PEEPHOLES AS MEANS OF ENGAGEMENT IN INTERACTION DESIGN

PETER DALSGAARD & CHRISTIAN DINDLER
DEPARTMENT OF INFORMATION AND MEDIA STUDIES
UNIVERSITY OF AARHUS, 8200 AARHUS N, DENMARK
TEL: +45 89429285, +45 89429282
E-MAIL: DALSGAARD@CAVI.DK, IMVCDI@HUM.AU.DK

We present and discuss the concept of *peepholes* as a means for creating engaging interactions. By peepholes, we refer to aspects of interactive artifacts and environments that utilize the tension between what is hidden and what is revealed to foster engagement. As a foundation for discussing the qualities of peepholes, we outline a *pragmatist perspective on engagement*, emphasising the reciprocal relation between people, technology, and environment. We articulate peepholes as an example of a concrete *means of engagement*. Through a range of examples and two design cases, we explore peepholes as a means of engagement and discuss the pragmatist conception of engagement.

INTRODUCTION

As technologies become woven intro the fabric of everyday life, we are urged to consider in what way these technologies promote human engagement and invite us to invest our skill, knowledge and time in interaction. In our own research, the issue of *engaging interaction* has been a central tenet emerging from our effort in domains ranging from urban settings to museums and libraries. Museums, as an example, strive to engage visitors in exploring cultural or natural history. In their efforts to do so, many museums have looked in the direction of interactive technologies in the hope that this will provide new ways for visitors to relate to exhibition spaces and new avenues of learning. Research efforts have illustrated that there is indeed potential in using new technologies and interaction styles to promote engagement. However, it seems that interaction design, as a field of research as well as practice, is in need of a richer conceptualization of the potentials of interactive technologies in promoting engagement. This challenge can be addressed both on a general level by developing theories about engagement and on a concrete level by exploring particular interaction styles, concepts and technologies. In this paper we move across this span of abstraction by first presenting a general conception of engagement based on pragmatist philosophy, followed by a discussion of a particular means for creating engagement, namely the concept of *peepholes*. By peepholes, we refer to aspects of interactive artifacts and environments that utilize the tension between what is hidden and what is revealed to foster engagement through curiosity and inquiry. Keyholes may be the archetypical peepholes – they provide a limited view into a larger context, revealing some aspects but not providing the viewer with the entire situation. Peepholes provide a glimpse of a hidden, secret or even forbidden world. They play on our imagination and our inquisitive nature as we are

drawn to disclose the world that is hidden. Peepholes are well known in the worlds of art and architecture as means of shaping curiosity. Here, we will articulate peepholes within the field of interaction design as a particular means of engagement that invites people to engage in mixed reality environments. As we will discuss throughout these paragraphs, peepholes may be realized through a range of modalities such as visual, tactile, etc. We seek to shed light on the qualities of peepholes, as well as to illustrate the potentials in a pragmatist conception of engagement as a foundation for discussing both over-arching conceptualizations of engagement as well as particular qualities of designed interactive environments.

The structure of the paper is such that we first outline the concept of *engagement*. We draw upon related work from the field of interaction design and move towards a *pragmatist* conceptualization of engagement. The pragmatist perspective gives rise to an understanding of engagement as emergent and relational, constituted not only by the relation between a subject and an interactive artifact, but as a phenomenon that develops in the complex transactions between people, physico-spatial surroundings, socio-cultural practices, and technologies. Building on this perspective, we develop the notion of *means of engagement* as the particular constructs that are intentionally shaped through design to mediate our engagement in the world. We briefly discuss four existing interactive installations that employ *peepholes* to foster engagement. We then present in more depth two experimental design cases in which we have employed and developed the notion of peepholes.

ENGAGING INTERACTION DESIGN

Our motivation for addressing the notion of *engagement* with interactive systems is to highlight and explore the ways in which people invest their talents, time, curiosity and resources in relation to interactive artifacts and environments. In a broad sense, engagement is a general perspective that highlights certain qualities or aspects of peoples' lives. Our interest here is to unfold a concept of engagement that will shed light on peoples' relation to interactive systems and the environments in which these exist.

Within the field of interaction design, academic contributions addressing experiential phenomena have to a large extent focused on arguments for the necessity of addressing experiential aspects and on establishing definitions and frameworks for understanding the concept of experience (e.g. McCarthy & Wright 2004, Batterbee 2004). Recently, Löwgren (2007) argued that the field would benefit from articulating particular experiential qualities of digital artifacts. Löwgren (2007) has provided examples of this approach in discussing the qualities of 'fluency' (Löwgren 2007A) and 'pliability' (Löwgren 2007B), as has McCarthy et al. (2006) with regards to 'enchantment'. We do not see engagement as an experiential quality on par with e.g. fluency or pliability. Rather, it resides on a higher level of abstraction and as such may be regarded as a meta-quality that encompasses a number of distinct experiential qualities. E.g. in a given situation, an artifact with a fluent and pliable interaction gestalt may promote engagement, whereas other situations may be un-engaging in spite of the presence of fluent and pliable gestalts.

In the following, we will weave our own observations and related work from interaction design and beyond in order to outline a conception of engagement.

SITUATED AND RELATIONAL PROPERTIES OF ENGAGEMENT

Engagement with interactive systems is fundamentally embedded in particular situations and cultural practices. When we design an interactive installation for e.g. a library, we need to explore the various components that constitute the library situation as encountered by guests, including physical spaces, cultural forms of practice, mediating artifacts, rhythms of movement and social interactions. A focus on the qualities of the "object" alone is thus too narrow to capture the forces at play in the transactions of engagement. This point is developed in depth by Arnold Berleant and his work on aesthetic theory. Berleant (1991) proposes the explanatory concept of engagement as the participatory alternative to the aesthetic concept of disinterestedness and illustrates throughout his work the essentially participatory nature of appreciating art, nature, and the human built environment. Some forms of participation are overt in nature and require people to physically interact with the artwork – e.g. an artwork may require people to physically interaction in order to experience the artwork. Yet, Berleant argues, even more "traditional" artworks require *participatory engagement* in that they are realized in the reciprocal relation between person and artwork. When we are immersed in aesthetic appreciation of an artwork, e.g. a painting, it is a process of participatory engagement in which we may imaginatively enter and explore the space of the painting. Moreover, engagement, according to Berleant,

unfolds within a complex field of forces – the aesthetic field - that shape peoples experience Berleant (1970)

MOTIVATION AND ENGAGEMENT

Engagement is fundamentally tied to motivation; what drives or inspires us to invest our resources in a situation. The issue of motivation is complex as it encompasses both long term, high level motivation that gives direction to peoples lives as well as particular situations and objects in our everyday dealings that may motivate us to engage in particular activities. Working from cultural-historical psychology, Hedegaard (1995) explicitly distinguishes between "motivation" as the dynamics that characterizes a person's activity and relation to the surroundings in concrete situations and "motives" denoting the long term goals that have impact on a person over extended periods of time. Moreover, as argued by Hedegaard (1995), individual motivation is developed through our participation in cultural forms of practice that in them selves are crystallizations of historical motives.

Motivation concerns the issue of investment; what people put at stake in the situation whether this is time, belief or other forms of resources. In his seminal work on optimal experience, Csikszentmihalyi (1990) showed how the flow experience is achieved when there is an optimal fit between challenge and skills. In this sense, flow describes the balances between what is invested in a situation and how the situation responds – the transactional process.

Here, we shall not attempt to cover the depth of the concept of motivation but note that motivation may spring from long term goals or interests and may be more situated and opportunistic in nature; certain surroundings may motivate to invest our skills and knowledge in particular activities. Arguably, motivation most often spring from the relations between these two archetypes.

So far, we have discussed engagement as a relational phenomenon that is dependent to what people bring to the situation in terms of motivation. In order to more fully articulate the concept of engagement, we do however need to account for engagement as an emergent property extended in time.

DEPTH AND UNFOLDEDNESS AS PROPERTIES OF ENGAGEMENT

Borgman (1995) argues that settings that inspire engagement have a certain *unfoldedness* and *depth*; a wealth of experiential properties and their disclosing

powers. In continuation of the motivation underpinning our engagement in situations, this can imply both the motivation to uncover or unfold new phenomena in our surroundings, or to explore in more depth seemingly well-known phenomena. Borgman uses the example of the artefacts that inhabit the kitchen of a gourmet cook – burners, pots, chopping blocks etc. – and the way in which the handling of these artifacts disclose their experiential properties. The sound of the pot as food is stirred at just the right temperature. This environment invites people to invest their skills, time and resources and to be engagement in the activity of preparing the meal.

Borgman's example also highlights the evolving character of engagement – qualities are disclosed through the transactions between the chef and the artefacts in her kitchen. McCarthy et al. (2006) further address this issue of unfoldedness or depth in relation to the potentials for enchantment in interactive systems. They note that interactive systems that are to evoke enchantment should offer potential for the unexpected and the opportunity for discovering new aspects or qualities of the system.

The unfoldedness and depth of particular artefacts is however closely tied to socio-cultural forms of practice in any given situation. In the example of the kitchen, the use of the artefacts is closely tied to the practices of the kitchen. The trainee chef's engagement with the artefacts is fundamentally shaped by the instructions given by more experienced chefs and particular task with which s/he is assigned. Again, this is a reciprocal relationship as we may see the artefacts themselves as crystallizations of particular forms of practice. This example does, however, highlight another fundamental issue in talking about engagement, namely *what it is* we are engaged with. The trainee chef is arguably engaged with learning to use the filet knife in the proper way. In another sense, the trainee chef is also engaged in the activity of preparing a meal where the tools are the means with which to achieve this. Heidegger's well known distinction between ready-at-hand and present-at-hand has been used extensively to explore how artefacts and interfaces may become transparent and allow the user to work *through* the artefacts while artefacts sometimes become the very object of attention when their working breaks down. As argued by Verbeek (2005), the answer does however not have to be either-or – present-at-hand or ready-at-hand. Verbeek (2005) argues that we may understand this as a continuum in that artifacts may mediate our engagement with the

world but at the same time require our attention and the exercise of skill.

TEMPORAL AND TRANSACTIONAL PROPERTIES OF ENGAGEMENT

Berleant's concept of participatory engagement urges us to consider the *continuity* between people and the forces at play in our environment – as transactions between mutually determining forces. Yet it is obvious that some artifacts, situations and environments seem to be more conductive of engagement and successfully capture people – be this art, technology or nature. As we have now begun to conceptualize engagement as an emergent quality we have yet to consider how engagement unfolds as a process extended in time. From our conceptions so far, it is obvious that we are dealing with a dynamic concept and we are forced to account for this dynamics in order to more fully articulate the concept. To this end, we turn to the concept of transaction as laid out by pragmatist philosopher John Dewey, whose work has heavily inspired the aforementioned contributions from Berleant and McCarthy et al. We regard the concept of transaction as being capable of capturing the dynamics of how engagement unfolds. One of the pivotal concepts in the work of Dewey (1934) is inquiry; the mode of experience and action by which the subject seeks to make sense of challenging situations and resolve or overcome the tensions they present; in Deweyan terminology, this is described as a transformation of indeterminate situations into determinate ones. In this perspective, the subject is an active and integral part of the situation, not an outside party to it. Situation in this perspective encompasses the subject, other people, the physical things in the world, and socio-cultural constructs. This notion of situation is analogous with Berleant's (1970) understanding of *the aesthetic field* as the inseparable and mutually influential forces that shape engagement.

The transactional perspective in Deweyan pragmatism highlights the reciprocal relationship between people and the situation – through inquiry people coordinate and shape the situation and in turn, people are shaped themselves. Building upon Dewey, Schön (1983) showed by way of example how we might conceive of design as a movement, where people make inquiries or "moves" within a situation and the situation, in turn, talks back. In the same sense, engagement unfolds in time as the iterative transformations between people and situation as inquiries shape both.

In inquiry, we often rely upon various resources in the situation in order to proceed. These resources include our repertoire of past experiences and habitual ways of relating to the world, as well as contextual resources, e.g. artifacts, physic-spatial surroundings, other people in the situation, socio-cultural norms etc. Inspired by Deweyan pragmatism, Gedenryd (1998) employs the term *situating strategies* to this resourceful approach; in his work, he emphasizes that competent practitioners develop a multitude of ways of bringing these resources to supplement and augment their reflection and action. In line with this, Hickman (1990) has explored in depth the role of instruments and tools in Dewey's conception of inquiry. Hickman explicates that Dewey's conception of technology is inclusive, denoting all of those resources that we bring to bear in the resolution of tensions and challenges in a situation. Since inquiry is central to Deweyan pragmatism, and technology is an integral part of inquiry, Hickman thus suggests that we may consider pragmatism a philosophy of technology. Although it may seem a digression from our exploration of engagement, this understanding of technology as an integral component of inquiry is in fact crucial to our line of argument: technologies are not just functional tools employed to carry out intended operations, they also influence our initial perception of a situation, our experience of inquiry, and our feeling of fulfilment when a challenging situation is resolved. In this manner, interactive artifacts and environments may function as means of engagement

A PROVISIONAL DEFINITION OF ENGAGEMENT

On the basis of the above, we may define engagement as an emergent and relational quality of the interplay between people and their environment – a view shared by Berleant, Borgman, and Dewey.

Engagement unfolds in inquiry, the mutual process in which the user in an interactive environment encounters a problematic framing of her experience, motivating an exploration of the situation through interaction with the intended outcome of transforming the perceived practice. This is instigated in situations that are perceived to have a certain depth underlying the immediate impression.

This resulting transformation unfold in time and may be understood in a very literal sense e.g. that an agent transforms her physical surroundings; it may be relational – e.g. that new social structures are established between people in a situation; or it may concern aspects internal to one party in the situation – e.g. that an agent gains new knowledge about the situation which transforms it from problematic to comprehensible. The notions of inquiry and

transformation as key aspects of engagement prompts designers to consider the ways in which they can challenge users – e.g. through evoking curiosity and motivation or establishing a competition between several users - and to examine to which extent the different parts of the situation assemblage can be altered through interaction, either literally, relationally, or internally. Technology plays a pivotal role in engagement as it both frames our understanding of the situation and serves as means for transforming it.

MEANS OF ENGAGEMENT
We employ the term *means of engagement* to denote the resources that inspire engaged interaction and serve as instruments for scaffolding the experience of engagement. In light of our pragmatist foundation, we consider means of engagement to have a twofold nature in that they both frame experience and as means of transforming it. The term is broad in that it can generally characterize artifacts and surroundings that we create through design that to a greater or lesser extent are conductive to engagement. In this sense, means of engagement are the structures that are intentionally shaped through design to mediate our engagement in the world. A similar line of though has been pursued by Verbeek (2005), who discusses, from a phenomenological point of view, the idea of how things can mediate engagement. In developing the idea of means of engagement, we want to bring attention to the multitude of aspects that mediate engagement. Thus it is a concept that cuts across the physical and interactional features of artefacts and socio-cultural forms of practice that are particular to a given domain.

These means can take on many shapes; in this paper, we are interested primarily in the particular qualities of interactive systems that act as means of engagement. In our further discussion, we will thus limit our focus to interactive artifacts and environments and explore means of engagement as the intentional constructs that are produced through design, which encompass or relate to the features of the situation that are relevant in conducting engagement.

To explore this concept further, we will present and explore peepholes as one specific type of means of engagement.

PEEPHOLES AS MEANS OF ENGAGEMENT
Building upon the definition of engagement laid out above, a key feature of peepholes as means of engagement is, that they at the same time instil curiosity and inquiry, and that they offer ways of unfolding or exploring the depths of the content they hint at. In this respect, peepholes must maintain a balance of tension between recognition / openness and obscurity / concealment. There must be something for a potential user to perceive, and it must be recognizable enough for them not to discard it. Yet, it should also be clear that not all is revealed, and that engagement is required in order to uncover what hides beneath the surface. Given our specific interest in digital technologies, a fundamental quality of digital peepholes is the potential of interactivity; that loops of feedback and response among user and system may gradually work to reveal more and more of what the user first got a hint of. As we will discuss below, this may take on a number of forms. The examples we will use are more broadly recognized under the terms *mixed reality* or *augmented spaces*. The concept of *mixed reality* was introduced by Milgram & Kishino (1994) as the combination elements with physical and digital/virtual properties. The term mixed reality is an interesting designation in relation to the concept of peepholes since it underscores the potential of shifting between different realities, or domains of inquiry. In many peephole installations, mixed reality is employed to create what Manovich (2006) has termed *augmented spaces*; environments in which layers of data are added to physico-spatial surroundings. Although this notion applies to many types of situated symbols, digital technologies hold unique potentials for expanding the dynamics of augmented spaces.

Having outlined the notions of engagement and peepholes as means of engagement, we will now present and discuss installations that may be understood as employing peepholes. These cases help illustrate the richness of the modalities with which peepholes may be realised and how these serve a variety of purposes.

PEEPHOLE INSTALLATIONS
In the following, we will briefly introduce four peephole installations and then go into more detail with two experimental design cases in which we have explored the use of peepholes as means of engagement.

JURASCOPES
The first example is from Berlin's Museum of Natural History, where ART+COM developed *Jurascopes* for the exhibition (picture 1). By looking through the Jurascopes, appearing as a pair of digital binoculars affixed to observation points in the exhibition, the

dinosaur skeletons in the exhibition space come to life; inner organs, muscles and skin appear and the dinosaur becomes alive. An animation is shown of the dinosaur in its original habitat. Visitors can use the Jurascopes to explore the variety of skeletons in the exhibition space. In this sense, the Jurascopes work as peepholes in time allowing visitors a sneak view into the age of dinosaurs. The installation very much plays on the relation between the lifeless skeletons in the exhibition space and the "hidden" life of the extinct creatures.

Picture 1: Jurascopes

OUT OF BOUNDS
Our second example is *Out of Bounds* (O'Shea 2007), developed by Chris O'Shea for Design Museum London (picture 2). Out of Bounds plays with the idea of being able to see through walls. Visitors use a torch to "shine" onto a wall surface. When the torch is pointed at the wall, a hole in the wall appears and the visitor can see through to the other side. As the torch is moved, visitors are provided a small glimpse into the hidden world.

Picture 2: Out of Bounds

Jurascopes and Out of Bounds are examples peepholes that rely on visual means; however, there are also examples of installations that employ other modalities to create peepholes as means of engagement.

AUDIO WALKS
In a series of so-called *Audio Walks* (Cardiff 2005), artist Janet Cardiff explores the layering of narratives in space (Picture 3). Users put on headphones and are guided through specific locations, e.g. the streets of New York, or the Louisiana Museum in Denmark, much like in a traditional guided tour. However, the audio content is not related to the present, but to stories in the past, effectively employing the present as a stage upon which the recorded story unfolds. Cardiff explains that "*The virtual recorded soundscape has to mimic the real physical one in order to create a new world as a seamless combination of the two. My voice gives directions but also relates thoughts and narrative elements, which instils in the listener a desire to continue and finish the walk.*" (Cardiff 2005). Although the audio walks do not employ interactive technologies, we have included the example since it represents a prime example of an auditive, narrative-driven peephole environment.

Picture 3: A photograph used as a prop Cardiff's audio walk *Her Long Black Hair*.

KHRONOS
The Khronos Projector (Casinelli & Ishikawa 2005) is an interactive art installation that combines visuals and touch-based interaction (picture 4). Film clips are rear-projected onto an elastic surface. When users touch the surface, a camera tracks the deformation and the film is rewound, giving the impression of reaching back in time, e.g. a user may touch part of a daylight cityscape and see it grow darker and fade into night.

Picture 4: The Khronos Projector

These examples highlight different modalities of peepholes and a range of purposes. To further explore the concept, we now turn to two design cases and discuss in more detail the use of peepholes.

HYDROSCOPES

The first example of our own work derives from our research on designing engaging exhibition spaces at museums and science centres. More specifically, we will look at one of the prototypes designed for the Kattegat Marine centre. The Kattegat Marine Centre is in many respects a typical marine centre displaying marine life from all over the world. The centre is primarily inhabited by large aquaria with glass sides that allow visitors to explore the variety of marine life. As part of our research efforts, we designed a prototype installation for the centre where visitors where invited to construct fish for a virtual ocean. Fish where constructed using a physical construction kit with embedded RFID chips. The construction kit contained the heads, bodies, fins and tails of a variety of existing species of fish. Starting from these pieces, visitors could create imaginary fish that combined the particular qualities of existing species. As visitors created the imaginary fish, they where invited to release the fish into a virtual ocean that was inhabited by the fish that others had created. The only way to explore the ocean was by using digital hydroscopes (picture 5). The hydroscopes provide a view down into the virtual ocean and allow visitors to explore the ocean by pushing the Hydroscopes along the floor surface.

Picture 5: Children using a Hydroscope

The Hydroscopes are a very literal manifestation of the Peephole concept as they provide a visual glimpse into a hidden universe beneath the surface. Our evaluation of the hydroscopes at the Kattegat Marine centre may in several respects help us begin to conceptualize peepholes as a particular means of engagement. From

our studies of the prototypes in use, it was clear that the Hydroscopes had an ability to attract the curiosity of visitors. Partly this may be ascribed to the fact that they were somewhat unfamiliar objects in the exhibition space. Visitors would typically stroll towards the Hydroscopes and discover that they could observe life in the virtual ocean. From this point, some visitors would stand still and observe the hydroscopes for a while and then leave. Most visitors, however, would figure out that it was possible to navigate the ocean by moving the hydroscopes around. Some realized this by gently touching the hydroscopes to discover that the image then moved. Others observed fellow visitors using the hydroscopes and were encouraged to try it for themselves. As such the Hydroscopes seem to have an initial attractional quality (Edmonds 2006) and indeed sustained engagement as visitors searched various parts of the ocean. Relating to our discussion of means engagement in the previous section, the hydroscopes may help articulate the some of the general qualities of peepholes. As the hydroscope only reveal a small part of the hidden ocean visitors are invited into what Dewey termed a process of functional coordination; making inquiries in the situation and being shaped by the results. The quality of the peepholes is, that it very literally invites people to invest effort intro the interaction by suggesting that something will be revealed. Moreover, the peephole in general and the hydroscope in particular has an innate quality of unfoldedness as discussed by Borgman and McCarthy & Wright in that they gradually disclose their qualities and content as visitors invest their resources. In a sense, this concerns a certain depth in the interaction as visitors disclose more of the hidden universe.

In order to more fully appreciate the properties of the hydroscopes we however, as argued by Berleant, need to look beyond the artefact itself to the situation or field in which the artefact exists. In the case of the Hydroscopes, these were part of a larger installation where visitors could construct fish and release these into the virtual ocean.
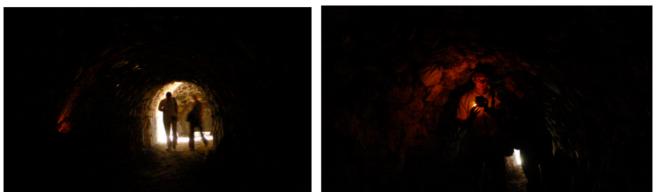
The first point to make is that the Hydroscopes exist in a particular context that plays a central role in their working. The idea of looking down through the surface into a hidden universe is aligned to the Kattegat Centre as an institution concerned with life in the ocean. In a certain sense, the Hydroscopes utilize a common understanding of life in the ocean as being hidden from our direct view. Moreover, the hydroscopes exist alongside several other elements in the exhibition space.

As argued by by Hindmarsh et al. (2002) it is vital to understand museum technologies as being parts of larger assemblies if we are to understand visitor experiences. Having read about fish and their characteristics elsewhere in the museum the hydroscopes provide peepholes to how imaginary fish might look like.

Viewing the hydroscopes as an example of a peepholes, sheds light on how peepholes as a means of engagement encourage inquiry and have a fundamental quality of unfoldedness at the hidden is gradually revealed. Moreover, the hydroscopes exemplified how peepholes, and means of engagement in general, work as parts of larger situations; the hydroscopes play on the metaphor of the hidden life in the ocean. The hydroscopes, however, do not in themselves provide visitor the opportunity to change or manipulate fish in the virtual ocean. As such, the engagement is only sustained as long as visitors are intrigued by searching the ocean. To the extent that visitor engagement was sustained at the marine centre, we have to look to the other elements of the exhibition. The construction table, where visitors construct fish for the ocean provided a means for sustained engagement. This view of the various means of engagement at the exhibition very much supports Hindmarsh et al's (2002) point of viewing installations as parts of larger assemblies – in our case, the individual means of engagement work as a larger assembly. The Hydroscopes are examples of a very literal interpretation of peepholes and indeed a very visual one. Our second case, Silence and Whispers, illustrates a less literal exploration of the peephole strategy through the use of audio rather than video.

SILENCE AND WHISPERS

Silence and Whispers (also treated in Dalsgaard, 2008) is an experimental mixed reality mock-up developed in 2006 as a cross-disciplinary collaboration between four interaction design researchers, including the author (picture 6). The installation employs a peephole strategy

to engage visitors in collaborative storytelling on Suomenlinna, a series of islands near Helsinki, Finland. Suomenlinna, which is today a Unesco World Heritage site and serves as a public park, has a rich and complex history. During shifting sovereigns it has housed military fortresses and prison camps. In present day, it is home to a small community of inhabitants and an open prison, as well as being one of the most visited parks in Finland.

Silence and Whispers is an experiential prototype in the form of an audio installation intended to assemble and pass on narratives that reflect this multi-layered cultural history. A series of stories about the islands' past and present have been assembled and recorded. These recordings have been edited and cut into fragmented storylines. The installation is placed in a series of underground caves connected by corridors. The narrative fragments are played back on a number of speakers distributed throughout the caves and corridors. In addition to these auditive segments, snippets of the stories are written on cave walls in chalk. The caves are almost entirely dark, only lit up by a few flickering candles. Whispers from the installation emerge from the caves, luring people to enter. Once they do so, they can move freely about in order to assemble the story segments. Pieces of chalk are scattered around the caves, and visitors can write compose their own stories on the walls. In addition (although not implemented in the prototype of the installation) an audio input option was planned for visitors to tell their own stories, which would then also be fragmented and spread throughout the caves. The intention was for the installation to evolve and expand over time as old stories fade away and new ones are added to the cave walls.

Silence and Whispers employs peephole strategies to engage visitors both in a very concrete sense - in that it is situated in an 'alternate' underground setting, accessible by cave entrances, luring visitors nearby by use of auditive whispers - and in a more abstract sense, in that the narratives are deliberately fragmented and the

Picture 6: Visitors move through the dark corridors in Silence and Whispers to explore fragmented narratives.

installation plays on visitors' curiosity by demanding that they explore the caves in order for them to bring together the snippets into complete storylines. The installation thus seeks to combine appreciation and engagement beyond immediate fascination by hinting at stories to be appreciated, yet requiring both engagement through action and reflection in order to reach a stage of fulfilment.

Silence and Whispers explores the notion of mixed and multiple realities through the stories, which represent layers of experiences and interpretations tied to the islands. It plays on the metaphor of the subconscious as that which is hidden below the surface, that which one can dive into to discover otherwise hidden aspects. It was designed to evoke an ominous atmosphere, to bring about a sense of respect for the history of Suomenlinna, and to instil a sense of co-participation through the ongoing accumulation of stories about the place. The latter is perhaps the most interesting facet of the installation in relation to the notion of peepholes: by presenting fragmented narratives, visitors are prompted to 'fill out the blanks' themselves; the fragments hint at certain genres, e.g. they may be ghost stories or love stories, and in recognizing these genres, visitors are prone to relate them to their own experiences. Our brief evaluations of the experiential prototype showed that several visitors would continue unfinished stories on the basis of prior experience. In this respect, the installation can be construed as a reverse peephole that fosters introspective engagement.

Being an experiential prototype developed as part of a research course, the installation was not fully developed. We are currently exploring ways of facilitating collaborative situated storytelling, encouraged by our experiences from employing the peephole strategy of fragmented audio narratives. However, not all settings lend themselves to such installations in the same way as the caves of Suomenlinna, which in retrospect was an ideal match for the metaphor of the sub-consciousness of the place.

CONCLUDING REMARKS

Through our cases, we have dealt with the issue of engagement on a very concrete level by discussing peepholes as a particular means of engagement and on a more general level by framing this discussion in a pragmatist conception of engagement. We have highlighted the quality of peepholes as inviting inquiry, having a gradual unfoldedness, and suggesting that

visitors' active involvement would render more of the hidden worlds visible. As argued, these qualities do however exist in complex situations and along side other means of engagement that fundamentally shape the actual quality of the peepholes.

As explored by Edmonds (2006), we may speak of several levels of engagement; some are immediate attractions, while other are sustained forms of engagement. As argued by Borgman (1995), a central feature of engaging environments is the unfoldedness – that the situation gradually reveals its experiential qualities. In the case of the Hydroscopes, these did in themselves rarely provide sustained engagement. Primarily they prompted curiosity and only sustained engagement as long as visitors where intrigued by exploring the ocean. However, this observation neglects the point of viewing means of engagement as parts of larger assemblies. The Hydroscopes did in some respect provide sustained engagement as part of the installation where people created their own fish and released it into the virtual ocean. This nuance does lead us to place more precisely the contribution of looking at peepholes in particular. Through our discussion on peepholes we have concentrated on this single means of engagement and its qualities, articulated in a pragmatist conception of engagement. This will hopefully provide detailed insights and inspiration for other interaction designers. It is however necessary to weave together the qualities of peepholes with other means of engagement that are employed in any particular design situation.

We seek inspiration in pragmatist philosophy since we find it well suited for framing and articulating the potentially reciprocal interaction that occurs when people engage the environment. Although formulated long before the advent of digital technologies, these notions are as relevant as ever, given the uptake of interactive technologies into experience-oriented domains.

One crucial finding that spans the range of examples we have explored is to establish a thorough understanding of the setting for which one designs. For mixed reality peephole installations to establish a convincing glance of an otherwise hidden world, it has to be well-aligned with the domain; not necessarily by presenting a mirror of what is present in the situation, but by establishing a connection that can spur the imagination of the people in the specific setting. Being interaction design researchers, we have a particular interest in exploring the potentials of interactive technologies. There are excellent examples of peephole installations that do not

employ digital technologies, such as Cardiff's audio walks. However, interactive technology possesses by nature certain qualities that designers can take advantage of to develop and stage dynamic layers that can be combined with our physico-spatial surroundings to create augmented spaces, and this has been our focus in the present investigations. At the same time, we are aware of the inherent dangers for interaction designers to become enamoured with technological fixes that may result in installations that draw people close by virtue of their innovative interfaces, but lack the power to sustain engagement. Because of this, there is good reason to extend the gaze further back to consider exceptional non-digital peephole examples, which we plan on doing alongside our further experimental explorations of interactive peepholes.

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