

its role in fostering imagination and creating moments of inspiration, as metaphors enable us to parallel entities in surprising ways. The power of metaphor in design, understood through the current linguistic theories, lies in the friction and mismatch between a metaphor and its referent. We will focus especially on magic as a creative metaphor and explore why it is among particularly useful metaphors. To answer this question, we will investigate magic as a cultural category which is connected to the human imaginary.

The Library workshop was a part of an ongoing interdisciplinary research program on “hybrid reality” conducted at the University of Oulu, in Northern Finland. The aim of the program is to explore the possibilities and challenges posed by the coupling of a 3D virtual city with the physical world into a hybrid urban space. The research program cooperates with several local companies and departments of the City of Oulu, such as the Oulu City Library. A public library was chosen as a one specific site where ideas related to hybrid reality are tested through concrete prototypes. Libraries can be seen as ideal sites for this kind of exploration: they are highly popular in Finland, attract people from different age groups and identify themselves as non-commercial democratic arenas in cities. The public image of Finnish libraries is relatively bright, depicting them as respected cultural institutions targeted for all citizens, delivering a highly valued public good. [1]

The Library’s administration was eager to cooperate with us researchers for several related reasons: Firstly, according to library legislation, public libraries in Finland must promote lifelong learning for its citizens, including learning about new technologies and their possibilities. Secondly, the library staff wanted to maintain the good image public libraries already have; they wanted to explore what kinds of possibilities emerging technologies have in promoting the library as a cultural institution and in making it a little bit more exciting and colorful. Third, the only group of citizens that the library found difficult to reach was teenagers, and emerging technologies were seen as a potential lure for them. Lastly, the Oulu City Library has cooperated with our research team since the early 2000s and in several projects exploring new technologies such as Wi-Fi and public displays in the library context. This background created a fertile ground for advancing research in participatory ways and arranging joint activities, such as the workshop that utilized magic as a metaphor. The Library workshop was preceded by several meetings between researchers and library administration, and a thematic interview. The idea of a multi-stakeholder workshop emerged in this interview, and the workshop was realized some months later.

Our group of stakeholders, in this case, comprised of two communities: the library staff and library users. Despite the fact that one of these groups were experts and the other laypersons, mixing these two communities into one larger entity within the workshop worked out surprisingly well. The participants respected each other’s ideas although they had very different expertise and experiences. The overall aim of the design process was to build technologies to support the library’s broad mission of providing various services and facilities as a public good. This overarching purpose was also highlighted in the thematic interview; it was the backbone of the whole design process.

With “hybrid city” we refer to the combination of the physical city space, its digital representation as a virtual 3D city model and all related digital media [29]. The 3D virtual environment is visualized using a computer game engine, providing interaction possibilities with various devices including web browsers on PCs and mobile devices. Conceptually, our understanding of the “hybrid city” somewhat resembles the “dual reality” introduced by Lifton [28]. In his model both physical and virtual worlds are complete unto themselves, but also enhanced by their ability reflect and influence each other. This definition emphasizes that physical and virtual worlds do not necessarily turn into a single mixed reality experience but they can interact and be complete by themselves. The “hybrid city” we employ is a detailed digital representation of the physical world city that is published on the web as a detailed, immersive, street-level and collaborative 3D virtual environment [2, 50]. Considering our virtual city model is a detailed “reflection” of the real world, it could be considered as a very early prototype of a local “mirror world”. Several authors have forecasted that when technology is mature enough, complete digital “mirror worlds” will become an integral part of everyday reality [e.g. 18, 40, 43]. Google Earth and Microsoft Visual Earth are well-known examples of such “mirror worlds” that have proven very useful for a wide range of application domains [42].

In the following sections, we first review the central concepts of this paper starting with “metaphor” and “creativity”. Next we concentrate on the term “magic” and scrutinize how magic as a creative metaphor has been utilized in technology design by other scholars. Then, we broaden our perspective and investigate how the concept of magic has been understood as a cultural category especially in cultural anthropology as this helps us to understand what kind of meanings, assumptions and imagery it mobilizes. We proceed to introduce our Library workshop and explain how the concept of magic was used in our workshop. Lastly, we ponder the utility of magic as a creative metaphor in multi-stakeholder design workshops, and present some notions on creative metaphors in general in the light of the contemporary metaphor theory.

2 THEORETICAL BACKGROUND

2.1 Metaphor in HCI

On a general level and in everyday language, metaphor can be understood as a figure of speech. Since Aristotle, scholars have had intense and broad discussions about the concept. The term has given birth to many debates also in human-computer interaction (HCI), in which metaphors have mainly been used in user interface (UI) design.

In his comprehensive article, Blackwell [7] traces the history of UI metaphors in HCI and describes how they have enabled “a process of reification” which basically refers to a process of making abstract ideas more concrete. The term “desktop metaphor” became popular when Research and Development teams at Xerox and Apple invented modern graphical UI. A set of well-known and easily understandable concepts were successfully used to familiarize users with completely new technology. Largely due to this promising start, metaphor became a buzzword in UI design and

it was considered a great tool that can efficiently connect novel and abstract things to users' everyday life. Especially “real-world” metaphors were seen as being useful in design practice, as they helped people to understand unfamiliar objects [e.g. 32]. Thus, it appears that at first metaphor was accepted as an important design principle in UI design. However, it has also been labeled overrated or even harmful by many researchers as users can interpret metaphors incorrectly, and especially because imitating a real-world counterpart can restrict the functionality of the novel entity [e.g. 38, 11].

In UI design the prevailing understanding has been that a metaphor and its referent, e.g. a virtual object on the computer screen, should resemble each other as much as possible. It must be emphasized that our approach here differs from this traditional UI design approach to metaphors, as we are more interested in the creative potential of the concept than its capability to reify abstract phenomena. This is a newer approach to metaphor in HCI which draws, for example, from design studies, as Blackwell [7] argues. He writes that the changing conceptions of metaphor are a part of the ever-changing definition of HCI itself; the discipline is currently expanding as a design research discipline, which, in turn, “has led to recognition of the way that metaphor can function as a creative tool for the designer” [7].

Pirhonen [39] approaches metaphor from a similar perspective, taking a slightly more radical standpoint: according to him, the understanding of the concept, traditionally used in UI design, is actually in contradiction with contemporary theories about metaphor that arise from linguistics. In UI design the conceptualization of metaphor has mostly leaned on an everyday definition and an expressive use of metaphor. For example, designers can create a metaphor of “pouring files from one device to another” when they are actually referring to the transfer of files [20]. There is nothing wrong as such in this kind of use of the concept but utilizing it only this way does not take full advantage of metaphors. The design strategy of finding a real-world equivalent to a virtual one should rather be called a *simulation*, not a metaphor, Pirhonen argues; both of these terms can be useful but in different ways. He admits, however, that drawing a strict line between simulation and metaphor can sometimes be difficult in practical design work. Despite this, we must at least broaden our understanding of metaphors and study what experts on the subject say.

The theory coined by Lakoff and Johnson treats metaphor as a “mapping across conceptual domains” [26, 27]. As the definition implies, this is much broader perspective on metaphor than conceptualizing it as a figure of speech. The classic example by Lakoff is the sentence “Love is a journey”. He explains that “*The LOVE-AS-JOURNEY mapping is a set of ontological correspondences that characterize epistemic correspondences by mapping knowledge about journeys onto knowledge about love. Such correspondences permit us to reason about love using the knowledge we use to reason about journeys*” [27]. The current theory defines metaphor as a central part of human conceptualization processes; it is not just a linguistic trick but a profound element of thought and reason, and therefore also of

communication. The greater the level of abstraction, the more metaphorical layers we need. It enables us to understand complex phenomena; it creates friction and mismatch between conceptual domains than forces us to reach towards new conceptualizations.

We can summarize that the observed pros and cons of using metaphors in UI design are connected to its powerful nature: metaphors can significantly steer human thinking as they are a profound part of it. Thus, as many authors deem, metaphors should, indeed, be used cautiously; we expand this notion a bit and note that their use should at least be elaborated upon carefully. We must be aware of the ways metaphor, as a theoretical concept, works according to the current understanding; in addition, we need to be aware of the cultural meanings of specific metaphors used in design. Although metaphors are understood through individual life worlds, and we can never be completely sure what kind of assumptions they evoke, they are also connected to shared cultural meanings. This socially shared background makes their use – and overall, their existence – possible.

The discussion on metaphor is also important in regards to creativity; as the theory of Lakoff and Johnson [26] suggests, metaphors enable the juxtaposition of unrelated concepts. We take the view here that this notion is not only useful in understanding novel phenomena, but also in fostering divergent thinking, which has been deemed a central aspect of creativity for decades [21]. As Funke [17] states: “*Divergent thinking, which is predominant in creative processes, is characterized by unusual associations, a shift of perspectives, and the enlargement of the horizon.*” It is to this effect that we wish to investigate the role of metaphors, and one metaphor in particular. Thus, we must first discuss the role of creativity in design.

2.2 Creativity in Design

To understand why metaphor can be a very useful tool in fostering creativity in PD, we must also take a brief look at the role of creativity in design. Researchers have found it difficult to reach a consensus on how exactly creativity should be defined: Meusburger [36] has suggested that there are over a hundred definitions in the literature. Attempts to provide a full account have produced generalities, wherein it is usually agreed upon that creativity is the making of something that has both novelty *and* utility [e.g. 36]. Csikszentmihalyi [12] further states that creativity does not occur “inside a creative persons head”, but in the interaction between a person's thoughts and their sociocultural context. This view of creativity as being essentially context-driven informed our own participatory workshop, wherein our mission was to enable the creativity of others.

While definitions usually escape creativity researchers, some agreement as to the processes of creativity have been more successful. Often, especially in everyday language, moments of creativity are characterized as “creative leaps” [13, 48]. According to Dorst and Cross [15], however, while these moments are often described as sudden bursts of insight, they are often only identified as such only in hindsight, and the actual creative process is much longer.

Wallas [48] suggested almost a century ago that creative processes could be described as having five stages: preparation, incubation, insight, evaluation and elaboration. In the preparatory phase, individuals work within the field for extensive periods of time, amassing expertise. In the incubation phase, the mind is not actively working on the problem, but rather making new connections unconsciously. In the insight phase, a novel idea emerges; however, it must be evaluated, as not all novel ideas are useful (which is considered the second important hallmark of creativity). Finally, the idea is communicated and refined, and this is described in Wallas' model as the elaboration phase. [17, 48]

While we can always argue that imposing such clear-cut categories necessarily fails to truly describe the reality of a phenomenon, Wallas' model's strength lies in its recognition of the time it takes for the brain to produce creative thoughts; similarly, the recognition of the incubation phase underscores the importance of making new connections in the mind. In creativity research, this is usually referred to as "divergent thinking" which refers to non-linear and intuitive thought. This is in opposition to "convergent thinking": analytical and logical, step-by-step thought processes [21]. Within the context of PD, the model also highlights the role of the designer-researchers who must act as both enablers of participants' creativity, but also as the experts who pose relevant, novel design questions, and evaluate, refine and communicate these ideas to the wider field. Professional designers themselves hold creativity and intuition in high regard. Engineering designer Jack Howe has proposed that this is the difference between an engineer and a designer (or an engineering designer). Similarly, industrial designer Richard Stevens attests that while an engineer is unhappy making intuitive and subjective decisions, a designer tolerates, even thrives, in these conditions. [13]. Furthermore, for a designer, a "solution" does not even need to be a straightforward answer to a problem, as Cross [13] attests. March [35] states that "A logical proposition is not to be mistaken for a design proposal. A speculative design cannot be determined logically, because the mode of reasoning involved is essentially abductive." In our view, this refers to divergent and convergent thinking, as defined by Guilford [21].

This state of affairs, we argue, is due to the fact that design mainly deals with "wicked problems". This conceptualization was brought forward by Rittel and Webber [41], who strove to produce an alternative to linear models of the design process that were being suggested by many design theorists in the 1960's. These presented design as a matter of problem definition and problem solution. The wicked problems model, however, suggests that there is an inherent and fundamental indeterminacy to all significant design problems. [9]. That is, there can be no definitive conditions or limits to design problems. Examined through the lens of "wicked problems", it is quite easy to understand why simple convergent thinking does not suffice; through divergent thinking designers wish to engage and harness their unconscious processes, i.e., creativity. Through this, they aim to present, not solutions, but practicable design proposals to wicked problems.

The question for us, then, was how can we foster creative thinking in others? As design is inherently subjective and is improved when large amounts of initial proposals from various points of view are presented [13], it is very reasonable to argue that involving non-designers in the initial phases of design can potentially be very productive, as well as ethically sound. Additionally, everyone has some ability to design [e.g. 13]; professional designers, however, have naturally fostered their design capabilities for many years, and thus, have improved design skills, divergent thinking and related creativity. Thus, in our study, fostering creativity and divergent thinking among our participants was an important requisite for the success of our workshop. For this purpose, we employed a metaphor.

2.3. Magic as a Metaphor in Technology Design and Research

In our participatory design process, we concentrated on magic as a creative metaphor. However, in the various design fields, magic is widely used among professionals in everyday language. Designers readily describe their designs as "magical", the most well-known example being the design company Apple, who have, for example, named a whole range of products as Magic Accessories². Indeed, many commercial design companies and practices have magic in their very names. Others have used the concept as an adjective to describe their personal design philosophies; most famously this has been done by Swiss architect Zumthor [53], who has used the expression "the magic of the real" to describe his fascination and sense of awe in regards to the material world. However, the concept of magic has not been elaborated upon in the design fields in any length. For example, a literary review shows that "magic" or "magical" as a creative metaphor has been used in technology design mainly with children [e.g. 16, 20]. This probably describes how the concept has been understood in IT research in general – as something rather childish and frivolous. Iacucci et al. [23] present one exception as they utilized a "magic object" in the design of mobile services and devices with adult participants. However, they did not specifically ponder whether the metaphor itself was useful or not, and how it functioned within the design process.

Connections between magic and specifically VR/AR technology are also reoccurring. For example, Binsted argued in her CHI 2000 plenary that the point of technology is to have "*power over the world around us, and that typical forms of imagined magic reflect the powers we would wish to have*" [4]. She discussed VR/AR as examples of effective and appealing technologies that have increasingly come to resemble imagined magic. As a simple but concrete example, she offered the handheld wireless pointer present in most VR/AR systems as their own variation of the magic wand. Similarly, VR goggles enable us to teleport (to remote imaginary places), farsense and predict the future, all typical magical applications. We can conclude that magic is widely used to describe technology but rarely explored in-depth in design-

² Apple. (2017). Magic Accessories. [accessed 13 Feb 2017]. <http://www.apple.com/magic-accessories>

related contexts. We deem it is important to understand *why* it has gained such a popularity.

Lynn and Robey [30], on the other hand, have used the metaphor of magic in a different way: as an interpretative lens to analyze IT management. The vocabulary connected to magic was drawn from the language used by their (adult) study participants so they decided to “take it seriously”. They argue that magic can be understood as “a timeless cultural format” that has survived thousands of years. We agree that there can be something exceptionally enduring in the concept of magic – as scrutinized in the next section – but we would like to be a bit more cautious with the word “timeless” as cultures and their meanings are in constant change. However, the analysis of Lynn and Robey [30] is very useful here as they ponder what kind of *meanings* magic has in relation to technology in our modern society. The authors build five archetypal cultural patterns that reflect the IT culture of two large insurance organizations; these are the revered, controlled, demystified, integrated and fearful IT cultures. These conceptualizations rely on different concepts derived from the western tradition of magic and sorcery, such as wizards and dragons. Importantly, it comes clear through their analysis that IT and magic can easily be placed on a level: both are understood as powerful forces that provide prosperity and wealth to companies but need to be carefully controlled. Furthermore, as authors themselves note, the archetypal responses depicted in the article actually reflect how people usually react to the unknown. IT - or advanced technologies in general - have become so complicated that they are seen mysterious, inexplicable and even miraculous.

2.4 Magic as a Cultural Category

Since the beginning of the discipline, anthropology has dealt with different forms of supernatural as a part of cultures’ beliefs and ways of life. There exists a wealth of literature on the subject, approaching the theme from various perspectives. These considerations have led scholars to ponder extremely profound questions – such as the foundations of religion, the underlying features of human psyche, and the very nature of science, reason and rationality [25, 44]. Magic as a specific concept can be understood as ways to control the surrounding world and indirect means to obtain desirable objectives. As anthropological research has pointed out, magic is not used arbitrarily but first and foremost to control things and circumstances that are not fully understood and thus not in control by other means [34]. Therefore, it is usually thought that the development of technology – and overall, the development of sciences and our increased understanding of the world – has replaced magical means and made it useless altogether [19]. Remarkably, also technology can be defined as “ways to control the surrounding world and indirect means to obtain desirable objectives”. Magical and mythical practices of human societies seem to defy rationality, and they are often seen as primitive relics opposed to modern, rational thinking.

At first glance it seems that in modern societies, magic flourishes mostly in literature, movies, games and other products of fiction. Harry Potter’s enormous popularity exemplifies the prominent appeal of fictional magic. However, there is more than

that in magic. In addition to fictional forms of magic, many practices and belief systems are still alive (yet altered): today there exists a variety of revitalization movements and different forms of neo-paganism, such as the modern-day Wicca movement [31]. In Iceland, people widely state they believe in elves, and this belief has had an impact, for example, on construction projects [14]. Magic as a cultural category is surprisingly durable which is probably connected to its deeper facets.

In this paper, we are especially interested how magic, as a set of given cultural meanings, mobilizes certain ways of thinking in the modern western society. The perspectives that we find relevant for our work can be summarized as 1) idealized version of reality and 2) margins of human potential. To explain and understand these aspect, we draw heavily from anthropology, in which scholars have demonstrated through their empirical fieldwork that magic often refers to idealized outcomes. In many premodern societies, magic was used in important and difficult undertakings, such as complicated processes of salt-making. Gell [19], drawing from the influential and prominent work of Malinowski, gives another classic example and explains how gardens in Trobriand Islands were laid out and how magic was involved. Gardening was associated with “extremely complicated and important body of magic” [33]. Magic and concrete work existed side by side. Gardeners followed strict rules when building their gardens to attract “growing power”, and a garden magician, in turn, performed complex ceremonies that included delivering long litanies that described an ideal garden and all its fine qualities. It has been interpreted that this motivated gardeners, and kept them focused to perform all the necessary (and rational) tasks to make the gardens flourish in reality, too. After all, the success of the gardens was crucial for the wellbeing of the whole community as they comprised the main source for food.

What then, is left of this in modern day information societies? Ideal realities and mythologized, perfect alternatives to everyday struggle and imperfection have not disappeared anywhere. They have just been located elsewhere. Malinowski suggested that one form they have taken can be found in advertising. Advertising presents idealized commodities and alternative realities that make us believe that perfection can be reached by purchasing the product or service. Gell, on the other hand, adds that genres, such as science fiction, work in similar ways: they present alternative realities in which all the possibilities are open. He concludes that “*The propagandists, image-makers and ideologues of technological culture are its magicians*” [19, 33.] Magic as a cultural category can thus be a powerful tool in evoking imagery that deals with ideal state of affairs and profoundly alternative ways of being. It is connected to our ability to imagine how things could be different – and better.

Our second point is closely connected to the first one. Kapferer [25] points out that “*magical, cultic and sorcery practices press to the limits of human experience and beyond, breaking through the barriers of language and concept. They are among those human practices at the very centre of human creativity (positive or negative)*”. Of course, we did not employ magic as a practice but treated it as a metaphor. Indeed, we claim that magic as a cultural

category – as technology – can be understood as something that extends the human potential. Nevertheless, magic is not concerned with the products of rational thinking, such as laws of physics or biological facts. This turns it into a speculative vehicle that transports us towards the “far shores of human possibility and potentiality” [25]. Needless to say, a metaphor that lets us to think something extraordinary can be highly valuable in the most creative phases of design process.

We can conclude that in participatory design processes, magic as a metaphor can be utilized to mobilize thinking connected to ideal state of affairs: how would participants want things to be? Secondly, it can be used to awaken thoughts connected to extraordinary and exceptional objects, activities and experiences.

3 CASE: “MAGIC” IN DESIGN PROCESS

3.1 Background of the Library Workshop

As mentioned earlier, the idea of a multi-stakeholder workshop first came up in the thematic interview which we conducted with two representatives of the administration of the library and a project worker focusing on new technologies. The main goal of the interview was to trace whether the Oulu City Library was, first of all, interested in our hybrid reality research theme, and if the reception was positive, discuss about cooperation possibilities. We first traced current challenges and trends relating to public libraries and their role in the city; secondly, the possibilities of virtual 3D models and AR in urban public environments were discussed. The interview lasted approx. 2.5 hours, and it was recorded and transcribed. After the interview, the workshop was planned in close cooperation with the library. Initially it was decided that the workshop would be open-ended and creative, and the aim would be to map the possibilities of combining virtual 3D models, AR and physical library into an entity called “Hybrid Library”. In addition, it was settled that future Hybrid Library should be something that would benefit both the library staff and the library users alike.

Overall, the Library workshop was arranged in the spirit of Participatory Design (PD); the goals had been set with the library staff, and the aim was to bring people with different kind of expertise together to create ideas jointly. Blomberg and Karasti [8] define the central principles of PD as follows: it must entail 1) respect for different knowledge, 2) opportunities for mutual learning, 3) joint negotiation of project goals, and 4) tools and processes to facilitate design. The central aim of PD is to create better and more usable artifacts; however, the goal of design process is not only the new product which is being designed. It is also of crucial importance that through processes of mutual learning participants gain insights into design processes, begin to understand the impacts of technology and realize they have a choice. [e.g. 5, 6, 10] We intended to respect these central principles. For example, we instructed the participants to respect each other’s expertise and told that the idea was not that the university researchers are in the lead; they were supposed to be equal participants. However, the project goals had been decided earlier with the Library administration, and thus participants of this

workshop could not affect them. The goals were, anyway, so broad that they did not pose very strict limitations.

Furthermore, one source of inspiration for our workshop were ideas provided by design fiction and speculative design. Design fiction can be defined as science fiction which is concerned with the realities of design [45]. Speculative design, in turn, is depicted as “a philosophical inquiry into technological application” [3]. These approaches inspired us because both provide means that can help us to think about futures in plural; a future development that seems inevitable is actually just one option among many. Although we did not write fictional stories or create subversive design objects in the workshop, we still wanted to illuminate the contingent nature of the future, and inspire participants to craft alternative proposals for future library. This was achieved by utilizing means described in the next section.

The Library provided us the space, most of the materials used, refreshments and lunch for the participants. Furthermore, all the participants received a small reward sponsored by the library; a ticket to the local science center. University researchers, on the other hand, took care of planning the program and assignments of the workshop. Participants (35 in total) consisted of library users (14), library staff (13) and university researchers (8) having slightly different backgrounds ranging from computer science to architecture and design. However, all of the researchers were already familiar with 3D technologies. Thus, participants held specific knowledge regarding 1) library usage, 2) library as a work site and library as a cultural institution, and 3) VR and AR technologies. It must be noted that these positions overlap easily as researchers can be identified as library users, and some library user participants had expertise on 3D technologies due their professional background. The age of the participants was between 20 to 56 years. All participant groups had both females and males but in total the number of females was a bit higher, 21 individuals.



Figure 2: Workshop participants drawing a mind map. © Oulu City Library.

We also consciously paid attention to materiality and its importance throughout the workshop: material surroundings and props can have significant effect on knowledge-making practices as they can affect the atmosphere, emphasize certain kind of communication (e.g. formal/informal), underline or disentangle

power relations or steer the thinking of participants [e.g. 47, 49]. The location was deemed crucial: we wanted to arrange the workshop at the Main Library and not at the university premises because one goal was to focus on the physical place, the Library building itself. After all, the aim was to explore how near future digital technologies and this specific physical place could interact, entangle and merge. This extremely central facet – physical environment – is too often neglected in the design of public urban technologies, as we have argued elsewhere [29, 51]. The comments and results proved that surrounding architecture inspired many participants and reminded them about the meaning and experiential aspects of being in this particular place. The Library and its unique materiality was also taken into account in the material provided to the groups: they received a box full of papers, colorful markers, scissors, glue - and some old books to cut.

3.2 Program and Assignments

The program of the half-day workshop began with a short introduction to VR and AR technologies and their novel possibilities through a mini lecture and video clips. The participants were also educated about the current strategy of the Library, and of course about the aims and goals of the workshop itself. At the end of this brief session, they had a chance to try out Oculus Rift headsets and explore 3D virtual model of the library with a PC. Next, we divided the participants into eight smaller groups that worked together for most of the time we had left. At the end of the day, we gathered together again and every group presented their ideas and concepts for the “hybrid library”.

The group work was based on three tasks that included discussions, mind maps, and crafting a collage. The composition of these assignments was determined by our aim to co-create radically new ideas and uses for the future hybrid library; we wanted to tickle participants’ creativity and open up perspectives rather than concentrate on well-known uses of 3D virtual environments, such as games or navigation. At this point we deemed that restrictions posed by the current status of technological development or our resources were not important; we could later develop and trim the ideas to match these limitations. It was central to produce alternative visions of near-future technologies. We realized this by creating a series of three assignments that followed a pattern of attachment – detachment – synthesis. Our approach resembles the structure of a *future workshop* which is a well-established tool used e.g. in PD. It includes three phases: 1) the critique phase in which problems that hinder the possibilities for a positive future are explored and also made visible; 2) the fantasy phase contains the creation of personal and common visions for the future; 3) the implementation phase in which concrete plans are made [24].

However, we did not start with the mapping of difficulties as we did not expect our technological system would offer a solution to some specific problem(s). Rather, we asked the participants to ponder their own relationship with the library, and their personal ways to use it. In addition, they could think what kind of hopes and dreams they had in relation to library. The aim was to make the participants to reflect on their relationship with the library as an institution and as a concrete physical place, and to find common

points of interest with the rest of the group. We asked them to draw a mind map and trace connections and common themes [Fig. 2].

The participants were allowed to open up the next page from the task sheet only when they had finished the previous one. The second assignment was called “the Magical Element”. It was accompanied with a sheet of paper including a cloud of words connected to magic; these included words such as “enchanted forest”, “crystal ball”, “flying”, “magic mirror”, and “talking animals” [Fig. 3]. The idea was that participants could use these words as an inspiration; the list was attached into the materials as there was some doubt that magic would otherwise be too broad theme. The participants were asked first to reflect on books, movies or fairy tales they knew and that had included especially impressive magical elements. When connected to the world of fiction and fairy tales, magic was linked with shared meanings found in popular culture. At first participants made some notes individually, and after everybody had come up with a suitable example, they could discuss about their choices for a while; what made these magical elements so impressive? The assignment included only writing and discussing due to the limited timeframe but it could have been interesting to complement it with some sort of visual or crafting task.



Figure 3: List of the words connected to magic. © Oulu City Library.

We had reserved a longer time for the last assignment that was given to the participants after a coffee break. Its topic was “the Hybrid Library”, and the goal was to draw together all the bits and pieces of ideas and insights collected during the whole day. The participants were asked to ponder technologies introduced in the morning, and think VR and AR technologies as magical. To emphasize this point, the task sheet included science fiction writer Arthur C. Clarke’s three laws, the third one stating famously that “*Any sufficiently advanced technology is indistinguishable from magic*”. We asked the participants to pick up a one theme based on the first assignment, and craft a wish or need. The idea was to combine this theme with some of the magical elements discussed in the second assignment, and finally sketch up a concept for a Hybrid Library. This concept was supposed to answer to the wish or need, or simply just enhance the library experience. The concepts were presented in the form of large collages including clippings from the magazines and books provided [Fig. 4]. At the end of the

workshop every group presented their concepts to the others and ideas were discussed.



Figure 4: A collage made in the workshop within library surroundings. ©Oulu City Library.

3.3 Reflection

The preliminary results indicate that the participatory, creative design process we employed was successful. The feedback that we got right after the workshop was, for the most part, positive: For example, one library staff participant commented that this was her best workday ever; another participant, familiar with design processes due to his work, praised the content of our tasks as he had found them very well designed. Some negative comments were connected to the “traditional” nature of the tasks, such as drawing a mind map. In their free-form presentations and collages all the groups mentioned the magical element, and some emphasized it had been very inspiring.

The ideas we got were versatile, and they contain abstract ideas as well as detailed concepts for the future Hybrid Library. Overall, the rather abstract and difficult idea of a future “Hybrid Library” was concretized in the results of the workshop. The participants had successfully reflected on how to bring digital into physical environment and vice versa; for example, the one of the more profoundly elaborated concepts was called *MyLibrary*, which was based on both AR and VR technologies and resembled the Facebook connected to the library environment and content. The other especially interesting concept was the idea to build imaginary virtual floors on top of the physical library’s 3D model; these floors could represent, for example, different literary genres, such as science fiction. Details of the library building, such as its numerous windows, had also inspired the participants. The possibility to create new hybrid communities with the help of technology, and Library itself as a community for citizens were recurrent themes. We are currently analyzing the results in-depth and they will be published elsewhere.

There are a couple of details we would like to elaborate critically: When introducing the concept of magic in the second task, we utilized a list of words which was perhaps a little bit risky. There is a possibility that these words have steered the thinking of participants too much, and many had actually used some of the ideas given in the task sheet. Pirhonen [39] claims that it would be

best to let the users to create the metaphors themselves; the designer’s challenge is to support this process. Thus, we probably could have trusted our participants more. We could have just let them ponder the higher-level concept of magic and came up with more specific ideas connected to it by themselves. Secondly, the concrete crafting tasks we used were quite conventional, and we could have utilized more imaginative methods. In any case, the limited timeframe posed some challenges and made us to choose assignments that are easy to adopt and understand by everyone.

4 DISCUSSION AND CONCLUSIONS

4.1 Divergent Thinking through Metaphors

In this paper, we have made the case for utilizing magic as a creative metaphor in fostering layperson creativity within the context of a PD workshop. We have employed literature from cultural anthropology, design studies and the study of creativity to explore this proposal. Furthermore, we have presented preliminary reflection of our Hybrid Library workshop in Oulu, Finland. In the following, we will briefly discuss the presented findings further.

Through our discussion of creativity in design, we pointed to the importance of divergent thinking as a central way of fostering creativity. This current understanding of creativity and design, then, is able to explain one aspect of the usefulness of metaphors in design in general. Metaphors enable us to connect two or more things which are unconnected by default. This juxtaposition enables the production of novel ideas. During other projects, we have arranged several workshops drawing from PD, and our preliminary analysis indicates the results of this one were particularly imaginative (which was the aim). To use the terminology of Wallas [48], these ideas must be further refined, or alternatively abandoned, in the evaluation and elaboration phases of our design process. The results of the workshop will be instrumental in the next phases of the process of designing the Hybrid Library.

4.2 Magic as a Metaphor for Technology Design

Our intention was not to use metaphors solely expressively, i.e. to connect well-known real-world objects into virtual ones to make them more understandable; nor did we want to use magical objects just as intriguing props. We do admit that these kinds of comparisons and conceptualizations probably have played an important role in the whole design process and in discussions between the participants. However, we leaned on the understanding of metaphors rising from linguistics which expands the meaning of the term. The main aim was to activate a whole domain of thought connected to “magic” as a cultural category. As we have presented, the concept of magic is connected to broad and perhaps universally human ways to think: it is part of our ability to imagine things that cross the limits of the tangible environment and current situation. We deem that magic as a concept can mobilize thinking that helps to come up with idealized and alternative realities, and related ideas.

Furthermore, we can claim that magic is a particularly useful metaphor in technology design due to certain similarities and

differences between the concepts of technology and magic. Technology in society serves a similar purpose as magic as a cultural category; both can be defined as indirect means to control our surroundings. Magic fulfilled this role without the benefit or the limitations of the scientific method; thus, it remains a concept that is free from rationalist demands under which technology usually operates. Magic and its curious nature as a category outside rational thinking makes it a special tool in creative design connected to technology, as it can be considered as “technology without any constraints”. This is especially helpful in early phase design realized with lay participants and focusing on complicated technological systems; employing the concept frees participants from pondering real constraints of technology and fosters a future-oriented thinking.

4.3 Formulating our Approach as a Conceptual Model

While we consider the use of magic, and metaphors in general, to be productive in the context of PD, the application of these ideas must be done quite carefully. We argue it is necessary to anchor the abstract concept used into participants’ everyday experience. In the design process that took place within the workshop, we aimed at connecting two very broad conceptual domains, magic and the idea of hybrid reality. The central elements of our design process and their interplay are illustrated in Figure 5. The principal metaphor we employed through different participatory assignments can be dubbed as “Hybrid Reality is Magic”. This metaphor can be deconstructed into source domain (magic) and target domain (hybrid reality). According to Lakoff and Johnson [26, 27], source domain refers to the conceptual domain from which we draw metaphorical expression; in a way, it depicts or borrows its qualities to target domain which, in turn, is the conceptual domain we intend to understand.

In addition, context was as important for the whole process. It contains three elements that anchored the abstract entities of magic and hybrid reality into the everyday life experiences of the participants: 1) introduction to the workshop in which we presented concrete technologies and library as an institution; 2) first task of the workshop which dealt with participants’ own relationship with the library, and their personal ways to use it; and 3) material surroundings where the workshop was arranged. This contextualizing was also a productive and creative part of the design process. Interestingly, by changing the context represented in the image, we could carry out participatory design processes aiming at ideas for “hybrid reality” in different environments, for example, in a school. Naturally, the details of methods should be planned in accordance with the participants.

Furthermore, also other components depicted in our model are (in theory) interchangeable: the target domain – the concept of “hybrid reality” – and the concept of “magic” itself. This means that we could utilize other creative metaphors in participatory design processes that are linked to other kinds of design cases. For example, we could seek ideas for new social media applications by utilizing the following metaphor: “Social media is magic”. Or, we could try to come up with another powerful and broad source

domain instead of magic. “Nature”, for instance, could be such a conceptual domain; if we would parallel it with, let’s say “robots”, it would also create the friction needed between the conceptual domains. Then, our creative metaphor could be “Robots are natural” [cf. 52]. Therefore, although we have mainly discussed magic, it is by no means the only powerful metaphor we can use in participatory design process; there are plenty of them. Understanding a metaphor, i.e. being aware of its cultural meanings is of a great help when choosing the best metaphor for each purpose.

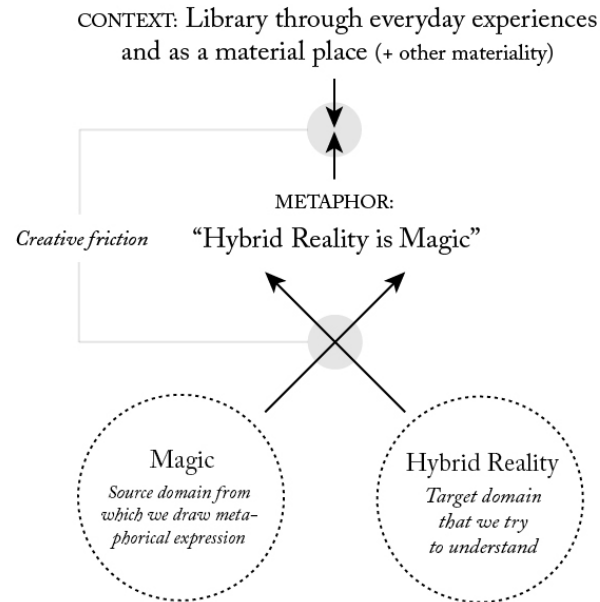


Figure 5: Our conceptual model of the principal elements of a participatory design process utilizing creative metaphors. © Johanna Ylipulli & Anna Luusua.

Finally, we have to highlight that the use of magic and other metaphors is culturally dependent. We found the particular metaphor of magic to be very effective, but it must be noted that its effectiveness is highly dependent on cultural and social surroundings. Our study was conducted in relatively secularized, high-tech western country where magic has very different connotations than, for example, among some very religious groups. In other words, magic can be understood differently in different societies. All the assumptions connected to different metaphors cannot be controlled, but researchers and designers must know the cultural milieu where they are working in order to utilize suitable methods. This is linked to the powerful nature of metaphors as creative tools.

ACKNOWLEDGMENTS

We would like to gratefully acknowledge the support of the Open Innovation Platform project (A70202) funded by the ERDF and the City of Oulu under the Six City Strategy program, and the COMBAT project (293389) funded by the Strategic Research Council at the Academy of Finland. We would like to thank participants of our workshop for sharing their time with us, and the Oulu City Library for cooperation.

REFERENCES

- [1] Svanhild Aabø, Ragnar Audunson and Andreas Vårheim. 2010. How do public libraries function as meeting places? *Library & Information Science Research* 32, 1 (2010), 16-26.
- [2] Toni Alatalo, Timo Koskela, Matti Pouke, Paula Alavesä, and Timo Ojala. 2016. VirtualOulu: Collaborative, immersive and extensible 3D city model on the web. In *Proceedings of the 21st International Conference on Web3D Technology*. ACM, New York, NY, 95–103.
- [3] James Henry Auger. 2014. Living with robots: A speculative design approach. *Journal of Human-Robot Interaction* 3, 1 (2014), 20–42.
- [4] Kim Binsted. 2000. Sufficiently Advanced Technology: Using Magic to Control the World. *CHI '00 Extended Abstracts on Human Factors in Computing Systems*, ACM, New York, NY, 205–206.
- [5] Gro Bjercknes, Pelle Ehn, Morten Kyng, and Kristen Nygaard. 1987. *Computers and democracy: A Scandinavian challenge*. Aldershot, UK, Avebury.
- [6] Gro Bjercknes and Toni Bratteteig. 1995. User Participation and Democracy. A Discussion of Scandinavian Research on System Development. *Scandinavian Journal of Information Systems* 7, 1 (1995), 73–98.
- [7] Alan F. Blackwell. 2006. The reification of metaphor as a design tool. *ACM Transactions on Computer-Human Interaction (TOCHI)* 13, 4 (2006), 490–530.
- [8] Jeannette Blomberg and Helena Karasti. 2012. Positioning ethnography within participatory design. In Jesper Simonsen and Toni Robertson (Eds.) *Routledge Handbook of Participatory Design*. Routledge, London, 86–116.
- [9] Richard Buchanan. 1992. Wicked problems in design thinking. *Design issues* 8, 2 (1992), 5–21.
- [10] Susanne Bødker. 2003. A for Alternatives. *Scandinavian Journal of Information Systems* 15, 1 (2003).
- [11] Alan Cooper. 1995. *About face: The essentials of user interface design*. John Wiley & Sons, Inc.
- [12] Mihaly Csikszentmihalyi. 2014. *Society, culture, and person: A systems view of creativity*. Springer, Netherlands.
- [13] Nigel Cross. 1997. Creativity in design: analyzing and modeling the creative leap. *Leonardo* (1997), 311-317.
- [14] Vanessa Doutreleau. 2003. Elves and Relationships with Nature in Iceland. *Ethnologie française* 33, 4 (2003), 655–663.
- [15] Kees Dorst and Nigel Cross. 2001. Creativity in the design process: co-evolution of problem–solution. *Design studies* 22, 5 (2001), 425–437.
- [16] Allison Druin and Carina Fast. 2002. The child as learner, critic, inventor, and technology design partner: An analysis of three years of Swedish student journals. *International Journal of Technology and Design Education* 12, 3 (2002), 189-213.
- [17] Joachim Funke. 2009. On the psychology of creativity. In Peter Meusburger, Joachim Funke, and Edgar Wunder (Eds.) *Milieu of Creativity: An Interdisciplinary Approach to Spatiality of Creativity*. Springer, Netherlands, 11–23.
- [18] David Gelernter. 1993. *Mirror Worlds*. Oxford University Press.
- [19] Alfred Gell. 1998. Technology and magic. *Anthropology Today* 4, 2 (1988), 6–9.
- [20] Mona Leigh Guha, Allison Druin, Gene Chipman, Jerry Alan Fails, Sante Simms, and Allison Farber. 2004. Mixing ideas: a new technique for working with young children as design partners. In *Proceedings of the 2004 conference on Interaction design and children: building a community*, ACM, New York, NY, 35–42.
- [21] Joy Paul Guilford. 1967. The Nature of Human Intelligence. *Science* 162, 3857 (1967), 990–991.
- [22] Paul Hekkert and Nazlı Cila. 2015. Handle with care! Why and how designers make use of product metaphors. *Design Studies* 40 (2015), 196–217.
- [23] Giulio Iacucci, Kari Kuutti, and Mervi Ranta. 2000. On the move with a magic thing: role playing in concept design of mobile services and devices. In *Proceedings of the 3rd conference on Designing interactive systems (DIS)*. ACM, New York, NY.
- [24] Robert Jungk and Norbert Müllert. 1987. *Future Workshops: How to create desirable futures*. Institute for Social Inventions, London.
- [25] Bruce Kapferer. 2002. Outside all reason: magic, sorcery and epistemology in anthropology. *Social Analysis* 46, 3 (2002), 1–30.
- [26] George Lakoff and Mark Johnson. 1980. *Metaphors we live by*. The University of Chicago Press, Chicago.
- [27] George Lakoff. 1993. The contemporary theory of metaphor. In Andrew Ortony (Ed.) *Metaphor and thought*. Cambridge University Press, Cambridge, 202–251.
- [28] Joshua Harlan Lifton. 2007. *Dual reality: An emerging medium*. Ph.D. dissertation. MIT, Cambridge, MA, USA.
- [29] Anna Luusua, Johanna Ylipulli, Hannu Kukka, and Timo Ojala. 2017. Experiencing the Hybrid City: The role of digital technologies in public urban places. In John Hannigan and Greg Richards (Ed.) *The SAGE Handbook of New Urban Studies*, SAGE, London, 535–549.
- [30] Michelle Lynn Kaarst-Brown and Daniel Robey. 1999. More on myth, magic and metaphor: Cultural insights into the management of information technology in organizations. *Information Technology & People* 12, 2 (1999), 192–218.
- [31] Sabina Magliocco. 2010. *Witching culture: Folklore and neo-paganism in America*. University of Pennsylvania Press.
- [32] Theo Mandel. 1997. *The elements of user interface design*. Vol. 20. Wiley, New York.
- [33] Bronislaw Malinowski. 1935. *Coral Gardens and Their Magic: The Description of Gardening*. (2012), Routledge, London.
- [34] Bronislaw Malinowski. 1948. *Magic, science and religion and other essays*. Vol. 23. Beacon Press, Boston.
- [35] Lionel March. 1984. The logic of design. In Nigel Cross (Ed.) *Developments in Design Methodology*. John Wiley & Sons, Chichester, 265–276.
- [36] Peter Meusburger. 2009. Milieus of Creativity: The Role of Places, Environments and Spatial Contexts. In Peter Meusburger, Joachim Funke, and Edgar Wunder (Ed.) *Milieus of Creativity: An Interdisciplinary Approach to Spatiality of Creativity*. Springer, London, 97–153.
- [37] Michael D. Mumford. 2003. Where have we been, where are we going? Taking stock in creativity research. *Creativity research journal* 15, 2-3 (2003), 107-120.
- [38] Bonnie A. Nardi and Craig L. Zamer. 1991. Beyond models and metaphors: Visual formalisms in user interface design. System Sciences, 1991. In *Proceedings of the Twenty-Fourth Annual Hawaii International Conference on Systems Science*. Vol. 2. IEEE, 1991.
- [39] Antti Pirhonen. 2005. To simulate or to stimulate? In search of the power of metaphor in design. In Antti Pirhonen, Hannakaisa Isomäki, Chris Roast, and Pertti Saariluoma (Eds.) *Future interaction design*. Springer, London, 105–123.
- [40] Alessandro Ricci, Michele Piunti, Luca Tummolini, and Cristiano Castelfranchi. 2015. The mirror world: Preparing for mixed-reality living. *IEEE Pervasive Computing* 14, 2 (2015), 60–63.
- [41] Horst Rittel and Melvin Webber. Dilemmas in a general theory of planning. *Policy sciences* 4.2 (1973): 155-169.
- [42] Wade Roush. 2007. Second earth. *Technology Review* 110, 4 (2007), 38–48.
- [43] John Smart, Jamais Cascio, and Jerry Paffendorf. 2007. *Metaverse roadmap: pathways to the 3D web*. Metaverse: a cross-industry public foresight project (2007). <http://www.metaverseroadmap.org/>
- [44] Rebecca L. Stein and Philip Stein. 2015. *Anthropology of religion, magic, and witchcraft*. Routledge, London.
- [45] Bruce Sterling. 2005. *Shaping Things*. Mediaworks Pamphlets.
- [46] Norbert A. Streitz. 2011. Smart cities, ambient intelligence and universal access. In *Proceedings of International Conference on Universal Access in Human-Computer Interaction*. Springer, Berlin, 425–432.
- [47] Tiina Suopajarvi. 2016. Knowledge-making on ‘ageing in a smart city’ as socio-material power dynamics of participatory action research. *Action Research* (2016): 1476750316655385.
- [48] Graham Wallas. 1926. *The Art of Thought*. Solis Press, Tunbridge Wells.
- [49] Mieko Yoshihama and E. Summerson Carr. 2002. Community participation reconsidered: Feminist participatory action research with Hmong women. *Journal of Community Practice* 10, 4 (2002), 85–103.
- [50] Johanna Ylipulli, Jenny Kangasvuo, Toni Alatalo, and Timo Ojala. 2016. Chasing Digital Shadows: Exploring Future Hybrid Cities through Anthropological Design Fiction. In *Proceedings of the 9th Nordic Conference on Human-Computer Interaction*. ACM, New York, NY, 78.
- [51] Johanna Ylipulli, Anna Luusua, Hannu Kukka, and Timo Ojala. 2014. Winter is coming: Introducing climate sensitive urban computing. In *Proceedings of the 2014 conference on Designing interactive systems (DIS'14)*, ACM, New York, NY, 647–656.
- [52] Johanna Ylipulli. 2015. A smart and ubiquitous urban future? Contrasting large-scale agendas and street-level dreams. *Observatorio (OBS*)*, Media City: Spectacular, Ordinary and Contested Spaces (2015), 85–110.
- [53] Peter Zumthor. 2006. *Atmospheres*. London, Birkhäuser.