

Serendipity as an Experiential Quality:

How Serendipity can be Used as a Resource to Create Meaningful Experiences

Petter Holmboe

Department of Design

Norwegian University of Science and Technology

ABSTRACT

In experience-centered design, the relationship between designer and user developed through dialogue, greatly influence the final design. How a situation is experienced and felt, however, differs from individual to individual. One person's meaningful experience may not be interesting at all to another. Serendipity can be at the heart of personal, powerful meanings. This article explores how serendipity can be used to create meaningful experiences in interactive systems. A literature review is conducted, exploring the richness of human experience and several experiential qualities. Several case studies and commercial products were analyzed to elaborate on experience-centered design and serendipity. Based on these insights I discuss how serendipity can be at the center of meaningful and profound experiences and how an Experience Scope Framework can be useful to open for serendipity. The purpose of this article is to contribute to the field of experience-centered design by offering new insights into serendipity as a resource in interactive systems.

KEYWORDS: Experience, Design, Empathy, Co-experience, Serendipity

1. INTRODUCTION

Since the end of the 20th century, there has been a lot of research into user experience and experience-centered design. The economy has changed from one concentrated on providing commodities, goods and services to one deliberately providing experiences [1]. Technology developers have long since recognized the importance of user experience and experience based services. As developed countries shift its focus from well-fare to well-being [2] and designers start to design possibilities rather than focusing on solutions [3], the efforts into creating easy to use and functional technology have also included experience as an integral part of the design. By accepting experience as part of the economy, businesses and organizations can help people find their own way in life [4] and increase overall well-being.

While earlier user-centered design focused on functionality and observation of users in

interaction with products, experience-centered design borrows from approaches such as the Scandinavian tradition of Participatory Design (PA), in that it involves users to a greater extent in the design process than traditional approaches. In experience-centered design, designers and users are separate and different centers of experiences and values [5]. Through dialogue, the relationship between designer and user evolve into a deep sense of understanding and empathy, allowing the designer to design for the full richness of human experience.

However, how two users experience the same situation is individual, and how people experience something alone will be different from a similar situation in a social context [6]. Designers cannot in fact *design an experience* but rather design *for experience*. The free will of users allow them to use products in ways that the designer did not intend them to. As the relationship between user and product grows,

they might evolve their own ways of interacting with the product, and they may discover new elements that change the purpose of the product. By using ambiguity in their designs, designers can take advantage of this and stimulate users to use products in their own way [7].

The word “Serendipity” usually refer to terms such as “chance encounter” or a “happy accident” often experienced in science, when researches makes an unsought discovery. Serendipity can be a powerful tool to create meaningful experiences. While exploring randomness in design, Tuck W. Leong found that “at the heart of the experience of serendipity was the emergence of powerful personal meanings [8]”. Although serendipity can make profound experiences, designers cannot guarantee that a serendipitous thing will occur, as that would defeat the very nature of the concept.

To understand how serendipity can affect experiences and emotions and how designers can utilize serendipity as a resource, one must first understand the full richness of human experience. In the next section, I will discuss what experience is from the perspective of pragmatist philosophy. Further, I will discuss experience-centered design, and how designers can understand experience in context of design and how empathy affects the outcome of a project. Finally, I will discuss serendipity, how we might open for serendipitous experiences to occur and why this is important in experience-centered design.

2. EXPERIENCE

During the past couple of decades there has been a lot of writing about experience and experience-centered design, involving different disciplines that often intertwine, such as psychology and philosophy and even economy. While Hassenzhal et al. [2] considers psychology and a view on experience design based on needs, Wright and McCarthy [9] developed a holistic approach to experience

that begins with the idea of how people make sense of things, people, situations, and experience based on pragmatist philosophy. In short, experience is everything that happens to us, whether it is a conversation with an interesting character or the daily commute to work. Wright et al. quote the pragmatist William James as talking about “this lifeworld as a blooming buzzing confusion, and the raw material of our experience as a stream of consciousness [10]”. How do we make sense of all these situations and experiences? How can we relate one experience to the other to make the continuous fabric of experiences that is life? Experience and interpretation of experience is the continuous process of making sense of life.

The philosopher John Dewey [11] argues that experiences are conditioned by past experiences and other people around us: “Just like no man lives or dies to himself, so no experience lives or dies to itself [11]”. People make sense of their current situation based on their previous experiences and on the reactions (or lack thereof) of people around us. Past experiences also affect how we anticipate and expect the situation to develop further, and how we act during that situation. I would argue that our experience defines who we are and how we behave or react in certain situations.

The *pragmatist approach*, as thoroughly described in literature, helps us to understand people and experience. It is a holistic view of the human experience and the intellectual, sensual and emotional responses in relation to self, others, artefacts and settings as “multiple centers of value, interacting with each other [5]”. The pragmatist approach is about understanding *an other* and trying to better understand how it feels like to be that person in their lived and felt life.

Forlizzi and Battarbee (2004) build on Dewey’s work and suggest that there are three different types of experience: *Experience*, *an experience* and *Co-experience*. The term *experience* refers to the constant stream of consciousness that

constitutes life; “the blooming buzzing confusion [10]” as stated earlier in this paper. *An experience* is something that can be articulated or named. It has a definite beginning and end, like a weekend in London or going on a rollercoaster ride. An experience might inspire behavioral and emotional changes. It might make us think differently and change how we view our selves or certain things in life. *Co-experience* is experience in social contexts. Co-experience is when a situation takes place with other people, either physically or virtually, and the experience is created together and shared with others. Humans are social beings and co-experience is an important part of understanding experience. In the next section I will elaborate on co-experience and how empathy helps us understand other people and the experiences we share with them.

2.1 Social situations and empathy

Experiences are greatly influenced by social situations [16]. For instance, imagine you are on a road trip with a group of people. If you run out of gas in the middle of nowhere, it might be viewed as an adventure if you are with friends, but it might also be viewed as a disaster if you are on a business trip and have meetings to attend. Experiences an individual has and how the individual interprets them are also influenced by virtual presence of others [12]. Interactive technology has played, and continues to play, a large role in supporting co-experience, especially with services such as Snapchat, which I will discuss later in the article.

We find certain experiences worth sharing with others. Perhaps many experiences would not really be *an experience* at all if it were not for that other person with you, sharing different perspectives and communicating, thus helping each other making sense of the situation. Sharing an experience with another person also serves as a platform to build new relationships, by involving you both in a common history and common ground [9]. Through empathy, you come closer to

understand how another person feels during a situation, which again contribute to your own meaning of the same situation.

Empathy can make us view a situation from another’s point of view, even if they are not present. Through empathy, we get to know people and, thus, get to know their values. The ability to see the world and oneself from another’s point of view, enables us to have internal dialogues with significant others in our minds, and they help us make sense of a situation [5]. Sometimes we can even hear their voices. These voices might come from experiences we have shared with that other person, or perhaps just from the sense we have of that person and his or her values.

Empathy is of considerable importance for designers, as it enables us to understand the emotions of people. To gain insights into the emotions of users, we need to ask questions they can answer in their own way. It is how we frame these questions and how we interpret the answers that enables us to generate a holistic view of user emotion and the experiences that led to these emotions. As feelings drive actions and actions result in feelings, I would argue that emotions are one of the main forces to how we make sense of experiences. This will be discussed further in the next section.

2.2 Emotion

Any experience has an emotional thread [13] and it is this affectivity that relates experiences to emotions such as happiness, enchantment or even sorrow. The emotions we had during an experience tend to summarize the experience. For example: “It was fun and exciting” or “It was frustrating”. Emotion is at the heart of experiences, and it is an essential ingredient in how people interact with other people, situations and products. “Emotion affects how we plan to interact with products, how we actually interact with products, and the perceptions and outcomes that surrounds those interactions [6]”. This quote would be just as true if you switch out the word *product* with *people* or *situations*. We can view emotion

as a resource for how we interpret an experience, and how we choose to communicate about the experience. Other people may also affect our emotions, and therefore social situations greatly affect how we make sense of experience. How we create experiences with other people is often referred to as co-construction. This term will be discussed in the next section.

2.3 Co-construction

An experience can be understood as “an episode, a chunk of time that one went through – with sights and sounds, feelings and thoughts, motives and actions [...] closely knitted together, stored in memory, labeled, relived, and communicated to others. An experience is a story, emerging through the dialogue of a person with her or his world through action [2]”. As experiences are influenced by social situations, we can say that experiences are *co-constructed*. Meaning that the sense or meaning of an experience is not fixed. Let us revisit the case with the flat tire from earlier: I presented two different situations; one where the social context was a road trip with friends, and the other a business trip with colleagues. How we make sense of these situations, and the emotions we have during the situations is greatly influenced by the reactions of the people we are with. They may result in two entirely different experiences. If everyone starts to laugh, chances are you will too.

How we interpret a situation might also change long after it happened. As we share a story of a situation we might have had, from our own point of view, the meaning of the experience might also change, as more perspectives and point of views are considered [9]. How people respond to the story might change how we make sense of that experience retrospectively, as mentioned earlier, but also about how we view our selves.

Social situations also make us creative. When co-experiencing a situation, each person might act accordingly to what the other expect, or they can do something unexpected and

exciting. In this way, each person contributes to the situation in a way that the other could not. In short, creativity is combining ideas in new ways [14]. Social creativity leaves open the opportunity to add something more to the situation than just one individual person can. According to Sanders [14], people who use technology together, are more creative than those who use it on their own. Social creativity is particularly important to experience designers as it explains how both designer and user contributes to the final design together. This concludes my description of pragmatist experience. The next sections will discuss experience-centered design; what it is and how we might use it.

3. EXPERIENCE-CENTERED DESIGN

An experience cannot be designed. Experience is how an individual interprets and makes sense of a situation [6]. Designers on the other hand, might wish for a certain experience for the user of their material, but how it is actually experienced depends on a person’s past experiences and social context. All kinds of past experiences might influence a situation and alter the it to something quite different than the designer had in mind. If you are on your way home from work, a scary situation in traffic might make you unable to appreciate dinner with family.

Empathy is one of our most effective tools. To gain a deep understanding of users we need to communicate with them through dialogue. So how should one understand experience and generate insight as to how people think and feel?

3.1 Empathy

As argued in an earlier section, one of the most important aspects while doing experience-centered design is empathy. “Borrowing the feelings of another in order to really understand them, but never losing your own identity – this is basic in empathy [15]”. This enables us to view a situation through the eyes of the experiencer, which again makes it

possible to, together with the user, construct experiences that are meaningful.

There are several ways of reaching this level of empathy, and they all require user involvement, and not merely observation. Traditional design methods often view the user as a subject, while the designer sits firmly in the role of an objective observer, gathering information and analyzing the lives of his or her subject in a scientific way [9]. To understand experience as lived and felt, designers need to engage in dialogue with the user, listen to their stories and bring their own stories, values and way of seeing into the process. Design empathy makes use of both the emotions of the user and the designer, enabling the designer to not merely be informed, but also feel for the user [12]. The designer should not “become the user”, but rather respond to how they see the user’s world in their own perspective as designer [5]. In the next section, I will explore how we can gain empathy and understanding through storytelling.

3.2. Storytelling

To better understand experience, we need to listen to stories and tell stories of our own. Only after understanding the experience of users, we can start designing the material to help them achieve those kinds of experiences. There are many ways to collect stories. In fact, humans tell stories all the time. “Telling stories is as basic to human beings as eating” according to the philosopher Richard Kearney [16]. We interact with people and share our stories for a variety of different reasons, from practical to emotional. From an early stage in our lives, we tell stories to provoke sympathy or shift blame on the playground [9]. When we get older, we tell thrilling stories to engage and entertain. We learn to build up the drama of our stories, containing plots and main characters, and end the story in a climax.

Storytelling is a dialogical activity, because it not only involves the storyteller telling his or her story, but they also engage with the listener, trying to understand their point of view [9]. The listener can respond with their

views on the story, whether it is what the storyteller wanted to hear or the opposite, or they may respond with a similar story.

When the experience designer collect stories, it often starts with a semi-structured interview [9]. It needs to be open to the interviewee so that they can talk about their lives and describe their experiences in their own way. The framing of these initial questions is important, and after the interviewee has started telling his or her story, the interviewer should only intervene to encourage or seek clarification.

How one formulates these questions may have big impacts on our final designs. In a study conducted by Youn-kyung Lim and William Odom [17] with students enrolled in a design methodology class at KAIST, they researched the type of questions used by design students and what impact those questions had on the final design. They found that students asking questions such as “What does eating alone mean to you?” and “Have you ever had any kind of special incident happen to you in a café?” resulted in greater user insights and empathy than questions such as “what kind of function do you typically use aside from communications functions?” [17]. The former questions may lead to an interesting and meaningful conversation, especially of the interviewer use words such as “value” and “feel”, while the latter may result in quite marginalized understanding of the user experience and a misguided final design, that may not facilitate the emotions or experiential qualities the designer set out to achieve.

There are several experiential qualities that may evoke emotions and meaningful moments from the user. In the next section, I will discuss some of these qualities, as well as how we can design for these kinds of situations.

4. EXPERIENTIAL QUALITIES

There are several experiential qualities designers might wish for users to experience. When designing a product, one might facilitate for some of these qualities, or all of them, as none are mutually exclusive.

In the following sections, I will discuss four major experiential qualities: *Co-experience*, *Aesthetics*, *Ambiguity* and *Serendipity*. Together, these create enchantment and can provide the means for the user to create rich experiences while also ensuring future use of the material. Later, I will elaborate on a research study on serendipity.

4.1 Co-experience

As stated in an earlier section, social contexts greatly influence how we interpret and make sense of our experiences. Battarbee and Koskinen [12] claim that neglecting co-experience not only leads to a limited understanding of experience, but also a limited understanding of design possibilities. People act towards products and systems through meanings they have for them [18]. As how people make sense of situations and people is influenced by social contexts, so is the way people interact with products. Another person might show us a new use for a certain product, or their reaction to our interaction might lead to new understanding of the product, thus giving it a new meaning. Together, people might come up with new uses neither of them had thought of earlier. Social creativity is not about creating new products or art, but rather about how we make sense and meaning of situations, or how we interact with tools and products [14].

With the arrival of smart phones and better Internet coverage came applications that connects us with each other from almost anywhere in the world, such as Snapchat. Snapchat is a mobile application that allows users to send pictures to each other that last from anywhere in between one and ten seconds. The pictures can only be viewed *once*, which again might incorporate more meaning and uniqueness to the pictures [19]. This is an application that lets the users share stories with each other. Here, as well as when we share stories through dialogue, we may not want to share the same information with everyone, allowing us to construct certain pictures to one group of friends, and another

type of pictures to another group of friends. Empathy allows us to understand which friends might appreciate the different kinds of content we want to share.

Snapchat is an excellent example of co-experience in today's interaction systems, as it lets users share stories with several people at the same time. It also promotes social creativity and it can help users make sense of situations they are currently in, if the recipients respond immediately. As stated earlier, situations encountered alone might not be perceived as an experience or story worth sharing at all, and may even be forgotten. Snapchat allows users to share stories which they might otherwise have forgotten, thus creating *an experience* of it, rather than letting it drift into unconsciousness.

Co-experience expands on traditional user experience by the fact that experiences created together are different from what users experiences alone [12]. By studying how people communicate both with and without technology, designers can learn to understand how people make meaning, share stories and do things together. As technology continues to develop, design possibilities for co-experience increases with it. It is important to understand how people communicate to able to fully take advantage of technology development and develop new products that uses aesthetic interaction to enhance embodied experiences, which will be the focus of the next section.

4.2. Aesthetics

Functionality and usability is not sufficient in experience-centered design. From the perspective of pragmatist aesthetics, the aesthetics of interaction systems is tightly connected to context, use and instrumentality [20]. Aesthetics experience relies on interaction that address both mind and body. Rather than viewing beauty as a trait or an added value of a system, Petersen et al [20] stress that designers should place aesthetics as an integral element of the material. Aesthetic interaction promotes curiosity, engagement and imagination, while at the same time

working as a continuously encouraging element for future use of the material. The aim of aesthetic interaction is to create involvement, enchantment, surprise and serendipity while using interactive systems as well as promoting bodily experiences.

According to Wright et al [5], “beauty emerges as a consequence of sensibilities towards our experiences and felt life within the design process”. The designer needs to understand how the users make sense of the material, and how they interact with it at a sensual, emotional and intellectual level. It is important to recognize the fact that “the user brings as much to the interaction as the designer leaves there [5]”. Designer and user are equal, but separate centers of value, mutually influencing the material through dialogue.

Dewey [11] argues that art and aesthetics cannot be fully understood without socio-historical appreciation. A chair is not beautiful in itself, but rather as a result of our socio-historical appropriation of the material and shapes used. Likewise, aesthetics experience is based on social context and our ability to engage both bodily and intellectual in an experience [20].

Petersen et al [20] conducted a case study where they developed a playful prototype for exchanging documents. In this project, walls, tables and floors are interactive surfaces, and participants exchange, move and arrange documents by using a ball. Using a ball as instrument of interaction, presents a culturally significant object, with connotations such as play, games and practice, where both intellectual and physical capabilities must be used to interact with the system. In this project, Petersen et al presented a clash of the socio-historically different contexts of ball and office, play and work, to encourage the participants to be creative and redefine ways of working and collaborating, resulting in an ambiguous context and working experience. Ambiguity in design, and especially HCI will be elaborated in the next section.

4.3 Ambiguity

Ambiguity is an interesting attribute to consider in HCI. While usually anathema in HCI, Gaver et al [7] argues that ambiguity can be used to encourage close personal engagement with systems. By balancing uncertainty and little context, and the familiar with the strange, ambiguity requires people to actively participate in making sense and meaning of a situation. “The work of making an ambiguous situation comprehensible belongs to the person, and this can be both inherently pleasurable and lead to deep conceptual appropriation of the artefact [7]”. I would argue that ambiguity and serendipity is closely related, as both are experiential qualities that demands active interpretation to make sense of the situation.

Gaver et al [7] identified three principals of ambiguity that asks for different sorts of interpretation: ambiguity of *information*, of *context* and of *relationship*. Ambiguity of information asks us to project our experiences, expectations and anticipations into an interpretation of incomplete information, like the mysterious smile of Mona Lisa. Ambiguity of context requires an integration of incompatible frames of reference, like a product being appropriated by the user to a use the designer did not think about. Ambiguity of relationship evokes a projection of our subjective experiences and attitudes onto new situations, impelling us to consider new beliefs or values. The most important benefit of ambiguity is that it gives designers the ability to “suggest issues and perspectives for consideration without imposing solutions [7]”. Ambiguity can encourage critical thinking, reevaluation of self and others and make us question what is true and what is not.

Boswijk et al [4] argues that in every meaningful experience, there needs to be a clear goal. I disagree: A meaningful experience cannot be staged. What is meaningful for one individual, may be totally uninteresting for the next. Ambiguity demands attention and

interpretation [7], and can lead to serendipitous experiences.

4.4 Serendipity

In science, serendipity can be defined as making an unsought finding, while in search for something else [21], such as the discovery of Velcro and penicillin [22]. There appears to be a lack of understanding of the potential value of randomness in interactive systems [8]. However, it has long been used by music systems, such as shuffle play methods, and more recently, Spotify's Discover function, which finds new music based on what the user has listened to the past week. Together with ambiguity, randomness can allow users to form their own experiences. Listening to music in shuffle mode can, according to Leong's et al [8] study, result in rich experiences such as joy, thrill and even serendipity, and it might make the listener view the music with new eyes.

Serendipity cannot be designed. It must occur by chance. However, by being open to the concept and allow for unexpected encounters to happen, we might enable it to occur, though it is not guaranteed [3]. For instance, consider Pokémon-Go: This is a game for smartphones that uses augmented reality to allow people to move around and capture virtual beings located throughout our real world. The game does not require the user's full concentration, which enable the users to have all kinds of experiences along their way, whether this means finding a beautiful location or interesting people. Some of these situations may very well be chance encounters that can be considered as "happy accidents". I will elaborate on Pokémon-Go later.

Although serendipity is always present in our lived experiences, it is rarely investigated in science [23]. Probably because it is difficult to gather the data of such experiences in an amount that is necessary for a valid investigation, compared to other experiential qualities such as fun and enjoyment. Liang [23] attempted to articulate serendipity through three design studies following a research-

through-design approach. One of these works was the "Sound Capsule".

When using Sound Capsule, an individual might receive a random phone call, with the content being an audio file recorded by the participant in the past [23]. Upon answering the call, the users hear an audio clip that they themselves recorded at least three months earlier. The time from the sound clip being made until the phone call was received was long enough so that the user would be defamiliarized with the contents. The audio files were saved in the Sound Capsule database and were chosen randomly by the program at a random time. It could happen while the participant was on her way home from work a Tuesday afternoon or after breakfast a Sunday morning.

In this study, semi-structured interviews were used to understand the user's experiences after participating [23]. The responses demonstrated serendipitous experiences beyond their expectations. Several emotions resulted from the phone calls, including envy, compassion, happiness and reflection. One participant received what he thought was an unintentional phone call where he heard a conversation between his girlfriend and a "strange man". He then realized that this strange man was in fact himself having a conversation with his girlfriend months ago. When his memory of the conversation gradually emerged, his mood suddenly switched to happiness and self-reflection. He later described the experience as "happiness by accident".

This experiment often resulted in spontaneous meaning-making for the participants [23]. Some participants had recorded audio files from trips and adventures with friends months earlier. The phone calls successfully created serendipitous experiences and happy reminiscence of a special time. One participant had even recorded a quarrel. Upon receiving the phone call, the participant had a feeling of reconciliation, and he reported an unexpected and dialogical understanding of himself and his relation to others.

It is important to note the social factor of serendipity. In a similar case study to that of the Sound Capsule, Liang [23] tested serendipitous experiences when interacting with friends as well as strangers, and found that the communication with strangers resulted in little or no feeling of serendipity at all. This could indicate that social context or familiarity with an experience, feelings or contexts will significantly increase the likelihood of serendipity.

To open for serendipity in our designs, we can look to the designer Jesper L Jensen's work [3]. He presents two different kinds of meaning making: *goal-oriented* meaning an *omni-oriented*. Goal-oriented meaning is a result when the person is working towards a goal. Every experience that does not contribute towards the goal is an obstructive experience. Omni-oriented meaning, however, is every meaning other than goal-oriented meaning. If your state of mind is omni-oriented, you are open to whatever draws your attention and impulsive actions, which might lead to unexpected outcomes. A system can, paradoxically, be both goal- and omni-oriented at the same time.

A good example of a system that is both goal- and omni-oriented is Pokémon-Go. The game has a clear goal: Catch Pokémons. In the game, however, you can battle against other players that you meet in the real world. These encounter awards the players by giving them points, thus, the game is promoting social interaction through random encounters. At the same time, the players must walk around in our real world to catch these beings, and this enables the players to have experiences that are not a part of the game itself, but a derived effect. The game is simultaneously allowing serendipitous experiences to happen while pursuing a specific goal.

Jensen also describes the direct and derived effects of the two different orientations[3]. For example, the direct effect of a design student's project is the finished design, while the derived effect is her or his learning from the project.

The direct effect of an omni-oriented experience on the other hand, is about well-being. The derived effects might be something that "connects to a person's values and personality, adding to his or her happiness [3]". For example, the direct effect of a chance encounter with an old friend resulting in a good conversation, is well-being and joy, while the derived effect might be that the meeting enhanced his or her sense of social belonging.

In his article "Designing for Profound Experiences", Jensen presented the Experience Scope Framework (ESF). This method may contribute to involve both goal-oriented as well as omni-oriented approaches, and explore both these entities in relation to each other, while at the same time look at direct and derived effects of an interaction.

4.5 The Experience Scope Framework

The framework, shown in Figure 1, is depicted as a two-by-two matrix with goal-orientation and omni-orientation along one axis, and direct and derived affects along the other [3]. The tool is applicable to any design-process, aimed at exploring the possibility of profound experiences.



Figure 1, the Experience Scope Framework [3]

Together with end users or a design team, the framework can help designer and participants gain insights they would not gain by using conventional methods. By not focusing on a problem or initial ideas for solutions, the framework generates a holistic understanding of what kind of experience that are possible to

achieve, then think of concepts. *Experience first - material later* is one of the governing ideas in experience-centered design [9].

Jensen describes an exercise he did with workers at a workplace, where the participants used the ESF to highlight meaningful aspects of their workday experience (see Figure 2) [3]. He chose to focus on the three quadrants *achievement, values* and *wellbeing*, which forced the participants to take their mind away from the task solving quadrant. “I think that in 98% of the work I usually do, I would only be interested in the quadrant we chose to skip [3]”, one participant remarked.



Figure 2, a completed ESF from case study [3]

The ESF can in fact be applied to several kinds of projects, such as a movie or a book. One of the major strengths with the framework is that the participants can discover emotions and experiences independent of the solution or end design. Being stuck in a specific mindset could result in biased research results and a misguided product which did not take the full range of possibilities into account when developing the product. Another strength is that it makes the designer focus on the derived effects of their product, not just how a product is solving a specific task. This makes the ESF a possibility driven tool, rather than a solution driven tool.

However, the use of the framework demands motivation from the participants. If the framework is used with a team of designers, this will probably not be an issue, but if the

participants are, like in Jensen’s case, workers of an office, they may not be able to jump into a suitable mindset, which can result in frustration. It can also be difficult to separate which aspects should be in the different quadrants, and the participants can argue that many aspects would fit in several quadrants. This can also be a source of frustration.

How can the framework contribute to designs open to serendipity? By focusing on the omni-oriented side, the designer can explore meaningful experiences without being affected by an already defined solution or goal. As the ESF is an idea generation tool, the design team can develop ideas that may result in a product that will support a greater part of human experience and emotion, while at the same time pursue both goal- and omni-orientations, which may increase the chance of serendipity. However, as experience-centered design methods involves users, they should also participate in using the ESF. In this case, user motivation is paramount, as the framework takes time to understand, use and interpret.

5. DISCUSSION

Keeping all this in mind, how can serendipity be used as a resource in interactive systems? From the pragmatist approach to experience-centered design, serendipitous experiences differ greatly from person to person, and one person’s serendipity may be meaningless to another. The very nature of serendipity is personal and depends on previous experiences. Even if an experience is serendipitous one day, it is not necessarily the next, even though the conditions are similar. Because of this, serendipity can be especially challenging to use as a resource in design.

Serendipity is the act of spontaneously making personal and powerful meaning of a situation [8], and falls under Forlizzi’s and Battarbee’s second experience type called *an experience*, in that it has a beginning and an end and can be articulated and labeled afterwards [6]. It is also often under the third type of experience: *co-experience*. Other people help us make sense

and meaning of situations, as another person can communicate new perspectives of a situations that we were not conscious of or able to ourselves. Social creativity can play a big role in creating serendipity in this regard.

Leong et al [8] showed that listening to music from an unconstrained audio library on shuffle mode could result in “happy coincidence” or serendipity, if the “track ‘magically’ underscores the prevailing mood or the lyrics of the song just ‘happens to’ speak directly to the listener”. This experience, of course, is not something a designer can guarantee to happen. However, by treating each user as a different center of value who comes to the interaction with a rich history of experiences and values, they will interpret the situation based on these earlier experiences to make meaning. By presenting something unfinalized and ambiguous that they did not predict, the users must exercise their own creativity and draw upon their own experiences for the situation to make sense.

Through qualities such as co-experience, ambiguity and unpredictability, serendipity can be used as a resource in design. By connecting content with earlier experiences, users will be able to extract memories within their own experiences and relate these to new situations to make them meaningful, or they may even see earlier experiences in a new light.

Though it can neither be tailored nor guaranteed, a system open to the occurrence of serendipity through the qualities mentioned above can increase the likelihood. An ambiguous system can lead to serendipity by mixing together perspectives and narratives the user has not combined before. The role of serendipity is indirect and random, so it is together with an omni-oriented system, the qualities above may lead to serendipity. Jensen’s framework may help in this regard. One should not, however, use ambiguity as an excuse for poor design, as this will sooner lead to frustration rather than serendipity.

6. CONCLUSION

Serendipity can to a certain degree be used as a resource in design, although it can never be guaranteed. Thus, commercial interactive systems should not be too dependent on serendipitous occurrences. There are several experiential qualities that may result in meaningful and rich experiences for users of interactive systems, and serendipity is just one of them. To keep users enchanted to a product and ensure its continued use, experience designers need to focus on all experiential qualities and their relation to each other, and try to enable serendipity through ambiguity, social interaction and randomness.

Using Jensen’s possibility driven framework may help to enable serendipity to occur, by allowing designers to explore the full potential of experiential possibilities of a project while also exploring both goal- and omni-oriented entities in relation to each other. However, designing systems that promotes social interactions while allowing people to explore unconstrained contents is a good start to at least open for the possibility, as this enables users to draw upon their own experiences and values to make serendipity for themselves.

In the end, serendipity is a personal experience and one needs to be open to it. This is something designers can facilitate by creating interactive systems that are not too focused on a final goal or that requires too much attention on one specific element. Rather design systems that promotes social encounters; that allow users to engage in what they feel is most intriguing; that allow users to have their minds elsewhere, like listening to music on shuffle-mode while walking home from work. The serendipitous experiences do not even need to be a part of the system itself, but rather a derived effect from the people using a system, like Pokémon-Go.

This paper has shed light as to how one can use serendipity as a resource in commercial interactive systems. There needs to be further research to explore what kind of experiences

are most prone to develop into serendipity. There seems to be a connection between serendipity and social context, or that the experience offers familiarity to an earlier, meaningful experience. This could be potential for designers to facilitate serendipity.

REFERENCES

- [1] B. J. I. Pine og J. H. Gilmore, «Welcome to the Experience Economy,» *Harvard Business Review*, pp. 97-105, July - August 1998.
- [2] M. Hassenzahl, K. Eckoldt, S. Diefenbach, M. Laschke, E. Lenz og J. Kim, «Designing Moments of Meaning and Pleasure: Experience Design and Happiness,» *International Journal of Design*, pp. 21-31, 30 November 2013.
- [3] J. L. Jensen, «Designing for Profound Experiences,» *Design Issues*, pp. 39-52, 2014.
- [4] A. Boswijk, T. Thijssen og E. Peelen, «A New Perspective on the Experience Economy,» *The European Centre for the Experience Economy, The Netherlands*, 2006.
- [5] P. Wright, J. Wallace og J. McCarthy, «Empathy and Experience in HCO,» *ACM Press*, April 2008.
- [6] J. Forlizzi og K. Battarbee, «Understanding Experience in Interactive Systems,» *ACM*, pp. 261-268, August 2004.
- [7] W. W. Gaver, J. Beaver og S. Benford, «Ambiguity as a Resource for Design,» *CHI 2003*, pp. 233-240, 5-10 April 2003.
- [8] T. W. Leong, F. Vetere og S. Howard, «Randomness as a Resource for Design,» *DIS'06*, pp. 1-9, June 2006.
- [9] P. Wright og J. McCarthy, *Experience-Centered Design*, Morgan & Claypool Publishers, 2010.
- [10] W. James, *The Principles of Psychology*, Cambridge: Henry Holt and Company, 1890.
- [11] J. Dewey, *Art as Experience*, New York: Perigree, 1934.
- [12] K. Battarbee og I. Koskinen, «Co-Experience: User Experience as Interaction,» *Co-Design*, pp. 5-18, 10 May 2004.
- [13] J. McCarthy og P. Wright, «Technology as Experience,» *MIT Press*, pp. 42-43, October 2004.
- [14] L. Sanders, «Collective Creativity,» *LOOP: AIGA Journal of Interaction Design Education*, August 2001.
- [15] B. J. Kalisch, «What is Empathy?,» *The American of Nursing*, pp. 1548-1552, September 1973.
- [16] R. Kearney, *On Stories*, London: Routledge, 2002.
- [17] Y.-K. Lim og W. Odom, «On the Importance of Framing Questions for User Research in the Experience-Centered Design,» *CHI 2009*, 3 April 2009.
- [18] J. Forlizzi og S. Ford, «The Building Blocks of Experience: The Early Framework for Interaction Designers,» *ACM Press*, pp. 419-423, 2000.
- [19] P. Wright, J. Wallace og J. McCarthy, «Aesthetics and Experience-Centered Design,» *ACM Transactions on Computer-Human Interaction*, November 2008.
- [20] M. G. Petersen, O. S. Iversen, P. G. Krogh og M. Ludvigsen, «Aesthetic Interaction - A Pragmatist's Aesthetics of Interactive Systems,» *DIS2004*, pp. 269-276, 1 August 2004.
- [21] P. Van Andel, «Anatomy of the Unsought Finding,» *The British Journal for the Philosophy of Science*, pp. 631-648, June 1994.
- [22] R. M. Roberts, *Serenipity: Accidental Discoveries in Science*, New York: Wiley, 1989.
- [23] R.-H. Liang, «Designing for Unexpected Encounters with Digital Products: Case Studies of Serendipity as Felt Experience,» *International Journal of Design*, pp. 41-58, 30 April 2012.
- [24] K. Battarbee, «Co-experience: the Social User Experience,» *CHI 2003*, pp. 730-731, 5-10 April 2003.