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Flow Experience in Participatory Designed Online Environments

Master Thesis

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Tallinn 2010

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Abstract

In this master thesis flow experience in participatory designed online environments is studied. Flow can be described as optimal experience in which the participant feels the control over the tasks and clearly understands what he/she has to do. During the flow experience the people feel time distortion, telepresence and are rewarded with a positive effect. In this paper the flow in participatory designed online environments is studied and questioned if flow could be validating the design of a web application. If a design is not understood, the participants will not be active, they feel distraction and can not experience flow. Since the development of Web 2.0 applications that form new hybrid environments, participants can take the role of designer and modify the system in order to make it transparent and fit their needs. Ambient intelligence describes a system that supports the participants activities and provides technically transparent environment for the user. In this way, the user may act freely and feel control over the tasks. This thesis analyzes flow in a participatory design experiment which was about finding new ways for storytelling in hybrid ecosystem. The hybrid ecosystem is studied in order to analyze how flow can encourage users to participate in the design process. Also, the characteristics and patterns of flow in a hybrid ecosystem are introduced.

Keywords

flow, participatory design, cultures of participation, ambient intelligence, hybrid ecosystem, online environment, social software, narrative ecology, hybrid media, mashup

1 Introduction

During some activities we feel high concentration and loss of self-consciousness. We feel control over these activities and experience positive emotional state. This kind of engagement is even often felt at everyday activities, like cooking and working. Musicians and sportsmen often describe this experience and illustrate it with enjoyable feelings. Csikszentmihalyi (1977) started to study these optimal experiences and calls them flow. Since then, flow has been studied and not only in psychology but also in human-computer interaction as an important theory for understanding the efficacy (the capacity to produce an effect) of online environments. If all the participants of a system would feel flow during every session, one could call it the most popular online environment. This is the bottleneck today - the systems are built by developers and not all the user's needs and interests are taken into consideration. The hypothesis I would propose, is that user involvement in the design process can evoke optimal experience and through that we understand better (the most optimal) design.

Since the beginning of Web 2.0 (O'Reilly, 2005), social web has seen a rise. And not only single services, but recently we admit the popularity of the mashups of the Web 2.0 applications. By mashup we understand a web page or application that uses or combines data or functionality from two or many more external sources to create a new service. Manovich (2008) introduces media hybrids, in which interfaces, techniques, and ultimately the most fundamental assumptions of different media forms and traditions are brought together resulting in new species of media. To use a biological metaphor, we can say that media hybridity involves the coming together of the DNAs of different media to form new offsprings and species.

The media hybrids and mashups today are not designed by developers and back-end architects, but the end-users have the power to design the hybrids according to their needs and skills. Cultures of participation (Fischer, 2002) points to the methodology that encourages the users to become the designers.

It is important to study how the cultures of participation design method and ambient intelligence support flow and how these methods can improve the design of web applications. The participatory design method allows the users to change the application's functionality and the way he/she wants to use it. As the outcome, the user should not feel

the control of computers in the process of communicating since using the system has to be simple and native. Does the experienced flow increase their participation in design process and satisfaction of their own designs? One of the goals of this thesis is to study how flow encourages the users to become designers.

The aim of this master thesis is to study the flow characteristics in a hybrid ecosystem (Pata, 2009) in which participants act as designers and collaboratively create narratives. In this paper, we study the nature of flow and conduct a qualitative research on the flow experiences in a participatory design experiment held as a university course. The author interviews the participants and analyzes the flow patterns in the mashup created for the collaborative storytelling experiment.

The following research questions are taken into consideration to study flow in the participatory designed online environments:

- What characterizes the flow experience in the participatory designed online environment?
- What are the triggers that keep users in the flow in the participatory designed online environments?
- How participatory design method supports experiencing flow?
- How flow validates the design of a web environment?

2 Literature review

The term flow refers to a state of consciousness[1] that is sometimes experienced by individuals who are deeply involved in an enjoyable activity. This optimal experience occurs when a person's set of skills matches the perceived challenges of the task (Csikszentmihalyi, 1977). Although the flow state can be reached during engagement in numerous activities, including sports, writing, work, games, and hobbies (Novak, Hoffman, and Yung 1999), the focus in this thesis is flow during consumer interactions with a Web application. In the experiment, flow is being evaluated in the hybrid ecosystem (Pata, 2009).

Mihaly Csikszentmihalyi, a professor and former chair of the Department of Psychology at the University of Chicago, started to study flow. In order to understand the motivation and paradigm of what keeps us enjoying some activities, Csikszentmihalyi studied self-rewarding, or autotelic activities. Csikszentmihalyi knew that if he could understand what made us so fond of some activities, he could revolutionize how we work and play. He observed painters, rock climbers, dancers, musicians, and surgeons, taking surveys and collecting their state of mind at random intervals.

In a state of flow a particular activity is perceived so enjoyable and intrinsically interesting that it is considered worth doing for its own sake (Csikszentmihalyi, 1990). It is interesting that flow is most often experiences during our everyday activities: cooking, cleaning and also during working and studying.

In recent years Csikszentmihalyi's flow theory has been used in several studies of human–computer interaction as a framework for modeling enjoyment, user satisfaction, playfulness, engagement, absorption and other related states of involvement with computer software. The outcome of these researches is used to describe the characteristics of flow in online environments and taken into consideration in evaluating flow in the design experiment.

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[1] Consciousness is the "I", the "self" that we all know, from which we view the world and interact with it, that sense of "subjective qualitative states of awareness, sentience or feeling" (Searle, 1997)

2.1 Flow

To reach a state of flow, one should perceive a match between the level of skills possessed and the challenges provided by the situation (Csikszentmihalyi, 1990). Csikszentmihalyi illustrated the match between the skills and challenge with flow channel.

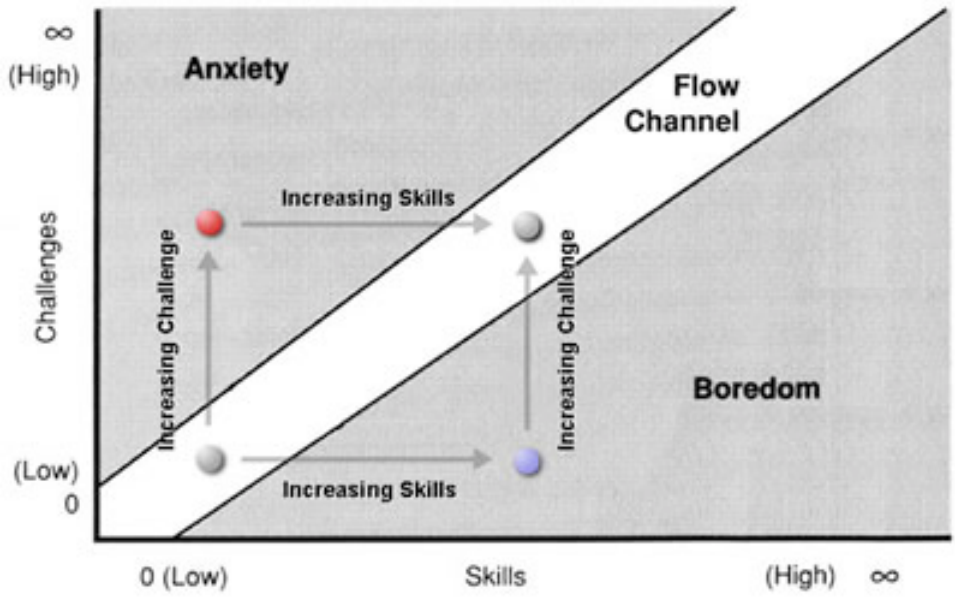

Figure 1. The flow channel (Csikszentmihalyi, 1990)

Activities leading to flow should also “facilitate concentration and involvement by making the activity as distinct as possible from the so-called “paramount reality” of everyday existence” (Csikszentmihalyi, 1990). Such activities should also provide a clear goal and instant feedback to the actor as well as increase the actor’s sense of control (Csikszentmihalyi, 1990). Examples of this kind of activities are, e.g., playing games, sports and arts. While engaging to them an actor usually loses self-consciousness, time passes more rapidly and an actor gains enjoyable experiences.

Flow might accompany almost every type of human behavior. Major characteristics of flow are: temporary loss of self-consciousness, and of sense of time, high concentration on the task and high level of control over it, objectives become clear and distinct, and actions merge awareness, experience brings full satisfaction and seems worth doing for its own sake (that means, motivated intrinsically), immediate feedback. What is especially important, the flow rests upon the precise matching between the available skills and the task challenges (Csikszentmihalyi, 1990). Still, not all these characteristics are needed for flow experience.

Still, flow cannot be experienced so easily by everyone. People with difficulties for concentrating and controlling their psychical energy do not feel in the flow zone very often (see figure 1 as the flow zone illustration). Also, some experiences from the past may influence people so much that later they have serious problems for forgetting the past activities and concentrating on the activities they are doing at the moment. These social factors are hard to overcome.

2.1.1 Flow and culture

The culture with its characteristics and common understandings creates the environment for flow experiences. The culture reduces the ontological anxiety and defines the environment in which the users act. The ontological anxiety is reduced by the culture as it reduces the perceptible dimensions. The culture makes us feel comfortable in this environment, we feel relaxed and are focused towards the activities (Csikszentmihalyi, 1990).

Every social system can be evaluated by the psychic entropy inside it and is described by the disorder of the participants activities (Csikszentmihalyi, 1990). The culture is “better” space in which the peoples objectives are correlated with their skills and knowledge. The culture is in a way dynamic as it should enable the individuals to keep developing their skills, because they need the experience of challenging new tasks and feeling the control over them.

The culture is there to protect us against chaos and unexpectedness. Like birds have the feather to protect against cold, water and bad weather conditions (Csikszentmihalyi, 1990). Cultures create standards, goals, convictions and help us to survive. In order to do that, the cultures narrows down the number of alternative goals and choices. If we concentrate only on the limited resources and possibilities, we can act freely according to the given rules. In the way we can compare cultures to games. The games have the rules and limitations - we play according to the rules without any doubts.

If cultures can define the goals and rules according to the skills of its members, it is possible to experience flow often. It’s very hard to evaluate how different cultures really influence flow. For example, the percent of population saying they’re “happy” in highly developed countries may be the same for less developed countries. Although, the cultures

that support higher education, self-development are usually more pleased with their lives compared to other cultures.

It is interesting to point out that people at work will most probably experience flow 4 times more probably compared to people watching TV. At work people have their mission, their tasks and they have to concentrate in order to fulfill the goals. They feel control over the tasks and feel satisfied.

The culture can be described by its affordances and constraints. The concept of affordances was originally introduced by American psychologist Gibson (1986). According to Gibson, affordances are material properties of the environment that can support the actor's existence and survival. The affordances define the space in which we act but in the other hand we see the affordances of the environment helping us to experience flow. That is because, the affordances already define the culture in which the user participates.

Building from Gibson's (1986) original notion on the importance of available information for the perception of affordances, Barentsen (2000) has introduced the concept of “intuitive interfaces”, which is immediately understandable to all users, without the need neither for special knowledge by the user nor for the initiation of special educational measures. We can conclude, that intuitive interfaces reduce the ontological anxiety the users might experience, because the concept of the environment is well understandable to the user and an important factor for flow has been fulfilled.

Agarwal et al. (2000) argue that perceived ease of use of an information technology has a positive effect on behavioral intention to use the information technology. Often, the information technology tools we use, are not intuitive for us and the success in using them depends on our previous experiences (skills) and also on the participatory design methods the technology enables. After controlling for self-efficacy perceptions, cognitive absorption with an information technology has a positive effect on the perceived ease of use of the information technology. By self-efficacy we understand an individual characteristic, that is reflective of confidence in one’s ability to perform a particular task (Bandura, 1997).

2.1.2 Research on flow

Flow has been widely studied as an important characteristic of any environment. If we knew exactly how to design the communities in the way it would make people to feel flow, we could support the communities better. Flow has been studied by various research methods: interviews, online questionnaires, real-time questioning. The summary of the recent researches on flow:

Researcher	Antecedents	Flow	Consequences
Agarwal and Karahanna (2000) Structural model	Playfulness, personal innovativeness	Higher-order construct of "cognitive absorption" (curiosity, control, temporal dissociation, focused immersion, heightened enjoyment)	Perceived usefulness, perceived ease-of-use, behavioral intention
Chou and Ting (2003) Structural model	Repetitive behavior	Higher-order construct (empathy, discovery)	Addictive behavior, self-control disorder, obsession, goal confusion
Finneran and Zhang (2003) Conceptual model	Artifact, person (trait, state), task	Multi-dimensional construct (dimensions not specified)	None specified
Hoffman and Novak (1996) Conceptual model	Skill, challenge, interactivity, vividness, involvement, telepresence, focused attention	Unidimensional flow	Increased learning, perceived behavioral control, exploratory mindset, positive subjective experience
Huang (2003) Structural model	Complexity, interactivity, novelty	Multi-dimensional construct (control, attention, curiosity, and interest)	Utilitarian and hedonic web performance

Researcher	Antecedents	Flow	Consequences
Novak, Hoffman and Yung (1999) Structural model	Online tenure, skill, control, interactivity, challenge, arousal, importance, focused attention, telepresence, time distortion	Unidimensional flow	Exploratory behavior (via telepresence)
Pace (2003) Conceptual model	Curiosity, time urgency, goal, usability, skill, challenge, distractions, content interest, progress toward goal, attention focus.	Multi-dimensional construct (joy of discovery and learning, reduced awareness of surroundings, time distortion, merging of action and awareness, sense of control, mental alertness, telepresence)	None specified

Table 1. The conclusion of flow research in the human-computer interaction field. The outcome of these researches is introduced in the following chapters.

2.1.3 The characteristics of flow

The characteristics of flow are important to study as they describe the effects of user experience that are seen as a validator for better design. Csíkszentmihályi (1977) pointed out the following components of flow:

• Clear goals - moreover, the challenge level and skill level should both be high.

• Concentrating - a high degree of concentration on a limited field of attention

• A loss of self-consciousness

• Distorted sense of time - the time is flying

• Direct and immediate feedback

• Balance between the skills level and challenge (the activity can not to be too easy nor too difficult).

• A sense of personal control over the situation or activity.

• The activity is intrinsically rewarding.

• A lack of awareness of bodily needs
• People become absorbed in their activity, and focus of awareness is narrowed down to the activity itself, action awareness merging.

Pace (2003) views flow as a multi-dimensional construct comprised of the joy of discovery, reduced awareness of surroundings, time distortion, merging of action and awareness, a sense of control, mental alertness, and telepresence.

Pace (2003) studied the factors for experiencing flow in finding information in the web: what is the nature of flow, as experienced by Web users engaged in information-seeking activities? He stated many factors necessary for experiencing flow and formulated a concept map of grounded theory. The grounded theory states that **curiosity** and **interest** play a vital role in the flow experiences of Web users. If the information they are seeking, is most interesting to them, flow is experienced often. **Time urgency** is another important factor. People are in a need to get the data they are looking for fast. Informants revealed their desire for speed in different ways such as imposing a time limit on a search, opening multiple browser windows, losing patience with slow downloads, losing patience with splash screens, selecting the first results returned by a search engine etc. Time urgency, like curiosity, can depend on individual differences.

Chen (2007) illustrates the flow zone. The optimal experience is felt in the flow zone, in which the **anxiety** is reduced and no **boredom** present. In an anxious situation we can not concentrate well and face distractions for completing the tasks. The culture plays a huge role here as it reduces the ontological anxiety and narrows down the possible scenarios for action. Often we feel bored and for flow we must accept new tasks that match our interests and **skills**.

The environment that supports flow, must meet the certain level of **complexity** for functioning. The level depends very much on the person - for example if you play guitar very well and want to join an amateur rock band, you get bored very soon, because you can play guitar much better and want to perform on higher levels. As the persons skills are improving time after time, he must be facing new tasks that fulfill the improved skills - the completion of new tasks effects us with positive emotions and can lead us to flow.

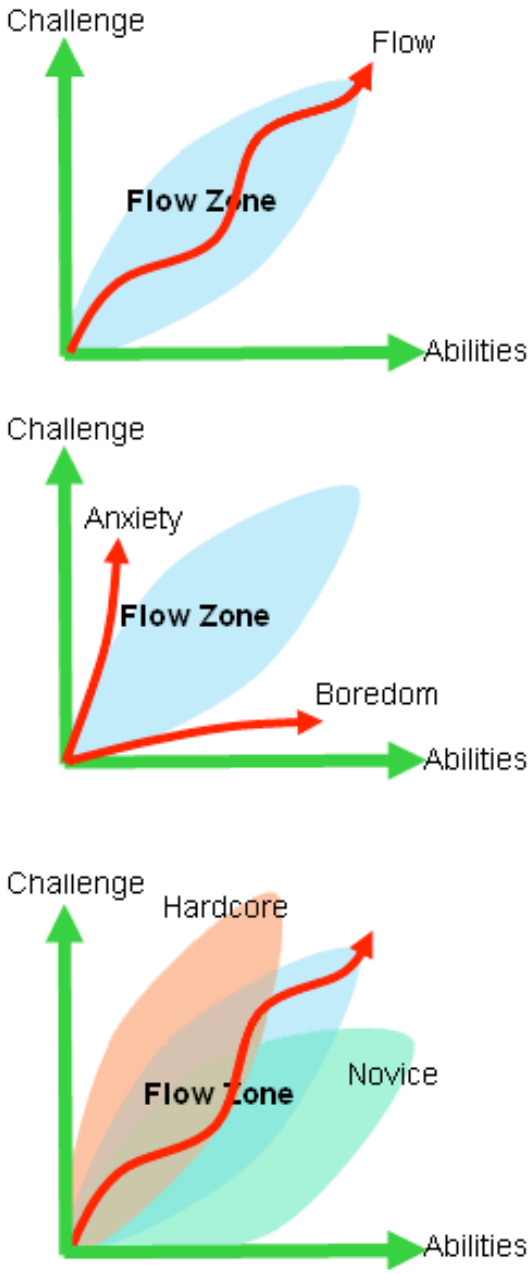

Figure 2. Optimal experience can occur in the flow zone Chen (2007).

2.1.4 The process of flow

Flow can not be experienced constantly, but is available only if the environment and user's skills support it. The processes of flow illustrates the requirements for flow creation and make us to understand how flow is felt during different activities.

The flow experiences of Web users vary in **duration**, **frequency** and **intensity**. People experience flow differently some may feel in flow every day while others feel the experience less frequently. Flow may vary also for different activities - searching information on the Web causes flow differently as playing a guitar or drawing. Still, enjoyment is a common factor in all flow experiences, but among Web users is appears to be linked to discovery - finding, learning and also communication. Csikszentmihalyi's research also suggests that 'the reason we enjoy a particular activity is not because such pleasure has been previously programmed in our nervous system, but because of something discovered as a result of interaction' (Csikszentmihalyi, 1990).

People experiencing flow say they do not notice time flying. Hours seem to be minutes because of focused attention and engagement of the activity. When the flow process ends, and they become conscious of how much time passed, they may feel guilty. They realize how much time was spent, but they explain it with the enjoyable moments spent and new things learned (Pace, 2003).

People experiencing flow often feel telepresence. When individuals use the Web they perceive two separate environments simultaneously: the real environment in which they are physically present, and the virtual environment presented by the computer. As explained earlier, a Web user's awareness of his or her physical surroundings is reduced during flow because attention is focused on the task at hand. All irrelevant thoughts—including awareness of one's surroundings—disappear from consciousness. It gives the user the possibility get involved and feel telepresence.

Pace (2003) mentions that also the users goal might change during the activities and according to that he might jump from one flow experience into another. It happens in activities in which the user gets stuck and simultaneously finds other relevant and interesting topics to him. The user continues his web experience and concentrates on the new goal.

When the challenge of an information-seeking activity is matched by the Web user's skill, the user makes progress toward a successful outcome and the experience has the potential to induce flow. When the challenge of an information-seeking activity exceeds the user's skill, the experience becomes frustrating, either because the user fails to find the item of interest or because the search takes too long (Pace, 2003).

The important factor in determining flow or frustration is not the absolute challenge of the activity, nor the absolute level of the user's skill, but rather the relative balance between the two. For example flow can be experienced by the user who is the first time using internet (as he's browsing and going from one page to another, he is studying the internet and that is what causes flow for him) or an heavy-internet user who's spending 8 hours per day in the internet (he's working on specific tasks that keep him working and in the same time experiencing flow).

In order to work successfully, concentration and mental resources are needed. The theory of consciousness states that humans can have only one element at a time in their focus (Baars, 1997). This one is the thing we are focusing at the moment and keeps our attention. Flow, the state of consciousness experienced in deeply involved enjoyable activities, requires focused attention. Multitasking and divided attention can be used for some activities, but there can be only one activity in which we can be totally engaged. That is how limited the humans capabilities are (Baars, 1997).

2.1.5 Distractions for flow

In the other hand, attention is a vulnerable process. Distractions come in different forms for Web users. Informants mentioned environmental distractions such as loud noise, people talking or a ringing telephone; physiological distractions such as hunger, fatigue or a need to use the toilet; and computer-related distractions such as software error messages, a broken Internet connection, or a browser that stops responding (Pace, 2003).

Web users tend to ignore minor distractions during a flow experience because their attention is focused on the task at hand. But a distraction that has sufficient intensity, frequency or importance to cause a shift in the user's attention will terminate a flow experience.

Interface elements that can distract a Web user's attention from the task at hand. Pace (2003) points out the following:

1. Lengthy response times
2. Disorganized content
3. Inconsistent navigation cues

4.Cluttered page layout
5.Inappropriate use of color
6.Broken links
7.Ambiguous link labels
8.Pop-up advertisements

Irrelevant factors that disappear from a Web user's consciousness during flow
1.Physical surroundings
2.Interactions with other people
3.Usual worries and concerns
4.Physical needs
5.Navigation path
6.Original reason for using the Web

Also, poor internet usability may work as a serious distraction in the flow process. A user's focus should be on the content of an interactive product, not on format or navigation. An interface should allow users to concentrate on the task at hand, not remind them that they're working on a computer. Designers shouldn't just package information, they should give users a way to get at it.

Nielsen (2008) mentions that applications are not about features but how people interact with them. Several applications explicitly targeted emotional design that puts users at ease and projects a sense of playfulness. If playfulness is not reached, the users might feel frustrated and face distractions for experiencing flow. Also Agarwal and her colleague in research Karahanna (2000) point in their study on information technology use that playfulness has a positive effect on cognitive absorption with an information technology.

2.1.6 Flow in online environments

Flow in online environments has been studied during the past years, but not in dynamic Web 2.0 applications that support social interactions and participatory design methods. The aim of this research is to understand the flow in static web (as the studies pointed out in chapter 2.1.2) and test the model in a hybrid ecosystem and evaluate if flow could be the trigger for users to participate in the design process.

In a quantitative modeling framework Novak and Hoffman (1999) developed a structural model that embodies the components of what makes for a compelling online experience. They used data collected from a Web-based consumer survey to measure these constructs. The focus was on online marketing and to understand what factors are important in order to experience flow (maximize the online experience) that in the other hand would lead to better results in sales and marketing. The consumer navigation of the web was examined.

Novak and Hoffman are one of the leaders in studying flow in web and in 1999 they conducted a research to the test their conceptual model introduced in 1996 (Novak and Hoffman, 1996). The model has been specifically formulated to represent the general customer experience in interactive online environments, with special attention to the commercial Web environment.

Novak and Hoffman (1999) studied 9 factors of flow in online experience (the direct and indirect influences on flow and finally the consequences of flow). They formulated the following hypotheses, including the direct influences on flow:

1. Greater skill at using the Web and greater perceived control during the Web interaction corresponds to greater flow while using the Web (H1)
2. Greater challenge and arousal correspond to greater flow (H2)
3. Greater telepresence and time distortion correspond to greater flow (H3)

Indirect influences of flow:

4. Greater focused attention corresponds to greater flow, telepresence and time distortion (H4)
5. Greater importance corresponds to greater focused attention (H5)
6. Greater speed of interaction corresponds to greater focused attention, telepresence and time distortion, and flow (H6)
7. The longer the respondent has been using the Web, the greater the skill and control (H7)

Consequences of flow:

8. Greater flow corresponds to greater exploratory behavior (H8)
9. Greater flow corresponds to greater positive affect (H9)

This model compared to Pace's (2003) model is very much similar. Both of them state that telepresence and time distortion are one of the key elements in evaluating flow. Also, we see that both studies show focused attention and the reduced awareness of surroundings is important in flow.

Hoffman and Novak conducted an online survey to evaluate flow and the results were formed as a structural model (figure 3).

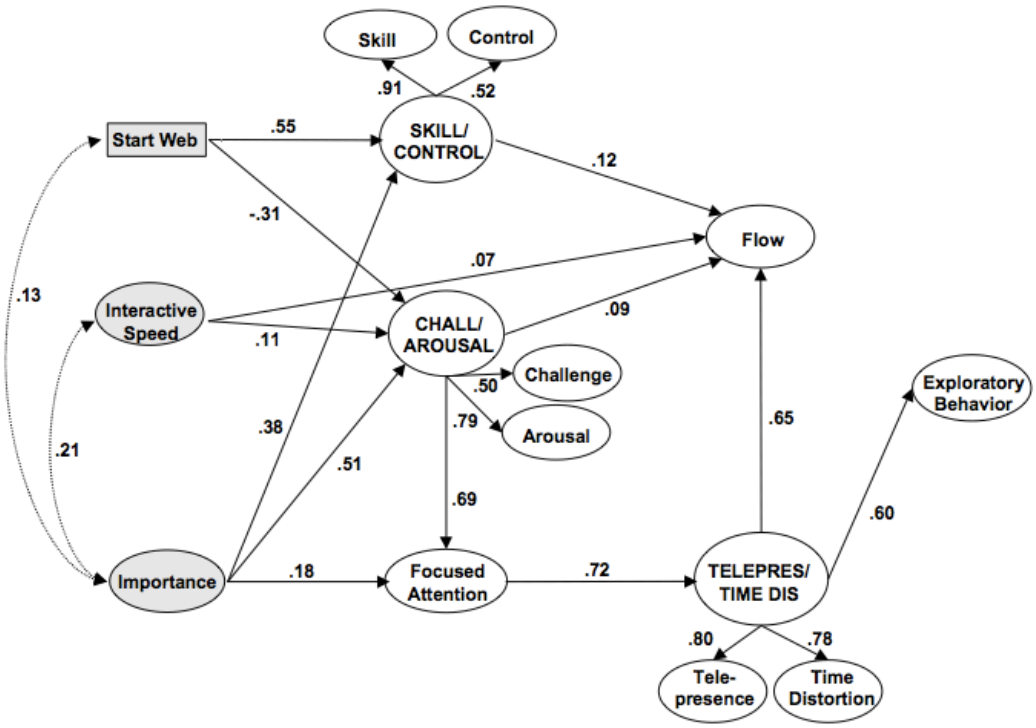

Figure 3. Hoffman and Novak's structural model of flow in interactive online environments (Hoffman and Novak, 1999)

The direct paths to flow from skill (H1), challenge (H2), and telepresence (H3) are positive and significant. However, there was no support for the hypothesis that greater focused attention corresponds directly to greater flow (H4), although focused attention was found to correspond to greater telepresence and time distortion (H4), thereby influencing flow indirectly through these variables. Interactive speed exerts a direct positive influence on flow (H6), but greater speed did not correspond to greater focused attention or telepresence and time distortion (H6). Greater importance was positively associated with greater focused attention (H5), and the longer the respondent had been using the Web,

the greater her skill and control in the Web environment (H7). Greater speed is actually in correlation with the ease-of-use of an information technology and the intuitivity of the interface (Agarwal et al., 2000). If the interface is intuitive, the tasks are easier to complete and flow has a greater chance to emerge.

For example, Novak and Hoffman's (1999) research results suggest that the Web site design must provide for enough challenge to arouse the consumer, but not so much that she becomes frustrated navigating through the site and logs off. Unexpectedly, greater challenge corresponded to greater focused attention online. This means that engaging consumers online will arise in part from providing them with excitement. Conversely, if the site does not provide enough challenges for action, potential customers will quickly become bored and log off. Huang (2003) argues that interactivity is one of the key factors for flow in online environments. Instant feedback supports interactivity (comments in a blog for example) and engagement and there is a better chance for flow.

Novak and Hoffman (1999) conceptualize flow on the Web as a cognitive state experienced during navigation that is determined by:

- high levels of skill and control
- high levels of challenge and arousal
- focused attention
- enhanced by interactivity and telepresence.

2.1.7 Flow in games

Games are designed for experiencing positivity and for entertainment. A good game must be interesting, attractive to the player and support the player to experience flow. And by games we not always mean adventure games with great graphics and movie effects. Voiskounsky and his associates (2004) studied experiencing flow in while playing online games, especially MUDs. MUDs (Multi-User Dungeon, or Multi-User Dimension) are text-only virtual environments, usually in a form of an adventure game; the latter is either original, or is based on fantasy books or movies.

Virtual worlds possess a number of unique features that make them a particularly compelling environment for the study of flow. Hoffman and Novak (Hoffman and Novak,

2007) note that as compared to visits to Web sites and online stores, flow will occur with much greater regularity, predictability, intensity, and for extended duration in virtual worlds.

McKenna and Lee (1995) have shown that MUDding fits the flow model, and that social interaction while playing MUDs is inseparable from the flow experience. It may be also noted that the highest level of involvement into MUDding is reported to take place at the moments when the gaming environment is not too simple but not too complex (Voiskounsky et al, 2004).

In the research, Voiskounsky et al. (2004) used the traditional method of handling survey data, i.e. factor analysis. Thus, the research is entirely quantitative - no qualitative data has been collected and/or analyzed. There was a 2-month long online survey held in spring 2003. The replies of 347 respondents were handled using exploratory and confirmatory factor analysis. 6 factors were mentioned: 1) flow, 2) achievement, 3) activity / passivity, 4) interaction, 5) thoughtfulness / spontaneity, 6) cognition.

The results of the research shot that flow experienced while playing MUDs is positively correlated with achievements (according to the correlation between factors flow and achievement). Also, the general statement saying that flow experience depends on the matching of the task challenges and the available skills, seems to get confirmation.

The correlation between factors 1 and 3 identify that players experience flow when they are sufficiently active, but not too active. As Hoffman and Novak (1999) explain in their model, if the application does not provide enough challenges for action, potential customers will quickly become bored.

The correlation between flow and interaction assumes that interactivity plays a huge role in experiencing flow while MUDding. Computer-mediated dialogic communications are specific for MUD environments; players even admit they often lose the sense of time while communicating. This type of interaction seems to be effective in initiating flow experience. Again, as the correlation is not that high, it shows that there can not be too much communication or vice versa, too few communication.

Flow might accompany mainly thoughtful behavior of gamers (according to the correlation between flow and thoughtfulness / spontaneity). Thus, flow is likely to occur when MUDders repeatedly play with the same characters and in the same situations, and

allocate long enough time periods weekly to playing. It might be concluded that players preferring familiar routes and ways and doing it on a regular basis might experience flow. As Csikszentmihalyi (1990) mentioned, flow is more likely experienced while doing activities we have done before. We know what do expect and feel comfortable while doing it.

The correlation between flow and cognition shot that flow experience is likely to occur when MUDders feel themselves interested and inquiring, when their cognitive motivation is initiated. The same issue was mentioned also by Pace (2004) and Novak and Hoffman (1999) - flow is occurred during motivational activities.

The dimensions describing flow patterns of typical Web shoppers, gamers, information seekers, chatters, and/or those interested in entertainments might slightly differ. Although at the positive pole of the flow factor, there are the following points: loss of the sense of time; attention is directed solely on the game; inspiration is felt; nothing distracts from the game; playing sessions last longer than planned; real-life and within-game situations are mixed and the latter situations acquire the status of reality; strain and tension are constantly experienced; when interactions with other players take place, time flies very slow (Voiskounsky et al, 2004).

Chen (2007) finds in his research the following conditions for experiencing flow in games

- As a premise, the game is intrinsically rewarding, and the player is up to play the game.
- The game offers right amount of challenges to match with the player's ability, which allows him/her to delve deeply into the game.
- The player needs to feel a sense of personal control over the game activity.

We see that games are the environments we can evaluate flow the easiest. Games in general are designed to amuse the users. According to that they often feel telepresence and time distortion. I have the experience on my own as well. If I used to play computer games, I often felt being inside the game. The time flew and the game totally controlled me - I often felt like I could not stop playing, because I had to explore the new levels and continue this game experience.

2.1.8 Flow in web design

Design for flow means designing enjoyable interfaces that deeply involved the users. For both, physical and interactive products, this means reducing or eliminating both external (i.e., environmental) and internal (i.e., pain, discomfort, anxiety) distractions that cause emotional responses like frustration or physical discomfort. Emotions demand and divert the user's attention. Providing immediate feedback for all user actions helps to reduce user anxiety. The effective use of layout, information design, typography, interaction design and information architecture all help in balancing the perception of challenge against the user's skill level. Information should be broken down into manageable "chunks" that don't overwhelm users cognitive faculties.

Gorp (2008) points the basic website design principles that will help to encourage flow:

- **clear navigation:** make it easy for the user to know where they are, where they can go, and where they've been, by including signposts such as breadcrumbs, effective page titles, and visited link indicators. Pace (2003) mentioned that focused attention is a vulnerable process and clear navigation is one way not to distract the user.
- **immediate feedback:** the designer has to make sure all navigation, such as links, buttons, and menus provide quick and effective feedback. Feedback should be offered for all user actions. When this isn't possible, there might be an indicator to hold the user's attention while waiting (e.g., progress bar). Otherwise people will get bored and will log off (Novak and Hoffman, 1999)

- **the perception of challenge with the user's skills should be balanced:** Since user skill levels differ, the complexity of the visual design with the number of tasks and features people can use should be balanced. It is important to know whether they are likely surfing experientially for fun or completing an important task. The website should be designed according to the audience's scenario of use: more visually rich for experiential use and less so for goal-directed use.

Design for web is relatively important, especially for e-commerce sites (Novak and Hoffman, 1997) and the designers should consider these aspects to support high user experience. While already flow, the users spend more time on the website and take part in the activities (like commenting, sharing the information with friend etc).

2.2 Ambient intelligence

As the technology's focus is moving away from computer as such more to the user, the way people interact with themselves and objects around them. The reason for that is the fact that we need to make the communication and computer system simple, just like transparent to the end user. The user should not feel the control of computers in the process of communicating, using the system has to be simple and native.

In its 1999 vision statement, the European Union's Information Society Technologies Program Advisory Group (ISTAG) used the term "ambient intelligence" in a similar fashion to describe a vision where "people will be surrounded by intelligent and intuitive interfaces embedded in everyday objects around us and an environment recognizing and responding to the presence of individuals in an invisible way" (Ahola, 2001).

The merging of computer and control science, electronics engineering and tele-communications allows presenting a new vision: Ambient Intelligence (AmI). The vision of AmI places the user at the centre of the technology focus: computers move to the background and intelligent, ambient interfaces to the foreground (Riva, 2005). The basic idea behind AmI is that by enriching an environment with technology (mainly sensors and devices interconnected through a network), a system can be built to take decisions to benefit the users of that environment based on real-time information gathered and historical data accumulated (Augusto, 2007).

Manovich (2008) notices that the distinction between a "representation" (or a "media format") and an "interface or tool" corresponds to the two fundamental components of all modern software: data structures and algorithms. Each tool offered by a media authoring or media access application is essentially an algorithm that either processes in some way data in particular format or generates new data in this format. Also, the hybrids may aim to provide new ways of navigation and working with existing media formats – in other words, i.e. new interfaces and tools.

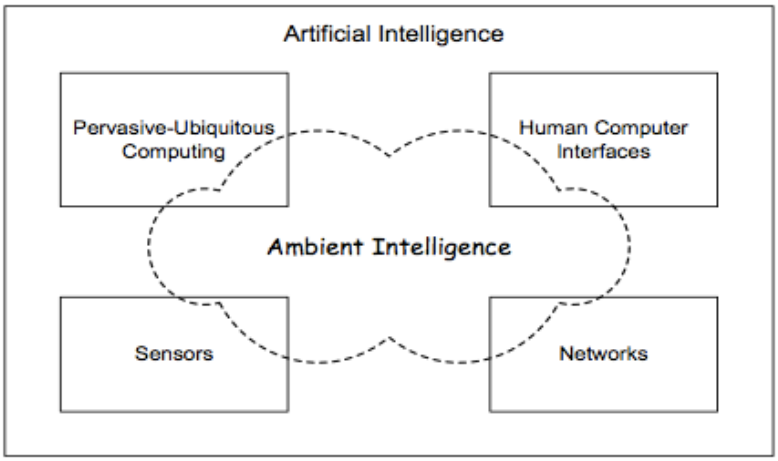

Figure 3. AmI in relationship with other areas in computer science (Augusto, 2007).

Riva (2005) argues that in the acceptance of the AmI approach, psycho-social guidelines have a critical role. According to that a psychological framework (centered on three concepts: *action, situation* and *presence*) for the ambient intelligence is introduced:

- *Any activity* is driven by a specific objective and it is structured in two different but strictly intertwined levels - *actions* and *operations* - each characterized by specific motives - *goals* and *conditions.*

- *The situation* is the physical, social and cultural space (context) in which the activity is carried out. Activity is influenced by the affordances and constrains the subject perceives within the situation. Vyas et al (2007) states affordance is not a property of an environment but it is better thought of as the common ground between the user and his environment. Users actively participate in the interaction with the environment. They might be carrying out different activities with what the environment affords. During the user-technology interaction, users actively interpret the situation and make sense of the technology while being involved in certain activities. Users' active interpretation' is central to the emergence of affordance that is socially and culturally determined.

- *The feeling of presence* provides to the subject a feedback about the status of its activity: the subject perceives any variation in the feeling of presence and tunes its activity accordingly. Specifically, the subject tries to overcome any breakdown in its activity and searches for engaging and rewarding activities (optimal experiences, flow).

2.2.1 Activity theory and ambient intelligence

Activity theory (Albrechtsen et al, 2001) perceives the relation between human and environment as dynamic, makes us focus on biological, historical and individual development. Activity theoretical human-computer interaction (HCI) has come to focus on:

- Analysis and design for a particular work practice with concern for qualifications, work environment, division of work, etc.
- Analysis and design with focus on actual use and the complexity of multi-user activity. In particular the notion of the artifact as mediator of human activity is essential.
- Focus on the development of expertise and of use in general.
- Active user participation in design and focus on use as part of design.

Riva (2005) gives AmI a psychological definition based on the experience of the user: *AmI is the effective and transparent support to the activity of the subject/s through the use of information and communication technologies.* It considers the activity of the subject as the main object of analysis. Ryder (1998) defines activity as the engagement of a subject (actor) toward a certain goal (objective). The activity is always mediated by physical and social tools (artefacts).

Activity theoretical HCI has insisted on understanding actual interaction, actual artefacts in use, not in isolation (Albrechtsen et al, 2001). Gibson (1986), in contrast, notes that we perceive objects, though when we look at objects we perceive their affordances, not their qualities. As a quality criterion, activity theory insists that the artefact should not impose itself on the user in use. Yet the user cannot achieve the particular goals without the artefact, and in this sense the artefact is an important part of shaping use. As the activity is mediated by artefacts, the interaction through artefact may stop and cause breakdowns. A well-designed artefact, activity theory insists, supports recovery from such breakdowns. Simultaneously, such breakdowns are openings for learning (learning in terms of reconceptualising the meaning of the artefact, for example).

Riva (2005) states 12 characteristics for designing AmI environments. The ones connected with activity are:

1. The AmI system has to identify the specific tools that mediate the activity of the if it wants to support the action of the user effectively.
2. An effective AmI system has to identify the specific objective of the user.

3. An effective AmI system is able to decompose the activity of the user in its different components: the system has to identify the start and the end of each level and sublevel of the activity of the subject to support them.
4. The lower is the level of activity, the easier is for the AmI system to support it: the object of an activity is wider and less targeted than the goal of an action.
5. To be effective, an AmI system has to induce breakdowns in the activity flow only to correct/improve its process: when the AmI system requires the attention of the subject, it produces a breakdown in the activity flow. So, the only value of breakdowns in the activity flow is to correct and/or improve it.
6. The more the AmI system is transparent to the user, the more is its efficacy: when an AmI system is transparent to the activity of the user, it complements and supports the user abilities improving the efficacy of the activity.

The consciousness of the conditions of a given tool is what distinguishes actions and operations. For example the first time the user drive a car, attention must be paid for all the actions: which pedals to shift, when to change the gear etc. When the activity becomes well practiced, actions do not have to be planned anymore - there is no effort on the action itself. The tool needs to become transparent.

2.2.2 Situations and ambient intelligence

The situative perspective shifts the focus of analysis from individual activity to larger systems that include behaving subjects interacting with each other and with other subsystems in the environment. Any activity is connected to the particular setting in which the subject acts. Its course is influenced by the physical, social and cultural space (context) in which it happens (situation). In particular, it depends on the natural and contextual characteristics (*affordances* and *constrains)* of the situation.

Barab (2006) introduces affordance networks that are dynamic sociocultural configurations that take on particular shape as a result of material, social, political, economic, cultural, historical, and even personal factors but always in relation to particular functions. Gibson (1986) introduced the concept of effectivities as complementing affordances. If an affordance is a possibility for action by an individual, an effectivity is the dynamic actualization of an affordance. Functionally defined, an effectivity set constitutes those behaviors that an individual can in fact produce so as to realize and even generate

affordance networks. When an individual has a particular effectivity set, he/she is more likely to perceive and interact with the world in certain ways. An intentionally bound system is not simply defined by the environment or the individual but emerges through the dynamic transaction that couples effectivity sets with affordance networks.

Riva (2005) describes the following guidelines for developing AmI:

7. An effective AmI system is able to identify the characteristics (affordances and constrains) of the situation in which happens the activity of the user: if an AmI system does not recognize the characteristics of the situation, it will be not able to support the activity effectively.
8. An effective AmI system is able to make the characteristics of a given situation visible to the user: affordances are the actionable properties between the world and an actor. If the affordances have been made visible, this may improve the activity.

Each social system is characterized by regular patterns of activity. These patterns, in which individuals participate, are characterized as practices of the community and are created over time by the sustained pursuit of a shared enterprise. A community of practice supports a shared activity when it generates ways of doing and approaching the used tools that are shared to some significant extent among members (Wenger, 1998). Communities of practice have an important role in guiding the activity of the members of a community:

9. An effective AmI system has to recognize the characteristics of the communities of practices in which the user is in.
10. An effective AmI system is able to support the development of the communities of practices: An AmI system may support communities of practice by recognizing the work of sustaining them, by giving members the time to participate in shared activities.

Csikszentmihalyi (1990) argued that the culture reduces the anxiety in the community and defines the rules that will lead the members of the community to experience flow. If the number of choices has been narrowed, people feel free and are will easily find flow in their activities.

2.2.3 Presence and ambient intelligence

How does the subject control the status of his activity? One way to answer this question is to use the concept of presence. Riva (2005) defines presence as “evolved neuropsychological process whose goal is the control of the activity of the subject”.

- Presence has a simple but critical role in our everyday experience: the control of agency through the unconscious separation of “internal” and “external”, also in the social and cultural space.
- The presence-as-process (the neuropsychological process) is the continuous unconscious activity of the brain in separating “internal” and “external” within different kinds of signals. It’s transparent to the self, but needed for its existence.
- The presence-as-feeling is experienced indirectly by the self through the characteristics of action and experience. In fact the self perceives directly only the variations in the level of presence-as-feeling: breakdowns and optimal experiences.

Riva (2005) argues that flow or optimal experience is the result of the link between the highest level of presence-as-feeling, with a positive emotional state. The feeling of presence is not the same in all the situations but can be different in relation to the characteristic of the social and cultural space the subject is in. There are some situations in real life in which the activity is characterized by a higher level of presence. In these situations the user experiences a full sense of control and it it’s associated to a positive emotional state, it can create an optimal experience (flow).

So, how does the subject control the status of his activity? It is the feeling or presence that provides to the self a feedback about the status of its activity. Specifically, the self tries to overcome any breakdown in its activity and searches for engaging and rewarding activities (optimal experiences):

11. An effective AmI system is able to induce a feeling of presence in the activity it is supporting: the less is the level of presence-as-feeling, the more are the breakdowns, the less is the quality of experience and the transparency of the AmI system.
12. An effective AmI system is able to make the subject aware of the meaning of the activity it is supporting: The subject experiences a full feeling of presence only understanding the meaning of the activity he/she is involved in. As Novak and his companions (1999) showed, people will experience flow if they are focused on the activity and feel the involvement.

2.3 Cultures of participation

The fast rise of digital media has given new powers to individual. There are new, unexplored opportunities for groups and communities. The networks provide the citizens with the means to become co-creators of new ideas, knowledge and products.

The Web 1.0 model primarily supports web page publishing and e-commerce, whereas the Web 2.0 (O'Reilly, 2005) model is focused on collaborative design environments, social media, and social networks creating the spaces for new cultures that allow people to participate and collaborate rather than being a passive consumer. What the personal computer has done to the individual, the internet has done the community (Fischer, 2009).

The need for end-user development is not a luxury but a necessity: computational systems modeling some particular "world" are never complete; they must evolve over time because (1) the world changes and new requirements emerge; and (2) skilled domain professionals change their work practices over time— their understanding and use of a system will be very different after a month and certainly after several years. If systems cannot be modified to support new practices, users will be locked into existing patterns of use.

Fischer (2009) points that end-user programming (EUP), end-user software engineering (EUSE), end-user development (EUD), meta-design, and cultures of participation are related with each other but emphasize different research directions and challenges.

Framework	Objectives
End-user programming (EUP)	Empower and support end-users to program (with techniques such as: programming by demonstration, visual programming, scripting languages, and domain-specific languages)
End-use software engineering (EUSE)	Add to EUP support for systematic and disciplined activities for the whole software lifecycle (including: reliability, efficiency, usability, version control)

Framework	Objectives
End-user development (EUD)	Focus on a broader set of developments (e.g., creating 3D models with SketchUp, modifying games); it puts end-users as owners of problems in charge and makes them independent of high-tech scribes
Meta-design	Define a framework and a design methodology to explicitly “design for designers” by defining contexts that allow end-users to create content; applicable to different contexts and encompasses principles that may apply to programming, software engineering, architecture, urban planning, education, interactive arts, and other design fields
Cultures of participation	Foster a culture (supported by meta-design) in which people have the opportunity to actively participate in personally meaningful problems in ways and at levels that they are motivated to do so.

Table 2. Design methods defined by Fischer (2002)

The development of the web means shifting from consumer cultures to cultures of participation (Fischer, 2002). The Web 2.0 world has attracted a very large number of contributors and created a number of success models (including open source software, Wikipedia, Second Life, YouTube, and 3D Warehouse, to name just a few) by breaking down the boundaries between producers and consumers. As also Manovich (2008) states, since the computer became a comfortable home for a large number of simulated and new media, it is only logical to expect that they would start creating hybrids. The media is changing and according to that the ways we can manipulate with it. No programming skills are required in order to create websites, mashups and hybrids. The new media supports combining them together and allows the meta-designers to act freely.

Meta-design is grounded in the basic assumption that future uses and problems cannot be completely anticipated at design time, when a system is developed. At use time, users start to look for new features and new ways for the system use. This can happen for two reasons: (1) users’ needs change and the original functionality does not support their

needs; or (2) users gain knowledge and move to the next level - they become heavy-users. One of the key arguments to add here is to study, how flow can encourage the users to participate in the design process.

The seeding, evolutionary growth and reseeding (SER) model (Fischer, 2002) is the model in support of meta-design. A seed is something that has the potential to change and grow. In socio-technical environments, seeds need to be designed and created for the technical as well as the social component of the environment (Fischer, 2009).

Instead of creating complete systems at design time, the SER model supports building *seeds* that can evolve over time through small contributions of a large number of people (being the defining characteristics of a culture of participation). The systems that evolve over a sustained time span must continually alternate between periods of planned activity (the seeding phase), unplanned evolution (the evolutionary growth phase), and periods of deliberate (re)structuring and enhancement (the reseeding phase).

The meta-designers use their own creativity to create socio-technical environments in which other people can be creative. The main activity of meta-designers shifts from determining the meaning, functionality, and content of a system to encouraging and supporting end-users acting as designers to engage in these activities.

2.3.1 The ecology of participation

Flow supports the ecology of participation as the participants are in a need for better design. Better in a way that it would match their personal skills and support the functionality they look for.

Cultures of participation requires contributors with diverse backgrounds and who value different ways of participating. Many collaborative design environments support only content management (participants can share their own materials), while other environments have the functionality for rating, tagging and also improving. Fischer (Fischer, 2009) notes 4 different levels of participation: (1) consumers; (2) contributors; (3) collaborators; (4) meta-designers.

The level defines the complexity of the tasks and the users role in the community and how much they have to learn for increasing their level. The development of the user depends on his needs and skills toward the environment.

The possibility for culture of participation depends on political, economical and social factors (Fischer, 2007). Meta-design relies on the motivation for participation and it has the potential to influence this by providing contributors with the sense and experience of joint creativity, by giving them a sense of common purpose and mutual support in achieving it (Fischer, 2009). Meta-design supports users who can redesign the original content and functionality. By that, the control is distributed among all the participants. The shared control will lead to more innovation, is said.

Meta-design is most successful if participants have been involved already from the very beginning of the design process. It’s the question of ownership - users feel they are part of the design.

3 Methodology

3.1 The evaluation of flow

There are several methods to study the flow experience. Interviews with the participants and questionnaires are most widely used, because flow in a sense depends much on individuals and the culture. Although, automatic data collecting is possible and supported by the experience sampling method. Nowadays collecting the data is made easier as we can use the people's mobile devices for data collecting. This mobile data collecting is important as it provides immediate feedback right here and right now - all the data and emotions collected represent the true experience of the moment.

3.1.1 Interviews and questionnaires

The qualitative research on flow includes interviews with the participants. Pace (2003) in his grounded theory of the flow experiences of Web users used semi-structured in-depth interviews, in which respondents were asked to discuss their flow experiences when using the Web in the context of information-seeking activities, categories in the data were identified and systematically coded, and relationships among these categories determined.

Novak and Hoffman (1999) conducted an online survey to study the following characteristics of flow. In that the following flow elements were asked from the people:

- **Focused attention**
  - my attention is not focused / my attention is focused (the participant was asked to rate this characteristic on a scale)
  - I concentrate fully / I do not concentrate fully
- **Involvement**
  - important / unimportant
  - irrelevant / relevant
  - means a lot to me / means nothing to me
  - matters to me / doesn't matter
  - of no concern / of concern to me
- **Playfulness**

    - I feel creative when I use the Web.
    - I feel playful when I use the Web.
    - I feel spontaneous when I use the Web.
- **Positive effect**
    - happy / unhappy
    - annoyed / pleased
    - satisfied / unsatisfied
    - melancholic /contented
- **Skill**
    - I am extremely skilled at using the Web
    - I know somewhat less about using the Web than most users.
    - I know how to find what I am looking for on the Web.
- **Telepresence**
    - I forget about my immediate surroundings when I use the Web.
    - Using the Web often makes me forget where I am.
    - After using the Web, I feel like I come back to the "real world" after a journey.
    - Using the Web creates a new world for me, and this world suddenly disappears when I stop browsing.
    - When I use the Web, I feel I am in a world created by the Web sites I visit.
- **Time distortion**
    - Time seems to go by very quickly when I use the Web.
    - When I use the Web, I tend to lose track of time.

Also, the questions were asked:

- Do you think you have ever experienced flow on the Web?
- In general, how frequently would you say you have experienced "flow" when you use the Web?

Online questionnaires ideally suite for investigating larger groups.

3.1.2 Experience sampling method

Experience sampling method introduced by Csikszentmihalyi (1983) asks participants to stop at certain times and take notes of their experience in real time. The point is to record the feelings and emotions during the activities. Fischer J. (2009) points out that there is

software that can run on hand-held devices (mobile phones) and collect periodic data about the persons feedback on the activities they are doing at the moment. The program at a random time moment asks questions about the persons emotions. This is the most accurate way to evaluate someones flow experience.

The methods recommended by Fischer J. (2009):

- The experience-sampling program version 2.0 (*ESP*) has been reported as a early as 1999 and is still widely used. It is a software package that contains a native application to trigger and run the ESM questionnaires on the PDA Palm Pilot, and a desktop application for Windows or Linux to create the logic for the timing of the prompts and the content and structure of the questionnaires in a browser-based application and to facilitate deploying the studies to the PDAs.

- *MyExperience* is open-source software that runs on devices with Windows Mobile. In addition to explicit data from questionnaires, it can be configured to collect sensor data collected with the device (e.g. GSM cells, GPS positions) alongside with user activity on the device.

3.2 The experiment

The participatory design experiment was organized as a university course “Narrative Ecology” targeted for master students of Interactive Media and Knowledge Environments in Tallinn University. The course aimed to give learners an experience of the design-based research and competences in initiating and planning various kinds of experiments in the city space.

The environment in which the experiment took place, can be called hybrid ecosystem. Pata (2009) summarizes participatory media environments together with geographical locations that can be conceptualized as a hybrid ecosystem, provided that participants of social media have ecological dependence of the particular set of tools that they use as their niche for taking action. Niches are particular abstract spaces for taking community specific actions, holding and recreating community meanings. Niches contain meaningful

community places. Niche in our context is community-specific and community-determined, it is an optimally meaningful region for the community (Kaipainen & Pata, 2010).

Crabtree et al. (2007) defines hybrid ecologies that combine and exploit the affordances of mixed reality and ubiquitous computing environments to extend the purchase of computing across multiple environments, physical and digital. Throughout the history of design, and across its variations, hybrid spaces have been treated as a special class of space with unique qualities or affordances that promote and support collaboration. For example:

- Media spaces **link** physical spaces through digital mediums.
- Mixed reality environments **fuse** physical and digital environments.
- Ubiquitous computing environments **embed** the digital into physical environments.
- Hybrid ecologies **merge** multiple environments, physical and digital.

The design experiment conducted during the “Ecology of Narratives” course (the hybrid environment) consisted of status and location sharing application Brightkite, photo sharing site Flickr, social networking site Facebook, Twitter and personal Wordpress blogs that represented the participants individual narratives.

The data was pulled with RSS feeds and combined on the course website and on the participants stories. Also, there was a tag “narrativeecology” widely used. Using this tag, mashups of collected content could be pulled together and monitored by the participants and participants from outside the community. Each of these social tools enabled alternatively to arrange a set of friends that could be monitored.

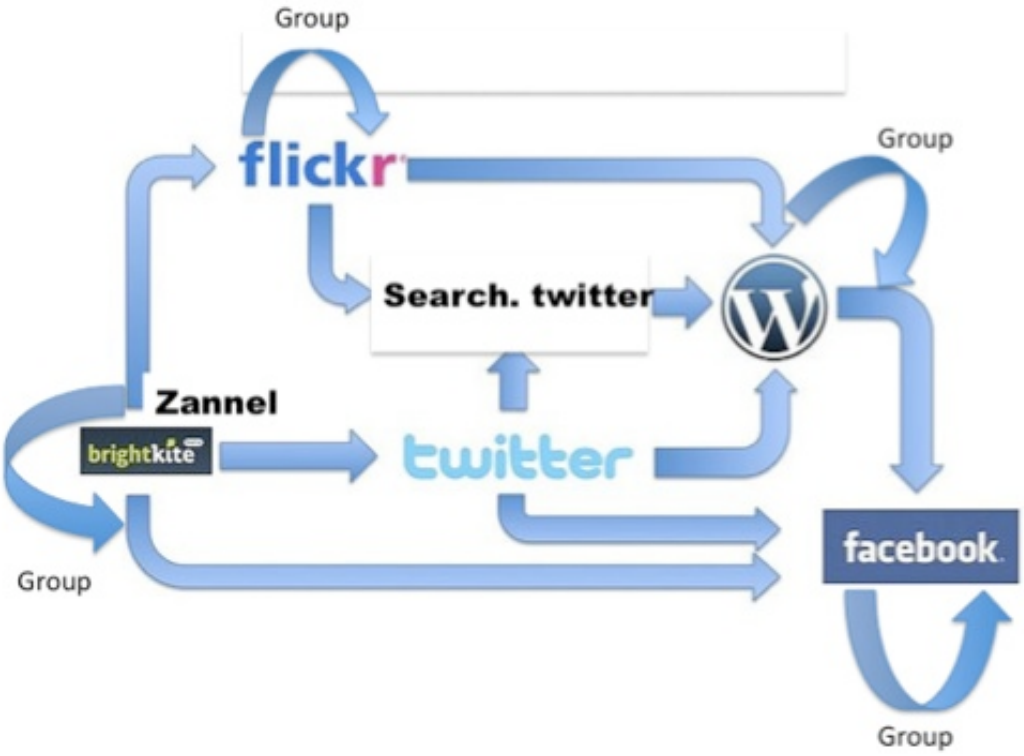

Figure 4. The environment for the experiment from the "Ecology of Narratives" wikipage http://beta.wikiversity.org/wiki/Narrative_ecologies

3.2.1 The participants

The "Narrative Ecology" master course was organized two times in Tallinn University in Spring 2009. The first time, there was a group of students from Estonia with various backgrounds from interactive media, art and semiotics and two supervisors. In total there was a group of 13 individuals participating in this experiment about ecosystem of narratives. The first lecture was held at the university and after that a 1,5 month long collaborative storytelling took place. The aim of the course was to study how the storytelling might work in social media environments. The course's website was used as the central repository of the stories: http://ecologyofnarratives.wordpress.com/

The second time, the course had the same point. Still, it was very intensive and lasted only 1 week. Participants of that course were 15 international students visiting Estonia as part of their studies, and 5 local master students of Interactive Media and Knowledge Environments program. The course website with the posts by its participants: http://hybridnarrativeecosystem.wordpress.com/ .

In a sense the second course was also different - the participants used only this joint blog to post their stories and follow the stories of others. As the second time the course was held for a very short time, the data from the second course did not have the same quality as from the first course.

3.3 Data collecting

In this research the author used qualitative research methods. The hybrid environments and its contents has been analyzed. According to the research questions, the following activity patterns and samples were inspected:

- how people used the hybrid environments and technologies
- what were the popular trends the participants discussed and why
- how often were they active during these experiments
- how people collaborated during these experiments
- what kind of emotions they felt, how they reflected it in their blogs and in the summary after the experiment
- why some participants felt comfortable in the hybrid environments and experienced flow
- what were the possible distractions of not feeling flow during these experiments

Analyzing this data shows possible flow sessions and we see which technologies, behaviors and topics trigger people to experience flow.

Additional to that, the author conducted structured interviews with the participants of the experiment. The following questions were asked:

- How focused you were participating in the course activities (blogging, uploading photos, commenting, following topics)?
- Did you feel involvement during the course? Did you feel like being a part of the story. What made you feel involved?
- Did you experience playfulness? Did you feel yourself flexible, creative, spontaneous during the Ecology of Narratives course?
- Was there a positive effect for you during the course? Were you happy, pleased, melancholic? Or maybe unhappy or annoyed? Why?
- How do you rate your skills? Did you understand the mashup concept of Brightkite, Twitter, Facebook, Flickr? Was it easy to use?

- Did you experience telepresence? Did you forget the surroundings? Did you experience like being in another environment while participating in the course?
- Time distortion experience? When you did use the hybrid environment, did you tend to lose track of time?
- Aware about the surroundings? Were you aware mostly about other people and emotions (like following a certain person) or following the whole ecosystem was important to you?
- Did you experience flow during the Ecology of Narratives course? Try to describe one of the flow experiences.
- Do you experience flow while you are using other social services in the web? For example do you feel flow in Facebook or Twitter? How often?
- What was your overall experience from the Ecology of Narratives project? Did you feel some overall positive feelings after the course, was there something else triggering?

The questions were formed according to the flow characteristics described by previous research (Novak and Hoffman, 1999; Pace, 2003). These factors are important to understand the possible flow experience during the design experiment and how they transformed the narratives.

3.4 Dataset collected during the study

As the course was held two times, there are separate course blogs that contain the narratives and reflections (http://ecologyofnarratives.wordpress.com/ and http://hybridnarrativeecosystem.wordpress.com/). The participants of the courses were divided into groups and all the groups reported their findings at the end of the course to the wiki. From the first course, 2 groups were formulated http://beta.wikiversity.org/wiki/Narrative_ecologies and the second time there were 5 groups of students: http://beta.wikiversity.org/wiki/Hybrid_Narrative_Ecosystem

The course blogs, personal blogs, Twitter channel and the wiki-page feedbacks supported collecting data of the “Ecology of Narratives” flow experiences.

As the outcome of the courses, there are photos on Flickr (522 in total)
http://www.flickr.com/search/?q=narrativeecology&w=all

Brightkite is a geolocation supporting application and all the photos shared from Brightkite to Flickr, have the geolocative coordinates associated with the photos (seen on the map) http://www.flickr.com/photos/tags/narrativeecology/map?&fLat=59.4325&fLon=24.7655&zl=6

As the mobile technologies are developing fast and enabling the new perspective for locative content, we could have created location-based stories during this experiment. For example if some participants start to notice some elements in the same city space and upload this to Brightkite, then a collaborative location based story will emerge. Brightkite enables us to follow the stream of a specific location and also the images on the Flickr map can be sorted according to the location.

One interesting fact here to investigate is the location driven flow experience. The author believes the location based media in combination with participatory design elements supports flow. If people choose the methods, define the tools and start following local narratives, they feel involvement and then need to participate in the narrative, comment and update the story with their own content. Still, figure 5 indicates that there were not so many narratives sticked to concrete places. It is also the question the size of the group - as there were not so many participating and also not so many people outside the group did participate. As it was a public space (the Brightkite, Twitter and Facebook) we could expect other people to participate in the narratives as well.

From the course materials, we can also follow the Brightkite feed http://brightkite.com/objects/search?q=narrativeecology and the Zannel feed (used mainly by only one participant for her personal narrative experiment) http://www.zannel.com/search.htm?query=narrativeecology

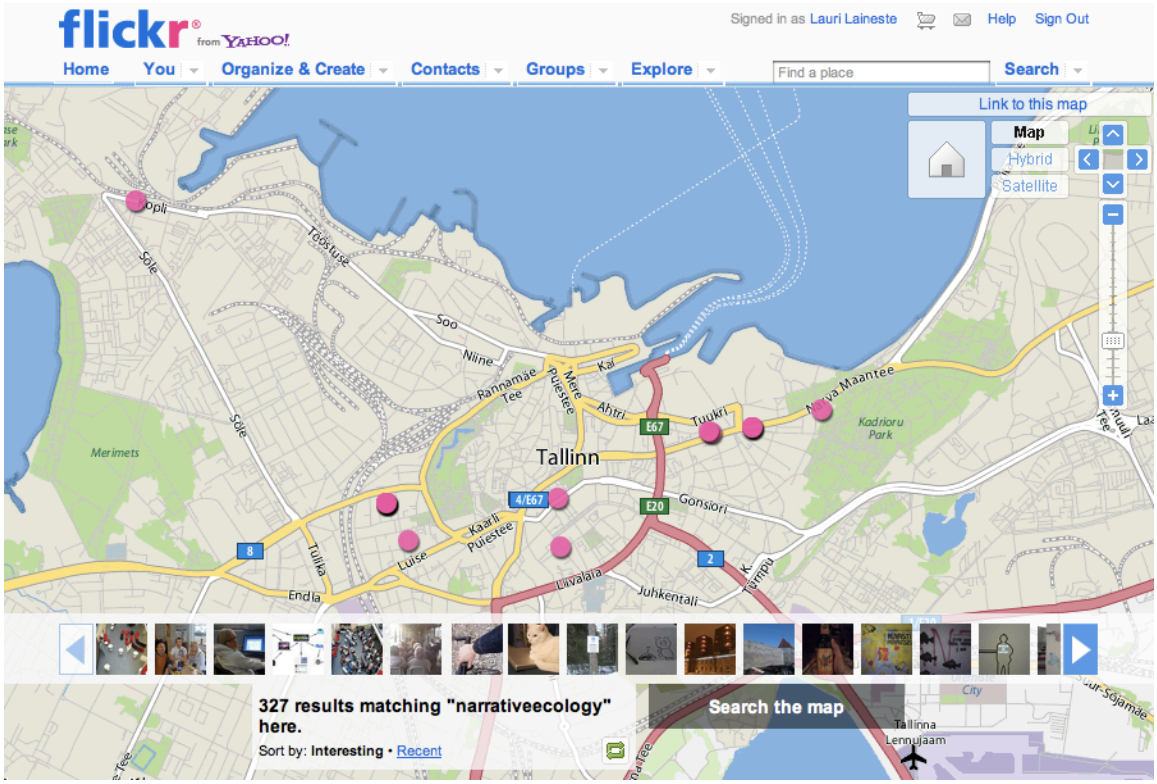

Figure 5. Flickr images tagged “narrativeecology” on the map.

4 Results and discussion

The design experiments took place in the mashup environment combined with Wordpress blogs, Brightkite, Zannel and Twitter feeds, photos on Flickr and other new media formats. At the beginning of the course it was actually not clear what should be the outcome of this project - it was about testing new ways collaborative storytelling in hybrid environment. From the flow theory's perspective, Csikszentmihalyi (1990) argued that clear rules and conditions are needed in order to experience flow and the culture in which we belong to, narrows down the options and reduces anxiety. In the other hand, the participatory design methods give the participants the freedom to take part of the design process and create the environment that personally suits him/her the best to experience flow. Also the hybrid media (Manovich, 2008) supports that the users can combine different media and play around with them with no programming skills needed.

As being a participant of this course as well, I can mention that we did start experimenting with some social media applications (Twitter, Brightkite) and during the experiment found the ways we liked the most to create our narratives. I believe in this way participatory design methods and new media help the participants to find the tools and storytelling ways that feel the most intuitive and also support their skills and interests. If the person feels comfortable within the environment, the system will become transparent for him/her and there is a greater chance for flow.

As Riva (2005) argues that the more the system is transparent to the user, the more is its efficacy: when an AmI system is transparent to the activity of the user, it complements and supports the user abilities improving the efficacy of the activity. The hybrid ecosystem must have the ability to change during participation to become transparent and intuitive. First, we faced some distractions while using the hybrid ecosystem (for example the concept of the mashup was not first well understood and some technical issues, like tagging the content, created complications), but we got used to the environment so that we could focus on the content only.

As I am thinking on that, I see all the technical, innovative features (like sharing across multiple social networks) as important feature for such ecosystem to exist. We learn not to pay attention on the questions how to share and collaborate the story with others, but it

will emerge automatically. For the participants the system itself has to become transparent.

4.1 Interviews

The author of the thesis conducted interviews with the participants of the “Ecology of Narratives” course (N = 7). The interview was about to investigate the participants experience from the course, if they experienced flow and to understand which activities and design patterns might be supporting flow. There are several aspects to study: how people start experiencing flow and what actually keeps them in the flow zone. One factor for that seems to be the community itself and the involvement in the activities. As Csikszentmihalyi (1990) mentioned, instant feedback is a key requirement for flow. Also Voiskounsky et al. (2004) proved that interactivity plays a huge role in experiencing flow. The feedback, comments and combined narratives made people feel involved in the hybrid ecosystem (Pata, 2009) and once flow already experienced, one could move into the flow channel over and over again.

Flow in the “Ecology of Narratives” course can be described in two ways:

- temporary flow - meaning that if a user sees something and immediately feels the need to take a photo of and share it via mobile on Brightkite for example. At some cases we feel triggered by the emotions and feel we need to share it.
- flow of the narratives - that could be experienced while browsing the narratives of others and combining them with other stories. Participants might feel being part of the story, they re-blog the content, create new narratives and participate in the community actively.

The questions were asked to pay attention on the following flow characteristics presented by Novak and Hoffman (1999).

Focus

6 people out of 7 reported they were very focused during the activities in the hybrid environment. They mentioned the activities on online applications and social software was very engaging and made them focus on the tasks and creating their narratives.

At the first course i was very focused and concerned to get the participant feeling in hybrid ecosystems. I was every day looking all the updated contents in blogs, microblog and flickr. I took pictures every day during my daily activities in town, sometimes i uploaded pictures with mobile phone immediately because i was interested in getting the other people to see them.

Involvement

What made people feel involved in the hybrid ecosystem, was the other participants' feedback on their narratives and the collaboration. Csikszentmihalyi (1990) said instant feedback in a key factor for supporting flow. For example if somebody's photo got a lot of comments and re-blogged by others, the owner of the content felt involvement in this narrative. 5 people out of 7 reported they felt involvement during the course activities.

When someone used my photos in their blog as interpretation of their own idea it made me feel involved, like, made me thinking other directions - new ideas came.

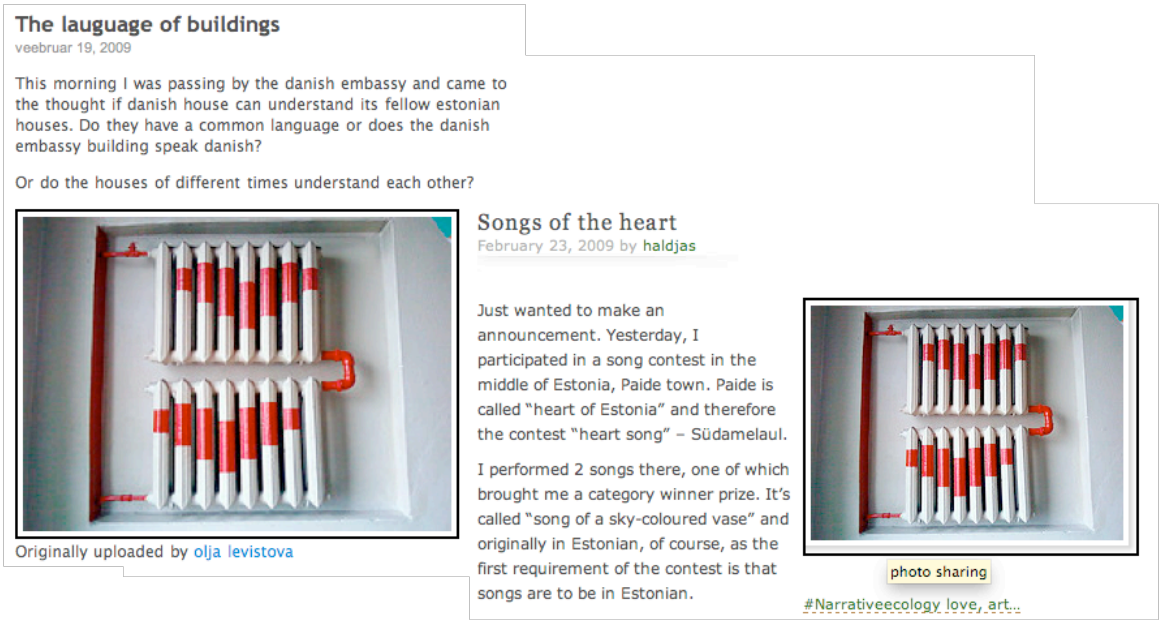

Figure 6. The photo was uploaded by one participant and then used by a second narrator in her story: http://inaudiblevoices.wordpress.com/2009/02/19/the-lauguage-of-buildings/ The photo was eventually reused by third narrator: http://haldjas.wordpress.com/2009/02/23/songs-of-the-heart/

Playfulness

The author wanted to find out if the participants felt themselves creative, flexible and spontaneous during the activities. Fischer (2009) points out that the meta-designers use their own creativity to create socio-technical environments in which they can be creative. The main activity of meta-designers shifts from determining the meaning, functionality, and content of a system to encouraging and supporting end-users acting as designers to engage in these activities. If the participants of such hybrid ecosystem have the possibilities for redesigning the functionality and participation methods, they feel playful and fulfill one criteria for experiencing flow. 4 people stated they were totally creative in participation the course.

> *Yes, there was playfulness. As I had my own particular idea, I wanted to experiment and use as much social software as I discovered and felt very creative. I was feeling flexible and spontaneous.*

Positive effect

Positive effect is one important requirement for flow. Riva (2005) argues that flow or optimal experience is the result of the link between the highest level of presence-as-feeling, with a positive emotional state. Positivity is needed to feel flow. Positive effect can be experienced if ones' skills meet the environment requirements and he/she feels control over the tasks. The interviews showed that everyone felt positivity on one or another moment. Still, 4 people said they experienced a strong positive effect.

> *I was pleased and happy when my contribution was used by other participants or when I received many comments (attention).*

Skills

Most of the people marked they had some complications at the beginning. Tagging the content and automatic sharing across social networks was not very well understood at first. Still, the participants got the knowledge and ideas to during the first days. It was seen that all the activities were not exactly the same as planned or expected, but still people found their ways in the mashup to share their stories.

We found out new network (Zannel) what also enabled to add images to the internet environment. The most important, it allowed to tag content. The thing with Brightkite was, that it did not add tags to photos. So, you had to go to Flickr and tag them separately.

> *I hadn't used such an automated system before but I developed the skills very quickly - to understand where to post things.*

Telepresence and awareness

Telepresence is one of the characteristics of flow (Novak and Hoffman, 1999). If a person is really focused on the task and feels engagement, he/she can forget about the physical surroundings, everyday problems, his/her daily routine and can only follow the narrative as such. Also, some participants felt engaged to some specific topics and became aware of them. It made them to study these narratives closer, collaborate and feel being inside of this story. On the highest level, telepresence at such cases is experienced that consequently leads to flow.

> *I experienced the real-life-presence if there is such a concept. When i noticed some dimensions i was very surprised and as if the totally new world appeared in front of my eyes (eg. colored shadows and reflections). The telepresence experience could be felt when i started to look the friends of my friends and what kind of content was mashed together at each persons personal view and how it influenced them to add some contents.*

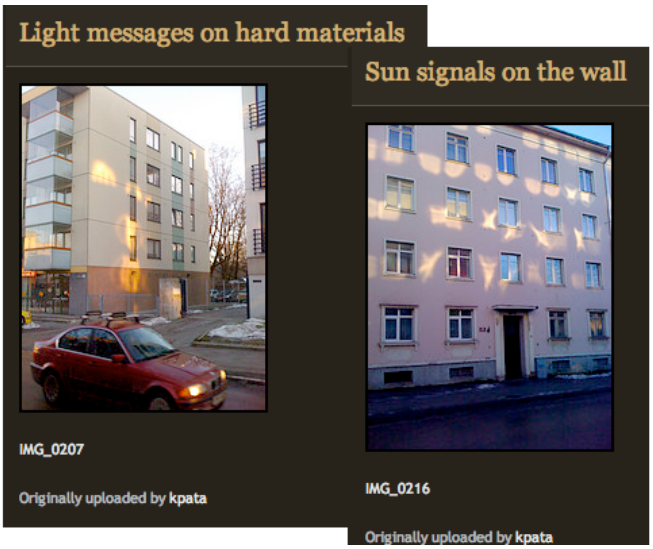

Figure 7. The reflections noticed by a narrator who experienced real-life-presence.

Time distortion

Time distortion has been described as one of the key characteristics in evaluating flow (Pace, 2003; Voiskounsky, 2004; Novak and Hoffman, 1999). The research shows that greater focus on tasks leads to greater time distortion, which in the other hands leads to greater flow experience. The participants often mark they felt lost the control over the time. It happens often in games and online activities. I have felt time distortion myself as playing some games and even finding some information on Facebook. The activities are so engaging that time flies by even without noticing it. Time distortion during the "Ecology of Narratives" course was not very clearly experienced.

Only 3 people mentioned they felt at some activities time distortion. There might be several factors for that. One is that participating in the narrative creation, actually does not require much time. If there was noticed something, it was uploaded to Brightkite and then followed by others from Twitter or the course blog. In a way, the narratives started to live their own lives and emerge automatically. People didn't have to spend a lot of time mixing the stories together. The hybrid ecosystem itself made the stories to roll.

Flow

I also asked the participants if they felt flow according to the flow description I presented them:

> *The word "flow" is used to describe a state of mind sometimes experienced by people who are deeply involved in some activity. One example of flow is the case where a professional athlete is playing exceptionally well and achieves a state of mind where nothing else matters but the game; they are completely and totally immersed in it. The experience is not exclusive to athletics - many people report this state of mind when playing games, engaging in hobbies, or working. Activities that lead to flow completely captivate a person for some period of time. When in flow, time may seem to stand still and nothing else seems to matter. Flow may not last for a long time on any particular occasion, but it may come and go over time. Flow has been described as an intrinsically enjoyable experience.*

4 people out of the people I interviewed, reported they felt flow at some level. At the end of the course it is definitely hard to evaluate how exactly they experienced flow, but we can

still conclude from the previous flow characteristics questioned, that half of the people experienced flow in the “Ecology of Narratives” course. We see the strong participatory design elements coming up from the course environment design - as there were some misunderstandings for some participants, they redesigned the environment in order to overcome the distractions. We can conclude that flow triggered them to participate in the design process and look for better storytelling ways.

A idea for future research would be to use some Experience Sampling Method’s technique to evaluate flow in participatory designed online environment in real time. For example if somebody starts to participate in the activities, on his/her mobile control questions would appear (asking about the flow experience, focusing, time distortion etc). It would enable us to collect the emotions and feedback in real-time and gather quantitative data.

Also, I asked if participants generally feel flow in social networking sites like Facebook or Twitter. As people feel involved with some people in their social network or a topic on Twitter, they often feel flow in these environments. 6 people out of 7 mentioned they have felt flow in participating in social networks.

> *I can totally forget myself on Facebook since I started to use it a lot. It makes you a freak of sharing and controlling information. The fact that I don't live in Estonia right now is forgotten.*

To sum up the interviews, we see that everyone felt some of the characteristics of flow. Mostly focus and involvement was experienced, but people also mentioned time distortion and telepresence. The mashup with its support to multiple blogs, aggregated and tagged content is a outcome of a participatory design experiment and as Fischer (2009) mentioned, the meta-design relies on the motivation for participation. Meta-design has the potential to influence this by providing contributors with the sense and experience of joint creativity. We can see that people working collaboratively on the narratives gave them the possibility to design the participation process. This leads to greater motivation and involvement which supports flow.

4.2 Flow patterns

We can determine some certain patterns and tendencies from the “Ecology of Narratives” course materials concerning flow.

4.2.1 The flow of a certain topic (individual flow)

The individual flow represents somebody’s personal experiment on hybrid media. For example one of the participants started noticing elements colored red and created the “red narrative”. In the “red narrative” (http://www.zannel.com/levistova) the author tried to express emotions visually (signs, letters, places, abstract shapes). This narrative was meant as a conceptual collection of “similar” photos labeled in “red”. It was a small art narrative within the “Ecology of Narratives” course showing the visual narrative of person taking those pictures in urban environment. This narrative did not attract active participants to add contents to this story. It only raised their interest to reuse some of the “red narrative” pictures in their own narratives.

Figure 8. The “red narrative” consists of symbols colored red.

4.2.2 The flow of a collaborative narrative

Some narratives triggered active participation throughout the community. If there was something interesting noticed, the others started following the narrative and collecting the same kind of elements. There were popular narratives about food, snow, birds, urban art, graffiti, geometric patterns, shadows. For example the narrative of birds in a personal Wordpress blog http://urbanexp.wordpress.com/2009/02/13/bird-narratives/ . The flow of a narrative is triggering, because people feel involvement in the narrative - the images and notes make them to re-blog the content and proceed with the experiment.

> *When a person is interested in something and is doing it with passion, then there will be others connected with it. With internet the best thing is that we can be connected with people all around the world. When we do not have people with same interests in the same town, then it does not matter, we can have a totally separate community in internet. Because they trigger some specific sensation, emotion, thinking…in relation with your life.*

Figure 9. The different kind of narratives from the second course of "Ecology of narratives". The bigger the tag in the cloud, the popular the narrative itself. For example the narrative of graffiti: http://hybridnarrativeecosystem.wordpress.com/tag/timeandpaint/

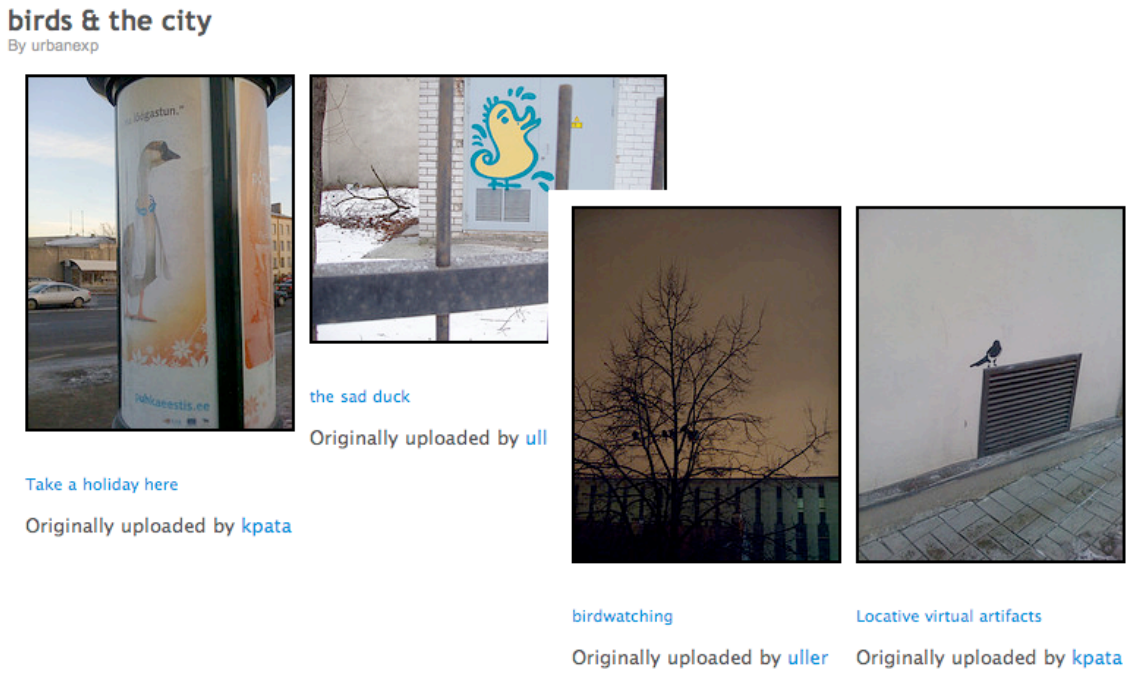

Figure 10. Another example of a collaboratively created narrative. A theme noticed by one participant triggered others to continue the narrative.

The collaboratively created narratives show the potential of participatory designed environments. Users choose the media, define the tools, shape the narratives and collaboratively develop them. Interactivity is one of the key elements for flow in computer-mediated communications (Huang, 2003). If users re-blog the content of others and leave comments, they support involvement and the tendency for experiencing flow is higher.

4.2.3 The flow of a location

Flow can occur in the narratives that consist of location based media. If people start a narrative and geotag the content and others contribute with geotagged photos and notes from nearby location, a locative flow will be experienced. The locative flow was not strongly experienced during this experiment, as there were not so many people participating in the course. For a location based narratives, the number of participants needs to be higher. Still, if there are a lot of people in a neighborhood, local narratives will start emerging. The locations tell the stories and people contribute in these.

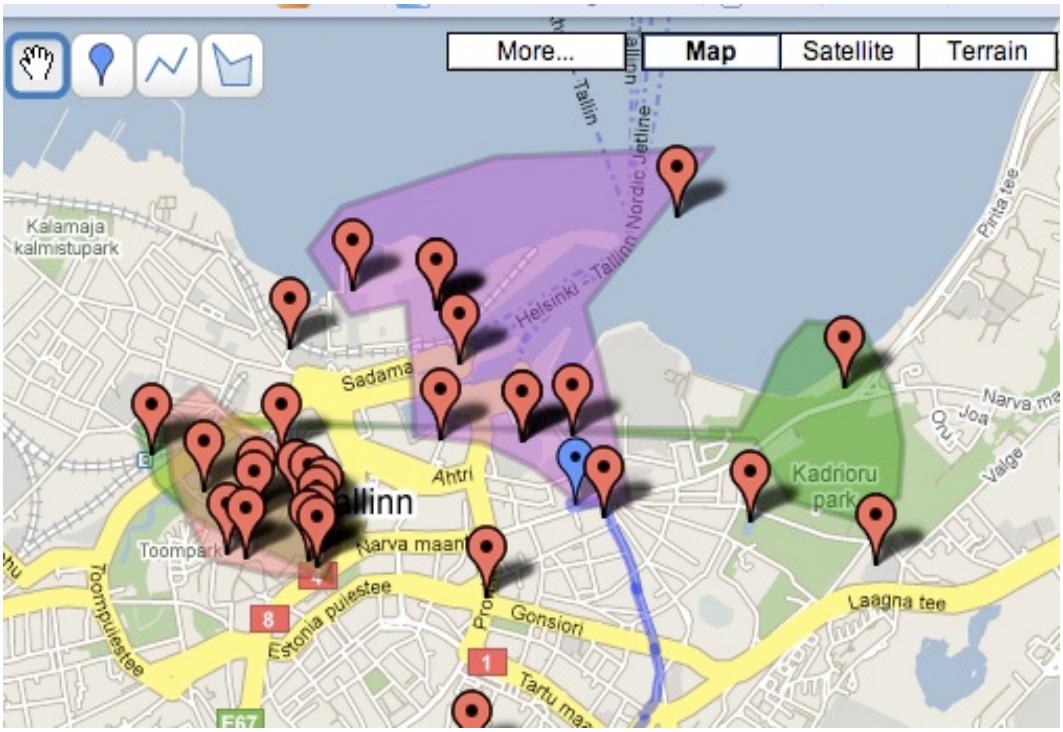

Figure 11. Geotagged content shown on Google Maps and how narratives can emerge according to locations. Each neighborhood has a specific story to share.

Geolocative flow is supported by mobile technologies and as both, Brightkite and Flickr have native smart phone applications, contributing in the local narratives is easy. Participants can follow the local stories and if they find the topic relevant to them, they can contribute. Recently introduced Google Buzz and Twitter's Geolocation features make it possible to follow narratives relevant to various locations and collaboratively compose new, location based narratives.

4.3 Participatory design in the hybrid ecosystem

The author was also investigating the hybrid ecosystem itself: how people collaboratively worked on the narratives and what kind of feedback they left after the course. From this information we can conclude some cases that are important to point out considering the flow experience. Csikszentmihalyi (1990) argued that the culture reduces the anxiety in the community and defines the rules that will lead the members of the community to experience flow. If the number of choices has been narrowed, people should feel free and

are easily find flow in their activities. As also Riva (2005) argued, an effective AmI system is able to identify the characteristics (affordances and constrains) of the situation in which happens the activity of the user: if a system does not recognize the characteristics of the situation, it will be not able to support the activity effectively.

Still, at the “Ecology of Narratives” participatory design experiment case, the rules had been not so strictly set and creativity and meta-design approach was supported. On the other hand, some participants felt distractions as they did not understood the concept of the ecosystem at first hand. Also the question of the narrative’s content popped out as a distraction: should we all start blogging about the weather? As there was no theme set, the participants started with everyday topics and shared their experiences within the community. As they received feedback, the narratives started to roll and users designed the ways to contribute in the narratives. One example of that:

- upload of photo or note on Brightkite and tag it with *#narrativeecology* (Brightkite automatically adds a geotag (geographical coordinates) as well)
- the photo will be automatically shared in Twitter, Facebook, Flickr (depends on the user’s sharing options).
- in these social networking services, the content starts to enroll with the other’s narratives (according to the tags of the content)
- the photo or note will be re-used by other narrators etc

A narrator mentioned that the mobile communication plays an important role in contributing to the narratives. For example if she experienced something and took a photo to continue her story, she could not upload at the same moment because the technology did not support that. iPhones do have native applications for Brightkite and Twitter and make it easy to contribute in the narratives at any place and any time. The time is often very important, because later you might not feel yourself in to flow anymore and uploading the photo via PC seems to be very distracting.

We can point out some guidelines that would support more effective collaboration in such hybrid environments and also encourage the users to experience flow:

- A better system to automatically integrate tags among the different platforms. At the moment the photos and notes added via Brightkite did loose tags if the photo was automatically uploaded to Flickr for example.

- A fully integrated platform that could post on different platforms, no matter the length of the post and able to post short stories such as on Twitter and long stories such as one that can be uploaded on a Wordpress blog. Some platforms do not support all formats.
- A global rating and commenting system. During this course a photo might had comments on Brightkite, Flickr and various Wordpress blogs. The comments make an important part of the narrative and the comments should be seen from one service.

Also, some distractions and technical issues were pointed out. Some participants mentioned Brightkite was not supported by Internet Explorer as it looked messy and there was no place where to post the message or photo. Such kind of technical errors do not let to participate in the community and it frustrates people. Also, there were some mapping problems pointed out that distracted some users: while posting photo at one geographical location in Brightkite it turned up in another street in Flickr. Brightkite did not allow editing messages and photos - the narrative could have not been modified if needed.

Design is an ongoing process and most probably, some of the modifications would been done during the experiment anyway, only if the experiment lasted longer. As Pace (2003) points out, web users tend to ignore minor distractions during a flow experience because their attention is focused on the task at hand. But a distraction that is intensive and frequent may cause a shift in the user's attention and will terminate a flow experience.

I am immersed by the potential of hybrid media and how users can shape their own ways for participating in online communities. As I discussed before, the experience of flow can encourage the users to take the role of the designer and collaboratively contribute in working on better design. The participants of the "Ecology of Narratives" course described their flow experience in the interviews and we can conclude that people who actively participated in the design process also felt greater motivation for collaborative storytelling which made them experience flow. Once in flow, they felt engagement in the community and continued their contributing in the design of the hybrid ecosystem.

5 Conclusion

In this paper the author studies flow as the enjoyable state of mind driven by optimal experience in a hybrid ecosystem. Flow in the participatory designed online environment is important to study, because by that we understand how these communities collaboratively work and what makes people to concentrate on the tasks. In the other hand, the participatory design methods, hybrid media and ambient intelligence environments will support creating flow experiences.

First, there is overview of the theory. Flow, the theory of optimal experience was first introduced by Csikszentmihalyi in 1977. Since then it has been studied also in human-computer interaction. Flow can be described by the following characteristics: high levels of skill and control, high levels of challenge and arousal; and focused attention; and is enhanced by interactivity and telepresence. The culture plays a huge role in flow as well - the culture supports with its constraints and affordances the activities in the community and narrows down the anxiety.

Today, in the design process, end-users are seen as the actual designers of the system. The cultures of participation and hybrid media support community-driven applications that fulfill the end-users criteria. If the end-user is also designing the system, he/she feels involvement and the system matches with his/her skills that both are needed in order to feel flow. Ambient intelligence described the ideal system for flow experience - the system that is transparent for the user and supports his/her activities. These technologies are important for users to concentrate on the tasks, feel the control and achieve their goals.

The author studied a university course “Ecology of Narratives”, that was a participatory design experiment with a goal to test new ways for storytelling in hybrid ecosystem. During the course, the participants used the potential of hybrid media and designed their ways in social online communities for creating narratives. The participants were interviewed after the course about their experience in the course activities and if they felt flow and its characteristics at any level. Also, the mashup, in which the storytelling took place, has been analyzed to find patterns describing flow.

The qualitative analysis indicated that all of the participants experienced some of the flow characteristics (focus, involvement, time distortion, telepresence, positive effect). The

author summarizes the results and finds the answers for the research questions. In the hybrid ecosystem people might experience flow because they are in a need for better design. So, the users take the control and use the possibilities for shaping the media in creative ways. In the ecosystem the narratives start to emerge and users feel involvement. Personal narratives trigger the participants to express themselves and they design the methods for publishing their narratives. Community-based narratives are engaging, because people start collaboratively working on them and give instant feedback to each other. Location based flow will appear if a minimum amount of media units will be geotagged in a neighbourhood. The author describes 3 types of flow experiences seen from this experiment :

- the flow of a certain topic (individual flow)
- the flow of a narrative (in the community)
- the flow of a location

Flow can be seen like a validation mechanism that supports finding better design for the users. Flow is taking the consumers to meta-designer level and encourage them to redesign the hybrid environment and mix new media. Several examples of redesigning the hybrid ecosystem was recognized during the experiment. Collaborative storytelling formed the shape of the narrative and was enabled by the cultures of participation methods.

What I would suggest for future research is to study location based flow. Mobile technologies and 3G coverage allow us to create (hyper)local narratives: users can start posting notes, photos and videos on a specific location and other people can participate. People often feel engaged to the stories and people in their neighborhood. Location based media should be researched as a possible trigger for flow.

6 Summary

Käesolev magistritöö uurib kulgemise kogemust kasutajakeskselt disainitud *online* keskkondades. Kulgemiseks nimetatakse tegevust, mida iseloomustab positiivne kogemus ja mida tuntakse meile jõukohaste tegevuste käigus, mille üle tunneme kontrolli. Kulgemist iseloomustab aja taju kadumine (aeg lendab kasutaja jaoks märkamatult) ja nö kohalolek (tunne, nagu oleksid tegevuse keskel ning unustad ümbritseva keskkonna). Magistritöö analüüsib kulgemise seisundit kasutajakeskselt disainitud *online* keskkondades ning püstitab küsimuse, kas kulgemise seisund võib olla justkui veebikeskkonna disaini valideerimise vahendis. Tihti on nii, et kui kasutajaliides on inimese jaoks arusaamatu, ei võta kasutajad seda rakendust aktiivselt kasutusele, nad näevad takistusi ja ei saa kogeda kulgemist kui positiivset seisundit. Web 2.0 keskkondade arenedes ning nendest tekkivate hübriidsete keskkondade kujunemisel, on kasutajale antud võimalus disaini protsessis osalemiseks. Kasutajakeskne disain toetab kasutaja sekkumist toote arendamisse ning selle abil tagatakse täpselt sellise funktsionaalsusega keskkond, mis vastab selle kasutaja kogemusele ning huvidele. Magistritöös uuritakse hübriidset keskkonda kui kasutaja-keskse disaini eksperimenti, mille põhjal esitletakse mustreid kulgemise kogemise erinevate viiside kohta. Magistritöös uuritakse, millised on kulgemisest iseloomustavad seisundid ja kuidas kulgemine soodustab kasutajaid disainiprotsessi osalema.

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