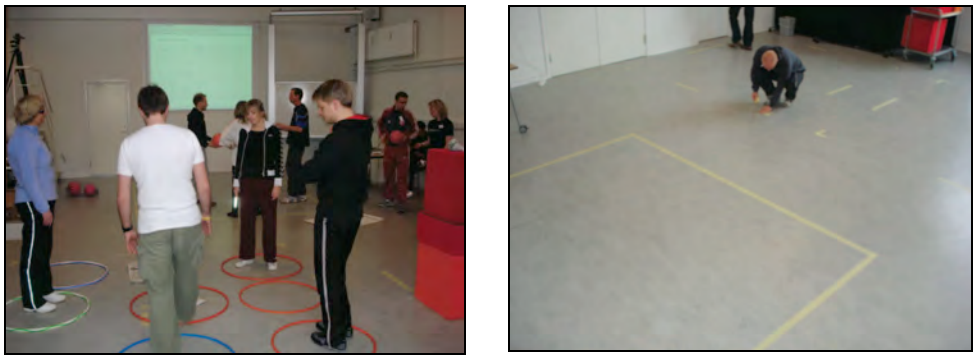

Figure 7. Left: participants in the OL2020 workshop working on their concept. Right: the floor surface was mocked-up using tape on the floor.

3.4.4 The Viking Ship Museum

The Viking Ship Museum project derives from my collaboration with the Intermedia group at Oslo University and Terje Planke from the Viking Ship Museum in Oslo. The project was aimed at designing means by which visitors might explore the process of reconstructing Viking ships and the doubt and interpretation that is inherent in this process. With around 400.000 visitors each year, the Viking Ship Museum is among the most popular museums in Norway. The museum is situated at the outskirts of Oslo and the exhibition is based on the four major Norwegian archeological finds of the Viking period: Oseberg, Tune, Borre, and Gokstad. The predominant part of the exhibition consists of the reconstructed ships from these finds that fill the centre of the exhibition space (figure 8). The ships have been reconstructed based on the original finds and interpretations of how the Viking ships are believed to have been constructed. This interpretation is based on the sparse literature from the period and on basic knowledge about ship building principles regarding the construction of the hull and the sails. It is however a process pervaded by interpretation, assumptions, and even qualified guesses.

Figure 8. The Viking Ship Museum in Oslo.

My efforts in the Viking Ship Museum project related to the reconstruction of one of the ships from the Gokstad find. The remains of three ships were found at Gokstad – the third of which having recently undergone reconstruction by Terje Planke who specializes in Viking ships and their reconstruction. The design efforts were guided by a set of ideals. These included framing the visitors as active participants in the museum space, communicating the doubt and uncertainty that was inherent in the reconstructed ships, and more generally opening up the museums for the discussion of Norwegian cultural heritage. The project consisted of a range of observational studies and contextual interviews at the Viking Ship Museum (Stuedahl *et al.* 2007). These were followed by workshops within the research group exploring new ways in which the reconstructed ship might be exhibited. Although several concepts for the exhibition were developed, no prototypes were developed or evaluated. Nonetheless, several aspects of the Viking ship project has been central in building my understanding concerning exhibition spaces as it highlighted a range of fundamental issues that I believe relate to museums more broadly. I will return to the Viking ship project and these issues in section 4.2.1.

3.5 Summary

In this chapter I have outlined my research approach and provided an introduction to the experimental projects in which I have been engaged. I have positioned my research approach within the notion of science for design realised as exemplary design research driven by question, programs, and experiments. This approach was not explicitly defined at the start of my process; rather, I have use this approach to

describe how my work has progressed and as a way of articulating the conditions on which my contribution rests.

In the following two chapters I address in more detail the contributions that I have made. The first chapter (chapter 4) deals with the issue of understanding engagement in exhibition spaces. This chapter outlines a general notion of *participatory engagement* and deals in more detail with the notions of *motivation* and *means of engagement* developed in P4 and P5 respectively. The second chapter dealing with my contribution (chapter 5) addresses the issue of shaping design inquiries within the scope of designing engaging interactive environments based primarily on P1-P3 & P6-P7. Throughout the chapter I develop and substantiate the notion of *fictional space* as a particular perspective emphasizing design inquiries that suspend or re-shape established structures of everyday practice as a basis for design explorations. In each of the chapters I visit the included papers two times. First, I focus on the academic arguments made through my papers and provide an overarching scaffolding for understanding and elaborating on this contribution in relation to established academic discourses. Secondly, I visit my papers with the intent of exploring the experimental work that makes up the basis of the academic arguments. The theoretical notions developed are used to shed light on the experimental work that in turn serve to nuance and consolidate the theoretical position. Moreover, as I revisit my experimental work in chapter 5, I show how the individual experiments delineate the scope of applicability of the notion of fictional space.

My work and process has evolved as a continuous dialogue between the museum as a domain of study, my design experiments, and the academic discourses to which my work relates. Separating my contribution into two chapters containing an initial discussion of the issue of engagement and a subsequent discussion of design inquiries reflects a concern for a coherent presentation of my arguments rather than a mirror of my process. It is my hope that what is potentially lost in progression is gained in clarity of arguments.

4 Engaging interactive environments

The issue of engagement in relation to interactive environments has been a guiding idea throughout my work. In the early parts of my project, the concept was perhaps mostly a reaction to what I found in the museums and science centres that I worked with. Although many of these to some degree succeeded in attracting audiences, it seemed to me that these institutions could potentially do more in terms of engaging their audiences. In this sense, *engagement* was a first reaction to my meeting with the domain of study. What began as a reaction later became a central notion and a guiding idea of my work. It became central because it has urged me to explore some of the basic ideas and notions that we may use to conceptualize the relationship between people and exhibition spaces and the ways in which technology may play a desirable role. I did not in the beginning of my process have a clear and exhaustive definition of the notion of engagement from which to work, and here, at the end of my process, this is still the case. My academic inquiries have however yielded insights that shed light on what I believe to be some of the central issues of pursuing an idea of engaging exhibition spaces. In these sections I will elaborate on these inquiries, my reflections, and their place within academic discourse and the museums as a domain of study. I do so under the notion of *participatory engagement*. This section summarises and unfolds the ideas presented in P4 and P5 and builds primarily on experiences from the IXP project, the runic stone exhibition at Moesgård Museum, and my work with the Viking Ship Museum (figure 9).

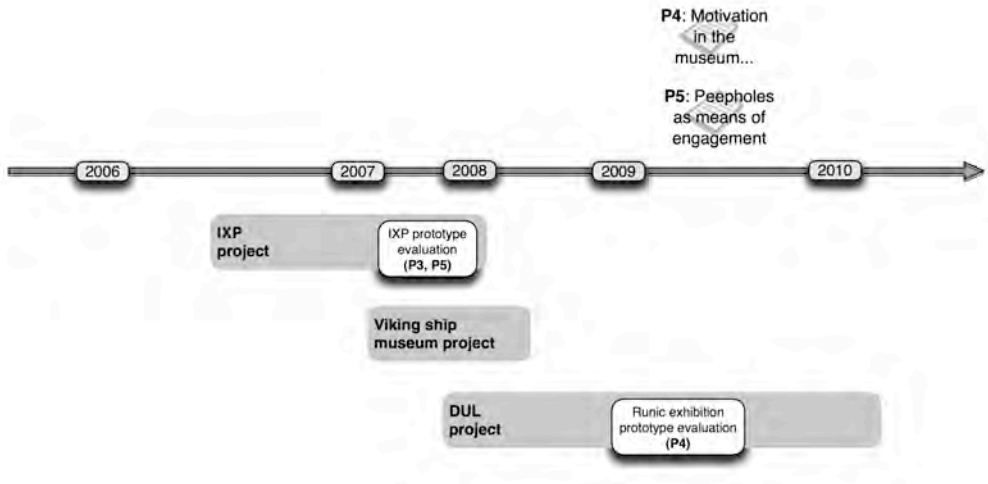

Figure 9. Overview of central projects and publications related to chapter 4.

I begin my account by considering the IXP prototype evaluation, which was among the fist cases in my PhD work. I use this as a springboard for discussing the issues of engagement. For me, the IXP project was paradigmatic in beginning to think about exhibition spaces as places of participatory engagement. Drawing on experiences from the IXP project, the following section will begin to unravel the notion of participatory engagement.

The Kattegat Marine centre, which provided the frame of some of the IXP research efforts, is an aquarium displaying fish and marine life from all over the world. The main part of the exhibition space is dominated by an array of large fish tanks with glass sides that provide unhindered view of the marine life (figure 10). Besides the large fish tanks, the space beneath the ground floor contains smaller aquaria situated in darker rooms that provide more intimate surroundings for exploring life in the sea. Besides the possibility of viewing marine life up close, the centre provides a range of more hands-on and interactive exhibits, a 3D cinema, an outside pool for seals, and play facilities. Among the most popular exhibits is an open circular fish tank, where visitors can get their arms wet and actually touch the fish. At regular intervals during the day, the marine centre staff invites visitors to watch as the various fish are fed. The feeding of the tropical sharks in the central aquarium is a popular attraction. The staff enthusiastically shares insights about the feeding habits of the sharks and visitors may be lucky enough to catch a glimpse of the sharks as they break the surface to feed.

Figure 10. One of the large aquaria in the Kattegat Marine Centre.

The point of departure for our work with the Kattegat Marine centre was an intention to explore how new interactive technologies might provide novel ways for visitors to explore marine life. The culmination of the process was the production and evaluation of two interactive installations that allowed visitors to construct imaginary fish using tangible parts and release these into a virtual ocean (see section 3.4.1). The products of the IXP project are further discussed in P5, Dindler *et al.* (2007), and Dalsgaard *et al.* (2008). Much of the Kattegat marine centre builds on the idea of allowing visitors to watch fish and marine life and as well as providing more factual information. The IXP prototypes invite visitors to engage actively with the exhibition space by means of constructing and actively exploring. The prototypes have been paradigmatic for my work as they show a very literal manifestation of the idea of providing various means by which visitors can invest their creativity, skills, and knowledge in the exhibition space. Similar agendas have been taken up both within academic field relating to interaction design and those relating more specifically to the museum domain. For example, Rogers (2006) argues for a shift in agenda within ubiquitous computing research from focusing on how technology can make peoples lives more comfortable, convenient, and informed towards exploring how ubiquitous technologies might support people in extending their capabilities as resourceful groups and individuals. Similar approaches are voices in the area of aesthetics of interaction (Petersen *et al.* 2004) and pragmatically inspired accounts of experience oriented application of interactive technologies (e.g. McCarthy & Wright 2004, Forlizzi & Battarbee 2004). Moreover, contributions that deal more specifically with the domain of museums have begun to explore novel ways for visitors to engage with exhibition spaces such as framing the visitor as virtual archaeologist (Hall *et al.* 2002). I will use the IXP prototypes here as a springboard for discussing generally the issue of engagement and more specifically the notions of *motivation* and *means of engagement* addressed in P4 and P5 respectively.

4.1 Participatory engagement - means and motives

The perspective of engagement points towards the ways in which people invest their time, beliefs, capabilities, and resources in particular situations. In outlining the issue of engagement in relation to interactive technology, I build primarily on the work of Arnold Berleant, Albert Borgmann as well as insights from pragmatism. Through a range of works, Arnold Berleant (1970, 1991, 1992) explores the notion of engagement as the participatory alternative to the classical aesthetic notion of disinterestedness. Berleant argues that: "*Engagement is the signal feature of the world of action, of social exchange, of personal and emotional encounters, of play, of cultural movements. Engagement is the signal feature of the direct and powerful experiences that enclose us in situations involving art, nature or the human world*" (Berleant 1991: 44). Berleant's notion of engagement has a distinctly participatory focus, highlighting the sense in which people are actively involved in their environment. Using *participatory* as a qualifier signifies this active involvement. For Berleant, the notion of participatory engagement is however a pervasive phenomenon. Sometimes participation is very overt, as in the IXP prototypes where visitors where invited to create imaginary fish by combining individual parts. Yet even more seemingly passive situations require participatory engagement as the experience is realized in transaction between people and their surroundings. As argued by Berleant, the process of appreciating a painting requires us to imaginatively enter and explore the world of the painting. Berleant's notions of participatory engagement thus works form a proposition that people not only appreciate situations as observers, but actively invest their resources, beliefs and prior experiences in the environment. Similar to Rogers' (2006) concern for the underlying agendas in ubiquitous computing research, Berleant's conceptualization points towards the resourcefulness of people as they engage in situations. Participatory engagement denotes a transactional process between people and environment in which there is a continuous exchange. Although Berleant's primary source of examples and reflection stem from the arts, he extends the general argument to encompass nature as well as the built environment (Berleant 1992). A similar line of though is found within pragmatism and in particular in Dewey's (1934) notion of art as experience. Dewey distinguishes between the art product and the work of art; the former being the physical and potential, and the work of art being what is experienced as people engage with the art product. The work of Berleant echoes Dewey's pragmatism, which has clearly inspired his writings (Berleant 1970, 1991, 1992).

Relating more specifically to technology, Albert Borgmann addresses the issue of engagement and provides concepts for exploring the role of technology in everyday life and culture at large. The work of Borgmann has been applied to some extend within fields relating to interaction design (Hallnäs & Redström 2002, Verbeek 2005, Verbeek & Kockelkoren 1998, Fors & Stolterman 2003). In a range of publications, Borgmann (1984) expresses a concern for what he coins the *device paradigm*, denoting the pattern of disengagement emerging as technological devices disburden us in our everyday dealings. Devices do not require of us to invest our skills, but make their commodities readily available. Borgmann (1984)

argues that in contrast to devices are *focal things and practices* that engage people in the fullest of their capacities. A similar line of thought is found in the work of Czikzentmihalyi (1990) and his work on optimal experience. Czikzentmihalyi (1990) argues that *flow* experience is achieved when there is an optimal fit between challenges and skills. Similar to Borgmann, the work of Czikzentmihalyi (1990) deals with how people engage their full capacities and how particular situations and environments promote this engagement. The notion of flow highlights this as the transactional process between what people invest and how the environment responds.

Although some of Borgmann's works may seem to evolve around a somewhat bleak outlook regarding the nature of technology, as suggested by Verbeek (2005), his articulation of the nature of engagement holds much value in thinking about the ways in which technology might invite people to engage. Borgmann (1984) argues that focal things, as opposed to devices, demand of people to be present in all their capacity and to invest their skill and effort in the particular situation. Rather than disburdening people, things are characterized "*not only by the wealth of their experiential properties but also by the disclosing powers of those properties*" (Borgmann 1995: 19). Things that promote engagement have a certain depth and unfoldedness; the qualities of the thing and what it makes possible are revealed as people invest their efforts in the situation. Borgmann's notion of the fundamentally involving nature of things that invite engagement reflects Berleant's (1991) notion of participatory engagement as a process in which people invest their resources in particular situations. However, where Berleant (Ibid.) seems to stress the pervasive nature of this engagement, i.e. that participatory engagement is a fundamental premise and pervades all parts of our dealings, Borgmann (1984) cautions us to think about devices that hinder our engagement. Indeed, Borgmann argues, that if we are to revive engagement in the design of material culture, we must recover the depth of design. Designers are, in Borgmann's terms, charged with the task of making the material culture conductive to engagement (Borgmann 1995).

Addressing the work of Borgmann, Verbeek (2005) argues that although Borgmann's outline of the characteristics of the device paradigm shed important light on technology and human engagement, he underplays the extent to which technologies might also amplify or strengthen engagement. Verbeek provides examples of how electronic pianos, CD-players and TVs not only diminish effort, but also provide new opportunities of engagement. Verbeek strives through his arguments to promote a balanced picture of how technology might diminish and amplify engagement. Through his re-interpretation of Borgmann, Verbeek articulates how engagement might be mediated through technology where some aspects are diminished, others are amplified, and new modes of engagement emerge.

In P5 I (along with my co-author) explore the idea of *means of engagement*. In many respects this idea resembles Verbeek's (2005) focus on how technologies might promote engagement. A focus on the technological artefacts in themselves is however to narrow to capture engagement as it unfolds. Within the domain of

museums, Hindmarsh *et al.* (2002) argue that the museum context demands that we consider coherent assemblies of interconnected and interrelated artefacts rather than single user interfaces. Returning to the work of Berleant (1991), he uses the concept of the *aesthetic field* to capture the forces at play when people appreciate art, nature, or other parts of the environments. For Berleant, the aesthetic field covers other artefacts, people as well as socio-historical forms of practice (Berleant 1991: 92). Similar ideas are found in the work of Dewey, who stresses that our experiences are always situated in particular circumstances encompassing people, artefacts, and social constructions creating a whole which Dewey terms *situation*. Found in both the work of Berleant and Dewey is the central notion that a situation is not something we enter into and that exist outside people, rather situations emerge through transactions between people and their environment. In P5, the notion of means of engagement is developed to not only denote the ways in which singular technologies might mediate engagement, but as a term that brings attention to the multitude of interconnected aspects that in concert mediate engagement. Returning to the realm of museums, technologies are always embedded in (and sometimes aligned with) particular circumstances where the physical locales, lighting, and the artefacts on display fundamentally shape how any particular technology mediates engagement. Studies within CSCW have provided relatively detailed accounts of how visitors' engagement unfolds in accordance with these elements of particular situations (e.g. Heath *et al.* 2005). Means of engagement is coined as a term that cuts across these boundaries and considers the intentional constructs that mediate engagement. In P5, the concept of *peepholes* is discussed as providing a particular means of engagement. Although the examples provided in P5 are of technological artefacts, it is stressed how these work together with other components of the situation to mediate engagement. What is suggested in P5 through the example of peepholes is that interaction design might benefit from articulating and reflecting on particular means of engagement, their implementation, and success in various contexts. Overarching ideas regarding engagement and experience do provide tools for critical reflection, yet reflections and formulations of more concrete means and their deployment might complement these overarching concerns.

As much as engagement in exhibition spaces depends on the physical and social context, it also depends fundamentally on what people bring to the situation. Visitors do not walk into a museum as a tabula rasa. Rather, people invest their time and effort in certain situations, based on their prior experiences, preferences, and knowledge. This is hardly a controversial statement. Yet as argued by Pierroux *et al.* (2007) and Czikzentmihalyi & Hermanson (1995), it remains a central challenge for museums to establish links between interest and preferences reflected in the everyday life of visitors and the knowledge presented in museums. This is not necessarily a trivial matter as it prompts us to explore the issue of motivation. Czikzentmihalyi & Hermanson (1995) provide a relatively detailed account of motivation, arguing that museums might use contextual stimuli or *hooks* to spur curiosity that in turn may arouse the personal and more enduring interest of visitors. What Czikzentmihalyi & Hermanson articulate is the fundamental

connection between what is presented in museum and the everyday life of visitors. Moreover, the conception presented by Czikzentmihalyi & Hermanson (1995) help to nuance the idea of means of engagement addressed in the previous section. Thinking about engagement in terms of motivation prompts us to consider means that work primarily as contextual stimuli that spurs curiosity and means that evoke more enduring interest. Edmonds *et al.* (2006) make the case, that these aspects are supported by various attributes of artefacts; *attractors* support the immediate interest while *sustainers* support more enduring engagement. Working from the perspective of Cultural Historical Activity Theory, Pierroux *et al.* (2007) coin the challenge facing museums as the bridging of two activity systems: the activity system embedded in museum artefacts and the activity system of the visitors. Goodman (1985) takes this connection a step further by arguing that the common end of museum is not necessarily providing information, but transforming vision and thus improving the comprehension of the worlds that we inhabit. What Goodman proposes is in a sense a pragmatic conception of what things in a museum might do (to visitors). Hence, the eloquent conclusion drawn by Goodman is that museums need "*to make works work*" (Ibid.: 58). The perspectives offered by Czikzentmihalyi & Hermanson, Pierroux *et al.* and Goodman feedback to the notions of means of engagement by stressing that a central part of engagement in museums is that it fundamentally relates to the everyday practices of visitors.

Whereas P5 develops the notion of means of engagement with substantial inspiration from pragmatist conceptions, P4 explores the notion of motivation from Cultural Historical Activity Theory. In P4 I provide (along with my co-author) an account of motivation and motives based on the work of Hedegaard (1995), Fleer *et al.* (2009), and Hedegaard & Chaiklin (2005). Similar to Czikzentmihalyi & Hermanson (1995), Hedegaard (1995) describes motivation as the dynamics that characterizes a person's relationship to the surroundings in any given situation. Motivation is thus a situated phenomenon. The term *motives* is used to denote more enduring goals that span extended periods of time and particular situations. According to Fleer (2009), motives are developed as people engage in institutions of society in which cultural values are inscribed. In this sense, the formation of motives is tied to cultural-historical forms of practice. In P4 it is suggested that the challenge of creating links between the everyday practice of visitors and museum knowledge might be achieved by creating exhibitions that specifically deal with visitors' dominating motives. Moreover, based on a discussion of the runic table installation, P6 illustrates how visitors' engagement with this installation was often realized by visitors relating aspects of their dominating motives of their everyday practices to the museum knowledge. The notion of motivation helps to shed light on the issue of depth discussed above by proposing that depth might be achieved by creating intersections between meaningful activities in everyday life and museum knowledge. Through these intersections the exhibition spaces may potentially draw together their subject matter with the richness of people's everyday engagement and thus create possibilities for depth of

reflection and not least for exhibition spaces that in the words of Goodman (1985) make works work, by transforming vision.

4.2 Reflection on cases

In order to qualify and nuance the perspective provided above, this section re-visits some of the experimental work explored in the included publication. More specifically, I will address work on the runic exhibition, the Viking Ship Museum[1], and return to the prototypes evaluated at the Kattegat Marine centre.

4.2.1 Means of engagement

My work with the Viking Ship Museum (see section 3.4.4) did not result in the production of prototypes, yet it is interesting as it sheds light on the issue of means of engagement. In terms of means of engagement, the Viking Ship Museum has a very clear profile. The reconstructed ships are centred in the exhibition space which is a single cross-shaped room with white stonewalls and a high ceiling. The decoration of the room is minimal; the reconstructed ships are positioned centrally in the room allowing visitors to pass on each side of the ships (figure 11).

Figure 11. The central space in the Viking Ship Museum.

At the far end of the building is a collection of artefacts displayed in classical display cases. A fence surrounds the reconstructed ships with signs clearly indicating that the ships are not to be touched. The exhibition is clearly structured around the idea of providing visitors with unhindered view of the ships and allowing them to explore only sparse information about the ships. Based on our

[1] The work with the Viking Ship museum is not specifically addressed in the included publications. I have however discussed the case in connection with the IXP case in Dalsgaard *et al.* (2008).

observational studies of visitor engagement at the museum, the exhibition seems to work well in the sense that only few elements distract the visitors' attention from the ships and their presence seems to instil a sense of awe and wonder. The distinct and solemn atmosphere of the museum seems to spur the imagination of visitors as they are confronted with the reconstructed ships. Based on the interviews conducted during our fieldwork, it was evident that many visitors became somewhat intrigued when viewing the ships, reflecting on how they were sailed and the lives of the people using the ships. Moreover, the distinctly minimalistic style of the museum brings into focus the details and material qualities of the ships. Returning to the idea of the pervasive nature of participatory engagement from Berleant (1991), the Viking Ship Museum provides an example of an exhibition space that uses stylistically stringent way of inviting visitors to engage through reflection and imagination. In terms of more overt means of engagement, the museum does, however, provide very little. Besides viewing the ships and reflecting on their use, visitors are offered few other means with which to engage with the ships. In other words, there are relatively few opportunities for people to invest their resources in the exhibition and become actively involved.

The Viking Ship Museum does provide guided tours, which are frequently used by tourists. The guided tours provide more in terms of information and stories relating to the reconstructed ships yet they do to some extent seem to remove focus form the materiality of the ships as visitors spend more time listening to the tour guide than they do appreciating the materiality of the ships. Moreover, a striking facet of the way in which people engage with the Viking Ship Museum is the amount of photographs and video taken at the museum. As the museum is one of the most popular attractions for tourist this might come as little surprise, yet the sheer scale of photographic practice was a surprise during our observational studies. The relationship between photography and tourism in a broader perspective has been discussed to some extent (e.g. Sontag (1977), Urry (2002)). Speaking of photography and tourism Sontag notes that "*It would not be wrong to speak of people having a* compulsion *to photograph: to turn experience itself into a way of seeing*." (Sontag 1997: 24). More to the point regarding means of engagement, Sontag argues that "*to photograph is to appropriate the thing photographed*" (Sontag 1977: 3). No doubt that many visitors take photographs with the intent of later sharing or revisiting their experience, yet the photographic practice does seem to become a means of engaging with the museum space. Standing in front of a particular ship and staging a picture with the perfect background becomes a way of appropriating the exhibited items and inscribing oneself into the setting.

The aim of the design work at the Viking Ship Museum was to communicate some of the doubt and processes of interpretation that had gone into the reconstruction of the Gokstad find. The Gokstad findings did not in themselves provide traces that could lead to an accurate reconstruction. Interpretation, assumptions, and even qualified guesses were needed to create a model of the original ships and the result is filled with doubt as to how the ships were actually constructed and sailed. The ships currently displayed at the Viking Ship Museum do not tell this story; they do

not disclose the secret that perhaps their current form is far from the original one and visitors are provided no means for exploring this dimension of the cultural heritage. The ships stand in the museum as monuments of truth about the life of the Vikings and as corner stones in Norwegian cultural history. From the point of view of Terje Planke, who is specialized in the reconstruction of the ships, there was an explicit agenda of putting on display these aspects in order to nuance the image of Vikings in Norwegian culture. In terms of interaction design, the interesting issue for my work was perhaps more that the issues of doubt and interpretation could be resources for spurring visitor engagement. Providing visitors with means for exploring how the Gokstad finding were interpreted and how these interpretations shape ideas about how the Vikings lived could potentially spur engagement by offering visitors opportunities to invest their ideas and imagination in the exhibition spaces. Such efforts might provide a way to offer the depth and unfoldedness that Borgmann (1995) identifies as qualities of engaging environments.

Although no prototypes were developed for the Viking Ship Museum, the project is interesting as the museum is a paradigm example of a clear style of exhibition where visitors are offered relatively few overt means of engagement. Moreover, I think the concrete issues of doubt and interpretation that were evident in the reconstruction of the Gokstad find, at least suggest themselves as a significant resource for museums in terms of providing visitors means with which to invest their ideas and resources in the exhibition space.

4.2.2 Investment, depth, and everyday practices

Whereas my work with the Viking Ship Museum remained on the level of conceptualizations and sketches, my engagement with Moesgård Museum (DUL) and the Kattegat Marine Centre (IXP) fostered concrete prototypes that explored novels means for visitors to engage. The projects did however address different topics, and as such, they serve to highlight various aspects of the conceptualization provided in this chapter. As discussed earlier, the IXP prototypes provide means of engaging with the issue of fish and marine life. Central to their design was the idea of re-instating the visitor as an active participant in the museum space. Following the notion of participatory engagement proposed by Berleant, it might be argued that engagement is always in a sense participatory – when people watch the exotic fish in the aquaria in the Kattegat Centre, their appreciation is fundamentally tied to their own experiences, knowledge, and beliefs. Our efforts did, however, centre on more overt forms of engagement. The prototypes invite people to engage through means of construction; creating imaginary fish and exploring their properties. They were aimed at promoting creative endeavors by urging people to invest their skill and imagination in creating the fastest, slowest, deadliest, or oddest fish possible. The Hydroscopes, that allow visitors to view their own fish and those that other have created do not in the same sense invite creativity. Similar to the aquaria of the Katteagat Centre, they offer visitors the chance to view (virtual) fish. The Hydroscopes do, however, incite people to engage in exploration of the virtual ocean. During the design process, several solutions were considered

for the virtual ocean. Among these was the idea of simply mounting projectors in the ceiling and displaying the entire virtual sea on the floor surface. The Hydroscopes where however designed with the particular intention of deliberately hiding parts of the ocean and thus inviting people to actively explore. In P5 the notion of *peepholes* is developed as a way of articulating the interplay between what is hidden and what is revealed. The Hydroscopes stimulate imagination by suggesting that there is something hidden beyond the view of the Hydroscopes.

The Hydroscopes and the construction table obviously illustrate an assembly of technology. Their working is also fundamentally intertwined with the physical layout of the Kattegat Centre, e.g. the Hydroscopes play on the idea that an ocean is hidden beneath the floor surface. Moreover, the quality of the Hydroscopes as maintaining a tension between what is hidden and what is revealed also relates to the very idea of the ocean as a hidden universe that is not directly accessible. The placement of the installations besides large fish tanks also played a role; people would watch the real fish swimming and sometimes return to the construction table with new ideas.

Based on the evaluations of the prototypes at the Kattegat Marine Centre, the prototypes did to a large extent succeed in engaging visitors in the playful activity of constructing fish. Visitors would construct the fastest, oddest or biggest fish possible and typically spent some time trying out various combinations. Yet many visitors did in fact mimic existing species in their designs and used the Hydroscopes to explore where they lived. The Hydroscopes in themselves spurred the curiosity of many visitors who engaged in exploring the virtual ocean, which in turn led some visitors to return to the construction table and create a new fish. Moreover, the Hydroscopes and the construction table often became places of social and cooperative activities as visitors showed their fish to each other or collaboratively moved the Hydroscopes along the floor surface. As reported in Dindler *et al.* (2007), the evaluations did, however, also show the limited depth of the installations as the fascination with the Hydroscopes and the construction table gradually faded when people had created one or two fish. The extent to which the prototypes sustained engagement seemed to hinge on the extent to which visitors remained intrigued by the playful and experimental nature of the installation. Some visitors found an additional depth in the installations as they began to compare fish and compete to make the fastest or funniest fish.

The prototypes developed for the runic exhibition at Moesgård Museum (see section 3.4.2) reflected similar concerns for inviting visitors to relate by means of construction. Moreover, both installations are mixed reality installations where both tangible forms of interaction and digital materials are employed. The runic table was specifically designed from the idea of exploring how the exhibition space might create links between the everyday life of visitors and the subject matter of the exhibition. This was done by inviting visitors to create their own runic stones and place these on a contemporary map projected onto the table surface. The runic table does arguably not contain the same playful element as found in the IXP prototypes. It is more concerned with inviting visitors to create links between the

practice of making runic stones and their everyday experiences. As such, the installation is a hybrid construction that merges elements from the runic stone universe with elements from everyday practice. This is done not only by the design of the tangible stones that represent miniature runic stones but also by the screens mounted on the table that take the visitor through four steps in creating the stones reflecting the general inscriptions on the original stones. The original runic stones typically stated who created the stone, to whom the stone was dedicated, the occasion of the stone, and a particular decoration. The installation asks visitors to consider what occasion or event in their own life that would be worthy of creating a stone and guides visitors through the various aspects typically found on the original stones. In this sense, the installation, in a very concrete way, creates a link between the practice and format of creating the original runic stones and the everyday life of the visitor. Moreover, the map upon which visitors choose a location for their stone was a contemporary map featuring roads, schools, and sports facilities and thus provides another way of anchoring the activity in places of everyday life. As discussed in P4, the stones made by visitors during the time of the exhibition reflect aspects of dominating motives such a relating to family members or central activities in their everyday life. Moreover, many teenagers used the installation to set stones that were social statements about their friends. As an example, one particular stone read "*Jeppe set this stone for Anne who is a nice chick*". This does arguably not reflect the seminal messages for which the stones were originally used. It does however serve to illustrate how dominating motives among teenagers concerning social navigation among friends are invested in the museum space. Thus there is here a blend between the dominating motives of teenagers and the domain of runic stones and the way these were created.

Keeping in mind Borgmann's (1984) notion of devices that diminish engagement by disburdening people with effort, it is obviously the case that the installation in no way requires the craftsmanship or effort that went into the design of the original stones. The effort that originally went in to creating stones is diminished. It does, however, prompt visitors to reflect on the seminal events of their own lives and on the significance of the original stones by both creating their own stones, but also by exploring the stones that other visitors have created. In this sense, the installation diminishes some aspects of engagement while promoting others. Moreover, the installation was aimed at connecting to the assembly of installations and artefacts exhibited in the exhibition spaces, where the actual stones are on display and information is provided regarding the stones. Compared to the IXP prototypes, the depth of the runic table is created by the extent to which visitors draw together the universe of the runic stones with their everyday lives. The installation does not have the same experimental quality of the IXP prototypes, but offers richness in the ways in which visitors come to reflect on particularly meaningful aspects of their lives. As argued in P4, what these meaningful aspects are, relate to the dominating and meaningful motives that people bring to the museum.

The IXP and the DUL prototypes both reflect attempts to create means of engagement where visitors actively invest their resources in the exhibition space. The IXP does this by spurring playful activity where the issue of fish and their

characteristics is explored creatively. The DUL prototype reflects a more specific concern for relating the subject matter of the exhibition to the everyday life of the visitors. They are, in the words of Berleant (1991), very overt forms of participation that in many respects stand in contrast to the means provided at the Viking Ship Museum. In relation to the field of interaction design, the prototypes illustrate the concepts of means of engagement (and more specifically peepholes) and how motivational aspects play a central role in relation to engagement. In relation to the domain of the museum, the prototypes illustrate an agenda of instantiating visitors as active participants in the exhibition space and of creating links between the everyday life of visitors and the museum. They are less concerned with providing factual information than they are with intriguing visitors to further explore the respective subject matters of the exhibition and prompting visitors to reflect on their everyday practices. They represent efforts to materialise an agenda of exploring how visitors might actively engage in the exhibition space and how, to paraphrase Goodman (1985), works might work to transform vision.

4.3 Summary

The account provided here summarizes key aspects and ideas that have evolved as central during my research crystallised in P4 and P5. Based on a general discussion of the notion of participatory engagement, I have pursued the idea of thinking about the means by which visitors are invited to engage. For this purpose, I have used the notion of *means of engagement* denoting the intentional constructs that mediate engagement. The notion stretches beyond individual technologies and interfaces to encompass the multitude of interconnected aspects that are arranged through design and that, in concert, mediate engagement. Particular means of engagement might use contextual stimuli to attract visitors' attention but may also create a depth of engagement allowing people to disclose new aspects continuously. One way of pursuing such depth in exhibition spaces is by creating intersections between museum knowledge and the everyday practices of visitors. I have discussed this issue through the notion of *motivation* and proposed that depth emerges and might be supported by providing means of engagement that invite people to relate museum knowledge to dominating motives in everyday practice.

The ideas reflected in P4 and P5 are closely related to my focus on shaping design inquiries that I will address in the next chapter. They are related in at least two ways. First, although the ideas are materialized in P4 and P5, they have been shaped through the workshops, observations, and reflections in which I have engaged during the various projects. Working with a variety of museums, exhibition designers, and visitors has in direct and indirect ways shaped my perspective. It is part of the program that I have pursued with regards to engaging interactive exhibition spaces. Second, the perspective presented here has been guiding for the ways in which I have worked with shaping design inquiries. This is both the case in the ways in which my design inquiries have been staged and conducted but also in the way that I have worked with the material produced in these inquiries. The participatory design inquiries discussed in the next chapter reflect, in various ways,

concerns for exploring how people might invest their resources meaningfully in exhibition spaces and how we may create means to support this process. Moreover, working with the material outcomes of the workshops, I have explicitly focused on situations were I saw aspects that related to my developing notion of engagement. Returning to the notion of appreciative system developed in the previous chapter, I will suggest that the perspective presented in this chapter has continuously taken part in shaping my appreciative system. The perspective has influenced my way of staging, seeing, and interpreting the outcomes of the various design inquiries. The perspective offered has a distinctly programmatic character in that it suggests a particular agenda to pursue. As I begin to explore how I have worked with shaping design inquiries in the next chapter, I will return to the perspective on engagement presented here and provide more concrete examples of how these aspects are materialised in my work.

5 Shaping design inquiries

The second strand of my research that I will unfold in this chapter addresses more specifically the issue of the design process. Whereas the previous chapter developed a notion of participatory engagement as a perspective on how people might engage as resourceful individuals and groups in exhibition spaces, this chapter deals with the formats of design inquiries with which I have worked. As discuss earlier, the two perspectives are fundamentally intertwined and are both products of designerly engagement. The separation into two chapters is done in the service of presentation rather than to reflect a divide.

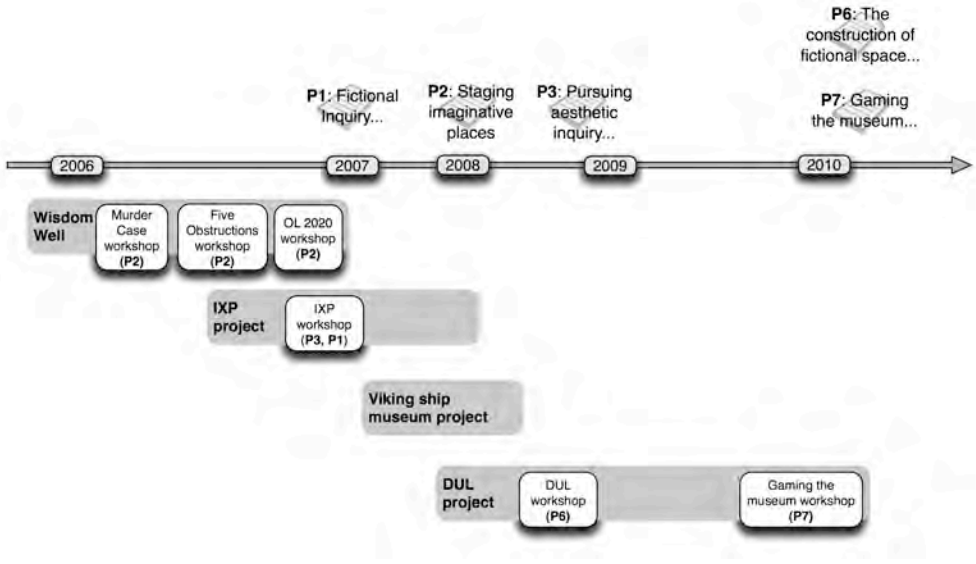

Figure 12. Overview of central projects and publications related to chapter 5.

Throughout this chapter, I deal in particular with the contributions made in P1-P3 & P6-P7 (figure 12). Similar to the preceding chapter, I will visit the included paper two times during this chapter. Together, these two parts of the chapter serve to outline the theoretical notions and to show the scope of their applicability through examples from the experimental work. During the first visit, I will tie together the contributions made in the included papers through the notion of *fictional space*.

Fictional space is developed as a general perspective for understanding design inquiries that suspend and re-shape established norms and conventions within a given practice. The motivation for doing so is to provide participants in design with a setting in which to explore future practices beyond established norms and conventions. I suggest that the creation of fictional space may be understood as participants in design practicing *games of make-believe* and that this process is mediated by the use of *props*. I begin the chapter by motivating the notion of fictional space within the realm of museums. Following this, an example is provided from a workshop in the IXP project (figure 12) as this serves as a paradigmatic example of my work on shaping design inquiries. From this example I provide an initial outline of the notion of fictional space. Based on this outline I continue to develop the notion of fictional space through five sections. I begin by grounding the notion of fictional space in design theory and in particular in the notion of design space as an emerging field of work in design practice. Based on this notion of design space, I introduce the notion of fictional space and discuss how this emerges through games of make-believe. From this I proceed to more in depth discussions on the role of props in the creation of fictional space, the outcomes of these inquiries, and the relation to participatory design. As I visit the included papers for a second time, I explore how the individual experiments addressed in the included publications provide nuance to the theoretical notion of fictional space and how these serve to illuminate the scope of applicability of staging fictional space in participatory design practice. The experiments are in the form of workshops conducted where museum visitors, staff, pupils, and teachers were invited to participate in design (figure 12).

5.1 Motivating fictional space

The central premise and motivation for addressing the notion of fictional space in design practice is that large parts of our everyday dealings are habitual and reflect historical forms of practice. When we eat dinner, go to the supermarket, or go to work we do so in particular ways that reflect our long-term familiarity with these activities. These activities reflect cultural forms of practice and we appropriate the habits, conventions, and motives that are inscribed in our surroundings and that we have learned through our life in society (Hedegaard 1995). Museums are no exception. Most of us know what a (typical) museum is and what to expect when we walk in the door. Of course we typically do not know exactly what the exhibition contains and what we will experience during our visit. We do however know something about what kind of activities are going to take place beyond the entrance; how we can and should behave and how not to behave. We know that we as museum visitors usually adopt an inquisitive and interested attitude allowing ourselves to be open to new ideas and experiences. We also know that we probably should refrain from running in the exhibition space and that talking loudly on our cell phone might not be the most appropriate behaviour. These are stereotypical examples, but serve to illustrate that we do not meet the museum space, or any other space for that matter, as a tabula rasa. We have a certain knowledge whether explicit or not about what to do and what not to do. This is not only the case for

visitors. Museum staff and curators also build habits concerning how they communicate about their exhibitions and how new exhibitions are designed. In terms of exhibition design, this is in one sense a clear advantage in that designers build on existing repertoires of knowledge about what works in an exhibition space. Exhibition designers know how images, artefacts, and text need to be arranged in order to capture the attention of visitors and how narratives and information should be displayed so that these are communicated to visitors. The potential problem, however, is that design becomes to heavily based on fixed assumptions about what an exhibition should be and what people do; thinking and acting becomes incremental without questioning underlying assumptions. There is of course obvious benefit in using concepts and experiences of what has worked so far. However, if the aim is to explore new modes for museums to exhibit artefacts and new modes for visitors to appreciate exhibitions there may be a need for creating circumstances that invite the exploration of ideas that are not based on fixed and implicit assumptions about what an exhibition is and what people do in exhibitions. I believe that the design challenge facing museums that I sketched in chapter 1 circumscribes that this may be a fruitful avenue to pursue. The central idea of staging fictional space is to reshape or by-pass the existing structures and settled patterns of meaning within a given context and let this be the stage of design activities. Through my work, I have experimented with a number of ways and formats for creating these settings; using narratives, places, and various artefacts. The purpose is to allow for participants in design to think outside the box and imaginatively explore what their practice might become if settled forms of practice were changed. It is thus a matter of shaping the design space to allow for new ideas that cut across incremental development. This is the core motivation and idea of fictional space. Through my work, I have progressively constructed a more nuanced understanding of the aspects of fictional space. In the following sections I will unfold this understanding. Before doing so, I will present an example of the creation of fictional space from the IXP workshop. This example will act as a springboard for discussing the issue of fictional space in more detail.

5.1.1 Fictional inquiry at the Kattegat Marine Centre

The example provided here is a half-day workshop (IXP workshop, figure 12) involving two researchers and a family of four (two adults aged 38 and 39, and two children aged 9 and 11). The purpose of the workshop was to explore new ways for visitors to experience the Kattegat Marine Centre. The workshop started at the Kattegat Centre with a brief talk about the project and the plans for the workshop. Before starting the actual workshop, the family spent some time exploring the Kattegat Centre on their own. After about an hour, the family had seen most of the aquaria and we were ready to start the workshop.

The first part of the workshop involved establishing a narrative that would frame the remainder of the activities. The narrative was inspired by the tale of the lost city of Atlantis. A room separate to the exhibition space was chosen as the base for the workshop and the place for introducing the narrative. The following narrative was introduced to the family: During the last couple of weeks, the employees at the

Marine Centre had been noticing a strange phenomenon. In the morning, they would find wet footprints leading back and forth from the aquaria. A few days ago, the centre had received a message in a bottle. We gave the message to the family. The message read:

Greetings Humans,

I hope this message finds the hands of good people who can help us. We, the people of Atlantis, have been forgotten by humans many years ago. For a long time we have been living happily, deep in the sea. The Marine Centre was accidentally built on top of our city, and we now face great problems. We sincerely ask for your help! In Atlantis we live on the great experiences and stories of humans. Stories, adventures, and fantastic experiences provide energy and life to the whole of Atlantis. For a long time we have lived happily on the experiences at the Marine Centre. But we are running out of fantastic experiences, and we need your help. We need you to create fantastic experiences so our city can once again thrive. To assist you in this task I have sent a box of magic tools that you can use however you like. The tools can do whatever you want them to do. I hope you will help us save our great city.

Yours truly,
The King of Atlantis

The letter explained that the Marine Centre had accidentally been built on top of the lost city of Atlantis. The people of Atlantis survived on fantastic experiences at the Kattegat Centre, but were running out, and needed the help of the family to envision new fantastic experiences. To aid them in their work, the King of Atlantis had sent a box of magic tools (figure 13, left). The family could ascribe any qualities to the tools, and use them however they liked. The box contained a variety of objects such as a mirror, a flute, an apple, and a black cloak.

Figure 13. Left: the family exploring the magic items in the box. Right: the family discussing how new experiences could be designed.

Having explored the contents of the box we discussed the plot of the narrative; the family had to imagine new experiences at the Marine Centre to save the people of Atlantis. At their disposal, they had the magic tools that the King of Atlantis had sent. The ideas created should be illustrated and enacted at the Marine Centre. Initially, some time was spent discussing the narrative frame; why had the Marine Centre been built on top of Atlantis, and how did the people of Atlantis live of experiences? Intentionally, several parts of the narrative were left open, inviting the family engage with and construct parts of the story.

Before embarking on the task, the family and the researchers spent some time discussing the items and imagining what they might be used for (figure 13, right). Each family member chose two specific places at the Marine Centre for which they had more or less specific ideas as to how new experiences might be realized using the magic tools from the box. As the family set out into the marine centre, they were asked to document and discuss all their ideas using a video camera.

Upon entering the Marine Centre, the family members took turns presenting their ideas. The presentations progressed with an initial idea proposed by one of the family members, followed by a discussion and elaboration of the idea. As an example, the young daughter of the family was inspired by the hallways in the marine centre that link a series of dark, cave-like rooms filled with smaller aquaria. In the box, she had found a pen originally used for a digital whiteboard. When pressed, the tip of the pen emitted a subtle humming tone (caused by the batteries in the pen). The daughter's idea was that the pen could be used as a treasure finder; when she walked with the pen and pushed the button, the humming sound would guide her towards hidden treasures beneath the floor (figure 14). The hidden treasures would be strange fish, or secrets that only she would find.

Figure 14. The daughter of the family illustrating her idea of a treasure finder.

Another concept was developed by the mother, who had chosen a magnifying glass from the box of magic objects. She imagined having the ability to explore the characteristics of the different fish in detail. The magnifying glass would be used at the aquaria to zoom in on the details of various species. Moreover, the magnifying glass would enable her to control the behaviour of the fish in the water (figure 15).

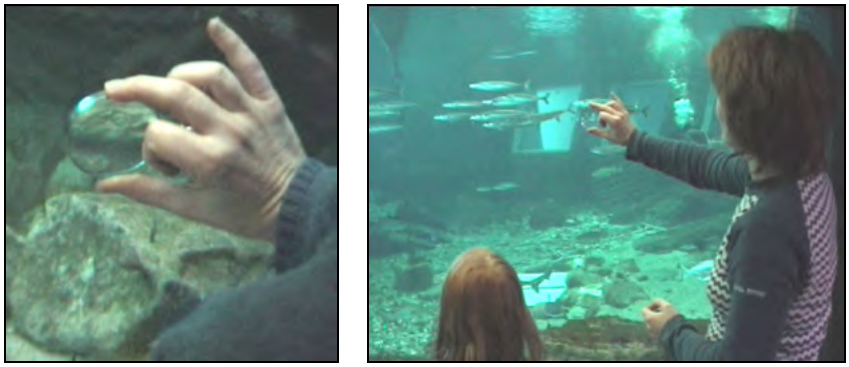

Figure 15 - The mother of the family illustrating her idea using a magnifying glass

These concepts were two among several developed during the workshop. Having presented the ideas for new experiences at the Marine Centre, we returned to the room where we had introduced the narrative. There had, of course, been no doubt during the workshop that the story was made up and that the objects in the box did not have magic properties. This had, however, not hindered the family in indulging in the playful atmosphere of the workshop and allowing themselves to image new and exiting experiences. Moreover, all participants were well aware that most of the ideas developed were not realistic, in the sense that they could be constructed exactly as they were envisioned. Yet the ideas and the workshop theme provided the springboard for discussing the qualities of experience that would be desirable at the Marine Centre, and the means that might be used to realize these. In particular, the discussion centred around issues of accessing the hidden world beneath the sea, being actively involved and engaged in the activities, and exploring the secrets and details of the hidden universe. The last issue in particular came from the concepts that the mother and the daughter presented (figures 14 and 15). The treasure finder highlighted the idea of actively exploring the hidden dimensions of life under the sea. The idea involving the magnifying glass fostered discussion around the details of the fish, and the possibility of exploring their abilities.

5.2 Outlining a notion of fictional space

The example provided above from the IXP project is from the early parts of my work. It was among the first in a series of workshops that experimented explicitly with using fictional elements to stage participatory design activities. In P1-P3 that were published during the first half of my project, the term *fictional inquiry* was coined, denoting a technique perspective where fictional narratives are used to suspend structures of current practice and provide participants a means for thinking beyond current constraints and assumptions. In the latter part of my project I have moved towards a more cohesive understanding of these design practices that tie these to issues in design theory. In P6 I present these reflections by discussing the creation of fictional space. Here I will elaborate on the notion of

fictional space and how this relates more generally to design theory and participatory design. What I suggest is that my work on shaping design inquiries may be understood in terms of the creation of fictional space in participatory design practice. I suggest that the creation of fictional space may be understood as participants in design practicing games of make-believe mediated by probs. This perspective, I believe, is able to capture on a general level, the more specific observations made in P1-P3 and provides a frame for discussing these contributions in a cohesive way. Moreover, as I will illustrate, this perspective is capable of encompassing the experiment reported on in P7, where the issue of everyday engagement in exhibition spaces is addressed. As I develop the notion of fictional space in the following sections, I will use the IXP workshop as a backdrop for understanding the creation of fictional space.

The notion of fictional space builds on the notion of design space, as the conceptual space created through the practice of design. In the following section I begin by tracing the notion of design space through central parts of the literature.

5.3 Design space as emergent phenomenon

The term *design space* is often used to denote the space of opportunity and constraint in any given design project. The design space delineates the boundaries in which designers must navigate. Using the term *space* suggests that it is concerned with movement in different directions and between various places. Within design theory, as introduced in chapter 1, the term design space has, however, been articulated from various positions. Simon's (1969) formulation of design as a science of the artificial presupposes the formulation of a generic problem space in which the designer searches for solutions (see section 2.3). The design space in this account may be mapped and navigated using rational procedures and exists as an abstracted entity external to the designer. This notion of design space has been further pursued within Artificial Intelligence research (see Woodbury & Burrow (2006) for overview). Schön's (1983) alternative account of design as reflective practice where the designer engages in a conversation with the materials of the situation stresses the co-evolution of problem and solution; the designer iteratively frames and re-frames the situation and allows for the situation to talk back. As argued by Telier (forthcoming), the perspective offered by Schön entails that the design space is created as the designer engages with the situation by framing and moving. The design space is thus an emergent phenomenon tied to the designer's engagement. It is this account of the design space that I will pursue here. Telier (forthcoming) exemplify this approach by providing a comprehensive account of the construction of design space in design students' work. Here, the term *space* is not used in the sense of a three-dimensional Euclidian space, but to describe the conceptual field of work in which the designer moves. As proposed by De Certeau (1984), space emerges as we consider vectors of movement and direction and is actively produced through practice. Extending this idea, Heape (2007) argues more generally that the design process may be understood in terms of the construction, expansion, and navigation of a conceptual space. This does not

mean that the design space does not relate to physical places and artefacts. On the contrary, Schön's (1992) account specifically entails that the design space is created as the designer engages with the materials of the design situation. These materials may of course be of a more or less tangible nature. The design space may thus be understood as the structure that binds together and makes coherent the moves that designers make as they engage with the materials of the situation. It is an emergent phenomenon that is produced through practice.

Central to the notion of design space is that it is an imagined field of work; a construction that the designer must take as the reality of the design situation (Schön 1992). Through design we imagine users and use and explore the artefacts and constellations that may bring about particular situations. In doing so, we also imagine more broadly the worlds in which these interpretations make sense which become the imagined field of our work. Designers are, in the words of Jones (1970), "*bound to treat as real, that which exist only in an imagined future*" (Ibid.: 10). As argued by Nelson & Stolterman (2003), the key capacity of design is the anticipatory image formation; the ability to imagine something that does not yet exist. As we engage with the materials of the design situation and imagine artefacts, systems, and constructs that do not yet exist the design space thus becomes a product of our imagination. As formulated by Hallnäs & Redström (2006), imagining things that do not exist is fundamentally an act of interpretation and definition; we interpret and ascribe meaning to the materials at hand. In design, we engage in the particular acts that define use and users. Users and use, as they are defined the design process, are logical constructs that inhabit the space imagined. We cannot directly study the users and use that we define through design (Ibid.). As noted by Jones (1970), the fundamental dilemma may be coined as the fact, that designers are forced to use current information to predict a future state that will not come about unless their predictions are correct. This is a circular situation. Design departs from something given, a wicked or ill-defined problem, but what that given is, somehow depends on what is designed. This very much serves to underlines Rittel & Webber's (1973) observation that wicked problems cannot be exhaustively defined and that every formulation is in itself a solution. Design rest on acts of definition and interpretation where imagination is inherent in the process. As formulated by Schön, designers:

"*construct the meanings of their situations, materials, and messages, but also the ontologies on which these meanings depend. Every procedure, every problem formulation, depends on such an ontology: a construction of the totality of things and relations that the designer takes as the reality of the world in which he or she designs."* (Schön 1992: 138).

What Schön (1992) articulates is the fact that not only do designers interpret the materials with which they are engaged, they also construct the worlds (ontologies) in which these interpretations make sense. As proposed by Telier (forthcoming), designers do not simply imagine new artefacts, but perform a leap into a hypothetical realm from which new artefacts and places can be imagined. There is a continuous exchange between being engaged in constructing meaning from the

materials of the design situation through acts of interpretation and finding new trajectories to pursue in the design space that is constructed. This is a continuous interplay between constructing, exploring and expanding the design space (Heape 2007). Engaging with the materials of the design situation is the process through which the design space is created; a space which in turn suggests new trajectories for movement and thus new interpretations of the material. The design space thus, one the one hand, ties together the places and ideas developed by working with the material and on the other hand suggests new paths to pursue.

The central notion pursued here is that of the design space as an imagined field of work that derives from the designer's engagement with the materials of the situation. The design space is thus as emergent phenomenon; it is derived from the interpretive acts of engaging with the design situation and in turn leads to new interpretations.

Returning for a moment to the example from the IXP workshop presented previously in this section, it is possible to understand the activities of the workshop as the construction and exploration of a design space. Through the workshop the design space was constructed and explored as the family engaged with the materials provided. Examples of this include the discussion about the magic artefacts in the box; the family spent time interpreting the meaning of these artefacts and what they might be used for. The narrative that was introduced to frame the workshop was also a material with which the family engaged. Although the narrative was relatively coherent, there were several unresolved issues that the family negotiated among themselves, such as how the people of Atlantis could live of experiences. The workshop not only shows participants imagining new artefacts and concepts for the marine centre, but also show how this process might be traced as the production of an imagined field of work – a design space. As the family began to explore ideas for the marine centre, they also constructed the imaginary world in which these efforts made sense. They discussed how these artefacts might make sense to the people of Atlantis and what they might use them for. This in turn opened up new avenues to pursue in their efforts. The IXP example provides a brief insight into how the design space was constructed collaboratively through the practices of participants. The example also highlights a range of issues that I will address in the next sections relating to the role of artefacts and narratives and the nature of collaboration in the construction of the design space. Before engaging with these issues, I will return the idea of fictional space. The example from the IXP workshop illustrates how the design space is not only an imagined field of work but also that it is to some extent based on fictional elements. In effect, the family moves within an unfamiliar space that is in some respects deliberately distanced from the context of the marine centre. Keeping in mind the motivation for employing fictional elements this was done to suspend and reshape some of the conventions and expectations embodied in the context of the marine centre. In the next section I provide an account of how the design space may be viewed as a fictional space and why this is a valuable perspective.

5.4 The design space as fictional space

The notion of design space as the imagined field of work created through the designer's engagement in the situation provides a perspective on how to understand design as it unfolds. This notion, as presented above, does however not account for the way in which the example from the IXP workshop employed fictional narratives and artefacts and how this shaped the design activities. In order to do so, this section builds on the notion of design space by suggesting in what sense this space may be viewed as a fictional space. Building on the arguments put forth in P6, an account is provided on how fictional space emerges as participants in design engage in games of make-believe mediated by props. The aim of this argument is to provide conceptual scaffolding for understanding the example from the IXP project in particular and more generally the practices that attempt to suspend or reshape conventions of everyday practice.

Using the term *fiction* is not without complications. In an everyday sense of the term we might think of fiction as somehow the opposite of reality; something that is unreal or at least not yet real. Continuing this line of thinking quickly locks us into a situation where we are forced to define what is real and what is not. Moreover, we become forced to account for the privileged position from which such claims can be made. To avoid being unnecessarily swamped in such philosophical issues that are well beyond the scope of this dissertation, I will opt for a constructivist approach found in the work of Goodman (1978), who specifically addresses the issue of fiction, as I believe this approach resonates well with the account of design pursued here. Goodman (1978) argues against the privileged position of any *real* world as a point of reference. All we have are versions of worlds and these are constantly in the making as new versions are constructed from existing ones – a re-making. As there is no privileged world to act as point of reference, the apparent distinction between real and fictional thus becomes in some sense meaningless. In Goodman's terms, fiction then does not function in reference to a privileged world from which real and unreal can be determined but from within particular versions of worlds. The function of fiction is to reconstruct new worlds from existing ones:

"Fiction operates in actual worlds in much the same way as nonfiction. Cervantes and Bosch and Goya, no less than Boswell and Newton and Darwin, take and unmake and remake and retake familiar worlds, recasting them in remarkable and sometimes recondite but eventually recognizable — that is re-cognizable — ways". (Goodman 1978: 104-105)

Fiction thus, in a sense, fabricates facts that form the basis for new versions of worlds. Goodman (Ibid.) suggests a range of concrete ways of worldmaking by which new worlds are constructed from existing versions. These include:

Composition and decomposition; worlds are divided into parts, subclasses, and features are re-composed into new constellations.

Weighting; some aspects or features are given more relevance or importance than others.

Ordering; worlds that may be similar in weighting and composition may differ in ordering. Elements and features may be ordered indifferent ways; linear, circular, etc.

Deletion and supplementation; making worlds from others worlds may typically involves deleting parts and supplementing with other parts.

Deformation; perspectives may be distorted, leading to new world formations.

Goodman's idea of fiction as an instrument for constructing new worlds marks a pragmatic concern for what fiction does rather than what it is (in any essential sense). Indeed, Schön's (1992) pragmatically inspired account of design as worldmaking addressed in the previous section, where it is argued that designers create the ontologies on which their interpretations depend, explicitly builds on Goodman's idea of worldmaking (see Kinsella (2006) for discussion). Reflecting Goodman's concern for what fiction does, Iser (1993) uses the verbal form *fictionalizing*, thus stressing the act of doing:

"In other words, ficitonalizing is free play. It oversteps what is and turns in the direction of what is not. Free play, however, would draw the fictionalizing act into a transcending movement that would make us forget what it has turned away from. Yet the fictionalizing act keeps in play what has been overstepped in order to expose it to becoming something other itself. Thus free play is tied to another form of play who's aim is to bring to light the motivation for overstepping." (Iser: 237)

For Iser (Ibid.), fictionalizing is an act of boundary crossing. Worth noting here, is how Iser simultaneously stresses that fictionalizing keeps in play what has been overstepped and thus maintains that worlds are made from other worlds. When I use the term *fictional space* here, I do so in Goodman's (1978) sense of worlds created through crossing the boundaries and overstepping what is. Keeping in mind the process related argument from Iser, fictional space is explored as en emergent phenomenon. I will maintain *fictional* as a qualifier to denote the particular distancing that is at stake in for example the IXP case and that I have addressed through a range of my papers (P1-P3 & P6). Distancing specifically refers to the fact the worlds are constructed by significantly overstepping, reshaping, and altering established structures within a given world.

To further explore the notion of fictional space and how it is created, I have found inspiration in literary theory. In particular I have found constructivist accounts, which conceptualize fictional space as the product of active engagement, instrumental in exploring the idea of fictional space. A natural focus within literary theory is how fictional space emerges from the relationship between reader, text, and author. At first glance, the scope of literary theory may seem somewhat distant from the issues addressed within design. As I will attempt to illustrate throughout

this section, there are however general arguments that may inform design and provide a perspective compatible with the notion of design pursued here.

In discussing fictional space in the American novel, Malmgren (1985) argues that literary works of fiction create fictional worlds that weave together elements from the empirical world with elements that have been made up. Fictional worlds are thus in a sense hybrid constructions that conflate elements into new constellations. Manlmgren's notion of *empirical world* as "*the contingent world as it presents itself in prosaic events, commonplace objects, and ordinary people*" (Malmgren 1985: 16) may at first glance seem at odds with the view presented by Goodman (1978), where there is no privileged world of reference. However, the central notion developed in Malmgren's (1985) argument is that worlds are developed from other worlds – similar to Goodman. Here, I will re-state the notion of empirical world in the sense of Goodman (1978), as a particular version of worlds. The fictional worlds created may be more or less autonomous depending on the extent to which they depart from previous versions. Malmgren draws a simple diagram depicting the trajectory, angle, and intersection between the different versions (figure 16).

Figure 16. Trajectory and intersection between empirical- and fictional world (adapted from Malmgren 1985)

The angle between the trajectories describes the level of autonomy; a relatively steep angle indicates a large degree of autonomy as the fictional world departs significantly from existing worlds, whereas a small angle denotes a larger degree of mimesis. Malmgren's model suggests that fiction works to establish a degree of remoteness or distance. Returning for a moment to the example from the IXP project, we may begin to understand this as an example of participants acting in a world created. The world was to some extend distant from their everyday practices and the practices associated with the Kattegat centre and thus suspended the conventions embodied in these practices. The space created was fictional in the sense that it was distant. The elements that were introduced in the form of narrative and various props worked to break down and reshape established ideas and expectations concerning the marine centre. Coupling the work of Malmgren (1985) and Goodman (1978) thus provides an overarching conception of the creation of worlds or fictional space as I have termed it here. However, the fictional space in the IXP case was not provided ready-made; rather, it was constructed using narratives and props. As proposed by Malmgren (1985), fictional worlds are

not stable constructs, but rather constantly emerging entities. In literature, Malmgren argues, fictional worlds are constantly re-created by the reader in the practice of reading. By analogy, the family in the IXP workshop did not only suspend their disbelief and allow themselves to be carried away, but also actively engaged in creating the world. As argued by Worth (2004), engaging with fiction is as much an act of our creative faculties as a suspension of our critical faculties. The account of fictional space pursued here, where fictional space is actively created, thus couples to the notion of design space as emerging from the situated practices of participants. The notion of fictional space addressed by Malmgren (1985) has introduced the idea of fictional space as distant. This account has, however, said little about the dynamics by which fictional worlds are constructed and re-constructed in practice. As highlighted by the example from the IXP workshop, it seems pressing to provide and account for the role of what is provided in terms of props, narratives, and materials and how these function as participants create fictional space.

To address this issue, I turn to the work of Walton (1990), who argues that fictional worlds are constructed through games of make-believe. The scope of Walton's work is representational works of art and he argues that these function as props in games of make-believe similar to the games children play with toys. Indeed, Walton suggests that "*In order to understand paintings, plays, films, and novels, we must look first at dolls, hobbyhorses, toy trucks, and teddy bears*" (Ibid.: 11). In children's games branches and cardboard may become swords and shields and the back yard the field of great battle – they become props in games of make-believe. Fictional worlds are products of the imagination, but imagining is not sheer free and unassociated play. In Walton's terms, props work by giving mandate to particular imaginings. More specifically, Walton identifies three general functions of props in games of make-believe. First, props may act as prompters of the imagination. When I see a plain cruising by high above me, I might for a moment imagine myself being in a warm sunny place far from the Danish winter. Second, props may be the objects of imagination. I might imagine that my chair would automatically roll me out of my office to the coffee machine when it sensed that I was in urgent need of caffeine. Often, props act both as prompters and objects of the imagination. Third, props may assist in the generation of *fictional truths*. Stating that superman has x-ray vision is a fictional truth in that it is true in a particular fictional world. When designers mock-up a new system using cardboard and Post-It notes, the fact that we can press buttons on cardboard boxes and scroll through displays made of paper is a fictional truth, as it is true in the world that the designers imagine. In the IXP case, the fact that the artefacts in the box had magic capabilities and that the people of Atlantis lived of experiences were fictional truths as they were true in the world in which the family was engaged. Fictional truths have the central function of mandating imaginings; accepting that a simple pen has magical capabilities allows us to imagine that it could in fact be a treasure-finder. Props may function in the generation of fictional truths that, in turn, give mandate to particular imaginings in games of make-believe. This is an inherently dynamic process; fictional truths give mandate to particular imaginings that in turn may alter or create new fictional

truths. As will be illustrated from the example in section 5.8.1, fictional truths may become subject of explicit negotiation in design activities.

This conceptualization provided above has laid the foundation for understanding the notion of fictional space. Fictional space is created as participants practice games of make-believe mediated by props. The fictional truths that are created give mandate to particular imaginings. By analogy, in the process of design participants imagine new places and artefacts mediated by the fictional truths that make up the fictional space. Concurrently, the fictional space evolves and is remade through the practices of participants. Where Walton (1990) provides the general notion of games of make-believe to denote the process by which fictional space is created, Goodman's (1978) account of worldmaking may be said to shed light on the nature of these games. As proposed by Goodman, worldmaking is accomplished through the processes of composition and decomposition, supplementation and deletion, weighting, ordering and deformation.

In the above conceptualization, a range issues that are central to my contribution have remained relatively untouched. In particular three areas have yet to be developed. First of all, as is evident from the experimental work that makes up the basis of my contribution, participatory design has been a focal area throughout much of my research. Although the issue of participation surfaced frequently in the account of fictional space provided earlier, little has been provided in terms of understanding the relation between participatory design and the emergence of fictional space. Secondly, I have used the notion of props as a general denominator for the artefacts, narratives and representations that are employed in the creation of fictional space. It seems pertinent to explore in more detail the significance of these props and how they are introduced, arranged and employed in participatory design inquiries. And finally, there is a need to account for the design material that is produced as participants engage in fictional space. In other words, what is the value of creating and engaging with fictional space in relation to a design process? The three following sections address these issues in the order presented here.

5.5 Fictional space and participatory design

In this section I address specifically the perspective of participatory design and discuss how the notion of fictional space may be understood within the scope of participatory design practice. P3 provides the first crystallisation of my efforts to conflate these notions. As P3 was written at a stage in my work where the notion of fictional space had not entered my vocabulary the term is not used explicitly. Rather, P3 develops the concept of *aesthetic inquiry*, which relates closely to the notion of fictional space, although coming from a different theoretical vocabulary. Aesthetic inquiry is described as a perspective on the participatory design practices that are specifically concerned with the transformation of modes of perceiving and acting within everyday practices. The notion of fictional space, addressed in this dissertation overview, provides an account of how aesthetic inquiries might be arranged and progress.

Comparing the account of fictional space provided to the notion of participatory design, some immediate discrepancies seem visible. In my account of the design space as an emerging phenomenon, I have used the somewhat anonymous concept of *the designer* – for example, the design space emerges through "the designer's" moves. The issue is somewhat complicated by the introduction of participatory design as the central tenet of this tradition is that the people, who are to use things that are designed, should play a key role in the process. In participatory design, the design space is thus a phenomenon that emerges through the collective efforts of designers, users, and other stakeholders.

The idea of fictional space in relation to participatory design may be understood in terms of Ehn's (1988) notion of design as always caught in the tension between tradition and transcendence; what already exists and what might exists. Ehn (1988) described the process of participatory design as the meeting between two different language games; the language game of design and that of use. Design may be accomplished by the building of design language games in which both users and designers can participate based on the game's family resemblance to already known games. The notion of language games shares much with the understanding pursued here of fictional space as emerging through games of make-believe.

Key to the grounding work in participatory design within Scandinavia was skill-based participation where workers were acknowledged as experts in their own practice. The proposition made within this work was that the essential knowledge possessed by competent practitioners was tacit and did not lend itself to formal description. In this regard, participatory design joined a series of authors that were critical towards rational approaches based on cognitive science (Winograd & Flores 1986, Nardi 1995). As argued by Spinuzzi (2005), participatory design more generally takes issue with rational approaches on both political on theoretical grounds. On the political level, researchers in participatory design have argued that rational approaches to knowledge lead to deskilling of workers and diminish workplace democracy. This has been particularly evident within the Scandinavian research. On the theoretical level, participatory design opts for approaches that acknowledge the situated, practical, tacit, and distributed traits of knowledge. The focus on skilled and competent practitioners led researchers within Scandinavia to adopt a tool perspective inspired by the idea of tools created in traditional crafts. The intention of the tool perspective was to "*build computer-based tools by which the craftsman can still apply and develop original skills*" (Bødker *et al.* 1987: 261). The point to be made here is that participatory design from the outset has maintained a strong footing in the current practice of users as the starting point of design. The tool perspective makes this commitment explicit by using the craftsman ideal of incremental development. Summer & Stoltze (1997) pursue this by proposing that participatory design could be conceptualized as "*evolution, not revolution*" (Ibid.: 1). The strong focus on current practice is exemplified in the relatively wide proliferation of ethnographically inspired techniques such as observation and interviews (Blomberg *et al.* 1993). Keeping in mind the political and societal landscape in which participatory design developed in Scandinavia there have been good reasons for this. In a Scandinavian labour scene marked by

conflicts of interest between blue-collared workers and management, acknowledging workers as skilled practitioners was a key insight for design. The notion of fictional space pursued here, marks a complementary perspective with a strong focus on transcendence. In P3 it is argued that the use of the fictional inquiry technique entails "*tipping the scale towards transcendence*" (Ibid.: 138). The point of the fictional space perspective is, however, not simply to design new artefacts that transcend radically the structures of established practices. As noted by Mogensen (1992), there is a perhaps subtle but indeed important distinction to be made between product and process. As argued by Mogensen (1992), Ehn's (1988) notion of the always-present dilemma of tradition and transcendence primarily concerns the products that are developed. Should for example a new word processor be designed as a traditional typewriter or in a completely new way that breaks with the tradition of the typewriter? Worth noting here is, that the products of design in a participatory design perspective encompass both the concrete artefacts and the knowledge and procedures that are produced in design. Should new designs build on existing skills of workers or should workers develop new skills? As agued by Mogensen (1992), the issue of tradition and transcendence is however also present throughout the process. Various techniques and approaches may focus more on understanding what is (tradition) or exploring what could be (transcendence). Thus, balancing the perspectives of tradition and transcendence is not only manifest at the end of the process, but also in the inquiries that make up the process. What is implied by the fictional space perspective is not that products should necessarily transcend and leave established forms of practice but that tipping the scale towards transcendence in the process of design allows participants to temporarily suspend what is taken for granted. Within the scope of participatory design, the notion of fictional space denotes a process perspective.

The issue of transcendence in the design process has been addressed in various ways crystallized in a variety of tools, techniques and approaches within participatory design. The use of mock-ups and prototypes as tools for cooperative exploration of design ideas has been a hallmark of participatory design (Ehn & Kyng 1991, Bødker & Grønbæk 1991). Sanders (2000) and Sanders & Dandavate (1999) proposes that we may think of these materials as generative tools or *make tools* that provide a language for co-design through which people can explore ideas and express their aspirations. Relating to the notion of fictional space, the cooperative prototyping approach exemplifies how fictional space is created through games of make believe. Ehn & Kyng (1991) show how a cardboard box with a label saying "laser printer" works very well as prop in the game of exploring the future practice of typographers and journalists. The fact that the cardboard box is a laser printer is a fictional truth. Accepting that this is the fact, allows for participants to imagine what the printer does and how it might work in the future. Moreover, techniques such as using metaphors and future workshops have been suggested as ways of addressing transcendence in the process (Kensing & Madsen 1991). The use of metaphors as a tool for creativity suggests transcending by conceiving of one thing in terms of another whereas the future workshop goes through phases of identifying current problems, fantasising about new ideas to

address these problems, and finally considering how new ideas may be implemented. Again, the use of metaphors may be conceptualized as a game of make-believe; we accept that for example the office space is a shopping mall and thus imagine how documents may be on sale and that we have shopping carts in which to carry around or work. Moreover, the use of Drama (Brandt & Grunnet 2000) and role-playing (Iacucci *et al.* 2000) has been proposed as ways of facilitating the meeting between designers and users. Central to these contributions is a dedication to the ways in which encounters between users and designers are staged; how artefacts, stories, and assignments set the stage for design as action (Bødker *et al.* 1991). Acknowledging the importance of the scaffolding of design activity, several of authors have explored the notion of *games* as a literal or metaphorical way of shaping design activity. Elaborating on the notion of language games from Wittgenstein, Ehn & Sjögren (1991) discuss how the playful notion of games may be used in the serious business of participatory design. Examples from the participatory design related communities have shown the fruitfulness of a broad spectrum of games, including board games (Brandt *et al.* 2008), video-card games (Buur & Søndergaard 2000), and inspiration card games (Halskov & Dalsgaard 2006). Not only is there significant flexibility in the game format, but also in the design issues that the games may address. As argued by Brandt (2006), the notion of games potentially provides a broad array of handles that participatory designers may use to shape design inquiries. The issue of games relates closely to the account provided of fictional space as emerging from games of make-believe. The game perspective implies playful activity within a certain structure. However, as noted by Brandt *et al.* (2008) structures or rules are not always fixed; they may be changes or moulded as the game progresses. The action of participants is thus not only related to making moves and imagining things within the rules of the game but also to expand the space of movement. In the examples provided later in this chapter I will go into more details concerning the dynamic character of fictional space in participatory design.

Looking across these techniques, tools, and approaches, they all offer formats for transcendence in participatory design inquiries. The specific approach of using fiction as an instrument in design has been addressed within a range of design related disciplines. Within participatory design, Ehn (1988) speculated that the theatrical Verfremdungseffekt might be used to recast what is already known and expose it to untried possibilities. This idea is echoed in the work of Bell *et al.* (2005) who argue that settings such as the home are so familiar that it is necessary to *de-familiarise* them in order to open up the design space. Even closer to the approach pursued here, Iacucci *et al.* (2002) propose that the design space may be viewed as a fictional space emerging through collective practices in the sense that "*it is composed of images that are free from the rules of reality and convention*" (Ibid.: 174). In particular, Iacucci *et al.* (2002) address this issue from the perspective of performativity in design. A similar proposition is made by Lerdahl (2002), arguing that fantasy worlds enable participants in design to break the bounds of tradition and enlarge the solution space. The approach pursues in my work shares much with these contributions. There is certainly an element of defamiliarization

embedded in the notion of fictional space and Iacucci *et al.*'s (2002) notion of fictional space is very close to what I have outlined. Moreover, the idea of breaking the bounds of tradition proposed by Lerdahl (2002) also finds resonance with my approach. The notion of fictional space pursued in this dissertation overview does however stress the emergent nature of fictional space as this emerges through games of make-belief and the central role of props in this process. Moreover, the perspective of fictional space suggests that it is perhaps not only a matter of opening the design space, as proposed by Lerdahl (2002) and Bell *et al.* (2005), but a matter of displacing it.

Within the scope of participatory design I have argued that fictional space entails tipping the scale towards transcendence in the process of design as a complementary perspective to creating a strong footing in existing practices. There is, however, an underlying issue of roles when the notion of fictional space is coupled to participatory design. The participatory design approach might imply that designers, researchers, and stakeholder are considered equals, but this does not necessarily imply that they are identical and have identical roles. So what is the role of designers, researchers, future users, and stakeholders in these inquiries? In the seminal work within Scandinavian participatory design, it was suggested that designers should be able to adopt a facilitator role in order to give a voice to those who are affected by design (Greenbaum & Kyng 1991). This has also been a central tenet in my work as I have strived to facilitate participants in exploring meaningful future practices. As noted by Nelson & Stolterman (2003), being in service does however not exclude self-expression and it falls upon the designer to be more than simply a facilitator. The designers must arrange appropriate forms of inquiry to provide people with the means by which they can create expressions about desirable futures. Moreover, the designer must be part of interpreting these expressions and giving them form in design materials and ultimately in products. My own agency in the design inquiries, reported in the included papers, has been manifest in a number of ways. First of all, I have (along with my colleagues) played a central role in the staging of design inquiries and thereby structured the formats in which participants could express themselves. There have of course been discussions about the scope of the particular projects and their aims in relation to the various institutions involved, but I have played a central role in addressing these concerns in particular inquiries. Secondly, I have taken initiative to interpret and select the outcomes of these inquiries. This is not to say that my colleagues and I have dictated the results, since much of the result of participatory design processes lies in the mutual learning processes through which all parties expand their conceptions. Yet we have taken the initiative in keeping momentum in the design process and shaped the materials that were put into play. Thirdly, returning to the notion of programs as appreciative systems, my focus on engagement has been prevalent throughout the ways in which inquiries have been staged and in which the materials have been interpreted. This is evident from the props that were employed during the workshops and the tasks that participants were asked to engage with. As I have pursued a particular program, the extent of this inscription of a particular appreciative system may be particularly evident. I do however

believe that the grounding work in Cooperative design may be understood using similar terms. Working with trade unions and promoting issues of workplace democracy and skill marked an explicit political and value-based agenda that led researchers to appreciate particular potentials and problems. Interestingly the program that I have outlined very much shares the idea of skill-based practices as I explore means by which visitors may engage in exhibition spaces as resourceful individuals and groups. This does in many respects reflect one of the central tenets developed in Cooperative design. The notion of participatory engagement presented in chapter 4 is in this sense an articulation of the ideals that I have pursued.

In the following section I continue to develop the notion of fictional space by addressing in more detail the central role of props.

5.6 Staging fictional space in participatory design

Fictional space emerges as participants practice games of make-believe. Yet as discussed in the previous section, the use of particular tools, narratives, and locations fundamentally shape what is created as these set the stage for action. In Walton's (1990) terms, the games of make-believe through which fictional space is constructed are mediated by props that give mandate to particular imaginings. The family in the IXP workshop participated in the creation of fictional space, yet they were to some extent bound by what was provided in the form of a particular narrative, props and the location of the marine centre. By analogy, in the literary theory explored earlier (see section 5.4) the reader of a text actively produces the fictional space, but does so by engaging with what the author has arranged in the literary work. The research presented in P1 and P2, reflects more specifically on the particular role of various props. In P2, I have together with colleagues explored the staging of a range of participatory prototyping events and how various aspects of this staging afforded on the one hand anchoring the design session in current practices and on the other hand transcending these practices. P2 develops the notions of *anchoring* and *transcending elements* as a way of articulating how various props, narratives, and assignments work to anchor and transcend established practices. In the IXP workshop, it may be argued that the box with magic items was a transcending element in that it afforded transcending established ways of appreciating the marine centre. The issue is however more complicated than these two concepts at face value would suggest. Returning for a moment to the IXP workshop: as the family went around the marine centre imagining new ways of appreciating the centre using magical props, much of the activity centred around the large fish tanks that inhabit the exhibition space. In a sense, the fish tanks worked as anchoring elements in that they maintained a focus on the physical properties of the marine centre. However, during the session the fish tank also prompted the participants to imagine new ways to interact. This, however, was closely tied to the narrative of the session that, in the words of Walton, gave mandate to particular imaginings. It would be overly simplified to merely categorize props as working to transcend or anchor. The potential value of

the notions of transcending and anchoring elements is to articulate that in the games of make-believe played by the participants, props assume various roles, and one perspective on these roles is how they afford anchoring and transcending. As the brief example provided here from the IXP project suggests, a more suitable way of looking at the props might be to see them as parts of larger constellations that work together as props in games of make-believe.

As noted in the previous section, the props that have been employed in the various cases addressed in the included publications are to some extend inscribed with the program in which I have engaged. This is particularly clear in the example provided in P6 (the DUL workshop) where a number of obstructions were provided for participants, explicitly stressing notions of participation, interaction, and visitor contributions to the exhibition space. Here the program and intentionality of the designer(s) becomes evident through the characteristics of the props. I will return to this example in section 5.8.1. It may, however, also be argued that the very act of selection particular aspects in a given practice and assigning these a central role in the design inquiry in itself reflects a particular appreciative system. Iser (1993) notes that in the realm of literature, the act of selecting particular things and giving these a central position in a literary work discloses the intentionality of the author. In a similar vein, I will suggest that the acts through which designers choose to focus participatory design inquiries around particular aspects of a practice in itself reflects and discloses the intentionality of the designer. In P2, dealing with the design of the Wisdom Well, the OL2020 workshop was structured around the physical dimensions of the Wisdom Well surface whereas the surrounding environment of the school was addressed to a lesser extent. This act of selection reflects the particular concern for aspects relating to kinaesthetic interaction confined to the floor surface. Props in the form of narratives and boxes with magic items may thus assume various roles and serve to transcend and anchor the activity in current practice and work in games of make-believe by giving mandate to particular imaginings. Yet the props also reflect the intentionality of the designer through their characteristics and their selection.

5.7 The products of fictional space

The previous sections have addressed how fictional space is created through the situated practices of participants and how props shape the creation of fictional space. So far, I have however said little about the design material that is produced when participants engage in fictional space and what value this has in design process as a whole. The focus of this section is how this material may be understood and how it comes to bear on the design process. There are at least two interrelated aspects of the material produced. In the example from the Kattegat Centre, some of the products of the workshop were ideas about how the Kattegat Centre might be appreciated using magic items. The family created specific concepts, more loose ideas, and incorporated these into scenarios that were played out at the Kattegat Centre. Obviously these products cannot be directly refined and implemented. Rather, they constitute design material that provides expressions of

peoples imagination and aspirations for what the marine centre might be like. The products of engaging with fictional space do, however, stretch beyond the immediate material produced through the workshop. Returning to the argument made by Ehn (1988), that design is a mutual learning process, the creation of fictional space also animates participants to reflect on existing practices. As suggested by Iser (1993), the fictionalizing acts of boundary crossing is two sided; the world left behind is not annihilated but re-actualised in the process of abandoning it (see Kambourov 2000 for discussion). The process of fictionalising thus prompts reflection on the world left behind. As argued by Goodman (1978), worldmaking is fundamentally a re-making where existing worlds are deconstructed and assembled into new constellations. Authors in participatory design have suggested looking at the product of design as not only physical artefacts but also as organizational development where people are prompted or even provoked (Mogensen 1992) to reflect on current practice. In this sense, an important part of the product of engaging in fictional space is the very process of constructing new worlds by deconstructing existing ones. These lead to new insight among participants and designers as to how practices might evolve and prompt reflection on existing practices. These two aspects of the material are clearly interrelated and reflect the idea of design as a mutual learning process.

The workshops addressed in the included publications vary significantly in terms of the issues addressed. As such, the concepts, scenarios, ideas, and reflections that were produced during these workshops are not a homogeneous category. This illustrates that the notion of fictional space is not a method or a technique that prescribes how particular design inquiries should be arranged and what ends should be addressed. Rather, the perspective enables reflection on particularly three aspects of design inquiry. First, it provides means and concepts for reflecting on how inquiries are staged and how particular props are employed in order to inspire participants to pursue particular aspects of the design situation. Second, the perspective provides concepts for reflecting on the progression of particular design inquiries; how do participants interpret particular props? How are existing practices re-shaped and re-envisioned through games of make-believe? Third, the perspective prompts reflection on the concepts, scenarios, and ideas developed during particular design inquiries and how these are the products of participants re-thinking existing practices.

The arguments put forth regarding fictional space so far, have primarily dealt with the issue on the level of individual workshop. Addressing the issue of how this comes to bear on the wider process leads me to consider how the creation of fictional space relates to seeing the design space as something that develops over an extended period of time and though a range of design activities. It could of course be reasonably argued that adopting this macro perspective embracing the design process as a whole, a range of other factors fundamentally influence the design space, including available funding, time, and technological constraints. One possible way of encompassing these diverse factors is to argue that the design space is continuously reshaped as the design process engages with various aspects. For example, one workshop might address the new experiential potential for an

exhibition spaces (such as the IXP workshop) whereas activities later in the project explores the technological constraints of the project. Another, and in my view more fruitful account, is to argue that looking at the design process as a whole, what may be discerned is the construction and existence of multiple spaces that overlap, intersect, and sometimes even compete. Although in a somewhat different context, Dourish (2006) has explored the notion of multiple and intersecting spatialities at play when people engage with environments. Dourish' account shows how these spatialities intersect and even compete but also in a sense illustrates the autonomy of particular spatialities that function on their own terms. This may be exemplified by returning to the IXP project. The workshop discussed in this chapter involving a family of four was aimed at exploring new ways of experiencing the marine centre. In parallel to this process were also processes that related to research and to potential technologies that might be employed. In particular, when developing the idea of the Hydroscopes, we explored how these might be realised using various positioning technologies. This exploration in turn led to new ideas about what should be developed. This process was obviously tightly related to the participatory design sessions at the Kattegat Centre, yet the technological explorations opened up a design space of possibilities and constraints that at times suggested new and competing ideas to be developed. In a similar vein, the research agendas pursued in the project suggested new path to follow and so did the agendas of the Kattegat Centre management that were concerned about how the prototypes would benefit their exhibition space. Viewing these as some of the different spaces constructed and explored during the project offers a way of understanding their fundamental connectedness as they continuously intersect during the project, yet it also allows us to understand the autonomy of these spaces as they are constructed and explored on their own terms and each suggest new paths to pursue in the process. Developments in new technologies open up new design spaces where we imagine new and exiting ways in which mobile devices and multi-touch surfaces might be used. However, as voiced by a range of authors within design (Nelson & Stolterman 2003, Krippendorff 2006) and deeply embedded in the participatory design tradition is a concern for the value of these technologies in relation to the people who are to inhabit the worlds that new technologies might afford. Krippendorff (2006) talks about the key capacity of designers to evaluate the desireablity of possible futures and Nelson & Stolterman (2003) develop the notion of desiderata, denoting not only what is possible but what is desirable. What is suggested by developing the notion of fictional space in participatory design is not that design should refrain from engaging with what is technologically possible, practically doable, and economically feasible, but that staging spaces where participants explore what might be desirable beyond current conventions and constraints might intersect with these concerns in the process and ultimately inform the design of interactive technologies.

5.8 Fictional space in participatory design practice

The preceding sections have provided the conceptual scaffolding for understanding fictional space in relation to participatory design. I have provided an account of

fictional space in relation to design theory and addressed the role of props for staging fictional space and the value of the design material produced. In the following sections I will revisit the concrete cases addressed in P1-P3 & P6-P7 that deal with shaping design inquiries in order to illustrate the scope of applicability of staging fictional space in participatory design practices. Moreover, the following sections serve to nuance and exemplify the theoretical arguments made in the first part of this chapter. Although the cases addressed in P1-P3 & P6-P7 all provide examples of the creation of fictional space in participatory design practice, they differ in a number of ways that show the scope of how I have worked with the idea of fictional space and provide nuance to various aspects of the theoretical arguments.

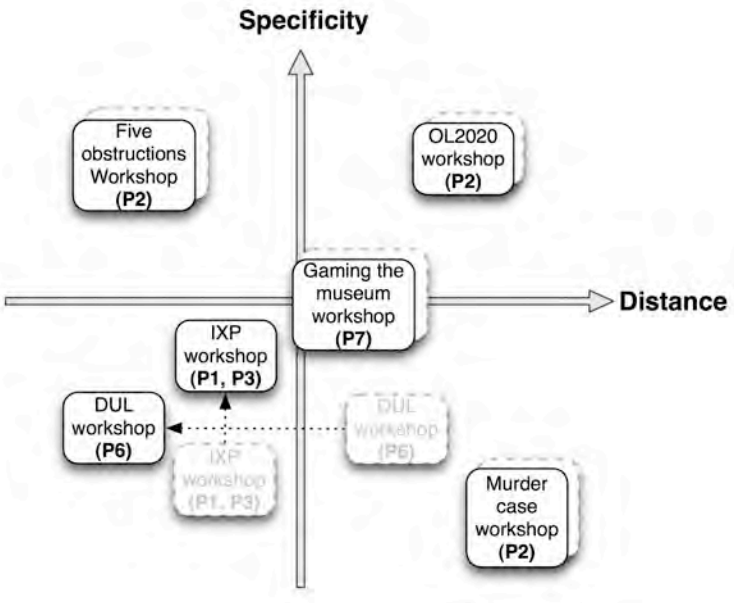

Figure 17. Overview of cases in terms of distance and specificity.

To illustrate the range in how I have worked with staging fictional spaces for design collaboration, I have arranged the experiments addressed in P1-P3 & P6-P7 according to two parameters in figure 17. The experiments are all in the form of specific workshops conducted during my project, where visitors, staff, pupils, and teachers participated (see section 3.4 for introduction). The two parameters delineate a space that circumscribes the ways in which I have worked with the idea of staging fictional space. The first parameter is the relative extent to which the space created in the workshops was distant from established practices within the specific domain. For example, the Murder Case exemplifies a workshop where the space created was significantly distant and had relatively little anchoring in the established practices of pupils and teachers, whereas the space created in the DUL workshop was relatively closer to established practices of the museum professionals. The second parameter is the relative specificity of the inquiries in

relation to the design process. In some cases the design inquiries where intentionally arranged to deal with relatively specific issues, such as the OL2020 workshop where we were specifically interested in the kinaesthetic aspects of the Wisdom Well. In other cases, the inquiries were arranged to be more broad and open for addressing a wider range of issues. For example, in the Murder Case workshop we aimed at broadly exploring how the Wisdom Well floor surface might become a part of school practices. I have chosen these two parameters as they reflect the intentions of the respective inquiries in relation to the scope of the design process in general. These intentions are reflected in the ways in which the inquiries where staged using props, narratives, and assignments. Figure 17 provides an overview of the various ways in which I have worked with staging fictional space in particular design inquiries to address various issues in the design process.

Keeping in the mind the notion of fictional space as emerging through practice, there may of course be a difference between how the inquiries were staged and how they actually evolved. For example, we might imagine that a workshop is staged as an inquiry into a relatively specific topic that has a high degree of distance from established practices. Yet, as the workshop progresses, participants actually build heavily on ideas from existing practices and address a much broader array of topics. In this case, there is an obvious discrepancy between intention and actualisation. The dotted boxes in figure 17 show how the workshops where intended to be placed in accordance with their role in the overarching design process, whereas the solid boxes show my interpretation of how the workshops actually progressed. As illustrated in figure 17, there was in many cases a relatively good match between the intended degree of specificity and distance and how this was realised in the workshop. However, in the IXP and DUL workshop there was a significant divergence from what was intended. I will return to these in the sections below. It should be noted, that the placements are not to be regarded as absolute but as relative. They provide an illustration highlighting differences between the various workshops and for discussing how fictional space may be staged and constructed in various ways.

The next sections then serve a double purpose. On the one hand, they serve to show the scope of the applicability of staging fictional space in participatory design practice. I do this by addressing workshops that inhabit various ends of the spectrum shown in figure 17. On the other hand, they serve to exemplify and nuance the theoretical arguments and illustrate how these relate to concrete design inquiries by showing in more detail the construction of fictional space in participatory design practice. In particular, the following sections will serve to exemplify and nuance the overarching argument relating to three aspects. The first one relates to how fictional space is constructed through the activities of participants. Here I will highlight how this construction is a dynamic process and show how the nature of the fictional space constructed may become the subject of negotiation. Second, I will provide more detailed examples of how a degree of distance was staged and evolved through particular workshops. In particular I will show how specific assemblies of props were used in various constellations and how participants worked with these. This will provide a richer picture of how fictional

space in terms of distance is created. Finally, I provide an example were fictional space was staged by merging everyday practices and museums practices. This final example shows how fictional space was staged not by using the somewhat exotic narratives (as in the IXP workshop) but by the merging of two well-known worlds. In the following sections I will discuss these three aspects in the order presented here.

5.8.1 Constructing

In this section I address the construction of fictional space. These processes are present in each of the cases. I will however focus more specifically on the DUL workshop (figure 17) as this highlights clearly central aspect regarding the construction and exploration of fictional space. In particular, the DUL workshop serves to provide a nuanced picture of how the construction and exploration of fictional space may become the subject of explicit negotiation and provides an example of discrepancy between the intended placement of the workshop and the actual outcome as depicted in figure 17. Moreover, the example shows how participants ascribe significance to particular props in their work, while disregarding others.

As part of the initial work with Moesgård Museum, we arranged a workshop where museum staff, researchers, storytellers, architects, and technology providers were invited to explore concepts for new exhibition spaces. The aim of the workshop was to develop concrete ideas and scenarios for the new Moesgård Museum that would act as points of reference for the remainder of the project and as the first materialization of new ways of thinking about exhibition spaces. The workshop was structured around an imagined design task. During the introduction, participants were informed that the sarcophagus of Tutankhamun was being brought to Moesgård Museum and that they had to design the exhibition space to host it. Participants were further given five obstructions that they had to incorporate into their work. The obstructions were that (1) the exhibition should involve inter*active* technologies (not just *re-active* technology), (2) that a significant part of the exhibition should use a counter-factual style of communication, (3) that the exhibition should revitalize the role of the body, (4) that a significant part of the content should be generated by the visitors, and finally (5) that parts of the exhibition should be located in the space of the city. The workshop progressed through two main parts where participants in groups initially discussed the obstructions and formulated more general visions about the exhibition before developing concrete concepts and scenarios. At the end of both parts, each group presented their work in plenum.

Having received the task, the groups began to work on their exhibition proposal. The beginning of their process was characterized by participants on the one hand relatively quickly coming up with concrete ideas for the exhibition based on associations from Tutankhamun and on the other hand participants discussing the meaning of the obstructions. As an example, a participant in one of the groups (an architect) proposed that the obstruction about the exhibition involving inter*active*

technologies, for him, was about *creating ones own content*. The *active*-part of inter*active* was taken to mean the sense in which people would relate their own experiences to those of Tutankhamun. The group proceeded to discuss and expand upon this idea of creating ones own content. Moreover, new interpretations were proposed relating to the other obstructions and how these might be interpreted. In light of the account of fictional space provided earlier, several aspects are at stake in these processes. Throughout the workshop, Tutankhamun worked as a prop that gave mandate to particular imaginings. As noted, participants initially had several ideas based on their immediate associations to Tutankhamun. Moreover, participants regularly discussed the meaning and significance of the props; how should the obstructions be interpreted and which should weigh the heaviest. In Walton's (1990) terms, the activity here can be understood as participants engaging in a game of make-believe mediated by props. Not only did the props prompt certain imaginings, they also mediated the generation of fictional truths; things that were taken to be true in the fictional space in which participants were engaged. For example, the interpretation of the first obstruction as relating to creating ones own content became (for a period of time) an established idea in their work and participants explored ways for visitors to create their own content. This interpretation became part of the fictional space as it suggested particular and legitimate paths for the participants to pursue. Accordingly, participants became engaged in exploring various ways in which visitors might create their own content in the exhibition and how this should relate to the theme of Tutankhamun. The process was however distinctly dynamic as new ideas gave way to new interpretations. In several cases, there was explicit negotiation between participants as to what was valid and what should be in focus in their efforts. At one point during the workshop, one of the museum curators in the group argued that it would be a shame if the exhibition did not tell some of all the great stories about Tutankhamun. She argued that although creating ones own content would be interesting, the museum was obliged to tell some of the stories in a more traditional manner using text and images. Not only was the curator referring to the rich material about Tutankhamun, she was also proposing that part of the exhibition should contain more traditional elements where stories were told and illustrated in the exhibition space. Another participant objected, arguing that the idea of creating ones own content should in itself be the way into these stories rather than traditional means of storytelling. What was at stake here was a quite explicit example of participants negotiating the make-up of their fictional space; what would be valid moves and directions to pursue. To what extent should their exhibition employ traditional means of communication? In the end, the participants made a compromise in which the exhibition space would contain both traditional elements of storytelling and elements of visitors creating their own content. This example illustrates how the creation of fictional space may be understood as processes re-making, as proposed by Goodman (1978). As argued by Goodman, world versions are re-makings of others versions through processes of constructing, reconstructing, and ordering. Not only did the participants engage in a process of designing an exhibition about a new subject (Tutankhamun) they also reconstructed the ideas about how exhibitions could be designed and what means

should be employed. The obstructions worked as props that prompted this process. As participants explored ideas relating to the notion of creating ones own content, established ideas about how exhibitions are done were continuously reconstructed. The reconstruction was however not a complete abandoning of established principles and practices. Throughout the workshop, the group maintained commitments to established ideas such as providing visitors with some form of factual information and having artefacts on display. In Goodman's (1978) terms, the world created by participants was a hybrid construction where elements where drawn together into a new constellation.

It is also worth noting from this example how participants, intentionally or not, disregarded some of the obstructions that had been provided. The group in question did for example not explicitly address obstructions 2 and 5, saying that the exhibition should involve counter-factual elements and that a significant part of the exhibition should be located in the space of the city. In fact, as the workshop evolved much of their focus was centred on the first and fourth obstruction concerning inter*active* technology and *visitor*-generated content. The end result for the group in question, was a scenario where visitors would collect objects themselves, examine them, and interpret them as well as having stories told as they went through the exhibition.

The DUL workshop exemplifies the construction and exploration of fictional space and the continuous re-making of this space through games of make-believe. During the workshop, participants continuously interpreted the materials at hand, creating ideas for the exhibition. These interpretations in turn led to the making and re-making of space that provided a field of work in which the participants moved. This was however a process where participants engaged in explicit negotiation regarding what should be valid in their game of make-believe. The space created may be regarded as fictional in the sense that is was somewhat distant from established ways of designing exhibitions, not only in terms of what was exhibited but also in terms of how the exhibition was made. This degree of distance was initiated through the use of props in the form of obstructions and the Tutankhamun narrative. It is however central that the props in themselves did not solely dictate the participants activities. Participants created their own interpretations and indeed disregarded some of the obstructions in their work. Yet the obstructions used in the workshop also exemplify a very literal inscription of values that relate to my program and to the research interest in the DUL project. The obstructions specifically invited ideas evolving around various aspects of how people might invest their resources in the exhibition space.

Although the design space developed during the workshop may be regarded as fictional, I have placed it on the left hand side of the horizontal continuum in figure 17. The reason for this is the fact that although aspects of the space created was distanced from the established practices of the museum in terms of the subject of the exhibition (Tutankhamun) and the means that were employed for the imagined exhibition, there was still a large degree of familiarity in the space constructed. Although Tutankhamun was an imagined an in some respects distant subject of an

exhibition at Moesgård Museum it may also be said to be a very prototypical subject for museum exhibition. As such, participants found the challenge of creating an exhibition for Tutankhamun very familiar and this did not radically depart from the challenges that they face daily in their museum. As illustrated by the dotted box in figure 17, this was not quite the intention of the workshop. The intention had been to create a larger degree of distance from established museum practices and thus urging participants to deal more fundamentally with what an exhibition could be. In retrospect, the choice of using Tutankhamun as a prop was arguably not the best, as this actually became an element that anchored the workshop in established museological practices. Choosing a less prototypical subject of the exhibition might have led to less prototypical results. In terms of specificity, the DUL workshop was relatively broad in the sense that it was not constrained to any particular aspects of exhibitions or practices. The Five Obstructions workshop conducted in relation to the design of the Wisdom Well project (placed at the top left hand corner of figure 17) employed a setup very similar to the DUL workshop where obstructions were used. The Five Obstructions workshop was, however, much more specific in the issues that were addressed as participants were asked to create concrete educational programs within specific subjects and specifically aimed at the Wisdom Well floor surface.

In the next section I address the issue of distancing with a particular focus on the OL2020 workshop and the Murder Case workshop as they both exemplify the attainment of a larger degree of distance.

5.8.2 Establishing distance

As argued in the first part of this chapter, the notion of fictional space entails the attainment of a degree of remoteness or distance. Remote spaces are marked by relatively few elements that anchor the activities to established practices. As illustrated by the horizontal continuum in figure 17, the OL2020 and the Murder Case workshop exemplify this approach. P2 deals with these two workshops as examples of participatory design practice leading to radically distant spaces. Here, I discuss the staging of these workshops and their progression in light of the conceptualization of fictional space in order to unfold how distance was created. In particular, I will discuss how various props where used in establishing distance. Both workshops were conducted as parts of the Wisdom Well project, where an interactive school floor was designed for a local school.

The Murder Case was arguably the most radical example of a fictional space. In this case, pupils created and explored a highly unfamiliar territory that departed significantly from their everyday school practice. The workshop was structured around a murder-case narrative where pupils were assigned the role of forensic detectives charged with the task of solving a murder-case. 12 pupils aged 11-14, their teacher, and five researchers participated in the workshop, which was held at the department square next to the Wisdom Well at the local school. At the beginning of the workshop, the pupils were introduced to the workshop theme: a murder had been committed in 2020 and they had to come up with a plausible

theory about who had committed the murder and how it had been done. The department square of the school was set up as the crime scene (figure 18, left) with the victim, a mannequin, still lying on the floor next to the Wisdom Well (figure 18, right).

Figure 18. Left: pupils gathering clues at the crime scene. Right: the mannequin with surrounding clues.

All pupils were provided with a t-shirt with a police department logo to emphasise their role as forensic detectives. A range of physical clues was left next to the mannequin. The clues included footprints, a futuristic mobile phone, a book where passages had been underlined, and a wallet that contained personal items belonging to the victim. Among the items in the wallet was a link to the victim's personal website that had been created for the occasion. Pupils had to solve the murder case using the clues at hand. The Wisdom Well located at the centre of the square acted as a resource that the pupils could go to whenever they needed to analyse evidence, search for information or for any other purpose. As the Wisdom Well did not yet have any implemented functionality, the pupils had to imagine how it would work – they had to design applications for the Wisdom Well on the fly. One of the researchers acted as the Wisdom Well technician, discussing and documenting the pupils' ideas. The idea of framing the pupils as detectives was adopted as this incorporated many of the qualities that were deemed relevant to explore in relation to the role of the Wisdom Well in the school. In particular, this framing was relevant as the pupils would engage in project oriented work where they had to search for information and apply their knowledge within a broader range of subjects and creatively come up with answers.

The workshop got off to a somewhat slow start as the pupils initially found it hard to get a grip of the assignment and to figure out where to start. On several occasions, the pupils needed assistance from the teacher who acted as a general resource. As the workshop progressed, the pupils became increasingly confident as they began to understand that there was no correct answer to be arrived at and that they had to make assumptions and user their imagination to complete the assignment.

In terms of the fictional space constructed as part of the workshop, the distance was achieved using a wide array of props that served to transcend established school practice. The narrative in itself marked an obvious distance from the nature of school activities. Not only in the sense that murder cases are not usually the subject of teaching, but also in the sense that there was a large degree of freedom regarding how the pupils should work and what results they should produce. There were no correct answers with which the pupils could compare their ideas. Schoolwork is of course not always guided by strict tasks and fixed answers, yet the workshop did in an extreme degree put the initiative in the hands of the pupils. The mannequin victim and the physical clues at the scene of the crime were all props that supported the general narrative. The Wisdom Well represented another transcending element, as the pupils were unfamiliar with the concept of an interactive floor and what this might be used for.

A particularly interesting aspect regarding the pupils' construction of fictional space during the workshop was the nature of the narrative and how this was used. Not only was the narrative of a somewhat exotic nature, it did also have a fundamental quality of being unfinalized. Many aspects of the narrative were left open and some aspects were even contradictory. For example, the narrative contained the idea that the murder was committed in 2020, but the pupils were to solve the murder in 2007. There was, perhaps surprisingly, relatively little confusion about this and similar contradictions. Rather, as the pupils' work progressed they arrived at workable versions of the narrative. Not necessarily versions that were logically coherent, but versions that made sense in their activities. The unfinalized character of the narrative was arguably one of the reasons why the pupils initially found it difficult to engage with the assignment, but it also prompted a large degree of investment, as the children ascribed meaning to and interpreted the narrative and the props. This process shared much with the activity of the group in the DUL workshop where participants in a similar vein interpreted, weighed, and selected particular parts of what was provided in the form of obstructions.

Worth noting here, is also how the murder case employed a range of supporting props, such as t-shirts with police department logos and detective nametags. Moreover, the clues found around the mannequin had been circled with tape and the mannequin was lit by a powerful spotlight - all done to instil an atmosphere of a crime scene. None of these props were intended (or did) play any direct role in the children's activities, rather they were intended to support the narrative and encourage the children to engage in the game of make-believe. Returning to the IXP case, similar props were employed in the form of seaweed and sand in the box of magic items that the family used. The DUL workshop on the other hand did not in the same way employ these kinds of supporting props.

In general, there were relatively few elements that anchored the workshop in school practices. The fact that the workshop was held at the school obviously provided significant anchoring. Furthermore, the role of the teacher did also seem to have an anchoring effect. The role of the teacher in the workshop was chief of investigation.

In most of the session he functioned as a resource person that pupils could consult if they had trouble figuring out how to proceed. As such, the relationship between pupils and teacher was very much inherited from day to day school activities. As argued in P2, the Murder Case workshop does in some respects seem to be bordering a state of flux where so little anchoring is provided that it may be difficult to recognize how the workshop activities might inform schoolwork and the design task of creating applications for the Wisdom Well. As argued by Iser (1993), fictionalizing acts are acts of overstepping what is, yet they keep in play what has been overstepped in order to suggest that it might become something else (Iser 1993: 237). This is of course a key notion relating to fictional space in design; that the activities must somehow keep in play the practices that are to be changed through design. If the workshop activities do not feedback and propose ways of re-shaping existing practices, then the efforts become activities of detached play. The Murder Case does perhaps, more than any other case in my work, begin to outline the boundaries of meaningful applications of staging fictional space.

The OL2020 workshop, placed at the top right hand corner of figure 17, is also an example of how a radically distant space was created. Similar to the Murder Case, relatively few anchoring elements were employed. A few aspects of the OL2020 workshop are of particular interest in terms of creating distance. The OL2020 workshop was held at the university and the participants were a group of teachers, designers, and researchers. The intention of the workshop was to focus specifically on the kinaesthetic aspects of interacting with a large floor display and how this might relate to educational purposes. The workshop was framed as the Olympics 2020 in Andorra, and the participants were assigned the task of developing new Olympic disciplines. As Andorra was the site of these activities, very little space was available – more precisely an areas of 4 by 3 meters matching the dimensions of the Wisdom Well. The area was marked up using tape on a floor surface. One of the central challenges of the workshop was to persuade participants to engage in the distinctly physical activities of creating and exploring games and physical ways of interacting on a floor surface. For most researchers, teachers and designers, sporty activities are not usually part of everyday work practice and we expected some degree of reluctance towards the physical nature of the workshop. In order to promote the physical theme, we started the workshop with a warm up session where participants competed in teams playing a variety of games including Twister and Sony EyeToy (figure 19, left). Moreover, the workshop was initiated by an opening ceremony, where participants were divided into teams and chose the country that they would represent during the games. The room had been decorated with flags from the various nations and energy bars and sports drinks were available (figure 19, right). To further support the physical nature of the workshop, participants had been asked to wear sports clothing for the workshop. These initiatives helped create a fun and exiting atmosphere, yet they also served the important purpose of prompting participants to create a space for their activities where it was not only legitimate but also expected to engage in physical exploration.

Figure 19. Left: participants engaged in the warm-up session. Right: Sports bars and drinks available to support the narrative.

Compared to the Murder Case, the OL2020 workshop dedicated significant time and effort in staging the distinctly physical nature of the game of make-believe in which the participants were to engage. In a sense, the game of make-believe in which participants engaged was more tightly scripted. In the DUL workshop discussed in the previous section, it was evident that participants disregarded many of the obstructions provided. The warm-up session of the OL2020 workshop was meticulously arranged and given a central position to ensure that it would not be disregarded in participants' work, as this would have potentially undermined the intention of the workshop.

Distance in the OL2020 workshop primarily concerned the fact that participants explored a space of physical activities rather than specific educational programs. The workshop was however not simply an exercise in who could create the most fun, compelling, or novel game for the Wisdom Well. In order to anchor the activities to the fact that the Wisdom Well would be used primarily for educational purposes, participants were asked to relate their games to a matrix of different learning styles. This matrix was however not instantiated with the same rigour as the warm-up session and subsequently played a minor role as the workshop progressed.

The DUL workshop discussed in the previous section exemplified, somewhat contrary to the intention, that the space created was closer to the everyday practices of the museum exhibition designers than had been intended. The Murder Case and the OL2020 workshop exemplify the other end of the horizontal continuum by showing the staging of a more radically distant space through the use of only few anchoring elements. As argued, the Murder Case workshop bordered a state of flux where so little anchoring was provided that the relation to existing practices, at times, became week. The risk of completely abandoning any kind of anchoring is of course that the workshop activities loose their power to feedback and suggest ways that existing practices might change. Although both workshops exemplify the creation of radically distant spaces, this was achieved by very different means of

staging. Of particular interest is the way that the OL2020 employed a tightly scripted warm-up session to ensure that the intended physical nature of the workshop was established. Moreover, both cases illustrate that both anchoring and transcendence is achieved through a complex constellation of various types of props that work in conjunction to frame the workshop activities.

A key difference between the OL2020 and the murder case workshops, as depicted in figure 17, is the specificity of the inquiries. In the OL2020, the intended focus of the workshop was relatively specific; physical games that took place on a 3 by 4 meter surface. In the murder case, the 3 by 4 meter surface was also as central focus. Here, the aim was however much more broad; the pupils could come up with specific application for the Wisdom Well or more general concepts that addressed how the Wisdom Well might become part of the activities in the department square. Moreover, the pupils were free to explore physical or more traditional ways of interacting. Obviously this broadness reflects the design task at hand; in the OL2020 we were specifically interested in physical aspects whereas the Murder Case reflect a more general interest in exploring how the Wisdom Well might become part of school practice.

5.8.3 Merging

Central to the account provided of fictional space, is that it is a hybrid space where a variety of elements are conflated into a new constellation. In the example from the DUL workshop, participants drew together elements from the world of Tutankhamun with interpretations of the obstructions to form a space that suggested certain trajectories in their work. In a similar vein, the IXP workshop presented earlier used the story of the lost city of Atlantis as a prop. The benefit of using these imaginative universes is of course that they instil upon the design session a certain imaginative freedom as participants are invited into a magical universe where established norms are suspended. Viewing these narratives as props, they represent transcending elements that support the creation of distance in respect to established practices. However, the notion of fictional space does not rely on the introduction of these somewhat exotic narratives. In P7, I discuss (along with my co-authors) a case from Moesgård Museum where children were invited to create new exhibition spaces based on their favourite computer game or online community. The case presented in P7 exemplifies an explicit effort to create a design space that conflates elements from children's everyday engagement in computer games with the exhibition space at Moesgård Museum. The case is relevant here, as it illustrates relatively clearly the composition of two worlds into a meaningful design space in which children explored ideas for museum exhibitions. Here, I discuss the staging and progression of the workshop with a particular focus on how pupils created a hybrid space that conflated elements from their engagement in computer games with the museum space. This section serves to nuance the idea of fictional space by showing how it may be instantiated as an intentional merger between two worlds.

The workshop took place in an empty exhibition space at Moesgård Museum where a class of 22 primary school children and their two teachers were invited to participate. Before arriving at the museum, the children had been asked to discuss and print screen shots of their favourite computer game or online community and join in groups according to their interests. The workshop was arranged in three central parts where the children started out by working with the games or online communities and gradually moved towards working with the museum domain. This movement was staged through two processes of translation as depicted in figure 20.

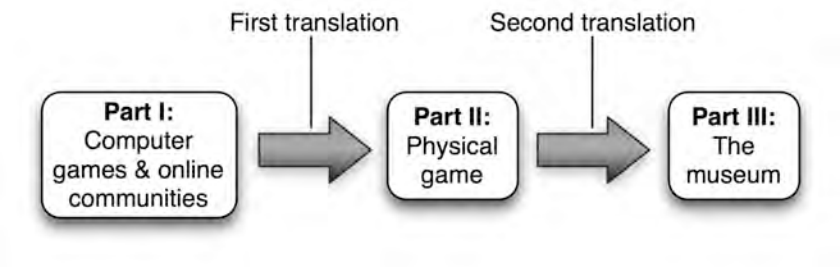

Figure 20. The workshop consisted of three parts connected by two processes of translation

In the first part of the workshop, the children discussed the qualities of the game or online community that they had chosen. In the second part of the workshop, the children where asked to create a mock-up of a physical addition the online environment that they had already selected, using cardboard, paper, and various materials available in a nearby storage room (figure 21, left). The physical addition should reflect the qualities of the game or online community that the children had discussed in the first part. The first translation (figure 20) was thus a translation from the online world to the physical world. In the third and final part of the workshop, the children were asked to use their physical mock-up as a point of departure for designing an exhibition for Moesgård Museum. Again, the exhibition design should reflect the qualities embedded in their mock-up. To support this task, the children were invited for a 15-minute visit to the museum's permanent exhibitions where they were asked to take pictures of the things they found most interesting (figure 21, right). It was stressed that pictures should not necessarily be of the historical artefacts on display; whatever they found interesting was valid. The pictures, along with their physical mock-up made in the second part of the workshop, would act as material for designing a new exhibition for Moesgård Museum. The second translation was thus a translation from the physical game design to the realm of the museum.

Figure 21. Left: One of the groups constructing a physical addition to their game. Right: pupils taking pictures in the exhibition.

The workshop used children's everyday engagement in games and online communities as a point of departure. This was very familiar territory for the children. Yet, the constellation where this was brought into the museum space was unfamiliar and did indeed diverge from children's existing ideas about what museum exhibitions were. In this sense, the familiar was made unfamiliar by bringing this into a new constellation. The central idea of the workshop was to experiment with an approach to design inquiries that took point of departure not in the domain where the technology was to be implemented, but in a domain where engagement and motivation was already strong. Through the two translations, the qualities of engagement from the games and online communities were merged with the museum domain. Goodman's (1978) explication of the processes of worldmaking provides a way of understanding this process through the notions of supplementation and deformation whereby perspectives are distorted and components from one world are supplemented with those of another world. Of particular interest here, are the processes of translation that connected the three parts of the workshop. As reported in P7, the groups handled the translations in different ways. One of the groups had chosen the TrackMania[2] online game (a racing game where players compete against each other and build their own tracks) as their point of departure. This group found the first translation relatively easy as the game itself represents a physical space in the form of tracks that players have to negotiate with their cars. It was relatively straight forward for the groups to create a physical mock-up of a new track that incorporated the elements that they found particularly engaging in the game. The second translation, where the group had to move from considering their physical track design to the museum, was more of a challenge. There was a significant gap between the realms of driving a car to visiting a museum. The construction of a workable design space where there was a meaningful blend between the two domains proved difficult. Indeed, the group needed help from their teacher to develop an idea as to how they could

[2] See www.trackmania.com

meaningfully merge the game with the museum. Another group, that had chosen to work with MSN messenger, went through the somewhat opposite process, finding the first translation difficult and the second more manageable.

The workshop illustrates the intentional staging of design inquiry with an explicit focus on merging qualities of two worlds. The assumption underlying this staging was, that qualities of engagement from the world of games and online communities could inform museum exhibitions. A range of props was used to achieve and support this merger through the translations. In the first part of the workshop, the children were asked to describe the qualities of their chosen game and rate this using a form, where the game was rated in terms of fun factor, game-play, friend factor etc. (see P7) Throughout the workshop, the children were urged to use and reflect on this rating as a way of maintaining a commitment to retaining these qualities in their work. In this sense, the form as a prop worked by giving mandate and legitimacy to imagining museums exhibitions that embodied these qualities. Moreover, the example from the TrackMania group shows that some groups found it difficult to engage in certain games of make-believe, where they had to merge qualities from games with the museum space. Compared to the IXP workshop, the setup in the Gaming the Museum workshop left it up to the children to reconcile two very different worlds. In the IXP workshop, the connection between the world of the lost city of Atlantis and the Kattegat Centre was bridged within the narrative and in this sense already provided. This was not the case in the Gaming the Museum workshop. Moreover, compared to the IXP workshop the games of make-believe played by the children in Gaming the Museum were somewhat forcefully changed through the translations. Having build up a game of make-believe concerning the making of a physical track (e.g. the TrackMania group), the groups were then forced to radically change their game and work-in the museum domain. The space created during the workshop was thus in a sense less stable as the groups had to adapt to new props and assignments.

The Gaming the Museum workshop illustrates the staging and creation of a fictional space that was driven not by the introduction of distant worlds such as the Murder Case or the IXP workshop, but by the intentional blending of two worlds. The motivation for this particular format was driven by the design intention of exploring how qualities of everyday engagement might inform the design of exhibition spaces. This particular agenda illustrates the deliberate inscription of my developing appreciative system into the staging of design inquiries. This is reflected both in the general workshop approach where the point of departure was taken the children's skilful participation in games and online communities and in the particular props that were employed.

5.8.4 Reflection on cases

In the three proceedings sections I have revisited the cases addressed in the included publications and provided examples of the creation of fictional space in participatory design practice and thus exemplified the concepts discussed in the first part of this chapter. The reflections presented here do not provide an

exhaustive account of the workshops and their progression. More detailed accounts are provided in the included papers. Rather, they have served the double purpose of illustrating the scope of applicability of staging fictional space and providing examples that nuance the theoretical notions developed in the first part of the chapter. In relation to the scope of applicability, I have provided examples of inquiries that address very specific issues in the design process (e.g. OL2020) as well as inquiries that were broader (e.g. Gaming the Museum). Moreover, I have discussed inquiries where a large degree of distance was attained (e.g. Murder Case) and examples where the space created was closer to the everyday practices of participants (DUL workshop). I terms of providing nuance to the theoretical account of fictional space, the examples illustrate the wide array of ways in which fictional space may be staged and produced through the use of props that serve to both anchor and transcend established practices. Through the examples I have shown how the construction of fictional space may become the subject of negotiation as participants explore what should count as valid in their games of make-believe. This is an important nuance as it accentuates both the dynamic quality of constructing fictional space and the fact that participants creatively interpret the props provided. Moreover, these sections have provided a richer picture of how these props are used and arranged in the establishment of distance. Props are positioned and work within larger assemblies and are closely tied to the design intention at hand. The final example in this section, showed how fictional space need not be staged using exotic narratives but may reflect a hybrid constellation where two relatively well-known worlds are brought together. More generally, the examples provide more concrete manifestations to inspire reflection and action relating to how particular inquiries are staged using various props, how these inquiries progress in terms of games of make-believe, and how the results of these inquiries are the products of participants reshaping or suspending established conventions within their practice.

5.9 Summary

Throughout this chapter I have developed and discussed the notion of fictional space as a general perspective for understanding the design experiments and contributions made in P1-P3 & P6-P7. The notion of fictional space is not a method that prescribes how design should be done, but a perspective for reflection on design practices. Motivated primarily by my work with museums, I have developed the notion of fictional space based on the idea of the design space as the emerging field of work created as participants in design engage with the situation and materials at hand. I have explored the notion of fictional space in relation to participatory design, arguing that the idea of fictional space may be framed as tipping the scale towards transcendence and may be understood as a complementary perspective to techniques and approaches that ground design inquiries in existing practices. With inspiration from Walton (1990) and Malmgren (1985) as well as the work of Goodman (1978) I have described the emergence of fictional space as participants practicing games of make-believe mediated by props. Goodman's (1978) descriptions of the processes of word making may be viewed at

the concrete make-up of these games describing how fictional space emerges through constructing, de-constructing, supplementing, and in general remaking worlds from other version of worlds. I have discussed the role of props in more detail, arguing that these function by anchoring design work in existing practices but also have a transcending function. Moreover, the props that I have employed during the experiments reported in the included publications reflect more or less explicitly the program with which I have been engage and thus connects the notions from chapter 4 to the focus on shaping design inquiries. In the second part of the chapter I visited the included publication again to provide concrete examples and to nuance the theoretical notions. These examples show the spectrum of applicability of the notion of fictional space by discussing how the experiments reported in the included papers vary in terms of the degree of distance created and the specificity of the inquiries. Moreover, the examples provide nuance to the theoretical notions by showing more concretely how the games of make-believe in which participants engage are indeed dynamic and to some extent messy processes where meaning and significance of props are negotiated, some aspects of the workshop setup are disregarded, and people creatively engage to explore what their future practice might be like if established practices and conventions are suspended or reshaped.

6 Conclusion

In this dissertation overview I have summarised three years of research crystallised in seven included publications. My work has been driven by an overarching research interest in designing engaging interactive environments that I have pursued primarily within a research program on designing engaging exhibition spaces for museums and science centres. My work has been driven by a range of experimental design projects in which I have engaged in concrete design activities that have framed my academic inquiries. I have described my research approach within the general notion of a science for design, realised as exemplary design research driven by question, programs and experiments. The key trait of this approach is that it adopts a perspective from within design where research is driven by interventions in concrete situations. The approach is suggestive in the sense that it aims at producing techniques, tools, and concepts for reflection that further design practice and research in more or less direct ways.

The included papers stand as contributions in their own right each making specific arguments and relating to established discourses and experiments. Through the dissertation overview I have summarized, connected, and developed the academic arguments made in the included papers. Moreover, I have re-visited the experimental work reported in the papers to nuance and develop the arguments. The contributions of my work fall within two interconnected categories each containing both overarching theoretical aspects as well as more concrete techniques, tools, and concepts for reflection and action.

Firstly, I have outlined the notions of participatory engagement as an overarching perspective for understanding how people invest their time, skill, and resources in interactive environments. Based on this overarching perspective, I have presented the notion of *means of engagement* denoting the intentional constructs that mediate engagement. The notion stretches beyond individual technologies and interfaces to encompass the multitude of interconnected aspects that are arranged through design and that, in concert, mediate engagement. Through a discussion of the issue of *motivation* I have argued that museums might spur visitors engagement by mediating between the everyday practices of visitors and museum knowledge. I have argued that the overarching perspective of participatory engagement has worked as an appreciative system in my work with design inquiries and that the two have shaped each other continuously.

Secondly, the majority of my contribution addresses the issue of shaping design inquiries. I have summarized this through the overarching notion of *fictional space* denoting a perspective on the creation of a design space where established norms and conventions are re-shaped or suspended in participatory design inquiries. The motivation for staging fictional space in participatory design is to invite participants in design to re-think existing practices and imagine what their practices might be like if established conventions were altered. I have made this motivation more tangible by relating it to the particular design challenge facing museums. I have argued that fictional space emerges as participants in design engage in *games of make-believe* mediated by *props* that give mandate to imagination and serve as both *anchoring-* and *transcending elements*. I have traced the notion of fictional space through design theory and developed the perspective within the scope of participatory design. The notion of fictional space draws attention to how the design space may develop as a field of work that is distanced from established practices and invite participants to imagine new forms of practice. Fictional space does not denote a ready-made method or technique for conducting design inquiries. Rather, I have suggested that it enables critical reflection and inspires action relating to three areas of design inquiries that deal specifically with re-shaping or suspending established conventions. First, it addresses how design inquiries are staged to meet particular ends and in particular how various props serve the purpose of anchoring and transcending established practices. Moreover, it stresses that the selection and use of props may to a certain extent embody the designer's agenda by reflecting his or her intentionality and appreciative system. Second, the notion of fictional space as emerging through games of make-believe provides concepts for reflection-in-action regarding the progression of particular design inquiries shedding light on how participants suspend, alter, and reshape particular aspects of their practice. This may potentially lead to more nuanced insights as to how participants envision that their practices might change and which particular aspects holds most potential and resistance. Third, the notion provides concepts for designers to interpret the results of particular design inquiries in the form of ideas, scenarios, or mock-ups in terms of how they are expressions based on participants re-thinking existing practices.

The contributions made in this dissertation fall in the intersection between design theory, participatory design, and interaction design. Primarily however, the contribution is positioned within the areas of participatory design. The contribution may be seen as extending the trajectory within participatory design to address new domains, new technologies and new ideals for people relation to technology. My work has primarily been within the realm of museums, yet I find it reasonable to propose that the notion of fictional space is applicable and useful beyond this domain. Within the scope of participatory design, fictional space denotes a tipping of the scale towards transcendence; not to imply that established practices should necessarily be abandoned, but that temporarily suspending or re-shaping these allows us to see beyond what is given and to explore exciting futures.

6.1 Future work

For me, the process of writing this dissertation overview has been one of refining, extending, and finding new aspects of the arguments that I have worked to establish during three years of research. As arguments are consolidated and the smoke of three years of research slowly begins to clear it becomes evident that a range of questions were not addressed and a range of path were not followed. Moreover, with every answer provided at least one new question seems to emerge. These questions and paths point in some of the directions that I hope to pursue in future work which I will sketch here.

Relating to the notion of engagement I believe that this could be fruitfully pursued even further. There are several ways of doing this. On the overarching level it is of course important to establish more nuanced theoretical understandings how interactive environments may invite people to invest their resources and potentially transform their view on aspects of their everyday life. In particular, I think that the notion of *depth* as an emerging quality may hold significant potential in understanding how engagement as an emergent phenomenon. On a more concrete level, I see a substantial potential, as argued in P5, in providing more detailed accounts of how particular means of engagement were designed and used. This would relate to the particular technologies and styles of interaction employed, but also to how these are integrated into particular circumstances. Such accounts, I believe, could potentially expand the collective repertoire of researchers and practitioners.

Regarding the notion of fictional space in participatory design there are a range of issues that I have addressed to a lesser extent in this dissertation and that I would like to pursue in the future. The role and nature of props and how these are appropriated in design work could be studied in more detail. Such studies might provide even more nuanced understanding of how materials in design work as resources and perhaps allow designers and researchers to address more proactively how particular props are chosen and how these come to bear on the design space. Moreover, I think that the role of the designer in participatory design inquiries might be a fruitful subject to pursue in order to shed light on basic (participatory) design abilities. I have in this dissertation rarely addressed how designers in particular workshops adapted their strategy as the workshop progressed, introduced particular props to change the direction of the workshop, and in general the ways in which they made sure that particular workshops kept on moving in fruitful directions. I believe that this is an ability that is found in designers that have significant experience in facilitating participatory design inquiries. It would be interesting to study this ability in more detail and provide an account of this aspect of what might be called participatory design ability. And finally, I have not in my project dealt systematically with disseminating my work on fictional space among design practitioners. I believe this would be an interesting path to pursue and that it might potentially be beneficial to practitioners and feedback into research.

On a more general level, I believe that the issue of design research as a scholarly discipline is in need of attention. As I have sketched in chapter 3, several authors have provided key insights into this discipline and formulated valuable accounts of the theory and practice of design research. It does however seem that this field of inquiry is still in its youth and in need of further development. This, I believe, is important for at least two reasons. First, as universities and design schools begin to provide more doctoral programs it is critical that candidates are provided tools with which to design their research process and help them make high quality contributions that are of value to their peers and to practicing communities. This is not a matter of formulating *the* design research method but providing doctoral candidates with the intellectual tools needed for reflection and action. Second, I believe that a nuanced vocabulary regarding design research may help establish more clear marks of quality in design research and the papers that are published in this area. Such a vocabulary could inform the way research is conducted, the ways in which results are reported, and support the process of reviewing the work of our peers. I find this to be a profoundly interesting and important challenge.

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Part II – Papers included

Papers included