Aalto-yliopisto
Insinööritieteiden
korkeakoulu

Juho Leppänen

Impact of digital orientation on user experience in workplaces: A case study of a multi-user workplace and its digital services

Master's Thesis
Department of Built Environment
School of Engineering
Aalto University

Espoo, 27 May 2018
Supervisor: Professor Seppo Junnila
Instructor: M Sc. (Tech) Vitalija Petrulaitiene

Aalto University
School of Engineering
Aalto University, P.O. BOX 11000, 00076 AALTO
www.aalto.fi

Abstract of master's thesis

Author Juho Leppänen

Title of thesis Impact of digital orientation on user experience in workplaces: A case study of a multi-user workplace and its digital services

Degree programme Master's Programme in Real Estate Economics

Major/minor Real Estate Economics **Code** ENG24

Thesis supervisor Professor Seppo Junnila

Thesis advisor(s) M.Sc. (Tech.) Vitalija Petrulaitiene

Date 27.05.2018 **Number of pages** 60+7 **Language** English

Abstract

Digitalization shapes how we use and experience space. It's enabling new ways of working, which affects what kind of spaces are needed and how much. Meanwhile experiences are becoming increasingly more important as new space as a service –type of assets are growing rapidly, which emphasizes positive user experience. New digital services are expected to revolutionize space as we know it and create so-called intelligent buildings, which creates a need for research and knowledge about their effect on different users.

This study aims to gather a thorough understanding of user needs and experience in a multi-user workplace and to examine if digital proficiency of the users and use of digital tools affects the experience. Research was performed by constructing a theoretical framework by literature review and studying the phenomenon through a user experience survey and interviews to members of Maria 01, a co-working space and a startup hub in Helsinki, Finland

Experience of place consist of multiple internal and external factors, such as individual needs and preferences. Needs are connected to the environment through concept of environmental fit and people with similar needs and preferences can be grouped into profiles, such as digital profiles, which are helpful in development and design processes.

Research found some correlation between both digital profile and usage of digital tools, and user experience. Use of social tools especially affected the experience in Maria 01, as the community is crucial part the experience in co-working spaces. However, the results have to be confirmed or rejected by other studies before there can be said to be a definitive relation between the two, but the results give reason to continue studying the phenomenon.

Keywords user experience, workplace, co-working, digitalization, digital profiles, user needs

Aalto-yliopisto
Insinööritieteiden
korkeakoulu

Aalto-yliopisto, PL 11000, 00076 AALTO
www.aalto.fi

Diplomityön tiivistelmä

Tekijä Juho Leppänen

Työn nimi Digitaalisen suuntautuneisuuden vaikutus käyttäjäkokemukseen työympäristöissä: Tapaustutkimus monikäyttäjätoimistosta ja sen digitaalisista palveluista

Koulutusohjelma Master's Programme in Real Estate Economics **Koodi** ENG24

Työn valvoja Professori Seppo Junnila

Työn ohjaaja(t) Diplomi-insinööri Vitalija Petrulaitiene

Päivämäärä 27.05.2018 **Sivumäärä** 60+7 **Kieli** english

Tiivistelmä

Digitalisaatio muokkaa miten käytämme ja koemme tiloja. Sen nousu on mahdollistanut uusien työtapojen kehityksen, jotka vaikuttavat siihen millaisille tiloille ja kuinka paljon on tarvetta. Samaan aikaan kokemukset kasvattavat arvoaan uudenlaisten tilaa palveluna- tyyppisten ratkaisujen kasvattaessa suosiotaan, joissa positiivinen käyttäjäkokemus on keskiössä. Uusien digitaalisten tilapalveluiden uskotaan muokkaavan tiloista uudenlaisia älykkäitä ympäristöjä, mikä luo tarpeen niiden vaikutusten tutkimiselle.

Tämä tutkimus pyrkii koostamaan kattavan ymmärryksen käyttäjäkokemuksista ja tarpeista monikäyttäjäympäristöissä sekä tutkimaan mikäli käyttäjien digitaalisuudella ja digipalveluiden käytöllä on vaikutusta käyttäjäkokemukseen. Se toteutettiin kysely- ja haastattelututkimuksena Maria 01 startup co-working hubissa Helsingissä. Tutkimuksen teoreettinen viitekehys koottiin kirjallisuuskatsauksena alan tutkimuksiin.

Tilakokemus koostuu monista eri sisäisistä ja ulkoisista tekijöistä, kuten yksilön tarpeista ja mieltymyksistä. Tarpeet ovat yhteydessä ympäristöön ympäristön sopivuus –konseptin kautta, ja samanlaisia tarpeita ja mieltymyksiä omaavat ihmiset voidaan ryhmitellä profiileiksi, kuten digitaaliset profiilit, jotka ovat avuksi kehitys- ja suunnitteluprojekteissa.

Tutkimuksen löydökset indikoivat että sekä digi-profiililla kuin digitaalisten palveluiden käytöllä olisi vaikutusta käyttäjäkokemukseen. Varsinkin sosiaaliset palvelut vaikuttivat kokemukseen niiden co-working tiloille ominaisen keskeisen aseman vuoksi. Ennen kun näiden ilmiöiden keskinäisistä riippuvuuksista voidaan varmistua, tarvitaan kuitenkin lisätutkimuksia, joihin tutkimuksen tulokset antavat perusteen.

Avainsanat käyttäjäkokemus, työympäristö, co-working, digitalisaatio, digitaaliset profiilit, käyttäjätarpeet

Acknowledgements

This master's thesis has been written as a part of Virtual Service Environment D -project (Virpa D), which is a joint development project of multiple companies and research units with objective to create world-class user experiences to user of commercial properties and develop scalable user services into real estate and commercial real estate sectors. Topic for this thesis was chosen both out of curiosity and necessity, to produce a comprehensive review of the subject for the purposes of Virpa D project and to study a topical and interesting subject that also builds on my past experiences in the field that I have acquired during my years working for Newsec.

I want to thank Seppo Junnila as my supervisor and Vitalija Petrulaitiene as my advisor, from Aalto University, who willingly guided this thesis to the right direction and made it all possible. I also want to thank Suvi Nenonen from SYK, who unselfishly shared her wisdom in the midst of all the hustle to develop mediocre ideas into great ones. Also thank you to Antti Huhta and Lauri Pulkka from Newsec, who have given invaluable guidance and help during the journey, and of course to my employer Newsec for the opportunity and for supporting me throughout my studies and especially during the final stretch.

And most of all, thank you to my family. Mum, sis, bro, darling, the little one, you are all precious. Without your support any of this would've not been possible.

To dad.

Espoo 27.05.2018

Juho Leppänen

Table of contents

1 Introduction

Introduction part of the thesis will cover research background and novelty value. Based on these, research aim and scope will be presented as well as the methodology and structure of the research.

1.1 Research background

Commercial real estate business is on the verge of revolution and new business models are being developed as digitalization reshapes the society and ecosystems within it. Ways of working and tenant preferences for premises are changing which is affecting whole industry, and development of new digital services and intelligent solutions will offer new prospects and possibilities for real estate and workplace development. This will transform how premises are used and how they affect the users.

User experience is a holistic description of interaction with a product or a service that is based on individuals' needs and preferences (Battarbee 2008). In commercial properties it affects all stakeholders, from the individual using the space to the owner of the real estate and the real estate portfolio to which the space and property in question belongs to. On the individual level, impact of our surroundings is profound as people spend 90% of their time indoors (US Census Bureau 2002), of which a considerable time in commercial properties such as offices. Studies have shown (Nenonen et al 2012, Vischer 2008) that the indoor environment has a considerable impact on people's health, happiness, productivity and innovation and that working environment directly affects the quality of worklife (Vischer 2008), which in turn affects the quality of life. Quality of life or 'wellness' of individuals is a generally trending topic that is present even on buildings standards (e.g. the new Well Building standard).

Employers, on the other hand, want their employees to be as healthy, happy, productive and innovative as possible as it cuts the cost through reduction in sick leaves and increases the profits as efficiency rises and innovations generate new business opportunities (Chesbrough & Rosenbloom 2002). Furthermore, a supportive and interesting workplace can be a recruitment advantage especially in booming industries, as companies compete over the most skillful and respected employees (Meister et al. 2010). Companies also often want their premises to relate with their values and image, in order to strengthen them and to create a coherent story.

High amount of vacant space and the continuing trend of sqm per employee reduction has increased the competition for tenants in commercial real estate market in Finland, as there is a need for less amount of space but of better quality (Newsec 2018). Flexibility, physical attributes and support for the 'new ways of working' is increasingly important for companies looking for new premises, which has spurred property owners and managers into developing their holdings according to the latest demands (Newsec 2018). In addition to more directly affecting the revenue streams of property owners, user experience of premises is also linked to brand experience of the owner and managing partners and different aspects of user experience can affect their brand image.

Although the phenomenon of 'new ways of working' has been discussed since 1970's (van Meel 2011), the development of e.g. portable devices, communication software and data storing has revamped how work can be performed. Mobility, connectivity and collaboration are the new defining factors as well as appreciation towards knowledge and human capital. Knowledge workers user information and data as a resource to produce value and their work is often associated with high amounts of autonomy, innovation and use of technology (Greene & Myerson 2011).

Not every knowledge worker is the same though as individual preferences and needs affect the behavior, in addition to the different roles individuals have in work. When designing or developing workplace solutions this has to be taken into account, as too generalized solutions rarely produce appropriate outcome. Profiling is a tool that can be used to group people with similar needs and preferences into profiles that also indicate about their expected behavior (Chang et al. 2008). These can be useful when designing virtual environments and digital services, to make them fit different individuals better.

Co-working spaces are one product of the change in the ways of working. User experience is perhaps even more central to them than to traditional offices as they offer space as a services and positive user experience is key for keeping hold of old customers and attracting new ones (van Meel & Brinkø 2014). Co-working spaces are a fairly new phenomenon worldwide but have quickly gained popularity especially in USA and large European cities and JLL (2016) estimates that in 2030 one third of commercial real estate portfolios is similar space-as-a-service type of assets. They usually take advantage of newest trends of workplace design and digital solutions while hosting a varied community of user from different organizations, i.e. a multi-user workplace.

While the digital revolution has changed our lives and different branches of business profoundly during the last two decades, real estate business has been lagging behind in most aspects. This is now rapidly changing as there are numerous startups and business heavyweights injecting new ideas, innovations and energy into the business. JLL (2016) presents five megatrends that influence the industry:

1) The ubiquity of the supercomputers (aka smartphones) now in everyone's pocket.
2) Pervasive high-speed connectivity.
3) Cheap and abundant cloud computing.
4) Billions of internet of things (IoT) sensors connecting anything that can usefully be connected to the internet.
5) The rise of artificial intelligence (AI) and robotics.

As development of technology and innovations open possibilities for use of digital services in order to improve the usability and experience of spaces, there is a need to know their demand and value for different stakeholders. Uncertainty about the return of investment can hinder implementation of new services and while the value can be otherwise difficult to calculate, user experience analysis can help to obtain more knowledge on the matter. Furthermore, in order to refine new digital services to be as successful as possible, it is fundamental to know their effect on different users.

1.2 Research goals and structure

Aim of this study is to gather a thorough understanding of user experience in a multi-user workplace and its digital services and to examine the effect of digital orientation of users. Digital user profiles by Rantala (2017) will be used to see, whether users have different needs and reactions to digital services depending on their digital orientation. Based on the findings of the study, suggestions are made for service and workplace designers on what should be considered when developing and introducing new digital services and solutions.

Research question is:

- Do digital services and digital orientation of the users affect their experience of a workplace?

In order to investigate the research question, profound understanding is needed on a few key elements. Following questions will guide constructing the theoretical framework for the research and help to reach the aim of the thesis:

- What is user experience of workplace?
    - How is workplace defined?
    - What does user experience in workplace consist of?
    - How can user experience be measured?
- How does experience differ between the users?
    - What needs or preferences can affect digital user experience and how can people be classified by them?

Work hypotheses is that the more digitally oriented individual has greater need for digital services and thus their presence in a work environment should affect them more positively than those who are less digitally oriented. Vice versa, the absence of digital layer should affect digitally oriented individuals negatively. According to Rantala (2017), the most digitally oriented people don't have any suspicions about digital services replacing analogical ones and feel discontent if the digital tools they have available don't allow them to work as efficiently as possible and if there is a lack of tools altogether. The effect of digital services is expected to be largest on the functionality and familiarity aspects of experience, since they are predominantly associated with usability and are used to improve it. They should however also affect other aspects such as the atmosphere, tempo, narrative and meaning of the place, since less digitally oriented people feel more digital stress and feel more critically about technology in overall than those who are more digitally oriented.

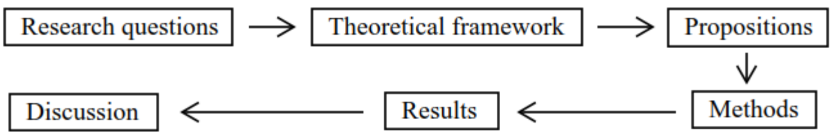

Figure 1 Applying research question and proposition

1.3 Key terminology

Terms "intelligent", "smart" and "digital" have been used, somewhat interchangeably, in general discussion to describe new innovation services and solutions that often exploit digital technology and innovative ways to use it. As intelligent and smart are, by definition, broader concepts then digital and can describe services or products that take advantage of non-digital solutions, term digital and digitalization will we be used throughout this research.

Review of past research on the field will set the theoretical framework for the thesis. In order to answer to the research question, the following key concepts need to be studied and discussed in detail.

Workplace is the multi-dimensional setting where work and its support activities happen (Vartiainen et al. 2006).

New ways of working is the continuous change in ways of working that changes the needs and preferences that employees direct on workplaces and thus is a major catalyst on workplaces changes (van Meel 2011).

User experience is a holistic concept that describes different thoughts, feelings and reactions that arise from interaction between user and a product in a certain context (Battarbee 2008).

Environmental fit describes the fit between users' needs and the environment (Vischer 2007). **User needs** in turn define human behavior and satisfaction and thus are a defining factor behind any user experience.

Digital profiles categorize knowledge workers by their needs and preferences concerning technology (Rantala 2017).

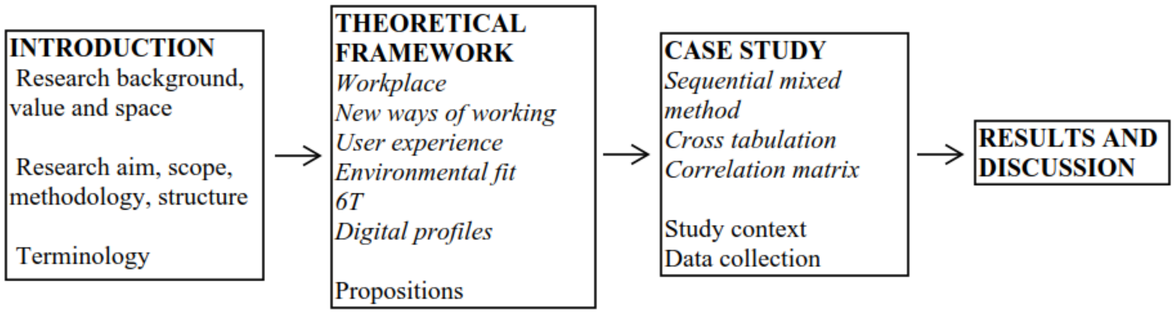

Figure 2 Thesis structure and key concepts

1.4 Research tools

Research will be executed via a single case study. Literature review inspects past studies and theories in the field of user experience and workplace development to set up the empirical part where impact of digital services on user experience will be analyzed using a survey and in-detail interviews, i.e. a mixed-method approach, for data collection and cross-tabulation, distributions and content analysis for data analysis.

The mixed-method approach (Johnson & Onwuegbuzie 2004, Creswell et al. 2011) will be used for the case study since, in addition to providing quantitative data to examine demographics, it offers qualitative data to explain the results of the survey and to gain valuable insight in the reasons behind different effects digital services have on user experience. Survey will be used to map the usage of different digital services and how they affect different aspects of user experience of individuals. The interviews will be designed based on the data obtained from the survey, in order to explain the results and to get better understanding of the phenomenon in the context.

The respondents for the case study will be members of Maria 01, a co-working space in Helsinki, Finland. Broad range of investors and small startups have an office there, creating a diverse mixture of users. These make them an intriguing target for a case study of digital services and its effects.

The framework for survey and interviews will be an adaptation of '6T-model', which is a tool developed for a comprehensive analysis of user experience based on customer experience design practices (Diller et al. 2006). The six different categories are concerned with atmosphere, time/tempo, functionality, familiarity, story and meaning of the space. These allow thorough analysis of user experience and how it is affected. The model has been used to analyze co-working environments before, but the scope is now expanded to include digital environment.

2 Theoretical framework

Key concepts for this research will be studied and discussed in theoretical framework.

The concept of *workplace* and its different elements and aspects will be discussed in first chapter. One key aspect here is the *new ways of working,* which are activities that define how workplace is shaped and drivers for its change. The activities are performed in workplace which is a multi-dimensional whole. Concept of multi-user workplace or *co-working* is the future of workplace, driven by change in the ways of working and in corporate requirements. It defines the context of the study and is crucial for understanding the theme going forward.

User experience (or UX in short) will be discussed in detail in the second chapter of theoretical framework as the central concept of this study. An integral part user experience in workplace context is the *experience of place* as the relationship between people's needs and their environment can be analyzed through concept of *environmental fit*, which describes the environment's support for people to fulfil their needs. As the UX in workplace context is understood, importance of *measuring user experience* in workplace will be discussed and how it can be done, as it is a key for the analysis part. 6T concept for analyzing UX will be introduced as a result.

Profiling and *digital profiles* will be discussed in the third chapter. Profiling is useful tool for designing and developing workplaces as it enables grouping users by their needs, preferences and tendencies. Digital profiles developed by Rantala (2017) categorizes knowledge workers by their digital orientation and these will be used in the empirical part of this study for the analysis.

2.1 Workplace

2.1.1 New ways of working

Ways of working are in constant change and it is an important factor that influences the relationship between workplace and its users. Ways of working derive from the type of work that is done and different task it includes, and how different tools enable them to execute those tasks. Revolution of information and communication technology has been a great enabler in this century, but the current change in ways of working is also being due to change in appreciation of material and immaterial resources. Knowledge and human capital have replaced money as the foundation of an organization (Harrison et al 2004).

Knowledge work is defined by the usage of knowledge, instead of labour or capital, as the means to produce value (Bosch-Sijtsema et al. 2010). It's characterized by problem-solving and creativity instead of routines and standardized work processes, contrasting with bureaucratic and industrial forms of work, and thus the people doing knowledge work require more spaces and tools that are individually modifiable to their needs (Greene & Myerson 2011).

Knowledge workers are usually given higher degrees of freedom and self-management, but at the same time they are more integrated in the organization and its values by the nature of work and work to achieve the same goals as the company. They are valuable resources for companies as they possess unique set of knowledge, also about the processes and the business, gathered by experience and education (Harrison et al. 2004). Knowledge work is also often associated with quality, as optimal or even maximal quality is often being pursued, contrary to traditional factory work where quantity and quality need only to meet some predetermined standards (Drucker 1999). Quality and efficiency of the work is affected by motivation and capabilities of the employer as well as working environment they tools that are available. Taking advantage of technology and digital tools is closely associated with knowledge work.

Collaboration with colleagues from tnhe same organization or others is often considerable part of the work for knowledge workers. Combining skills and knowledge of multiple people is often the most efficient way to innovate and develop processes and new ways to use data that already exists. Meetings can be in person, through phone, skype or telepresence equipment and can happen unscheduled or scheduled, which create requirements for different kinds of spaces and tools for both physical and virtual environments.

Knowledge workers often work in various places in the office, by a client, on the road or at home (Bosch-Sijtsema et al. 2010). This *multilocational work*, which takes advantage of virtual work environments, is enabled by modern information and communication technology, allowing people to work anywhere, with people on the next room or on the other side of the globe. It is one form of autonomy granted to knowledge workers and it requires abilities of independence, self-guidance and responsibility for one's contribution.

Studies show that employees value multilocational work, or *remote work*, as it enables them to better balance work life and family and also allows them to stay home to focus more intensively to a certain task that requires only individual work (Newell et al. 2002, Vartiainen et al. 2007). Design of virtual workplace is highlighted since employees don't spend all of their time in their physical office and have to create work environment to different places (Hislop & Axtell 2009). Another term for remote work is *telecommuting*, which describes the use of virtual environment for the work, i.e. commuting by technology (Ross 2016). Though telecommuting has positive sides, some studies argue that greater proximity and accessibility increase family demands, which neglects the gains towards better work-life balance (Igbaria & Guimaraes 1999, Kurland & Bailey 1999).

Independence of time and place defines *mobile work*, which is highly dynamic as the workplace can change multiple times a day. When employee works more than ten hours per week outside of the office and uses technology for collaboration, he or she can be considered mobile (Gareis et al. 2006). This type of work is typical for consultants and executive personnel, who often rush from meeting to meeting, using the little breaks and commuting in-between to perform tasks. As they are often away from office, mobile workers can feel separated from the community and often come to office especially to socialize with others (Petty et al. 2001, Venezian & Alleen 2007). Thus it is important that the physical environment in the office supports this.

New ways of working reshape the industry in multiple different ways. Multilocational work affects the total need for office space, as employers only need to provide workstation and others spaces for a share of its total full-time employee count. The actual spaces have also changed, from cellular offices to landscape and kombi-offices to currently trending activity-based offices where there are different kind of spaces for different activities. Also, as the traditional reason for coming to office has diminished, organizations need to attract users to their physical spaces to collaborate and network by other means, one way to achieve this is by making spaces more attractive and functional.

As the main function of the office changes to be a place for interaction and collaboration, spaces have to support these actions better. Mobile and remote workers need to be taken into consideration by providing more functional spaces for those who just shortly visit the office during the day and making sure that remote workers are able to efficiently communicate with those who are present at the office and have functional connections and tools at their disposal even on the road. Development of ICT tools is crucial as it can enable more efficient mobile and multilocational work by enhancing collaboration and management and offering more immersing and coherent social environment for those who aren't always present.

Hyrkkänen et al (2012) presented that mobile work has also created a need for building codes to be expanded to cover needs generated by it, for example layouts should be clear and instruct occasional visitors. Places that aren't primarily designed for work should also support mobile and virtual work and offer spaces where noise and other disturbances can be minimized. Mobile and virtual work should also be considered when designing and selecting furniture that are not intended for working.

2.1.2 Different elements of workplace

The environment where the work happens is the *workplace*, which can be divided into physical, virtual and social entities (Vartiainen et al. 2006). In addition to *workspace* which only accounts for the physical and virtual environment and the different spaces where the activities take place, workplace thus also considers the psychosocial aspect of the environment (Nenonen & Kojo 2013). While physical space can be a meeting room or open office with workstations for individual work and virtual space for example a videoconference or a shared document, social environment is collection of the individuals and organizations, their culture and interactions between each other and other organizations.

The terms space and place often tend to merge in general discussion, but as they can be distinguished from each other by two major factors. Firstly, space is merely an empty geometrically regarded physicality, which has abstract geometries such as distance, shape, size or volume, while place has physicality and is combination of objects and things (Gieryn 2000, Tuan 1977). Secondly, while space lacks any meaning or value, place is associated with objects, practices and representations. According to Tuan (1977) an undifferentiated space becomes place as we get to know it better and endow it with value and according to Ramirez (1993) it occurs when something meaningful happens. Space is place without the unique compilation of things, meanings and values (Gieryn 2000).

In workplace, these unique things are the activities, culture and social interactions between people. A workplace has spaces that people endow with value so that they become places for work. These can be both physical and virtual and as virtual environments have developed and become more common, the role of physical environment as defining factor for place has diminished and faded the borders between different places (Evans 2011).

2.1.2.1 Physical workplace

Workplaces are still built around physical spaces though. A task doesn't necessarily always need a virtual or social setting, but people can't entirely detach themselves from the physical world. It can be argued that certain tasks are not space or environment specific and can be performed anywhere, or that in some cases people may be totally unaware of their surroundings while in virtual meetings or being deep in thought (Hyrkkänen et al. 2012). The person still remains in the physical space though and people or activities in the environment can cause the person to lose focus or distract the meeting. Although work may not directly happen in a physical space, it enables it to happen somewhere else, like in person's mind or in virtual reality.

Physical workspace is located anywhere where work happens: at the office, in a train, at home, at a client's office, in a cafeteria, etc. When considering workplace as a whole, all these locations should be considered, although the employer can only really affect the workspace that is in the office. The physical workplace consists of all material things that are in it, meaning the building and its components, furniture and equipment.

Physical indoor environment is seen to comprise of physical building (including architecture), indoor air quality, temperature, acoustics, lighting, maintenance and the hygiene of water and air (Nenonen et al. 2012). Indoor environment can also be divided into measurable and non-measurable attributes. Measurable attributes are technical and definable by a physical quantity, such as temperature, acoustics and lighting. Uneven distribution of temperature, insufficient ventilation and lighting and bad acoustics are basic problems of many commercial properties and although many of them are straight-forward to measure on their own, calculating the combined effect of air movement, composition and temperature for example is still tricky and requires heavy computing power and simulations. Draught, which is caused by swift movement of cool air, is a common problem in spaces that require powerful cooling and ventilation. Non-measurable attributes are subjective and derive from a person's views and preferences, such as aesthetics, as well as how the space supports the communication, culture and collaboration of group of people (Nenonen et al 2012).

Different laws, design instructions, classifications and certificates set parameters for the physical environment (Nenonen et al 2012). New commercial spaces have to fulfil certain threshold values for the measurable attributes, such as cubic meters per hour per person for ventilation and building certificates like LEED, BREEAM and WELL evaluate and rank buildings, existing and new, based on the measurable attributes. These represent the actual performance of a building to a certain degree, but people have their own preferences and needs which dictate their unique experience of the space and how well it supports and fits to them. Since people have their own preferences regarding physical environment, they value adjustability. Ability to adjust one's environment also creates them a feeling of empowerment, which affects their stress-levels and satisfaction. (Vischer 2007)

2.1.2.2 Virtual workplace

Virtual workplace is enabled by technology, allowing employers to work and collaborate through different technologies and applications such as email and Skype (Bosch-Sijtsema et al. 2010). These tools make it possible for employer to work anywhere and at any time, even on the move, and as technology advances, the interactions enrichen. This makes mental presence more important than physical one and the boundaries between online and offline states become more vague.

Virtual workplace includes different virtual spaces such as intranet, internet, network drives, cloud storages and online content editing and creation tools (Bosch-Sijtsema et al. 2010, Nelson et al. 2017). These enable accessing files from anywhere, sharing them and editing them together with others simultaneously. Text-based messaging applications, phone calls, teleseminars and virtual reality enable interaction on different intensity levels to exchange information and ideas. Shared calendar and online task and project management tools allow management of time and resources. Common trends between the tools are accessibility and connectivity of both data and people (Denyer et al. 2011).

Usage of virtual spaces is enabled by hardware, i.e. different devices, such as laptop, phone, tablets, screens and audio equipment as well as the ICT infrastructure like network connections. Important attribute for both hardware and software is their compatibility and ability to interact with each other. For synergy reasons, companies often prefer software platforms that offer wide range of different tools, as well as standardized hardware to minimize corporate network and security system installation as well as the compatibility with different accessories like screens, adapters and docks.

Virtual and physical workplace co-exist at the same time, since the employee has to physically be somewhere even when working in virtual reality. Physical attributes such as noise can affect how deeply and without interruptions the employee can concentrate on the virtual environment (Hyrkkänen et al. 2012). When working from a public place like train or cafeteria, information security can be an issue, and the relationship between virtual and physical environments can cause safety risks for example when driving a car.

Functionality of the technological equipment and tools of the employee as well as connections and portals is essential for usability of virtual workplace. In addition to technological issues, problems can arise from limited skills of the user, which makes education a fundamental part of introducing new tools and systems (Evans 2011, Hyrkkänen et al 2012). Clear instructions, ease of use and support alleviate skill-based problems. Creating, maintaining and improving common culture in virtual workplace is one of its greatest challenges. Without face-to-face interaction common practices and emotional connections between people are difficult to establish.

2.1.2.3 Social workplace

Individuals and groups of people and their interactions and culture create the social layer of environment. It is often highly regarded by employees as working with people who they can get along with and connect emotionally as well as the shared culture, identity and belonging is appreciated and can contribute to the work satisfaction, motivation and performance (Vischer 2008, Bandiera et al. 2007). The rise and development of virtual spaces has also led to change of the social space, as new technologies allow new kind of interaction.

Behaviour of people is contextual, as it is affected by the social setting (Ajzen 1985). Literature review by Nenonen (2005) indicates that the relationship between people and the environment is bidirectional, as the social context shapes the space and vice versa. Meanwhile Meerwarth et al. (2008) argue that social context differentiates workplaces from each other so decisively that it requires additional focus and consideration when designing and developing workplaces.

Social dimension is essential in modern knowledge work, since much of the value production comes from innovative use of knowledge and mixing it with that of the others'. This has been acknowledged by organizations, as they have been increasingly adopting so-called 'web 2.0' technologies that, in contrast to web 1.0 which only enabled access to information, provide a platform for social interaction and collaboration (Denyer et al. 2011). Such technologies include for example web-based communities, social-networking, wikis and blogs. When used in business context, these technologies are seen to lift businesses to the next level, to become 'Enterprise 2.0'.

Though enterprise 2.0 technologies are claimed to be social and participative and are widely believed to transform businesses, expectations towards them haven't always realized. In a case study by Denyer et al. (2011), respondents didn't see the technologies to have desired effect and in some cases even restrict participation, openness and socializing. Corporations have been accused in some cases of trying to change the social environment in workplaces to fit the technical, without considering and respecting the social aspects and how they affect use of technologies (Leonardi & Barley 2010). Mumford (2006) emphasizes the importance of including the employees in design and decision-making process of new systems as well as design of jobs and work processes, and thorough consideration of social structures and aspects in the organization.

2.1.3 Future of workplace

The change in the social, virtual and physical layers of the workplace has been driven by the changes in the ways of working and digitalization. As the activities and ways of producing value in corporations change, the environment has to adapt to these changes in order to support it. Together with increasing number of small enterprises such as startups and changing corporate requirements for spaces, new ways of working and digitalization have been key-drivers behind the rise of new type of workplace concept, coworking (Lievonen 2017). Co-working spaces along with other space as a service –type of assets are estimated to

Concept of co-working is defined by Oxford Dictionaries (2016) as use of a working environment by self-employed people or who are from different organizations, usually to share equipment, ideas and knowledge. Co-working spaces can be divided by their typology to public offices, third places, collaboration hubs, coworking hotels, incubators and shared studios and they are often offered to customers as a service instead of a traditional lease contract (Kojo & Nenonen 2016). The concept was first introduced in 1990's following the steadily growing numbers of freelancer, who previously had to work either from home or in public or semi-public environments, either compromising in social environment or suitable ergonomics (Botsman & Rogers 2011, van Meel & Brinkø 2014). Initial success was mild but started to grow steadily after a few setbacks and the growth has continued ever since. In 2014 there were over 2,500 co-working spaces around the world (van Meel & Brinkø 2014) and by the end of 2017 this number was estimated to be around 14,000 with WeWork and Regus being the largest and best-known providers (Green Street 2017). Though the growth of co-working has been driven mainly by freelancers thus far, larger corporations have begun to co-work as well through outsourcing parts of their headquarters or regional offices to co-working operators.

The multi-user model is defining for the co-working concept, as the community composes of individuals from different organizations. International companies and small startups gather into incubators, startup hubs and innovation labs to innovate new business models and products, mobile workers seek for a place to work for a day while on a business trip and freelancers and other business nomads seek for communities that offer the social environment in addition to physical and virtual spaces. Sense of community and the social environment is a key component in all co-working spaces and it is considered to be a factor that separates them from other workspace concepts (Garrett et al. 2014). Different kind of events that gather members together on daily or weekly basis are essential part of the service offered by many co-working providers and social interactions are encouraged by other means as well. Physical space is often designed so that it enables efficient collaboration and also random interactions and virtual solutions support information exchange.

Lievonen (2017) investigated in her study how investors saw the phenomenon and identified four key-drivers for the phenomenon: new ways of working, fragmentation of companies, changed corporate requirements and new dynamics. Fragmentation of companies consider the increasing amount of small enterprises and outsourcing but also decreasing average company lifespan. Companies are becoming more specialized in their core businesses and outsource their support functions to others, but still half of the S&P 500 companies are estimated to be replaced during next 10 years as volatility in businesses increases (Anthony et al. 2016). This volatility partly affects the changing corporate requirements, which include need for more flexibility regarding the premises and also better efficiency, profitability and productivity of production factors like people and space. So at the same time there is need to minimize the unnecessary space, but also to invest in the necessary space so that it supports the employees and ways of producing value the best. New dynamics include the digitalization and new technology as well as sharing economy, servitization and new generations.

Challenges of the concept according to DTZ (2015) and JLL (2016) are security issues and privacy in the highly collaborative environment and risk of dispersed organisation culture that rises from employees not being physically connected. Security and privacy issues are concerned with cyber and data security in addition to risk of business ideas and knowledge being leaked in the physical space. Quick burst of demand for co-working space could also cause availability issues if supply side isn't able to keep up. Van Meel and Brinkø (2014) state, that the fierce competition between co-working spaces makes focusing on customer experience the most important success factor. This effectively means concentrating on perfecting the user experience in every aspect and dimension, which creates demand for effective evaluation of the experience and feedback, as well as comprehensive knowledge on the matter to help designers to create successful spaces.

2.2 User Experience

2.2.1 Definition

Due to its commonly understandable and holistic nature, concept of user experience has gained popularity on many fields of research such as design, cognitive science, social science, business and anthropology (Battarbee 2008). This has produced numerous definitions, models and theories to describe its nature and structure. Development of new ways of working and changes that they bring have caused workplaces to become places for communities and planned and unplanned encounters, which has increased the need for workplace management in which user experience plays a key role (Nenonen & Kojo 2013).

User experience (or UX in short) is a holistic and multidisciplinary concept that comprehends the user, the object of use and the context of use (Battarbee 2008, Nenonen et al. 2012). In general the concept of user experience is usually concerned with products but is similarly usable to services and more complex entities, such as workplaces, which can be seen as an object of use. The UX is based on the concept of *experience*, which is the constant stream of self-talk that takes place when people are conscious (Forlizzi & Battarbee 2004). Experiencing produces *experiences*, which have a start and an end and are something that can be articulated or named and classified by a certain trait and they often inspire changes in emotions and behavior of a person (Forlizzi & Battarbee 2004). Someone who is experienced has had many experiences as they give the ability to learn and build knowledge and the reality is different for each individual as it is construct of their experiences and how they feel and think (Tuan 1977). *Co-experience* means sharing or creating of experiences together with others in social context (Forlizzi & Battarbee 2004).

As a term, user experience has been extensively used for a few decades, but with varying meanings (Law et al. 2008). Alben (1996) defined user experience from the perspective of product design as all aspects of the user's interaction with the company and its services and products. According to her, the first goal is to meet the exact needs of the customer without fuss or bother, then the focus should be on simplicity, elegance and enjoyment. Alben added that actual user experience exceeds fulfilling users' needs and offering certain attributes. The object of user experience can be anything from an individual item to complex integrated experience such as an airport (UXnet 2009).

Desmet & Hekkert (2007, p. 3) focused more closely on product experience and distinguished three major components for it. They defined product experience as "the entire set of affects that is elicited by the interaction between a user and a product including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience)." Desmet and Hekkert highlighted that cognitive processes like interpretation, memory retrieval and associations, are affected by individual and cultural differences, which causes different individuals to attach different meanings to same product. It is through these processes that people recognize metaphors, assign personality or other expressive characteristics, and assess the personal or symbolic significance of products. Emotional responses in turn arise because our biological systems that try to ensure our survival: "an emotion is elicited by an evaluation (appraisal) of an event or situation as potentially beneficial or harmful" (Desmet 2002). Pleasant emotions pull us towards products that are beneficial, while unpleasant emotions will push us away from those that are detrimental for our well-being. Both cognitive processes and emotional responses are based on the aesthetic experience however, i.e. the perception of the product and its structure, order or coherence by the perceptual system. Forlizzi and Battarbee (2004) also underline the significance of emotion by stating that it is at the heart of any human experience.

Hassenzahl & Sandweg (2006) described UX as a consequence of a user's: 1) internal state, including predispositions, expectations, needs, motivation, mood, etc., 2) the characteristics of the designed system, such as complexity, purpose, usability and functionality, and 3) the context within which the interaction occurs, e.g. organizational/social setting, meaningfulness of the activity, voluntariness of use and so forth. Hassenzahl and Sandweg's definition offers more evaluational perspective on the matter, focusing on what influences user experience instead of how to take it into account in the design phase of a product (Law et al. 2008).

Forlizzi and Battarbee (2004) grouped different theoretical approaches to examine experience into product-centered, user-centered and interaction-centered. Product-centered approaches, such as Alben's (1996), are most usable for design practices, as they examine elements and issues that need to considered while designing a product. They often provide information in form of a list of topics or criteria that can be used in a design process. User-centered models enable designers and developers to understand the people who might use their products, usually through a multidisciplinary approach to understand people's behavior and different aspects of experience. They often consider the motives and goals behind the users' behavior (Hassenzahl 2003, Mäkelä & Fulton-Suri 2001). Interaction-centered models also take advantage of approaches from different disciplines, but ultimately focusing in the actions and reactions of the user and how they engage with the object of experience. These have been classified in number of different ways, for example into passive and active or immersive and absorbing (Pine & Gilmore 1998) and operational, inventive, aesthetic and social (Margolin 1997).

Forlizzi and Battarbee (2004) divide user-product interactions themselves into fluent, cognitive and expressive. Fluent interaction is something that doesn't require people's attention, allowing it to be concentrated on something else, their example being riding a bike or morning coffee-making ritual. Cognitive interactions cause changes in the users since they include something new or that the users aren't used to, which causes users to focus on the product at hand. In expressive interactions users try to find a better fit between themselves and the product, such as a new or more efficient way to use it or by tailoring it to better suit their needs.

User experience is closely related to, and often mixed with, concepts of *usability* and *user satisfaction* and clear separation between these terms is crucial. Usability, as the name suggests, is focused on task efficiency and effectiveness, i.e. dimensions that are also an integral part of UX, but it lacks the non-functional aspects of experience that rise from e.g. aesthetics. User satisfaction, similar to UX, considers user's emotional responses and perceptions about a product or a service, including hedonic aspects of the experience, but in a more outcome-oriented way (Schmitt 1999). User or customer satisfaction can be statistically defined as "number or percentage of customers whose experience with a firm, its product or its services exceeds specified satisfaction goals" and it's a key performance indicator for many companies due its quantifiable nature and because gives an indication on how many of their customers would potentially return (Farris et al. 2010).

It was identified that measuring user satisfaction as such is not enough (Alexander 2008) and Vischer (2008) stated that "work environment evaluation studies have tended to focus on occupant satisfaction as the single outcome variable, thus limiting their value in the research arena". She continues by claiming that though focusing on general or certain attribute specific user satisfaction “may work for diagnosing discomfort and dissatisfaction with a view to solving building problems, it has added little to our understanding of how people perceive their workspace and the of effects of their social relationships and self-image on these perceptions”.

In order to unify varying definitions and terms used by researchers, an international ISO standard was introduced in 2009. The multidisciplinary nature of user experience and varying scale of analysis used in research had produced a wide range of definitions and differences in perspective, focus and time dimension (before, during or after the interaction). The international standard on ergonomics of human system interaction defines user experience in ISO 9241-210 as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service" (International Organization for Standardization 2009). According to the definition, user experience includes all the emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that the user has before, during and after the use. The interconnectedness between UX and usability is recognized and the standard notes that usability criteria can be used to assess aspects of user experience. While usability includes primarily utilitarian aspects of the system, UX concentrates on feelings produced by both utilitarian and hedonic aspects.

Study by Law et al. (2008) gives strong support for the compiled ISO definition. Most respondents in their study, who were researchers and practitioners in the field of UX, agreed on the dynamic, context-dependent and subjective nature of user experience. However, the question whether experience is social or individual was controversial. The authors argued that though the social context is highly influential and a group can experience together, the holistic user experience is still inside each individual in that group and varies between them. They quoted one respondent who stated that: “Only an individual can have an experience but I believe it can be externalized (albeit poorly) and recognized and related to by others” (Law et al. 2008). Difference of user experience to other experiences, such as brand, product and service experience, was also highlighted. It was argued that user experience shouldn’t be limited to products or services, as it is also affected by the company behind the product. Brand experience on the other hand was argued to be broader concept, including all experiences the user or customer has with that brand.

One element of user experience is its temporal dimension or situationality, as it is pointed out in the ISO standard. Though experience happens in a certain moment and its start and end can be defined, it is affected by user’s previous experiences and it will change as time goes on after the moment. Sward & MacArthur (2007) defined user experience as “the value derived from interactions or anticipated interactions with a product or service and the supporting cast in the context of use (e.g. time, location, and user disposition).” Thus, in order to assess the true UX, it needs be done while user is interacting with the product or service. The respondents in the survey of Law et al. (2008) argued though that the different experiences can be compared in spite of the fleeting nature of the circumstances and some even suggested that the UX should be assessed both during and after the interaction to gain a complete picture. The authors highlight understanding the formula from expectations before the interaction to emotions during and after it as an interesting research for the future.

Relationship between different experiences and emotions was defined by Forlizzi and Battarbee (2004) as *scalability of experience*, i.e. the infinite amount of interactions and responses that contribute to larger experiences over time. Larger and more emotional and connected experiences stay influential and in memories over time. For example the overall experience of a workplace consists of multiple different experiences of different size and meaning over time, which are affected by those in the past. An isolated negative incident such as malfunctioning elevator is usually quickly forgotten if it's not that significant, but it may build up to overall feeling of dissatisfaction if similar incidents are frequent and spaces and services continuously fail to support the activities in them. Of course even an isolated incident may stick in the memory for a long time if it's meaningful enough or connected to other experiences and memories, such as broken AC on the hottest day of summer.

2.2.2 User experience in workplace

User experience in the context of workplace is defined by *experience of place*. Here experience can be seen as a cover-all term for various modes through which people know and construct reality, which in addition to the primary senses and modes like symbolization, include sense for orientation, posture and locomotion through vestibular organs as well as to air quality, pressure and temperature (Tuan 1977). A stimuli from our environment triggers the perceptual sensory system and arouse our consciousness (Crick & Koch 1997). Experience of space is created by the ability to move in a space that is observed by eye sight and depth perception provided by eyes as well as the hand-eye coordination gives ability to estimate distances and get a feeling of what is near and what is far (Tuan 1977). Hearing and scent deepen the experience, as hearing can give us information about the scale of the space and scent can create strong links to previous experiences. When considering an experience of place, all these senses and modes are important and influence together the forming of the experience.

This experiencing is usually passive and happens without humans concentrating or putting effort into it (Pine & Gilmore 1998) although one can also actively seek experiences, to widen their reality and build knowledge by adventuring into the unknown (Tuan 1977). The received information from the environment is processed in various levels, sometimes consciously and sometimes unconsciously (Clements 2006). Different pieces of information are recognized and labeled with meaning by comparing it with data in database of past received information that humans gather during their lifetime. The database changes constantly, which is why same piece of information can cause different responses in person as time goes on. Experiences also categorize data and appropriate responses in human brain and create links, which is why stimuli like visual perception of something or a sound that person has experienced before can cause positive or negative response solely because the past experience is associated in the database with a positive or negative feeling.

Positive and negative feelings during experience are linked to users' needs and them being fulfilled or denied. When experiencing a place, this is crucially impacted by the fit between the environment and the needs of the user, which dictate users' behavior and how they need environment to support them. This varies between people, not because the basic needs are different but because some needs are stronger for others and also because individual preferences and differences. Max-Neef et al. (1989) stated based on their study that fundamental human needs are finite, few and classifiable, and that the needs are the same in all cultures and in all time periods and what changes is the way in which the needs are fulfilled.

In work environment, user needs can be divided to physical, functional and psychosocial needs (Vischer 1989). Needs in these categories are based on fundamental human needs, such as those presented by Max-Neef et al (1989) or Abraham Maslow's (1943). In his theory, Maslow suggest a hierarchy of needs that define human behavior and satisfaction, which range from basic physiological needs, like food and water, to needs of higher order such as self-actualization based on their prepotency.

Physiological needs include the most basic human needs that consider physical survival, such as food, water, warmth and rest. Fulfilling basic needs is more essential and people tend to spend more time and effort on them (McLeod 2017). Safety and security are on the next step of the hierarchy, which can be also accounted as basic needs. Feeling of safety and security are a sum of multiple factors such as physical security, job, health, income, future and socially challenging situations. Social needs include friendship, intimacy, trust and acceptance as well as receiving and giving affection and love. All people have a need to belong and have meaningful relationships, which affects interpersonal relationships (Baumeister and Leary 1995). Esteem needs are divided by Maslow (1943) into esteem for oneself, which include dignity, achievement, mastery and independence, and the desire for reputation or respect from others.

On the top part of the pyramid, presented in Figure 3 representing Maslow's motivational model (Maslow 1970a, 1970b), are cognitive needs, which include need for knowledge and understanding, curiosity, exploration, meaning and predictability. Aesthetic needs consider the appreciation and search for aesthetic beauty, patterns and balance, which people need to experience in order to continue their progress towards self-actualization. Self-actualization needs that are about realizing one's potential and seeking personal growth and peak experiences, to become everything one is capable of becoming (Maslow 1987). Transcendence needs, or spiritual needs, are motivational factors that transcend beyond personal needs, such as services to others.

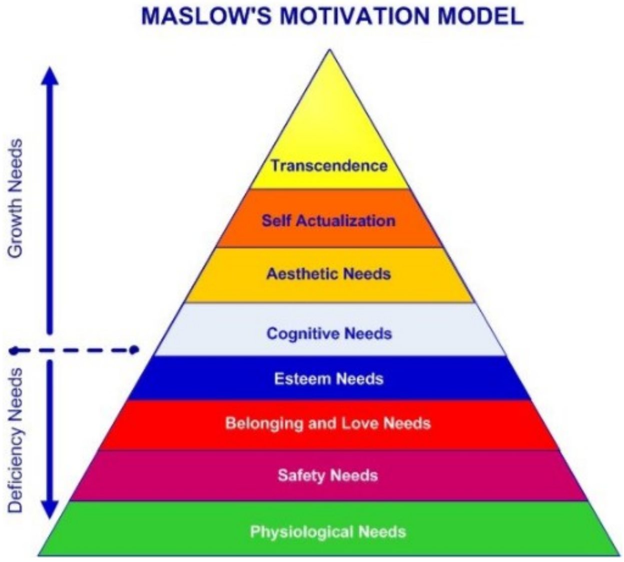

Figure 3 Maslow's motivational model

First four categories of needs in Maslow's hierarchy are deficiency needs, that arise due deprivation. The deficiencies motivate people and the longer they endure, the stronger the need to fulfil them becomes (Maslow 1943). When a deficit need is somewhat satisfied, other less satisfied needs will start to guide people's behavior, becoming so-called salient needs. Growth needs, i.e. the self-actualization needs, in contrast don't fade as they are being fulfilled, but become even stronger since they don't arise from a lack of something but from desire to grow and fulfill one's potential.

While Maslow's theory fails to answer how exactly the subject decided its most urgent needs, McFarland and Sibly (1975) introduced and idea that all motivations converge on a 'final common path' and that the brain uses a pleasure or joy as common currency to rank competing behaviors and needs and decide the outcome. Thus it compares all the needs that are present in a certain moment and choses the one which it expects to produce most satisfaction. In experiments where different needs have been pitted against another, subjects' behavior have been seen to be repeatedly coherent and aimed for the maximum pleasure possible (Clement 2006). It was also pointed out though that individuals sometimes behave in a way that doesn't produce them pleasure or joy in that moment, but they expect it to produce those feelings later (Cabanac 1992). While pleasure and joy are momentary feelings, comfort and happiness are more stable states of satisfaction or dissatisfaction which come from continuous fulfilment of needs.

The comfort-fit model by Jacqualine Vischer (2007) describes the relationship between user needs and work environment and how well the environment can answer to the needs of individuals. Mismatch or 'misfit' between the environment and the individual causes workspace stress that affects one's health, performance and satisfaction. The three hierarchical categories of 'environmental comfort' include physical, functional and psychological comfort, which are presented in Figure 4 (Vischer 1989).

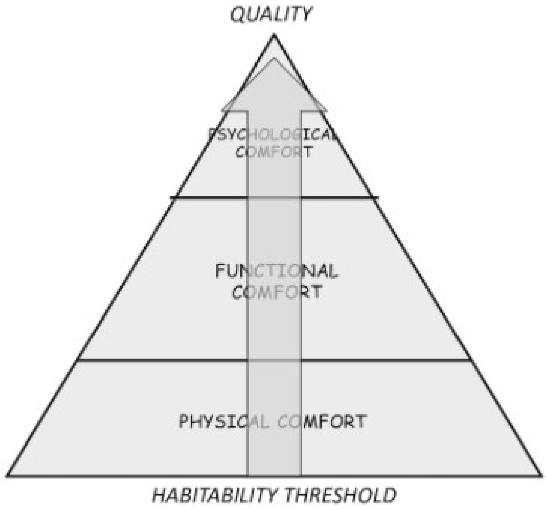

Figure 4 Vischer's model of environmentl fit

Physical comfort includes the basic human needs presented by Maslow (1943) of warmth, safety, hygiene and accessibility, and without an acceptable level of performance on this category, the space is inhabitable. They represent the bare minimum what is needed for people to just be in the environment. These physical needs can be met by following building codes and standards, which give the basis for comfortable physical environment, and the value produced is based on necessity (Vischer 2007). Performance in this category can be measured to a large degree by measuring the physical quantities and gathering objective user feedback. Once an environment fulfils the basic human needs, such as health and safety, users need the environment to support their activities they are there to perform.

Functional comfort describes the ergonomic support of the space for users' tasks and activities. This can mean furniture ergonomics, layout, lighting etc. elements which affect how well the user can focus his or her energy on performing work. Functionally unsupportive space draws energy and effort out of the worker to cope with problematic environmental conditions, not allowing to direct it to the tasks at hand. Value is calculated from measuring the performance of workers, i.e. how effectively they can perform tasks. In physical environment, inability to adjust furniture layout can mean that the employee can't take full advantage of the space, decreasing his or her efficiency.

Psychological comfort is created by feelings of control, familiarity and belonging. Control can be environmental or about one's accessibility towards others (i.e. privacy), and can affect workers through enabling mechanical or instrumental control or empowerment. Belonging can be individual or collective feeling of being in possession of the space. Familiarity is about the ease of use and associating the space with other pleasant or familiar settings through perceptions. Concept of territoriality is also essential.

The environmental comfort model (Vischer 2008) states that the optimal working environment can be most efficiently and probably achieved through quality in all three categories, although shortcomings in one can be at least partially compensated in another. The basic human needs are more difficult to compensate than the higher level needs though, as they are the basis for well-being of the individual, as argued by Maslow (1943).

Mobile work and work in virtual workplace has its own challenges on physical, functional and psychological fit. Ergonomics and layout of physical workspace are often highlighted as the setting is usually something that is not design for working, such as commuting vehicles and cafeterias. Hyrkkänen et al. (2012) found out that people were struggling to find places for quiet work or confidential discussion while on the move and inappropriate furniture causes fatigue of musculoskeletal organs. At the same time especially mobile phone allows people to adjust their postures and move around, which helps the fatigue generated by traditional work at a workstation or by working on a laptop in non-suitable locations or postures.

Most influential aspect of functionality in virtual environment is often the availability, speed and functionality of internet connection, while functionality of tools and applications is also essential. The lack or paucity of functional power sockets, internet plug-ins or wireless webs hamper work especially during transitions (Hyrkkänen et al. 2012). In their study, Hyrkkänen et al. also found out that since workdays of mobile workers were often busy, use of technology was expected to be quick and smooth, which lead to irritation, i.e. technostress, if this wasn't the case.

The selection of the communication tool has essential impact on the psychosocial comfort as it affects the feel of belonging and thus the feeling of territoriality. More information rich means of communication enable greater feeling of belonging and also virtual team building methods like sharing photos of leisure time and calls for no particular reason contribute to it (Hyrkkänen et al 2012). The issue of being ever available through virtual tools can lead to loss of feeling of control and mixing platforms for leisure and work related content is sometimes seen as a privacy issue.

Overall, Hyrkkänen et al. (2012) found Vischer's model to be useful for assessing virtual places and spaces. They emphasized challenges of controlling the simultaneous co- and telepresence, simultaneous use of many virtual communication and collaboration channels as well as simultaneous use of work and leisure related virtual channels. Also the vitality of functional connection, i.e. accessibility, causes the usability threshold (or the habitability) of the space to be at the functional level. Hyrkkänen et al. (2012) state that developing a well-functioning virtual workplaces for mobile employees requires extensive attention to the whole system and collaboration between different actors.

Other environmental psychologists such as Nigel Oseland (2009, 2017) have also used Maslow's hierarchy of needs to connect health, wellbeing and performance in work environment. He classifies the requirements of successful and supportive workplace according to Maslow's hierarchy, by starting with the basic needs that ensure health, then equipment and facilities in order to perform the different tasks, followed by safety and security, comfort and biophilia, social and quiet and at the top of the pyramid, choice. Oseland (2017) emphasized the balance between social environment and privacy, or quiet, since both introverts and extroverts require a bit of both, as well as the freedom, empowerment and trust, which enable us to pursue the higher level needs in the hierarchy.

The comfort and biophilia, i.e. the support for the biophilic needs, is connected to environment role as a restorative element. According to 'Attention restoration theory' by Kaplan (1989), people constantly direct their attention to different things which causes mental fatigue. Directed attention is essential for maintaining focus and repelling distractions but it requires effort and will become less effective with sustained use. Mental fatigue causes decreased problem solving capabilities, reduced ability to focus attention, impulsiveness and increase in the amount of errors.

Being able to recover from gained fatigue throughout the day is essential for maintaining a good performance level. Restorative settings that promote recovery have four key elements: being away, extent, fascination and compatibility (Kaplan 1989). Being away means physically or mentally breaking away from things that cause fatigue, for example by a change of scenery or a change in mental content. Extent is a feeling of immersion in a rich coherently structured environment that fully absorbs the user to be a part of the whole. Fascination is involuntarily directed attention, triggered by an interesting object in the environment, that doesn't require effort and thus allows the fatigued attentional system to rest. Fascination occurs in varying intensities from "soft" to "hard", soft representing a setting that allows reflection, such as a beautiful scenery or other natural amazements, and hard fascination describing a setting that does not, such as an intense movie or competitive sporting event. Compatibility means a perfect fit between the goals of the individual and the information provided by the environment. Although natural environments have been found to better include the four elements than urban ones, there is no difference whether the setting is directly or indirectly experienced (Felsten 2009).

Juhani Pallasmaa (1996) argues that buildings should be a multi-sensory experience as the invigorating power of nature is due to its interaction with all senses. Vision may be the most prominent source of information in most cases, but other senses have just as important part in formation of the holistic experience of environment. Soundscape in a building can give a feel of monumentality or hostility and a scent is often one of the most persistent memories that people have of a place. Senses interplay with each other and combination of for example sight and touch enables person to get a feel for the scale of the space and distance of different things.

2.2.3 Measuring user experience in workplace

Growing interest towards the emotional side of the experience in recent years also sets new demands for measuring the experience (Ganglbauer et al. 2009). While traditional methods focus on functionality and usability and often from the perspective of the designer or the producer, new methods need to be more user-centered and evaluate all aspects of the experience, including the hedonistic ones. These can help understanding and developing the multi-sensory environments that Pallasmaa (1996) for example presented that the modern work environments should be. Study by Veermeeren et al. (2010) revealed need for early-stage methods and methods for measuring social user experience as well as establishing practicability and scientific quality.

Methods for measuring different elements of user experience and usability of space can be divided into three categories: Physiological, Objective and Subjective (Ilgen 1991). Physiological methods are, in theory, the most scientific as our negative and positive experiences cause reactions in our body, through e.g. stress or happiness hormones, which can be quantitatively measured. Problem of these methods is their vulnerability to distractions and the intrusive nature of measuring. Objective methods in other hand are the least intrusive in nature as they observe the behavior of the subject. Subjective methods gather user's opinion on different aspects through questionnaires and interviews for example and although they may lack in empirical and quantitative aspects, individuals are argued to be likely to work according to their feeling despite what physiological or behavioral performance measures suggest (Nenonen et al. 2012). There is no single method of measuring to profoundly examine user experience, instead studies these days are a combination of multiple methods. One challenge of these studies is combining the subjective and often qualitative data with quantitative measurements.

For purpose of measuring experience of places, subjective measures have been used most extensively (Rasila et al. 2012). Subjetive methods include methods like questionnaires, interviews, narrative techniques and contextual inquiries (Ganglbauer et al. 2009). These are mostly based on self-reporting and gather users' perceptions about the object of the study. Objective methods can include monitoring user's behavior while he or she is using a space.

Physiological methods, though they would be extremely interesting to deploy and would possibly be revealing, still need excessive amount of equipment for the actual data gathering process and expertise in analyzing the data and connecting it with the phenomena that are being studied. Electroencephalography (EEG), electromyography (EMG) and electrodermal activity (EDA) measure activity of the brain, muscles and eccrine sweat glands respectively as positive emotions activate different muscles than negative emotions and eccrine sweat glands are said to correlate linearly with arousal (Ganglbauer et al. 2009). However all these methods require electrodes and cables fitted to e.g. face and head of the subject, which is highly disturbing and also expensive to facilitate. Different hormones can be measured by taking samples of blood or saliva, but these can only be executed on certain intervals like after a work day which limits applying them for measuring individual experiences in the spaces, is prone to factors that are not accountable and is also fairly expensive to facilitate. Methods that are least disturbing are practically limited to measuring heart rate, which tells about the arousal of the subject, and variability of the heart rate that can be used to measure positive and negative valence of an experience (Ganglbauer et al. 2009). In future different kind of chips and measuring devices that can be inserted into blood circulation and used for measuring amount of hormones on the go can help the practical problems of the physiological measuring, but they still remain fairly intrusive in nature and require ways to ensure privacy of the subject.

Methods can also be divided based on their focus and perspective. *Post Occupancy Evaluation* (POE) is a general classification for facility oriented evaluation methods used for building during use (Preiser et al. 1988). They focus on the physical and technological attributes of buildings and are intended to discover how building, product or a service has worked for its intended use via a process of systematic collection and analysis of data and comparing it to performance criteria (Becker 2018, Rasila et al. 2012). POE's assess how well users', such as employees, building staff, visitors and particular interest groups, functional needs are met and tries to identify aspects where its performance can be improved. POE can be used to fix problems of new buildings, assessing development needs of and older building or developing new ones (Preiser 1989).

One problem of POE methods, in regards of actually developing and improving usability and user experience of buildings, is that according to Vischer (2009) the results of post-occupancy evaluation rarely lead to changes in building design and same mistakes are made over and over again. They are also fixed on assessing buildings fitness to its use. Other building evaluation methods like DQI (Design Quality Indicators), BIU (Building in Use) and BRE (Building Research Evaluation) have been developed based on POE and there have been different tools developed also for modeling and measuring services, such as service mapping and *serviceability tool* (Rasila et al. 2012) which evaluate the fitness of the building from different perspective and with different focus areas.

While POE methods are focused on the physical aspects and functionality of the building or space, which are essential but not the only criteria for good user experience, *usability evaluation methods* (UEMs) take into account physical aspects and functionality factors but inspect them more from the perspective of the user (Rasila et al 2012). Key factors for usability are effectiveness, i.e. whether users can achieve what they want to do in the space, efficiency, i.e. how long it takes the users to achieve it, and satisfaction, i.e. their feelings and attitude towards the product. Assessing the phenomena from users' perspective allows discovering different aspects than when it is done in facility oriented way.

Though usability is an abstract concept, measurable attributes can be used to assess it by valuing for example how fast and easy the learning process is and how efficient the actual use is (Nenonen et al. 2008). Tools such as heuristic evaluation and formal usability inspection can be used to identify problems in the early stage of design phase, while cognitive walkthrough focuses on ease of learning. Methods for assessing usability are mostly from field of product development, but according to Nenonen et al. (2008) they can be applied to both physical and virtual environments. Well regarded UEM's for evaluating spaces include e.g. walkthrough audits (Nenonen & Nissinen 2005), customer journey (Christopher et al. 1991) and critical incident technique (CIT) (Flanagan 1954), which use different combinations of interviews, surveys, observations and indoor attribute measuring in order to assess how users and activities are supported by the environment. Idea of usability walkthroughs is to go through all aspects regarding the usability along the process from the perspective of the user and evaluate possible shortcomings along the way.

Usability evaluation methods can often be expanded to evaluate user experience in more holistic way as well. Since usability can be seen to be part of user experience, UX evaluation methods can incorporate aspects of UEMs but need expand them to cover more emotional aspects of the experience also (Vermeeren et al. 2010). Goal of critical incident technique is to identify moments in the use process with were somehow exceptional, in either good or bad, however this perspective dismisses those moments which are not exceptional (Flanagan 1954). Sequential incident technique (SIT) meanwhile evaluates all incidents that the customer perceives during the entire process (Nenonen et al. 2008). Defining the customer path is naturally central for this approach, with objective to understand the typical moments customers experience along the process, i.e. defining the customer journey.

Similar to CIT and SIT, customer journey method is process oriented as it specifies the experience in structural manner. First phase in the method is to understand the different phases the user has from being a possible user to being a regular and former user (Nenonen et al. 2008). This categorizes the journeys and needs of the user depending on the phase. It is also necessary to define all the possible users of the product or service, in order to investigate all the possible customer journeys. Once these are steps are taken, the actual user experience is examined through for example surveys and interviews.

Although process oriented methods are helpful for categorizing the different user experiences and understanding the different moments along the way, they can be fairly heavy to execute. Defining components and aspects for each phase of the customer journey and for each different customer requires considerable work even before actual gathering of data and analyzing it. They don't offer any actual way to break the experience into smaller components either, which would allow to understand and analyze all possibly meaningful factors for the experience.

Diller, Shedroff and Rhean (2005) presented a comprehensive model for user experience from the perspective of experience design that makes it possible to analyze non-measurable and invisible experiences, feelings and views of the user. They divided experience into six dimensions that are:

1. **Time/duration** is about the offered experiences stretching outside of the timeframe of the provision process
2. **Intensity** is about engagements where customers' attention is present during the experience and becomes a habit with repetitious experiences
3. **Interactivity** is about the type of engagement people have in an experience, whether passive, active, or interactive
4. **Breadth/consistency** is about the experience of consistency, e.g. about the organization's strategies and messages being appropriate for each experience
5. **Triggers** are about redefined design, which results in new solutions and reflects the judgment and preferences of the designers regarding experience

6. **Significance** is about the meaning of the experience to the user: levels of emotions, values, and meaning, which often surpass the set tangible resources such as budget or feature requirements by users

This model was developed for the designers and as such it doesn't directly apply to examining experience of place from the users' perspective. However Nenonen and Kojo (2013) modified the model by Diller et al. to fit workplace setting by recognizing convergent themes in the dimensions and finding more suitable and contextual counterparts for them.

Based on their findings, Nenonen and Kojo (2013) propose the following dimension for the experience of place:

1. **Frequency** (Time/Duration) is about the use, sense and rhythm of time in the place, which usually refer to different activities that are happening in the place. Dimensions also includes the sense of history.
2. **Familiarity** (Intensity) is about easiness of using and learning to use the place.
3. **Functionality** (Interactivity) is about support to activities and performance and easiness to change the place for different purposes. Usability are users' perception of control are integral concepts.
4. **Narrative** (Breadth/consistency) considers continuity and consistency of the story of the place through features such as identity, brand and purpose of the place.
5. **Atmosphere** (Triggers) is about the holistic sense-experience of the place which is created by sensory environment and cognitive symbols such as signs.
6. **Importance** (Significance) is about meaning and significance of the place to its users by supporting users' identity and values. It relates to concepts of appropriation, attachments, belonging, ownership, control and privacy

Nenonen and Kojo (2013) conceptualized the model by labeling each dimensions with descriptive words with same first letter to create the 6T-dimensions of user experience of a place.

Table 1 6T concepts

T-concept	Area of concern	Aspects
Tune	Atmosphere	Sensory environment and cognitive symbols
Tempo	Time	Use of time, sense of time and rhythm, history
Task	Functionality	Modifiability and support of activities and performance
Tie	Familiarity	Learnability and ease of use, memorability
Tale	Story	Continuity and consistency of the story and narrative, visibility of history
Theme	Meaning	Support of users' identity and values

A set of questions in each category can be used for analyzing experiences (Tähtinen et al. 2016). These are presented in Table 2.

Table 2 Relevant questios for each T-concept

T-concept	**Meaning and relevant questions**
Tune Atmosphere	The tune indicates the first impression of the experience • How do we feel in the place? • What kind of sensual and emotional experience is it? • What is the first impressions based on sensual, emotional and cognitive triggers?
Temporality Frequency	Temmporality indicates the state of existing within or having some relationship with time. • How do we experience the history, presence and future of the place? • What is the rhythm and tempo of the place?
Task Functionality	Task indicates the charge, assignment, detail, mission, engagement, occupation, undertaking, exercise, business and responsibility that area connected to the purpose of being in the place. • How does the place help me fulfil the task I am supposed to do? • How can I affect the place to fulfil the task I am supposed to do?
Tie Familiarity	Tie indicates the connections and links and how we use them. They are the things that link our behavior in a place with cognitive and social maps. • How easy it is to connect to the place? • How much effort do I have to give for fluent connectivity?
Tale Narrative	Tale indicates the story and narrative of the place and has these synonymous expressions: anecdote, history, legend, fable, myth, parable, allegory and saga • What kind of story does the area tell? • How is the story told? • How consistent is the story?
Theme Significance	The theme indicates the general meaning, sense, or content of a place to its users and includes the course of a person's life or habits. • What is the meaning of this place to me? • What effort am I willing to make in this place? • How important is the place to me?

Kojo and Nenonen (2014) successfully used the framework to identify elements of user experience that the Aalto University Design Factory building, an innovation hub type for a co-working place located in Espoo, Finland, should support and how. They argued that the model was functional for its purpose on provided feedback that they may have not acquired if some other framework had been used. The 6T-model was also used in a study by Tähtinen et al. (2016) to understand factors that make Punavuori neighbourhood in Helsinki, Finland attractive to its users. The study yielded positive results about the usability of the framework, making it easy to identify common points and ways of connection people had to the area.

2.3 Profiling

Understanding the requirements of mobile and multi-locational work is essential when developing ways of working and workplaces (Vartiainen et al 2005). Companies sometimes falsely assume that all knowledge workers learn and work the same way, which is harmful especially when developing and investing in a workplace. Failure to recognize different groups within one's workforce can cause investments towards new working environment to be wasted and lead to inability to achieve goals that were set for the project. It's also not reasonable to examine each individual separately, as it would make analysis and decision-making too complicated and demand unnecessary amount of resources (Greene & Myers 2011).

Profiling is a technique used for describing and clarifying behavioral models of individuals, by finding certain common factors (Chang et al. 2008). It allows designers to group people with similar needs and preferences, to be able to develop services for wider range of users. Profiling is focused on human-centric design and it is guided by the possible users of the service and it also offers coherent means for communication between designers, developers, marketing and management (Pruitt & Grudin 2003). Profiles can include needs, goals, skills and preferences that are associated with members of certain profile. These allow identifying behavioral models and possible responses to environments, services or situations, making design and decision-making processes more feasible.

Profiles are influenced by the role individuals have in their organization, i.e. job description, knowledge and skills, in addition to their own traits and persona (Rantala 2017). Although people can have several roles in the organization, usually one of these is defining; for example salesmen are often highly mobile as they visit possible customers at their offices while financial administrators are usually explicitly fixed and customer servants are on the phone for the majority of their work day. Thus the different roles tell about people's behavioral models and needs and what kind of profiles there might exists.

Profiles of knowledge workers can provide information on how and when they are available, where they work, how they work and how they handle data, thus allowing to understand especially their ways of working (Rantala 2017). For example, when designing a new workplace, profiling the users by their mobility is often useful. Anchors are users who mainly work at their desk and only have occasional meetings inside or outside the office (Greene & Myers 2011). Connectors work in various locations around the office as they interact with multiple departments and connect information inside the organization. Gatherers gather information from outside of the organization by visiting clients and partners and then bringing it back to the office. Navigators mainly work outside the office. The ratio between these profiles tells the designers about the nature of work that is done in the organization and how many workstations, meeting rooms and other spaces is needed in relation to the number of employees.

One adaptation of profiling is individualizing the office environment for users. Langensiepen et al. (2014) present that analysis of the office workers' activities of daily working in an intelligent office environment can be used to both optimize energy consumption and office workers' comfort. This can be achieved through monitoring user with sensors and profiling them by their behavioral models. Though the model presented by Langensiepen et al. is far for complete, it shows initial promise and teases what could be achieved with further development of the analysis.

Profiling thus is a useful tool in many aspects of human-centered design and it can also be utilized in developing digital environments and virtual workplace. According to Nelson et al. (2017), investigating digital behavior and needs of users can support design of digital environment and understand changes in the ways of working.

2.3.1 Digital profiles

Digital profiles by Rantala (2017) describe how digitally oriented knowledge workers are. In her study, Rantala asked respondents ten statements concerning technology that covered for example their skill, experimentality, eagerness to replace traditional methods and interest towards technology in general. Respondents scored these statements with points from one to five and based on the overall amount of points, the respondents were divided into four groups As a results, following profiles emerged:

1. *Early adopters* are extremely interested in technology and follow the latest trends eagerly. They are eager and open to trying new tools even though they might still be unproven and learning to use them is effortless. Early adopters can often solve their and their colleagues' technological problems on their own and using technology feels natural and efficient for them. They are often totally paper free, only rarely resorting to taking notes on paper. Early adopters are active and innovative user of social media and suffer from minimal technostress, which spurs mostly from for example malfunctioning or in some other way non-optimal tools. Corporations are usually too slow or non-supportive regarding technology for their liking.
2. *Exploiters* are not that interested in technology and only use digital tools when they boost productivity and are actually helpful. If traditional method feels more natural and efficient method for them, they are not willing to replace them with digital ones. The exploiters feel that digital tools are too often used to boost productivity and efficiency when in reality they just increase the amount of unnecessary work. When digital tools work properly and the exploiters know how to use them, using them feels effortless to them and more often than not they are able to independently solve technical problems or challenges that arise. The exploiters use social media when its useful or necessary for their work and feel some technostress, caused mostly by non-functioning technology and unnecessary tools.
3. *Learners* are interested and willing to use different digital tools and open to replacing traditional methods with them, but for some reason (usually lack of time for learning or lack of support from organization) they aren't able or capable of taking advantage of them as much as they'd want to. The learners feel that they don't get enough tutoring from their employer for using digital tools and often when there's a technological problem, they aren't able to solve it on their own and need assistance. They actively use social media, sometimes for work also, and are interested in the possibilities it can offer. They suffer from moderate technostress that is caused by poor usability of systems and emerging problems, as well as lacking support from the organization.
4. *Bystanders* prefer traditional methods, such as pen and paper, over digital tools. Learning to use new applications or devices is a challenge and they aren't usually eager to do it. Bystanders are also generally not interested in technology or digitalization. They are not active on social media and prefer traditional means of communication like phone calls and face-to-face conversations. Bystanders often need help for solving technical problems and suffer from considerable technostress which is caused by complexity and uncertainty of technology as well as the growing dependence of it.

These are of course Rantala's qualitative interpretation of the results and in a way artificial partition of people into four types of digital profile. Some might affiliate themselves with more than one profile and some aspects regarding the use of technology or opinion about it don't necessarily fit to all members of a profile. Still, they give an indication about one's tendencies, views and needs and thus offer a usable classification for its purposes.

Age and gender affected the demographics somewhat in the study (Rantala 2017). Although all profiles were found in each age groups, share of early adopters were higher in midst of younger respondents. Also larger proportion of early adopters were men, while learners were more often women. Number of years spent in the current organization didn't have any effect.

Rantala (2017) proposes that these profiles can be used to support employees better and in a way that is fitting for them. For example early adopters need organization to enable development and experimentality regarding technology and to offer range of tools that are up to date, while learners and bystanders require more support and training. Furthermore, taking into account the different levels technostress and attitudes towards technology when designing spaces can yield positive results as for example bystanders may long for technology free moments to invigorate oneself during the day, while early adopters may use breaks to surf social media.

Digital orientation can also tell how different individuals use digital tools and especially what tools, and thus what they require from their surroundings. As early adopters may fair well with using just digital tools for work, exploiters may long for traditional methods such as post-it notes and flip charts (Rantala 2017). Different needs of the users can be accounted for when developing the environment and to consider functionality, wellbeing and comfort.

2.4 Summary and propositions

Workplace is a comprehensive and complex concept that includes the different physical and virtual spaces, i.e. the physical and virtual workspaces, and the social layer and the different actions that are performed there and meanings people associate with them. Workplaces and workspaces are under constant change and development, partly due to the constantly changing ways of working. Rise of knowledge work, multilocational work, mobility, collaboration and digitalization are revolutionizing the space and place and co-working spaces are, in a way, the epitome of this development. As many believe they are the future of office space market, or at least a considerable part of it, they are a worthwhile object of new workplace studies.

Experience of place includes all emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that the user has before, during and after the interaction. User experience of workplace consist of numerous smaller interactions and experiences with physical and virtual spaces, people, services and actions performed in the place. User needs dictate people's behavior and relationship with the environment and the extent to which the environment fits the needs causes comfort or discomfort, i.e. positive or negative experience. People with different needs, preferences and behavior can be divided to certain profiles, that simplify different behavioral patterns and responses that individuals may have. Measuring user experience has been limited to measuring physical attributes of the space and its usability from perspective of the premises or designers in the past, but also new methods focusing on the holistic experience of the user have been developed. These can be used to gain knowledge on the both functional and emotional aspects of the place.

Based on the digital profiles by Rantala (2017), more digitally oriented people should more extensively use digital services as they are more experimental and open to test, learn and substitute traditional methods with digital ones. Digitally oriented people are also more dependable on them as they have substituted traditional methods with digital ones and are used to working with them. Digital services, used to a certain extent by individuals, have been created to help them work and perform more efficiently, make activities more effortless and enjoyable and enhance communication and socializing. In addition to being tools for other activities, the services also creates individual user experiences as user interacts with them which contribute to the whole.

Usage of digital services provided by both the premises and their employers should then affect the user experience of individuals. Also since people with different digital profile have different needs for the digital tools and use different methods for working, and have different perceptions and preferences, they should also have different needs and preferences towards the environment and hence experience it differently.

Based on theoretical framework, three propositions can thus be constructed:

P1: Digital profile affects the usage of digital tools and services

P2: Digital profile affects user experience

P3: Usage of digital services affects user experience

The three propositions are interconnected. Digital profile should affect how much and what tools and services the user uses. In turn, using certain digital services should affect the general user experience since the experience the user has with the service contributes to the overall experience and the service can also contribute to for example using the spaces by making them easier to use. As the digital profile and the use of digital services should be connected, digital profile should hence also be connected to the user experience.

3 Methodology

3.1 *Context*

Object for the case study is Maria 01, a co-working hub and a community of startup ecosystem located in the center of Helsinki, Finland. Maria 01 has around 700 members and 10 000 sqm of space, spread in the premises of old Hospital building converted to office use.

The community is mostly composed of diverse tech startups, investors, accelerators, and partners of Maria 01, forming the largest gathering of startups in northern Europe. Maria 01 itself describes the community as “a league of tech entrepreneurs and investors building the future.” Startups represent innovative fields such as artificial intelligence and e-commerce for example. The members are mostly on the young side, between ages of 20 and 35, innovative and entrepreneur spirited.

Maria 01 habits an old hospital building built in 1880’s, consisting of complex network of corridors and small rooms. HVAC systems and other technology has been naturally installed later. Despite some upgrades to bring the building to the 21st century, it hasn’t seen a massive overhaul meaning that most original partition walls and structures are still in place. Building was converted into office style use before 2016, when Maria 01 started its operation in the premises and the largest makeover can be seen in ground floor in the premises of the restaurant Starter and in the premises of individual startups or companies that have financed the changes by themselves.

The premises consist of dedicated workstation in enclosed offices and team spaces, non-dedicated workstations in open office, phone booths, “random nooks and crannies to work in”, meeting rooms and spaces, lounge, event spaces and restaurant. Event spaces and the restaurant are available for external users also, other spaces require membership.

Despite having quite historic spaces in use, Maria 01 offers some interesting and modern digital services. Control access to the different spaces is organized with an mobile phone application, meaning that there is no physical keys, and guests who arrive to visit the premises can log in by a tablet in the lobby which then informs the host about the arrival of his or hers guest. There is an info screen showing information about upcoming events and other relevant information in the lobby. Meeting room reservation can be done in Maria web site or in a web-based reservation system with a mobile phone application planned to be released in the near future. In-house communication is done in Slack, an information sharing and collaboration software that uses different channels that members can join and create and there is also Office R&D in use for managing members and the community. Both have mobile applications.

3.2 Research methods

Scientific research can be performed using different methods, which can be divided to quantitative and qualitative methods (Rajasekar et al. 2006). Quantitative research is based on measuring quantity or amount by applying statistical, mathematical or computational tools on numerical data which is usually collected at the beginning of the research. It investigates questions what, where and when. Qualitative research studies quality of certain phenomena non-numerically, by applying reasoning and trying to describe why and how something happens.

Quantitative and qualitative methods are often regarded as contrasting methods but they can also be used together in a single study to support each other. This is called a mixed-methods approach, where quantitative and qualitative research techniques, methods, approaches, concepts or language are mixed into a single study (Johnson & Onwuegbuzie 2004, Cresswell & Clark 2011). Reasons and needs for using mixed-method approach instead of either quantitative or qualitative method alone can be for example insufficiency of one data source, need to explain initial results or to enhance study with a second method. When the methods are employed sequentially, it is called sequential mixed method approach (Creswell 2009).

Sequential mixed-method approach was chosen for this research in order to use quantitative data gained from a survey to examine the previously presented proposition and qualitative data from both survey and interviews to gain understanding of the underlying reasons behind why quantitative data yielded the results it did. Interviews were modified according to the results from the survey, so that the most apparent findings that arose from the survey could be explained, if possible.

Nature of the study is exploratory even though it's based on quantitative data, as the aim is to possibly uncover new phenomena and not confirm any existing ones. Since the method is a single case study, any results that would be acquired couldn't be generalized to consider other multi-user environments. No hypotheses are being tested and conclusion are based on descriptive statistics of variables through distributions and content analysis.

Web-based survey was used to collect the quantitative data by mapping the usage of different digital services and how the users experience the space, in order to examine the proposition that were created based on the theoretical framework. Survey is a classical tool of data collection, which can be used for both quantitative and qualitative research methods, but is especially useful when applied together with statistical analysis since it allows collecting a large dataset with relatively low effort (Hirsjärvi et al 2009). Dataset is collected with a standardized form of questions which minimizes the distractions, but this can also affect the results negatively if different respondents understand questions or statements differently or in a way that was not intended by the researcher. The honesty and carefulness of the respondents is also difficult to ensure.

In order to get the most valid results and minimize the previously mentioned threats, clarity and unambiguity of the statements is essential. Statements need to be chosen in a way that they most probably answer the research questions and proposition and unnecessary ones need to be avoided. Testing the survey beforehand is one way of ensuring best possible results.

Framework for the survey and interview was adaptation of the '6T' model, which thoroughly covers different aspects of user experience (Nenonen & Kojo 2013). It includes the categories of atmosphere (visual, soundscape, scent, feel), tempo, functionality, familiarity, story and importance. Framework was chosen for its holistic nature and also to test its viability in evaluating digital environments.

Previous studies and surveys using the 6T model were used as a basis when compiling a list of possible statements for the survey. Test survey was used to selectively pick most descriptive, understandable and unambiguous statements to use for the actual survey, as well as to tune the language and structure of the survey and to iron out any problems that may occur. The test survey was sent to 18 respondents in Newsec, of which 15 answered. It had 127 overlapping and intentionally similar statements divided between the different 6T categories and respondents were asked to comment on any unclear statements or words that they came across. Some respondents were interviewed on how they understood different statements.

Exploratory factor analysis (EFA) was used as a method for selecting the group of statements for the actual survey from the precursory 127. EFA is a technique within factor analysis, which is a collection of methods for explaining the correlations among variables in terms of more fundamental entities called factors (Cudeck 2000). EFA is usable when trying to reduce the number of variables by finding underlying relationships between them.

Preliminary elimination of statements were made based on comments from respondents, as some statements were clearly too vague or difficult to comprehend and would have falsified the result of the exploratory factor analysis. 101 statements were chosen for exploratory factor analysis which was performed in RStudio.

Cattell's (1966) scree plot was used as a method for determining the number of factors for the EFA. Statements were distributed to factors by their loading figures, which describe how much of the statement is described by that factor. Depending on the category, 4 to 6 factors were sufficient according to scree plot analysis. Statements that represented different factors the best and formed a coherent whole, were chosen for the survey. List of statements chosen are presented in Tables 7 and 8 in the results. A 5-step Likert-scale was used for the 6T statements.

Based on the feedback from the test survey, other parts of the survey around the 6T statements, namely the background information, introduction texts and questions about digital profile, were also modified accordingly to make the survey feel more fluent and understandable. A comment field was added to the end of the survey to gather qualitative data already in the survey.

The respondents of the survey were voluntary individuals from the population of Maria 01 members and staff. Link to survey was distributed to community via Slack, which is an information sharing and collaboration software that is used in Maria 01 community. Survey was done in May 2018 and it was performed with Surveypal, a web-based application for organizing surveys.

In the survey it was possible for the respondent to volunteer for a short interview. Six of those were chosen for the interviews. Interviews were designed based on the results from the survey, to investigate more in-detail the different aspects of users' experience of Maria 01, what were the most influential factors present and how the saw the role of digital services now and in the future.

The dependencies between different factors in the survey data were examined by cross tabulation and correlation matrixes. Cross tabulation, or contingency tables, can be used for survey data analysis, to analyze relationship between multiple variables (Everitt 1992). They give an overview of the data and correlation between variables, which helps recognizing interactions between them. They usually include the different sub-groups in the population on either columns or rows and the variables on other. Correlation matrixes in turn can be used to present correlation between multiple variables and the statistical significance of those correlations. Statistical significance of the correlations was tested with the two-tailed Student's t-distribution (Jones 1952).

4 Results and data analysis

In this chapter, results from both survey and interviews are presented. Survey data serve as basis and data from interviews is presented to support findings from the survey. Citations from interviews are presented in citation marks and in *italic*.

4.1 Background information

17 respondents in total answered the survey, of which 52,9% were male and 43,8% were female. 64,7% percent had been in their organisation for less than one year and the rest 35.3% for 1-3 years. 11,8% of the respondents were younger than 25, 76,5% between ages of 25 and 35 and 11,8% between ages of 35 and 45. 17,6% were most used to working in enclosed offices, 52,9% in open offices and 29,4% in activity-based offices. Nearly all, 82,3%, rated their daily work to be entirely or almost entirely digitalized. 87,5% were quite satisfied with their current digital tools, 12,5% were not satisfied nor dissatisfied. 82,4% were happy with the amount of digital tools at their disposal, 11,8% thought they had too few and 5,9% thought they had too many. Half of the respondents were early adopters and half were either learners or exploiters.

Background information regarding the respondents of survey are presented in Tables 3, 4 and 5.

Table 3 General background information of the respondents (1=not at all, 5=entirely)

Age:	<25	25-35	35-45	<45
	11,8%	76,5%	11,8%	0,0%

Gender:	Female	Male
	52,9%	47,1%

Years in current organization:	< 1 Year	1-3 years	> 3 years
	64,7%	35,3%	0,0%

Months at Maria 01:	< 2 months	2-6 mths	6-12 mths	> 12 mths
	11,8%	23,5%	35,3%	29,4%

Office type that you are most used to	Enclosed	Open	ABW
	17,6%	52,9%	29,4%

Percentage of working hours spent outside Maria 01	< 33%	33-66%	>66%
	88,2 %	5,9 %	5,9 %

How digitalized is your daily work?	1	2	3	4	5
	0,0%	5,9%	11,8%	35,3%	47,0%

Overall satisfaction with digital tools	1	2	3	4	5
	0,0%	0,0%	12,5%	87,5%	0,0%

Do you have enough digital tools?	Yes	Too few	Too many
	82,4%	11,8%	5,9%

Digital profile	Exploiter	Learner	Early adopter
	18 %	29 %	53 %

The interviewees, six in total, were chosen amongst survey respondents who were willing to participate the interview and represented different digital profiles. 50% of them were male, 50% female and also 50% had been at Maria for less than 6 months, 50% had been there over 6 months

Workstations in Maria are divided to enclosed offices, team spaces and open office areas, which are fairly evenly represented in the study, as seen in Table 4. Nearly all who use workstations in team spaces or open offices use phone booths daily or weekly and they are also recognized important in the qualitative data gathered in the survey and in the interviews. Reservable meeting rooms are in moderately active use and in open comments some pointed out that they are occasionally fully booked, especially if you are trying to find one ad-hoc. Non-reservable meeting spaces are even more sparse and usually taken, so when an occasional need arises for collaboration space, there usually isn't any available. Some valued them to be more important than the reservable meeting spaces, as the usual type or work for them requires more unscheduled rather than pre-scheduled meetings. Complete lack of brainstorming and co-innovation space was also highlighted, as the reservable meeting rooms were seen as too formal, uninspiring and non-functional for these kind of meetings. This caused some users to search for fitting space elsewhere.

Table 4 Usage of different spaces in Maria 01 by the respondents

	Daily	Weekly	Monthly	Seldom	Never
Workstation in dedicated office room	41,2%	11,8%	0,0%	0,0%	47,1%
Workstation in team space	11,8%	17,6%	5,9%	0,0%	64,7%
Workstation in open office area	31,3%	12,5%	0,0%	12,5%	43,8%
Phone booths	5,9%	35,3%	11,8%	5,9%	41,2%
Researvable meeting rooms	5,9%	70,6%	0,0%	23,5%	0,0%
Non-reservable meeting rooms or spaces	11,8%	35,3%	23,5%	5,9%	23,5%
Cafeteria, restaurant	23,5%	52,9%	17,6%	5,9%	0,0%
Informal spaces for individual work or collaboration	5,9%	47,1%	0,0%	41,2%	5,9%
Event spaces	0,0%	17,6%	41,2%	29,4%	11,8%

4.2 Usage of digital tools and services

In Table 5 are presented how often respondents used different digital tools for work. In questionnaire these were divided to individual or organization provided tools and tools or services provided by the premises. Some tools like note applications, task managements tools and online project management tools were either used frequently or not used at all. Email was the most used mean of communication, followed by text-based messaging and phone calls. Teleseminars with audio only were more common than those with both audio and video, and laptop was used more frequently compared to equipment on meeting rooms. For receiving community and premise related information and reporting premise related issues, Slack was used far more often compared to email.

Table 5 Usage of different digital tools by the respondents

	Daily	Weekly	Monthly	Seldom	Never
Email	100,0%	0,0%	0,0%	0,0%	0,0%
Text-based messaging applications	82,4%	17,6%	0,0%	0,0%	0,0%
Social network services	88,2%	11,8%	0,0%	0,0%	0,0%
Task management tools for individual use	47,1%	29,4%	0,0%	11,8%	11,8%
Note applications	29,4%	23,5%	0,0%	23,5%	23,5%
Online project management tools for collaboration	29,4%	41,2%	5,9%	5,9%	17,6%
Online content co-creation tools	41,2%	17,6%	5,9%	5,9%	29,4%
Phone for calls and meetings	64,7%	35,3%	0,0%	0,0%	0,0%
Teleseminar application on laptop with audio	29,4%	35,3%	11,8%	11,8%	11,8%
Teleseminar application on laptop with audio and video	17,6%	23,5%	29,4%	17,6%	11,8%
Voice commands for using any application or device	5,9%	5,9%	11,8%	23,5%	52,9%
Gesture controls for using any application or device	11,8%	5,9%	11,8%	5,9%	64,7%
Access control application in smart phone	58,8%	17,6%	5,9%	5,9%	11,8%
Info screens around premises for info and navigation	0,0%	29,4%	0,0%	35,3%	35,3%
Virtual lobby for guest arrival notification	5,9%	11,8%	35,3%	29,4%	17,6%
Meeting room reservation by phone	5,9%	17,6%	11,8%	23,5%	41,2%
Videoconference equipment in meeting rooms	0,0%	29,4%	11,8%	17,6%	41,2%
Slack for information about events etc. or reporting issues regarding premises	58,8%	35,3%	0,0%	0,0%	5,9%
Email for information about events etc. or reporting issues regarding premises	11,8%	29,4%	29,4%	11,8%	17,6%

Many interviewees highlighted the importance of Slack in the community and in operating in Maria 01 in the first place. It was seen to help communication between community members and also between members and the staff and giving feedback about bigger and smaller things. It was also used by members to communication in their own organization. This arguably makes the application more tempting to use, as it's not "another" new tool to the toolkit, but replaces communication tool or tools that would otherwise be used for internal communication. It's thus a prime example of an Enterprise 2.0 application.

> *"There are always people who are willing to help* (in Slack)*, it doesn't matter if you need a hammer or something is broken in your office or you need tea or whatever, or there is some new tool on the market that you want to learn how to use."*

> *"When you use Slack, you can get all information that you need. Of course people are different and some just aren't interested"*

> *"Sometimes you ran into people who aren't using Slack and have been here for a year?! Like why are you in Maria if you aren't in Slack..."*

> *"Although Slack is kind of a startup standard, still many don't know how to use it and how important it is… the introduction to Maria doesn't highlight these enough"*

A few comments highlighted the importance of structure and design in these kinds of community and communication applications.

> *"Tissue issues back! We had this Slack channel only for toilet related issues… You don't dare to post such small things into bigger channels…"*

> *"I think you'd need to be present more, so for urgent messages it's not great... I think you need to send the message directly to someone so that they would receive a notification… of course you don't want notifications about every post"*

The other defining digital tool that is part of the user experience used in the Maria is the access control app Lukoton. Unfortunately it mainly got mentioned in negative light, as it was seen as too slow and unreliable.

> *"Sometimes I have to wait half an hour in general space and wait for someone else to come to work because it's not working"*

While no one stated in the survey that they had too few digital tools (Table 3), in the interviews early adopters did hope for more functional mobile applications.

> *"We do have these mobile application (Lukoton and Office R&D) but neither of them really works… mobile is the correct platform for these kind of applications though"*
> - early adopter

> *"I don't know if* (we need more) *digital tools, I mean we already have Slack and all…"*
> - exploiter

One respondent also saw a need for different kind tool for the community, which would be more suited for larger ideas and development.

> *"We actually have a tool ourselves that we have been developing, it's used to co-create spaces with others, I think it's exactly what this space needs… it could be used for bigger things that can actually improve the area a lot* (compared to feedback channel for more minor and acute issues).

4.2.1 Impact of background variables and digital profile of the user

Background of the users had some effect to the use of different digital tools. Men used note and teleseminar applications, voice commands and online co-creation tools more than women, while women used slightly more social network services. Time spent at Maria had effect especially in usage of access control application and info screens, while type of office the respondent was most used to seemed to correlate somewhat with usage of text-messaging and task management applications. Age didn't have considerable effect. Correlation matrix between background variables and usage of digital tools is presented in Appendix 1.

Digital profile had effect on both total usage of digital tools and usage of individual tools. The total usage of digital tools deviated considerably between individuals though and in case of Maria and it members, it thus seems to be due more individual preferences and needs if one used multiple different tools concurrently and diversely. There was more notable difference between profiles when comparing usage of individual tools. Average usage of digital tools per digital profile is presented in Table 6 and correlation matrix with significance analysis of digital profile and usage of digital tools is presented in Appendix 2. There are only three profiles included since there were no bystander among the respondents from Maria 01.

Table 6 Average usage of digital tools per profile (5=daily, 1=never)

	Exploiters	**Learners**	**Early Adopters**
Email	5,0	5,0	5,0
Text-based messaging applications	4,7	4,8	4,9
Social network services	**4,3**	**5,0**	**5,0**
Task management tools for individual use	**3,0**	**4,2**	**3,9**
Note applications	**1,7**	**2,8**	**4,1**
Online project management tools for collaboration	3,7	4,0	3,6
Online content co-creation tools	**3,3**	**3,2**	**3,8**
Phone for calls and meetings	**4,0**	**4,6**	**4,9**
Teleseminar application on laptop with audio	**3,0**	**3,0**	**4,5**
Teleseminar application on laptop with audio and video	**3,0**	**2,4**	**4,0**
Voice commands for using any application or device	**1,3**	**1,4**	**2,5**
Gesture controls for using any application or device	**1,3**	**1,4**	**2,6**
Access control application in smart phone	**4,7**	**5,0**	**3,4**
Info screens around premises for info and navigation	**2,3**	**3,6**	**1,5**
Virtual lobby for guest arrival notification	3,0	2,8	2,5
Meeting room reservation by phone	2,7	2,0	2,4
Videoconference equipment in meeting rooms	**3,3**	**2,6**	**1,9**
Slack for information about events etc. or reporting issues regarding premises	4,7	4,8	4,5
Email for information about events etc. or reporting issues regarding premises	3,0	3,8	2,9
	62,0	**66,4**	**67,8**

Early adopters were more frequently using task management and note applications, which tells about their tendency to have switched entirely from using post-it notes and paper to digital solutions. They also used teleseminars applications on laptop with both audio and video more frequently and the teleseminar equipment in meeting rooms less frequently. This indicates about early adopters' readiness and eagerness to use more immersive and information rich forms of virtual communication and transition out of traditional teleseminar equipment that are installed in meeting rooms to more flexible and mobile solutions. Exploiters meanwhile were using less social media for work, though even they used it at least weekly. These findings are in line with findings by Rantala (2017)

Early adopters were using email the least to receive information about events and repost issues about premises, albeit narrowly, as was also found out in Rantala's study. Their experimentality and expertise showed especially in tendency to use voice and gesture controls for using application and devices. While nearly none of learners or exploiters ever used them, half of early adopters used gesture controls at least sometimes and over half used voice controls.

Surprisingly the early adopters used virtual lobby, info screens and access control application less than other profiles. Reason for using virtual lobby more seldom can be caused by smaller amount of visitors, which can be result of more active use of Skype and other virtual methods for meetings or that they are employed in more "back office" type of roles which includes less external meetings.

Lack of using info screens may be due to getting all necessary information from Slack directly to smartphones and laptops which makes it pointless to pay attention to info screens and boards in the premises while the access control application has alienated some early adopters from using the access control application by its unreliable operation, as can be understood from one interviewee:

> *"First thoughts in the morning are probably the relief I get from not having the Lukoton* (the app) *anymore, you can see the problem in the morning as everyone rushes to make it in with same opening of the door"* - early adopter

Correlation between digital profile and usage of digital services is statistically significant regarding social network services, note applications and using phone for calls and meetings. Otherwise the results don't fulfil the requirement of p-value under 0.05.

We can conclude that the digital orientation of the user seems to slightly affect the overall amount and versatility by which they used different digital tools, though this deviated between individuals and is not statistically significant. The profile also indicated about their tendency to use more modern and faster types of tools and in some cases the difference was statistically significant. Proposition 1 (P1) is thus partly correct.

4.3 User experience in Maria 01

User experience in Maria 01 is presented in Tables 7 and 8. These present all the responses to different statements, which are divided into the 6T categories. Atmosphere consists of visual, audio, scent and feel.

> *"It* (first impression of the place) *depends on which door you enter through… we are using that door and there is a huge amount of trash piled at the door… and it feels like is this a back door of some kind?... this main entrance is really really cool though as first you see the Starter restaurant which looks very modern and cozy"*

> *"I think the atmosphere in the spaces is a lot of fun and it is an atmosphere of community. Everyone is really friendly and willing to help… Maria staff is also doing a lot to bring people together and to create the atmosphere… so it's not just the people"*

In visual category, most respondents tended to agree with the statement “the space is alive”. This was seen to be mostly caused by people coming and going as well as chatting amongst each other, which creates motion and life to the space. Visibility in the space was somewhat criticised though as one participant to the interview highlighted:

> *“We are the only startup with their door open, I don’t know what the others are doing but yeah… so maybe some glass doors that you can close but you can see through (would be good)”*

Especially the restaurant in the ground floor and the main lobby gathered praise. Other spaces evoked more mixed feelings.

> *“The restaurant is so beautiful in my opinion… it’s the decorations and the elements of nature”*

Soundscape of the space was in general deemed more pleasant than not, but many thought that it is uninspiring and that acoustics aren’t that great. As the different spaces don’t have much soft materials, this isn’t that surprising.

> *“When we were upstairs, everything was heard as we don’t have partition walls between us. Even when you are a startup in growth phase, you need some sort of privacy at some point... now we have walls but it’s actually too silent there”*

Scent and the quality of air was criticized by some while some felt it to be neutral. No one fully agreed that the scent is fresh or pleasant, or that it creates a cosy atmosphere.

> *“There is usually some smell in Maria, it can be food or sweat or carbon dioxide when the fresh air runs out… we also get some cigarette smoke and smell of barbeque from outside … I understand that it also evokes the feeling of sweatshop that it is connected to the activity in the space”*

According to the respondents, lack of real decoration and soft materials also makes the spaces feel cold and hard and temperature was seen to fluctuate based on time of the year and day. Many also thought that the space is far from clean, which can also be seen in the previous comment about trash piles by the side entrance.

The feeling of life and motion in the space contributes to making the mood feel vibrant. Respondents also felt that there are many things happening in the space simultaneously and that the elements that tell about the history of the place are present. However different functions and activities in the space were thought to be not that well connected.

> *“There is this informal meeting space by the event space, but when the event space is in use, that can’t be used anymore.”*

> *“Yea that’s kind of a funny thing… when the restaurant is closed, you have to circle from above or outside the building to get to the other side.”*

Although the meeting rooms were criticized somewhat in open comments as mentioned previously, spaces were regarded to support both individual work and collaboration fairly well. In interviews this was somewhat clarified as respondents stated that they understand and bare the crude and unfinished environment, since they don’t have much capital and can’t thus afford anything fancy. They are content by having a place to work and likeminded community around them.

Table 7 6T categories of atmosphere, feel and tempo in Maria 01

		1	2	3	4	5	Average
Visual	The space is cosy	6 %	29 %	29 %	18 %	18 %	**3,1**
	The space is exciting	12 %	18 %	18 %	35 %	18 %	**3,3**
	The space is alive	6 %	6 %	12 %	59 %	18 %	**3,8**
	It is easy to see what is happening around me	18 %	18 %	29 %	29 %	6 %	**2,9**
Audio	The soundscape is pleasant	12 %	12 %	35 %	24 %	18 %	**3,2**
	The soundscape is inspiring	24 %	18 %	35 %	18 %	6 %	**2,6**
	I can select my soundscape	18 %	18 %	47 %	12 %	6 %	**2,7**
	The space has good acoustics	18 %	24 %	41 %	12 %	6 %	**2,6**
Scent	The space is associated with certain scent	13 %	19 %	50 %	6 %	13 %	**2,8**
	The scent is pleasant	6 %	19 %	56 %	19 %	0 %	**2,9**
	The scent is fresh	13 %	25 %	50 %	13 %	0 %	**2,6**
	The scent creates a cosy atmosphere	6 %	31 %	50 %	13 %	0 %	**2,7**
Feel	Interior materials in the space are pleasant	24 %	24 %	24 %	24 %	6 %	**2,6**
	The space is clean	24 %	18 %	12 %	41 %	6 %	**2,9**
	The space is drafty (ie. there is unpleasant movement of air)	6 %	18 %	29 %	35 %	12 %	**3,3**
	Temperature in the space is even/stable	18 %	18 %	29 %	35 %	0 %	**2,8**
Tempo	The mood of space is peaceful	6 %	24 %	18 %	35 %	18 %	**3,4**
	The mood of space is vibrant	0 %	24 %	24 %	35 %	18 %	**3,5**
	There are many things happening at the same time in the space	6 %	12 %	29 %	41 %	12 %	**3,4**
	Different activities are well connected in the space	20 %	27 %	27 %	20 %	7 %	**2,7**
	There are elements that tell about the history of the place	0 %	24 %	18 %	24 %	35 %	**3,7**

The virtual lobby was thought be working well, though retrieving the guest was sometimes problematic when the restaurant by the lobby was closed in the afternoon.

> *"Problem is that when the restaurant is closed, it is different* (walking in the premises and picking up guests from the lobby for example) *so there is something that hasn't been thought out that well. Other than that the virtual lobby works well and there is also the reception by Maria staff so that is cool"*

Most claimed they know how to use the space and easily find what they need, that it is safe and giving feedback is easy. In open comments though the lack of informative maps was criticized, since the layout of the building is somewhat complex and some functions were felt to be illogically located. There was also lack of instructions about which spaces can be entered freely and what can be not.

> *"It's easy to give feedback about the space but that you are heard, that is a different thing"*

"Noooo..! (Answer when asked if it is easy to find people and spaces) *... and sometimes there are companies who own a whole space but you can still go through it and you wonder if I should go through here or not… and today there were some new meeting rooms that had been added and I was like: door 2A, where is that….?*

Nearly everyone agreed at least partially that the space has a story. The history of old Maria hospital is visible in the space and known by everyone, some liked it more and some less, and some thought that the space could tell more about the activities that happen there now. In the interviews many saw the role of Maria along with the whole area to grow even more integral in the startup scene in Finland and worldwide and were excited about its future.

"We've been hearing about the plans since we arrived here, that this is the next Silicon valley, so that's what I'm really looking forward to… I'm really seeing this becoming the biggest startup hub… It is the right place to be."

Maria was considered important by almost all respondents. This was especially caused by the community and the support it offers for startups in different phases as well as the connections and possibilities it offered for the growth of the business. Many also liked it's unique story and brand which derives from the history of the building and area, as well as the location. Infrastructure wise the premises were seen to be sufficient.

Table 8 6T categories of functionality, ease of use, narrative and importance

		1	2	3	4	5	Average
Functionality	The space supports individual work	6 %	18 %	24 %	35 %	18 %	3,4
	The space supports collaboration	6 %	12 %	18 %	53 %	12 %	3,5
	The space supports spontaneous meetings	6 %	18 %	35 %	29 %	12 %	3,2
	Conditions of the space (eg. temperature) can be adjusted	29 %	29 %	18 %	18 %	6 %	2,4
	The space offers options for performing different tasks	6 %	24 %	29 %	35 %	6 %	3,1
Ease of use	I know how to use the space	6 %	24 %	0 %	47 %	24 %	3,6
	I easily find what I need	12 %	6 %	29 %	41 %	12 %	3,4
	The space can be modified to fit my task	6 %	24 %	35 %	29 %	6 %	3,1
	The space is safe	0 %	12 %	24 %	29 %	35 %	3,9
	It is easy to give feedback about different aspect of the space	6 %	12 %	12 %	47 %	24 %	3,7
Narrative	The space has a story	0 %	0 %	29 %	29 %	41 %	4,1
	The story is visible in the space	0 %	12 %	24 %	35 %	29 %	3,8
	The space tells about the activities in the space	6 %	6 %	53 %	18 %	18 %	3,4
	The space has a brand	6 %	12 %	18 %	35 %	29 %	3,7
	The brand is aligned with the brand of the area	6 %	6 %	35 %	29 %	24 %	3,6
Importance	I gladly come back to the space	0 %	6 %	29 %	29 %	35 %	3,9
	I want to keep the space tidy and in good shape	0 %	0 %	0 %	35 %	65 %	4,6
	I think of the space as my own	6 %	0 %	18 %	35 %	41 %	4,1
	I know that I'll come across important persons, things and thoughts in the space	6 %	18 %	24 %	18 %	35 %	3,6
	Memories are made in the space	6 %	13 %	31 %	31 %	19 %	3,4

4.3.1 Impact of background variables

Regarding the background variables and their correlation with experience of Maria 01, the most influential factor seemed to be the time spent at Maria, which correlated negatively with almost all UX statements, most strongly with category regarding soundscape. This isn't surprising as new things tend to be seen more positively, i.e. they have novelty value. Men also rated the statements somewhat lower than women. Also those from more technical fields tended to rate technical statements more critically, especially statements about soundscape, temperature and adjustability of the conditions. Those who used workstations in open space, also felt more negatively about the pleasantness of the soundscape. Age in turn correlated positively with statements about historical elements and visibility of the story in spaces.

The correlation matrix between background variables and aspects of user experience are presented in Appendix 3.

4.3.2 Comparison between digital profiles

Table 9 presents comparative scores on each 6T category for each profile.

Early adopters rate their experience of Maria 01 lowest in almost every category. In importance the difference is non-existent and in scent category they average a marginally higher score than user from other profiles. The margin is largest in categories concerning visual, tempo, and ease of use.

Table 9 Average score in each 6T category per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
Visual	**15,0**	2,7	12 ... 19	**14,0**	2,8	9 ... 20	**11,9**	3,2	8 ... 16
Soundscape	**11,3**	0,9	10 ... 12	**13,2**	2,7	10 ... 20	**10,1**	3,7	6 ... 17
Scent	**10,3**	1,1	9 ... 12	**10,4**	1,7	8 ... 13	**10,6**	3,5	1 ... 17
Feel	**10,7**	1,8	8 ... 13	**12,2**	1,8	9 ... 14	**11,7**	2,8	7 ... 15
Tempo	**19,3**	0,4	19 ... 20	**16,4**	4,1	9 ... 25	**15,2**	3,1	9 ... 20
Functionality	**15,7**	2,4	12 ... 18	**17,6**	3,5	10 ... 25	**14,7**	3,9	9 ... 23
Ease of use	**19,3**	0,4	19 ... 20	**18,2**	3,4	12 ... 25	**16,7**	3,8	7 ... 22
Story	**20,0**	2,7	17 ... 24	**19,0**	4,0	12 ... 25	**17,9**	2,5	14 ... 25
Importance	**20,0**	3,3	15 ... 25	**19,6**	2,5	14 ... 25	**19,2**	3,5	11 ... 25
Total	**141,7**			**140,6**			**127,9**		

4.3.2.1 Atmosphere

In visual category, seen in Table 10, early adopters scored considerably less in statements "The space is exciting", "The space is alive" and "It is easy to see what is happening. The environment in Maria 01, which was described by respondents as "crude" and "plain", didn't seem to provide enough excitement to their liking. Though they are some technology, namely the virtual lobby and info screen in the main hall, otherwise the digital layer is fairly hidden. The early adopters were also using those services the least. The low visibility of digital layer in the space may also affect "the space is alive" statement, as just moving and chatting of people doesn't evoke a feeling of dynamism in the most digitally oriented persons.

> *"It still has the old hospital looks, which is okay in a sense… but it lacks a bit personality and excitement"* -early adopter

> *"There are like-minded people, so yea that inspires, its not so much the space"* - early adopter

> *"Meeting rooms are extremely distressing and uninspiring… a couple of times when we have had a great vision for brainstorming, we've taken a full day off and went to Design Factory* (A coworking hub in Otaniemi, Espoo) *or similar. No one wants to sit in those rooms for a whole day… There is no space for big ideas"* - early adopter about excitement in the spaces

Between learners and exploiters there weren't any real differences, though learners rated marginally lower in all except statement about visibility.

> *"I think it is exciting ... because of the everyone and what we do"*- exploiter about excitement of the space

> *"Visually I like the different spaces… I understand the idea behind the messy looks… I would take it maybe a bit further still… and maybe the restaurant is a bit formal and fancy for relaxed chatting"* - exploiter about the visuality

Table 10 Average score of visual statements per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
The space is cosy	**3,3**	1,1	2 … 5	**3,0**	0,8	2 … 5	**3,1**	1,0	1 … 5
The space is exciting	**4,0**	0,7	3 … 5	**3,4**	1,1	2 … 5	**3,0**	1,1	1 … 5
The space is alive	**4,3**	0,4	4 … 5	**4,2**	0,6	3 … 5	**3,3**	0,9	1 … 4
It is easy to see what is happening around me	**3,3**	0,9	2 … 4	**3,4**	0,9	2 … 5	**2,4**	1,1	1 … 4

In statements about soundscape, scores deviated somewhat. Interestingly the learners scored higher than both exploiters and early adopters in "The soundscape is pleasant" and "The space has good acoustics". Here though the primary working space of the respondent can be seen to have effect as those in private rooms scored higher than those in team spaces and open offices.

> *"I think the soundscape is ok… sounds from the restaurant are sometimes too loud, which everybody complains about but other than that I think it is fine… you can go to phone booth when you need to take an important call"* - exploiter

Early adopters thought the soundscape to be less inspiring than other profiles and also interestingly didn't think they can select their soundscape. Interviews didn't really support these results though and in the case of Maria 01 it thus be concluded that profile doesn't seem to have coherent effect on the experience of soundscape

Table 11 Average score of statements about soundscape per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
The soundscape is pleasant	3,0	0,0	3 ... 3	3,6	0,7	3 ... 5	3,1	1,4	1 ... 5
The soundscape is inspiring	3,3	0,4	3 ... 4	3,2	0,7	2 ... 5	2,1	1,0	1 ... 4
I can select my soundscape	3,0	0,0	3 ... 3	3,0	0,8	2 ... 5	2,4	1,1	1 ... 4
The space has good acoustics	2,0	0,7	1 ... 3	3,4	0,6	3 ... 5	2,4	0,9	1 ... 4

Early adopters associated the space with a scent more than other profiles and some did find it extremely unpleasant and stuffy, while others felt more neutral about it. This was heavily space and person dependent though, which was supported by the interviews and no real connection between the digital orientation and experience of scent can be seen or noted.

> *"There were these toilets which smelled really bad... otherwise I think it's ok"* - exploiter

> *"Scent, I think it is okay, neutral, doesn't really evoke any feelings."* - early adopter

Table 12 Average score of statements about scent per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
The space is associated with certain scent	1,7	0,9	1 ... 3	2,6	0,5	2 ... 3	3,2	0,9	1 ... 5
The scent is pleasant	3,0	0,0	3 ... 3	2,8	0,6	2 ... 4	2,9	0,7	1 ... 4
The scent is fresh	3,0	0,0	3 ... 3	2,4	0,5	2 ... 3	2,6	1,0	1 ... 4
The scent creates a cosy atmosphere	2,7	0,4	2 ... 3	2,6	0,5	2 ... 3	2,8	0,8	1 ... 4

In feel category, learners evaluated interior materials and temperature higher than both exploiters and early adopters in but this deviated between respondents and is clearly affected more by other variables. Cleanness was also not affected by the digital profile. Early adopters were generally quite unsatisfied with the interiors, which can be due to the dated looks.

> *"It's quite unfinished and rough generally, although the restaurant is really nice, the interiors there."* - early adopter about the interiors in Maria 01

Although early adopters rated the statement about draft generally higher than others, there were deviation between individuals and it seemed to correlate more with the field of education.

Table 13 Average score of statements about feel per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
Interior materials in the space are pleasant	2,7	1,1	1 ... 4	3,2	1,4	1 ... 5	2,3	0,8	1 ... 4
The space is clean	2,7	0,9	2 ... 4	2,8	1,4	1 ... 5	3,0	1,1	1 ... 4
The space is not drafty	3,0	0,7	2 ... 4	3,0	1,2	1 ... 4	3,6	0,8	2 ... 5
Temperature in the space is stable	2,3	1,1	1 ... 4	3,2	0,6	2 ... 4	2,8	1,0	1 ... 4

4.3.2.2 Tempo

Exploiters felt the mood of the space to be more peaceful yet vibrant than learners and early adopters, while early adopters tended to disagree with "different activities are well connected in the space" and didn't agree as strongly with the statement about historical elements.

> *"I think it is a bit of both* (peaceful and vibrant)*, which is not necessarily a good thing though… arranged events affect the mood a lot I think, they would need to be more informal and relaxed though and not always about work related stuff… like who has a speaker on a breakfast?"* - exploiter

> *"The mood varies a lot… even if there is one person talking on the phone or having a meeting in the space, it breaks the peaceful atmosphere"* - early adopter about mood of the space

> *"I think the feeling comes mainly from company as we have our own spirit of doing things… this kind of buzz"* - early adopter

Early adopters also didn't feel as positively about the history that was visible in the space, as was stated also in the visual category.

Table 14 Average score of statements about tempo per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
The mood of space is peaceful	**3,7**	1,1	2 … 5	**3,2**	1,0	2 … 5	**3,3**	1,0	1 … 5
The mood of space is vibrant	**4,3**	0,9	3 … 5	**3,2**	1,0	2 … 5	**3,3**	0,7	2 … 4
There are many things happening at the same time in the space	**4,0**	0,0	4 … 4	**3,4**	0,6	3 … 5	**3,2**	1,1	1 … 5
Different activities are well connected in the space	**3,0**	0,7	2 … 4	**3,0**	0,8	2 … 5	**2,4**	1,1	1 … 4
There are elements that tell about the history of the place	**4,3**	0,9	3 … 5	**4,2**	1,0	2 … 5	**3,2**	0,9	2 … 5

4.3.2.3 Functionality

Early adopters were the most critical about the functionality of the space, excluding regarding spontaneous meetings, though this deviated between individuals. As others were content with how they support individual work, some of the early adopter were fairly critical about it and also felt that the space didn't offer enough option for performing different kinds of tasks.

> *"I'm missing a space for when I need to seriously focus, so quiet and with pleasant scent… I think for collaboration the spaces are okay, maybe not when you need a space right away but then again I understand that there can't be a lot empty space, so everything is used efficiently"* - early adopter about functionality

> *"The wifi could be more stable as it tends to cut out every hour or so"* - early adopter

> *"There's virtually no whiteboards or anything to scribble on when brainstorming with someone"* - early adopter about meeting rooms

> *"Again we are very flexible here as it's part of the experience, so we are cool with whatever, like sometimes when there is no meeting rooms available."* - exploiter about functionality of the space

"We have our own room, which is great because we have a lot a confidential stuff... and the phone booths are great, I could be in them the whole day!... there could be more extempore spaces for working though" - exploiter

Conditions of the space were found unadjustable by early adopters and exploiters though this correlated more strongly with the field of education. Exploiters were the most critical about the support for spontaneous meetings.

"When you want to have this kind of brainstorming meeting… these kinds of informal meeting spaces it what is missing mostly" - exploiter

"There's no relaxed space for collaboration... like this kind of cafe that you can just pop in… of course there is this restaurant but it's so crowded in lunch time and closes early" - exploiter

Table 15 Average score of statements about functionality per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
The space supports individual work	**4,0**	0,0	4 ... 4	**3,6**	0,9	2 ... 5	**3,1**	1,0	1 ... 5
The space supports collaboration	**3,7**	0,4	3 ... 4	**3,8**	0,7	2 ... 5	**3,3**	1,0	1 ... 5
The space supports spontaneous meetings	**2,3**	1,1	1 ... 4	**3,6**	0,9	2 ... 5	**3,3**	0,7	2 ... 5
Conditions of the space (eg. temperature) can be adjusted	**2,3**	1,1	1 ... 4	**3,0**	0,8	2 ... 5	**2,1**	1,0	1 ... 4
The space offers options for performing different tasks	**3,3**	0,4	3 ... 4	**3,6**	0,9	2 ... 5	**2,8**	0,9	1 ... 4

4.3.2.4 Ease of use

In category regarding ease of use of the space, early adopters were again the most critical, though their answers deviated somewhat between the respondents. Exploiters didn't disagree with any statements and only a few learners were also slightly critical. Early adopters were the most vocal about absence of any useful maps that would show location of different rooms, functions and people, which showed in the scores.

"The first time when you visit these all historical items are really cool, but I would still change them for some signs that tell you that breakroom is that way and so forth" - early adopter about the lack of signs

"There is information, somewhere, when you know where to find it. But yes, I would say it's not accessible enough, especially for newcomers" - early adopter

"I think when you get used to it, you easily find what you need. You don't need that many things in a place like this now that everything is so digital ..." - exploiter

Usability of different spaces were appreciated the most by exploiters, however the deviation was considerable between learners and early adopter and some were very positive about it while other were very negative.

"I like that there are so many meeting rooms… they are easy to reserve and use" exploiter

"Spaces are easy to reserve but of course you miss a proper mobile application for it" - early adopter

"I haven't have any problems with them (using spaces)*, so no complaints"* - early adopter

Early adopters felt most critically about modifiability of the space to fit certain task while safety was considered equally good by everyone. Almost all respondents felt that it was easy to give feedback.

Table 16 Average score of statements about ease of use per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
I know how to use the space	**4,3**	0,4	4 ... 5	**3,4**	1,1	2 ... 5	**3,4**	1,2	1 ... 5
I easily find what I need	**3,7**	0,4	3 ... 4	**3,4**	0,9	2 ... 5	**3,2**	1,1	1 ... 5
The space can be modified to fit my task	**3,3**	0,4	3 ... 4	**3,4**	0,9	2 ... 5	**2,8**	0,9	1 ... 4
The space is safe	**4,0**	0,0	4 ... 4	**4,2**	1,0	3 ... 5	**3,7**	1,0	2 ... 5
It is easy to give feedback about different aspect of the space	**4,0**	0,0	4 ... 4	**3,8**	0,6	3 ... 5	**3,6**	1,3	1 ... 5

4.3.2.5 Narrative

In statements regarding narrative of the space, scores were pretty uniform. Early adopters felt however that the current activities aren't as well presented in the space as they could be. Again respondents emphasized that the "sweatshop" style spaces were more than sufficient for them, but hoped the spaces still to tell more about the innovation and visionary nature of the activity. Story was mainly built around the history of the space and less about what it is now and what it will be in the future.

"From the outside its okay that it looks historical but maybe when you go inside it should be more modern… but it should be visible (history) *but not as much"* - early adopter

"I think it's a good story that back then the hospital was helping people and now we are helping people by innovation" - early adopter

"Of course it's tech and innovation but it is also startup, so a lot of bootsrapping, I think that is the magical part. I don't pretend to come here and see the Google HQ" - exploiter

"The story of the space is great… it's good topic for small talk when someone new arrives here, because everyone knows the history… I think it's very cool that there are these old items around… I think the combination between old and new is successful, although the restaurant is perhaps a bit too fine" -exploiter

Table 17 Average score of statements about narrative per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
The space has a story	**4,0**	0,7	3 ... 5	**4,6**	0,5	4 ... 5	**3,9**	0,8	3 ... 5
The story is visible in the space	**4,3**	0,4	4 ... 5	**4,2**	0,6	3 ... 5	**3,4**	0,9	2 ... 5
The space tells about the activities in the space	**4,0**	0,7	3 ... 5	**3,4**	0,6	3 ... 5	**3,1**	0,8	1 ... 5
The space has a brand	**3,7**	0,4	3 ... 4	**3,4**	1,5	1 ... 5	**3,9**	0,8	2 ... 5
The brand is aligned with the brand of the area	**4,0**	0,7	3 ... 5	**3,4**	1,1	1 ... 5	**3,6**	0,8	2 ... 5

4.3.2.6 Importance

The spaces and the experiences were regarded equally important by all respondents. Everyone especially felt that they want to keep the space tidy and in good shape, which indicates that the space isn't irrelevant but they want to enjoy the time there and are willing to put in effort to achieve it.

> *"Everyone here is so helpful regarding anything and we found an investor here… So you can get everything here and don't really have to move around... Yea it feels like our space."*
>
> *"It's the community, that is critical… it is also a great place to work, the infrastructure is good enough"* - early adopter

Table 18 Average score of statements about importance per digital profiles

	Exploiters			Learners			Early adopters		
	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.	Ave.	Ave. Dev.	Dev.
I gladly come back to the space	**4,0**	0,7	3 ... 5	**4,0**	0,8	2 ... 5	**3,9**	0,8	3 ... 5
I want to keep the space tidy and in good shape	**4,3**	0,4	4 ... 5	**5,0**	0,0	5 ... 5	**4,6**	0,5	4 ... 5
I think of the space as my own	**4,0**	0,7	3 ... 5	**4,2**	0,6	3 ... 5	**4,0**	0,9	1 ... 5
I know that I'll come across important persons, things and thoughts in the space	**3,7**	1,1	2 ... 5	**3,8**	1,0	2 ... 5	**3,4**	1,2	1 ... 5
Memories are made in the space	**4,0**	0,7	3 ... 5	**3,3**	0,9	2 ... 5	**3,3**	1,0	1 ... 5

Data gathered in different 6T categories of the survey indicate that the digital profile of the user could affect how he or she experiences the place. In general early adopters rated the statements lower than others, but there was also considerable deviation between individuals. Especially visual and ease of use aspects seemed to be affected by the profile of the respondent. In functional category, difference between early adopters and learners was also considerable, but since exploiters valued statements about functionality generally lower than learners, there is no strong statistical correlation between the variables.

These results are not statistically significant, as can be seen from correlations and p-value calculations that are presented in Appendix 4. Correlation is strongest and most significant in visual and ease of use categories with p-values approximately 0.15. The qualitative data from the interview supports the results though and there was noticeable difference how interviewees from different categories commented on different aspects of the experience. The early adopters seemed to consider the historical look and feel of the environment less interesting and inspiring, which was repeated in numerous answers.

We can conclude that the proposition 2 (P2) seems to correct, though the result is not statistically significant.

4.3.3 Impact of using different digital tools

The relationship between using different digital services and the experience of Maria was measured by correlation analysis, which is presented in full in Table 19.

Table 19 Correlation matrix between usage of digital tools and user experience statements

	Text-b	*Social*	*Task m*	*Note a*	*Online*	*Online*	*Phone*	*Teleser*	*Teleser*	*Voice c*	*Gestur*	*Access*	*Info sc*	*Virtual*	*Meetin*	*Videoc*	*Slack f*	*Email f*	***Digitools***
Cosy	0,31	-0,27	0,11	-0,01	-0,08	0,01	0,28	-0,08	-0,05	-0,03	-0,38	0,00	0,23	0,08	-0,28	0,06	-0,30	0,27	-0,05
Exciting	0,23	-0,20	0,15	0,27	0,33	0,47	0,07	0,18	0,30	-0,06	-0,35	0,32	0,37	0,30	-0,04	0,16	0,52*	0,54*	0,51*
Alive	-0,11	-0,27	-0,31	0,13	0,18	0,39	-0,30	0,10	0,22	0,08	-0,13	0,14	0,53*	0,5*	0,31	0,24	0,76***	0,76***	0,51*
Visibility	-0,18	-0,35	-0,08	0,35	-0,17	0,31	-0,28	0,16	0,21	0,28	0,03	-0,07	0,51*	0,42	0,06	0,34	0,35	0,87***	0,47
VisualSUM	0,09	-0,35	-0,02	0,24	0,09	0,38	-0,06	0,12	0,22	0,08	-0,27	0,13	0,52*	0,41	0,00	0,25	0,41	0,78***	0,46
Pleasant	0,22	0,07	0,39	0,14	-0,15	0,07	0,24	-0,16	-0,03	-0,27	-0,30	0,34	0,20	-0,24	-0,63**	-0,08	-0,23	0,14	-0,07
Inspiring	-0,01	-0,26	0,01	0,15	0,09	0,26	-0,12	0,02	0,12	-0,07	-0,29	0,30	0,47	0,34	-0,25	0,42	0,38	0,68**	0,35
Selecting	0,02	-0,10	0,05	0,46	0,04	0,57*	-0,09	0,08	0,30	0,07	0,26	0,21	0,37	0,25	-0,03	0,28	0,40	0,67**	0,59*
Acoustics	0,28	0,05	0,20	0,43	0,29	0,29	0,33	0,35	0,31	0,06	-0,01	0,37	0,56*	0,18	-0,40	0,16	0,36	0,62**	0,59*
AudioSUM	0,15	-0,07	0,20	0,34	0,07	0,35	0,11	0,08	0,20	-0,07	-0,12	0,37	0,47	0,15	-0,40	0,23	0,26	0,63**	0,42
Scent	-0,09	0,24	-0,23	0,49*	-0,34	0,40	0,17	0,13	0,15	0,28	0,20	-0,43	0,00	-0,17	0,19	-0,39	0,14	0,37	0,15
Pleasant43	0,54*	-0,06	0,37	-0,14	0,23	-0,01	0,54*	0,24	0,21	-0,08	-0,37	0,23	0,24	-0,12	-0,45	0,24	-0,01	0,23	0,16
Fresh	0,35	-0,17	0,35	0,06	0,00	0,09	0,26	0,17	0,27	0,07	-0,27	0,05	0,17	-0,13	-0,40	0,19	-0,10	0,32	0,15
Cosy44	0,43	0,09	0,35	0,07	0,43	0,22	0,36	0,03	0,16	0,03	-0,23	0,17	0,11	-0,04	-0,28	0,06	-0,07	0,13	0,22
ScentSUM	0,37	0,08	0,25	0,24	0,07	0,26	0,46	0,24	0,33	0,14	-0,10	-0,03	0,11	-0,24	-0,29	-0,08	-0,01	0,31	0,24
Materials	-0,01	-0,25	0,08	0,20	-0,08	0,25	0,19	0,05	0,08	-0,15	-0,41	0,18	0,41	0,11	-0,28	0,03	0,27	0,58*	0,19
Clean	0,19	-0,03	-0,01	0,39	0,19	0,17	0,31	0,24	0,26	-0,05	-0,19	0,23	0,09	0,09	-0,49*	-0,05	0,27	0,04	0,21
Draft	0,27	0,27	-0,09	-0,40	0,08	-0,41	0,09	0,08	0,18	0,03	0,20	0,03	-0,14	-0,45	-0,09	-0,41	-0,12	-0,58*	-0,29
Temperature	-0,07	-0,06	0,02	0,05	0,37	0,00	0,22	0,43	0,5*	-0,02	0,03	0,35	-0,01	-0,06	-0,5*	-0,05	0,23	0,22	0,24
FeelSUM	0,17	-0,05	0,00	0,15	0,24	0,04	0,36	0,36	0,44	-0,09	-0,19	0,35	0,17	-0,11	-0,61**	-0,19	0,30	0,15	0,17
Peaceful	0,14	-0,35	-0,01	0,13	0,16	0,08	0,22	0,24	0,40	-0,14	-0,20	0,34	0,06	-0,02	-0,55*	-0,11	0,08	0,14	0,10
Vibrant	0,06	-0,19	-0,24	0,11	-0,07	0,5*	-0,14	-0,29	0,07	-0,10	-0,18	0,02	0,19	0,38	0,22	0,07	0,39	0,38	0,20
Simultaneou	-0,11	-0,21	-0,45	0,11	0,20	0,08	-0,18	0,12	0,26	0,18	0,02	-0,06	0,16	0,57*	0,06	0,31	0,59*	0,21	0,28
Flow	-0,12	-0,10	-0,06	0,31	-0,19	0,24	-0,08	0,08	0,16	0,20	-0,08	-0,14	0,31	0,43	-0,03	0,43	0,38	0,68**	0,36
History	-0,38	-0,09	-0,13	-0,08	-0,21	0,11	-0,18	-0,38	-0,45	-0,11	-0,22	-0,20	0,21	0,23	0,16	0,49*	0,31	0,21	-0,06
TempoSUM	-0,12	-0,27	-0,25	0,17	-0,04	0,29	-0,10	-0,06	0,12	0,00	-0,19	-0,01	0,27	0,44	-0,05	0,34	0,49*	0,46	0,25
Individual	0,03	-0,19	0,07	0,36	0,25	0,47	0,05	0,23	0,20	0,04	0,05	0,17	0,35	0,09	-0,06	0,44	0,54*	0,47	0,54*
Collaboratic	-0,21	-0,17	-0,20	0,25	-0,33	0,23	0,02	-0,01	-0,12	-0,09	-0,34	-0,10	0,32	-0,07	-0,09	0,11	0,37	0,47	0,03
Spontaneous	0,10	0,08	0,02	0,43	-0,01	0,38	0,40	0,15	0,01	0,07	-0,15	-0,09	0,32	0,03	0,00	-0,10	0,19	0,56*	0,31
Adjusting	-0,10	-0,17	0,13	0,36	-0,04	0,32	0,15	0,17	0,11	-0,01	-0,18	0,12	0,33	0,21	-0,28	0,37	0,25	0,74***	0,38
Option	-0,25	-0,14	-0,15	0,35	-0,05	0,41	-0,04	0,08	-0,06	0,01	-0,04	-0,05	0,40	0,20	0,11	0,47	0,6*	0,63**	0,40
FuncSUM	-0,10	-0,14	-0,02	0,42	-0,04	0,43	0,14	0,15	0,04	0,00	-0,15	0,02	0,41	0,12	-0,09	0,32	0,46	0,7**	0,41
Knowing	-0,15	-0,27	-0,33	0,11	0,07	0,23	-0,05	0,11	0,01	0,13	0,09	-0,22	0,06	0,62**	0,39	0,56*	0,48	0,32	0,34
Finding	-0,13	-0,21	-0,16	0,33	0,05	0,48	0,01	0,14	0,04	0,16	-0,02	-0,20	0,20	0,64**	0,42	0,46	0,51*	0,64**	0,51*
Modifying	0,03	0,02	0,13	0,44	0,06	0,61**	0,04	0,02	0,09	0,01	-0,16	0,08	0,43	0,40	0,12	0,40	0,64**	0,7**	0,58*
Safe	-0,36	-0,04	-0,54*	0,15	-0,16	0,19	-0,21	-0,17	-0,12	-0,35	-0,13	0,25	0,12	-0,04	-0,24	-0,06	0,52*	0,05	-0,11
Feedback	-0,12	-0,10	-0,47	0,18	0,03	0,15	-0,08	0,19	0,12	0,15	-0,12	-0,18	0,27	0,38	0,25	0,27	0,7**	0,39	0,29
EaseSUM	-0,19	-0,16	-0,36	0,31	0,02	0,42	-0,07	0,08	0,04	0,04	-0,08	-0,09	0,27	0,53*	0,26	0,43	0,74***	0,54*	0,42
Story	-0,12	0,27	-0,19	0,03	0,29	0,30	-0,19	-0,33	0,04	-0,17	0,15	0,30	0,21	0,18	0,08	-0,14	0,52*	-0,01	0,18
Visible	-0,24	-0,07	-0,40	-0,21	-0,01	0,18	-0,26	-0,46	-0,26	-0,17	-0,13	0,01	0,23	0,48	0,22	0,28	0,44	0,20	0,00
Activities	0,31	-0,05	-0,09	-0,13	0,22	0,13	0,01	-0,28	-0,09	-0,16	-0,43	0,23	0,26	0,71**	-0,06	0,37	0,27	0,21	0,15
Brand	0,15	0,06	0,12	0,27	0,32	0,40	0,34	0,04	0,24	-0,24	-0,29	0,26	-0,16	0,04	-0,18	-0,18	0,26	0,01	0,18
Area	-0,03	0,03	-0,11	0,10	0,04	0,33	0,17	-0,20	-0,03	-0,40	-0,43	0,21	-0,10	0,11	-0,18	0,09	0,38	0,06	-0,01
StorySUM	0,03	0,06	-0,17	0,03	0,24	0,38	0,05	-0,32	-0,02	-0,32	-0,34	0,28	0,10	0,41	-0,05	0,11	0,51*	0,13	0,14
Comeback	0,14	0,17	-0,09	0,16	0,20	0,53*	0,22	-0,16	0,01	-0,22	-0,18	0,18	0,17	0,21	0,01	0,11	0,54*	0,25	0,28
Tiding	-0,02	0,49*	0,29	0,13	0,05	0,22	-0,03	-0,41	-0,29	-0,07	0,23	0,12	0,24	-0,28	-0,06	-0,02	-0,07	0,03	0,06
Owning	0,03	0,19	-0,03	0,48*	0,41	0,77***	0,04	0,14	0,26	0,05	0,27	0,16	0,17	0,38	0,37	0,21	0,78***	0,44	0,74***
Important	-0,03	0,17	-0,03	0,48	0,13	0,81***	-0,05	-0,06	0,12	0,08	0,08	-0,02	0,29	0,34	0,41	0,15	0,7**	0,6*	0,61**
Memories	0,06	-0,01	-0,12	0,20	0,24	0,6*	-0,02	0,05	0,24	0,09	0,02	0,02	0,23	0,41	0,29	0,28	0,7**	0,49*	0,54*
ImportanceS	0,04	0,19	-0,04	0,38	0,26	0,75***	0,04	-0,05	0,13	0,00	0,09	0,09	0,26	0,32	0,29	0,19	0,71**	0,49*	0,59*
UXSUM	0,02	-0,12	-0,10	0,32	0,09	0,49*	0,08	0,04	0,15	-0,03	-0,22	0,13	0,40	0,36	-0,07	0,29	0,59*	0,65**	0,44

(* = p < 0.05, ** = p < 0.01, *** = p < 0,001)

Most of the tools didn't seem to have any significant impact on the experience. However the use of both Slack and email for information exchange correlated positively with multiple statements and 6T categories, especially the statement "The space is alive" and all statements about ease of use and importance had significant correlation with using Slack. This makes sense since using Slack was seen integral for operating in Maria as well as for the exchange of information and being part of the community. Community in turn was the most defining factor for Maria to be felt important and seemed to affect positively on the other aspects of experience as well. It is then understandable that using Slack and email to be part of the community affects the experience in Maria.

Usage of info screens had moderate correlation with visual statements and usage of virtual lobby with ease of use category. Those interviewees who used virtual lobby were pleased how it worked and felt that it was valuable tool to have, which can thus be seen to contribute to the feeling of ease of use. Using virtual lobby also correlated with feeling the current activities of the place to be visible in the space. Interestingly using phone to do meeting room reservation correlated negatively with statements about soundscape and feel of the space, however as it also correlates moderately with the time respondent has stayed at Maria, it is probable that it isn't defining factor.

Usage of online co-creation tools had positive correlation with almost all statements, most notably with statements about importance, but this is likely an indication about some other underlying factor than indication about positive effect of using co-creation tool. There were also some isolated correlations between tools and individual statements. In general, using more digital tools correlated positively with multiple statements about the user experience and also had moderate correlation with the overall score from all user experience categories, though this wasn't statistically significant. It thus seems that the usage of digital tools does affect the subjective user experience and the proposition 3 "*Usage of digital services affects user experience"* seems to be correct.

The result is however somewhat contradictory with the connection between digital profile and user experience. Initially it was hypothesized that since digitally oriented people should generally use more digital tools and the usage of digital tools should to correlate positively with experience of the place, as it seemed to do according to the results, then there should also be positive correlation with the digital orientation and the experience of the space. As the digitally oriented people use more digital tools which correlate positively with the UX of Maria, they should also rate the experience more positively. As this isn't the case according to the results, is the initial hypothesis or some of the proposals that were made based on the theoretical framework false?

Reasons for the result can be various. Small sample size could have twisted the results, or the connection between the phenomena may not be that straightforward. The effect of community and collaboration to the user experience also seemed to be more defining than usage of digital tools or the digital orientation. The factors behind the results regarding the digital orientation and user experience seemed to be more about the historical atmosphere of the place, not so much about the aspects about usability, as was hypothesized initially. Furthermore, the digital profile correlated more with social network services, phone and teleseminar applications, than those services and tools that were meaningful for the experience, such as Slack, the virtual lobby and info screen. The early adopters actually used those less than other profiles in average.

The research question that was set for this study was: do digital services and digital orientation of the users affect their experience of a workplace? Based on the results, the answer is yes. Although the community aspect in Maria 01 was controlling regarding the experience, there could still be identified connections between usage of certain services and how the users experienced the space. The difference between profiles was mostly caused by the preference of digitally oriented users for more modern spaces that would fit better with their values and interests, though there were also differences on how different profiles felt the spaces supported their work.

5 Discussion

Concept of user experience includes the user, the context and the object of use and in workplace it consists of multiple internal and external factors. On individual level the different needs, preferences and previous experiences affect what people prefer and seek and how they behave. This in turn affects the needs they focus on the environment and what reactions the different stimuli coming from the environment cause in them. The environment, i.e. the workplace, on the other hand is a multi-dimensional construct that consist of physical, social and virtual entities. It is affected by the different ways of working and driven to change as they change. Digitalization and change in the corporate requirements have also contributed to the revolution of the virtual, social and physical layers, which has also spurred a totally new workplace concept, co-working, that is expected to revolutionize the office market.

User experience of workplace consists of numerous smaller interactions and experiences with physical and virtual spaces, people, services and actions performed in the place, and it includes elements such as the usability, i.e. the functionality and ease of use, atmosphere, tempo, narrative and importance. The individual experiences are affected by the past experiences and change as time goes on after the interaction. The match or mismatch between individual and the environment can be understood through concept of environmental comfort, which describes how well the environment can fulfill the needs of the individual. People with similar needs, preferences and behavioral tendencies can be divided into groups, or profiles, which help designers, decision-makers and other stakeholders to understand the different demographics within the population and allow producing tailored solutions with reasonable investments.

Methods for measuring user experience of place vary by their perspective and focus. Post-occupancy evaluation methods are focused on technical aspects of the space from the perspective of the building while usability evaluation methods expand to assess all factors that affect the usability of the space and concentrate on the perspective of the user. However both of these mostly disregard the emotional side of the experience, which can come from for example the aesthetics, patterns and mood in the spaces. These can be accounted using models such as the 6T model to comprehensively assess different elements of the experience from the perspective of the user.

Based on the results of this study, it can be concluded that both digital profile and the usage of different digital tools seem to affect the experience of workplace. In general, more digitally oriented people evaluated the environment of Maria 01 more critically, although this varied between individuals. The effect was greatest in categories regarding visuality, tempo and ease of use, with the most significant factor seemingly being the preference of digitally oriented users for more modern spaces, although some usability aspects did seem to have an impact as well. These results were partly supported by the results from a test survey, which was performed in premises of Newsec Asset Management in Helsinki, but they are still statistically insignificant and need to be considered as indicative at best.

Usage of Slack and other tools for communicating community and premise related information correlated strongly with how important and easy to use the respondents regarded the spaces to be. It also correlated significantly with the overall user experience. Usage of other digital services such as access control application, virtual lobby and info screen had some correlation with aspects of the experience but it could be argued that since these aren’t as integral for the experience of Maria 01, the effect also remained more modest. Although the community aspect seems to be dominant factor regarding the user experience, the role of the actual tools that support this can't be undermined. They were crucial according to the respondents for information exchange, being part of the community and overall operating in Maria 01. In addition for enhancing the social environment, they also improved the usability aspects of the space.

A few aspects stood out to be considered when developing digital services and platforms. Functionality of tools and services is naturally critical, as the access control application was mainly mentioned in negative light although the idea and purpose are positive. Even the most promising and useful solutions fall short without careful design and implementation. It is also important to recognize the importance and usefulness of a service or solution and make sure this is passed on to the users. This is emphasized with less digital users, who concentrate their learning to those tools they see most valuable for them. The training, tutoring or instructions for using a new tool should also be adequate and there is a risk of isolation and domino effect if these steps are not taken. In the case of Maria 01, this was questioned regarding Slack, which was seen as a vital part of operating in Maria and being part of the community. Socially supportive environment needs to be available to everyone, but it is of course down to an individual choice of how integrated one desires to be in it. However, now that channels for giving feedback and participating in development and decision making are also going digital, it needs to be ensured that everyone is included.

There is also development potential and demand for services on a few key areas of Maria 01, which are applicable to similar multi-user workplaces and older buildings under development. The ease of use affected by the complex layout of the building, which is a common problem in both older and newer buildings. Informative map included with indoor positioning and navigation instructions to preferred destination would be helpful especially in larger premises. As it could also be connected to the access control system and real time information about event that are taking place, the guide could instruct the user to a route that avoids restricted areas and temporarily occupied spaces. A co-development platform for development of the spaces and the area would in turn offer a productive tool for the community to engage in the development and for harnessing the creative potential that is lying around. This would enable a truly user driven development and integrate user more profoundly into the community.

Role of digital services in Maria's case and in general varies depending on the perspective that it is viewed from. In a way they can been seen to create new needs instead of fulfilling any existing ones. Non-digitalized spaces and environments have been used by people for centuries and people have been more or less able to fulfill their physiological, psychological and self-actualization needs in the premises without any apparent aspect that would be improved with the introduction of digital tools. New digital tools in both consumer and professional businesses are often marketed by creating new needs for people and organizations that have to be fulfilled, new efficiency standards to be reached and higher synergy advantages to be achieved. Digitalization of work made it possible for people to become mobile and to work from wherever, and for corporations to transfer what was previously physical to the virtual world.

On the other hand though, as was argued by Max-Neef et al. (1989), the needs stay the same as time goes on and only the ways, by which they are pursued or fulfilled, change. Corporations still try to produce profit by doing business and using different asset to do so as efficiently as possible and employees still try to fulfil different responsibilities given by the corporation to earn income while staying healthy, having meaningful social relationships and developing oneself professionally and individually. Thus the digital services only provide new ways of achieving these pre-existing needs. Mobility and better connectivity make it possible to be social and participate the community in workplace and be more present at home while also perform work tasks more efficiently and effectively.

Digital services can and most likely will reform the experience of space in future. It’s a continuous development process which needs careful planning and supportive change management to yield results that are expected from it. Different user groups need to be considered in order to ensure efficient process and productive outcome and hopefully this research will provide useful in that regard. It shows that digital services can enhance the experience and usability of the space in different ways and that digital orientation of the people can affect how the experience the workplace. As was stated by Meerwarth et al. (2008) the “one size fits all” way of thinking is outdated and culture of the organization and the individuals should be considered in the design process. This can be achieved only through by gaining a thorough understanding of different needs and preferences of the users.

6 Conclusions

Aim of this thesis was to gather a thorough understanding of user experience in a multi-user workplace and its digital services and to examine the effect of digital orientation of users. To achieve this, literature regarding user experience and workplaces was reviewed and proposition were made. The research was a mixed method case study, applied by a survey and interviews to members of Maria 01, a startup hub in Helsinki, Finland, with 17 respondents to the survey and 6 interviewees.

The results showed that digital services and digital orientation of the users may affect their experience of a workplace. The study was exploratory, meaning that the data is not generalizable and may or may not indicate about actual correlation between two or more variables or phenomena.

6.1 Quality of the research

Construct validity, internal validity, external validity and reliability of the research measure its quality (Yin 1989). Construct validity describes the ability of the research method to study what it was meant for, internal validity the extent to which a causal conclusion based on the study is warranted, external validity the extent to which the results can be generalized to other contexts and reliability the ability of the method to produce results that aren't random, i.e. are repeatable. As this is an exploratory study, test of internal validity isn't valid.

Construct validity of the research is satisfactory, as overall the research methods that were used are appropriate for studying the phenomena in question (Hirsjärvi et al. 2009). More statements would have made the survey more representing, as now the different categories had 4 or 5 statements to cover complex and diverse subjects. Test survey was used to find factors from a larger mass of statements and most representative statements were chosen according to the results, but still this left variance unexplained. Also the test survey results and analysis could have been different in another context. Use of objective methods in addition to subjective methods to confirm their results could have increased the construct validity.

External validity of the study is impossible to estimate. As a single case study, the results can't be generalized to any other multi-user workplaces or other workplaces without further analysis, since controlling and deducting impact of any case-related factors is impossible and there is no studies done in other contexts with similar methods which could be used for comparison (Yin 1989). Though the results from the test survey offered somewhat similar results, it isn't enough to prove the results any more generalizable since the survey form was slightly different. As the nature of this study was exploratory instead of confirmatory, this isn't a major issue, but it would naturally still benefit from having multiple cases.

Reliability of the study is average since generalization of the results to the whole Maria 01 community is questionable as the sample is small compared to the whole population (Hirsjärvi et al. 2009). The sample does however represent different demographics in Maria quite well, as there are individuals with different education, age, gender, nationality, occupation and organization, but these can be unevenly represented which can falsify the results. Also the effect of one individual is considerable and since the sample isn't completely random, individuals' interests can be seen to have an effect on their likelihood to participate the study, which can also affect the results. Thus the sample is biased.

Data was gathered by a survey and interviews and especially in surveys it is difficult to confirm that the respondent answers truthfully and to his or hers best ability (Hirsjärvi et al.

2009). As the answers are also subjective views of the respondents, their truthfulness can be questionable. Misunderstanding regarding the statements can also affect the results as for many the questionnaire wasn't in their native language. This risk was minimized by using as simple vocabulary as possible without compromising the meaning and by performing a test survey to try to make sure that the statements were as unambiguous as possible. The need for falsifying the answers was also tried to be minimized thorough emphasizing the scientific nature of the study.

6.2 Further research

Further research in the subject is needed to confirm or deny the results that were gained in this study. It seems that there may be correlation between digital profile of the users and the user experience, but more cases with larger samples and different context should produce statistically significant data for reliable comparison. There was statistically significant correlation between some digital tools and the user experience, but this could also be due to some hidden factors. Thus deducting the possibly affecting hidden factors is crucial and the method should be tested in highly digitalized environment with several digital tools available and more non-digitalized people also. Naturally applying the study to single user environments would be beneficial also for generalizing the findings.

Studying pre-emptive measuring of the experience and gathering an extensive list of different variables that affect the experience offers another subject for future research. It was recognized that although there are several methods for measuring user experience after implementing the service or product, there are considerably less feasible pre-emptive methods. 6T model for example hasn't been used in proactive way. Pre-emptive methods could effectively be used to predict how different users experience a place and would thus be a beneficial tool for developers and designers.

Literature

Ajzen, I. 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

Alben, L. 1996. Defining the criteria for effective interaction design. interactions, 3(3), 11-15.

Alexander, K, 2008, Usability: philosophy and concepts. In Usability of Workplaces - Phase 2. Report 316. Rotterdam: CIB.

Anthony, S. D. Viguerie, S. P. Waldeck, A. 2016. Corporate longevity: turbulence ahead for large organizations. Strategy & Innovation, 14(1), 1-9.

Bandiera, O. Barankay, I. Rasul, I. 2010. Social incentives in the workplace. The Review of Economic Studies, 77(2), 417-458.

Battarbee, K. 2008, Co-experience: Understanding User Experiences in Social Interaction, PhD thesis, University of Art and Design Helsinki, Helsinki.

Baumeister, R. F. Leary, M. R. 1995. The need to belong: desire for interpersonal attachments as a fundamental human motivation. Psychological bulletin, 117(3), 497.

Bosch-Sijtsema, P. Ruohomäki, V. Vartiainen, M. 2010. Multi-locational knowledge workers in the office: navigation, disturbances and effectiveness. New Technology, Work and Employment. Vol. 25, No. 3, s. 183-195.

Botsman, R. Rogers, R. 2011. What's mine is yours. New York, Ny: Collins.

Cabanac, M. 1971 Physiological role of pleasure. Science, 173, 1103–1107

Cabanac, M. 1992 Pleasure: the common currency. J. Theoret. Biol., 155, 173–200.

Casey, E. S. 1996. How to get from space to place in a fairly short stretch of time: Phenomenological prolegomena. Senses of place, 27.

Chesbrough, H., & Rosenbloom, R. S. 2002. The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. Industrial and corporate change, 11(3), 529-555.

Christopher, M. Payne, A. Ballantyne, D. 1991. Relationship Marketing, Oxford, Butterworth-Heinemann.

Creswell, J. W. and Plano Clark, V. L. 2011. Designing and Conducting Mixed Methods Research (2nd edition), Sage Publications, Los Angeles.

Cohen, A. Stotland, E. Wolfe, D. 1955. An Experimental Investigation of Need for Cognition. Journal of Abnormal and Social Psychology. 51 (2): 291–294.

Colbert, A., Yee, N. & George, G. 2016. The digital workforce and the workplace in the future. Academy of Management Journal. Vol. 59, No. 3, s. 731-739

Crick, F. Koch, C. 1997 The problem of consciousness, Scientific American, Special Issue 'Mysteries of the Mind', Jan., 19–26.

Cudeck, R. 2000. Exploratory factor analysis. In Handbook of applied multivariate statistics and mathematical modeling (pp. 265-296).

Denyer, D. Parry, E. Flowers, P. 2011. “Social”,“Open” and “Participative”? Exploring personal experiences and organisational effects of enterprise2.0 use. Long Range Planning, 44(5-6), 375-396.

Desmet, P. 2002. Designing emotions. Delft University of Technology, Department of Industrial Design.

Desmet, P. Hekkert, P. 2007. Framework of product experience. International Journal of Design. 1(1), 57-66.

Drucker, P. 1999. Knowledge-Worker Productivity: The biggest challenge. California Management Review. Vol. 41, No. 2, s. 79-94.

Edwards, J. Billsberry, J. 2010. Testing a multidimensional theory of person-environment fit. Journal of managerial issues, 476-493.

Evans, K. 2011. Work-based learning: Setting the scene. Pachler, N., Pimmer, C. & Seipold, J. Work-based mobile learning, concepts and cases. Bern: International Academic Publishers. s. 27-48.

Everitt, B. S. 1992. The analysis of contingency tables. CRC Press.

Farris, Paul W. Neil T. Bendle. Phillip E. Pfeifer; David J. Reibstein 2010. Marketing Metrics: The Definitive Guide to Measuring Marketing Performance. Upper Saddle River, New Jersey: Pearson Education, Inc. ISBN 0-13-705829-2

Felsten, G. 2009. Where to take a study break on the college campus: An attention restoration theory perspective. Journal of Environmental Psychology, 29(1), 160-167.

Forlizzi, J. Battarbee, K. 2004. Understanding Experience in Interactive Systems. Interactive Systems DIS2004, 1st-4th August, Cambridge, Massachusetts, ACM Press, New York, pp. 261-268.

Ganglbauer, E. Schrammel, J. Deutsch, S. Tscheligi, M. 2009. Applying psychophysiological methods for measuring user experience: possibilities, challenges and feasibility. In Workshop on user experience evaluation methods in product development.

Gieryn, T. F. 2000. A space for place in sociology. Annual review of sociology, 26(1), 463-496.

Greene, C. Myerson, J. 2011. Space for thought: designing for knowledge workers. Facilities, Vol 29, No. ½, s. 19-30

Harrison, S. Dourish, P. 1996. Re-place-ing space: the roles of place and space in collaborative systems. In Proceedings of the 1996 ACM conference on Computer supported cooperative work (pp. 67-76). ACM.

Harrison, A. Wheeler, P. Whitehead, C. 2004. The distributed workplace. New York: Spon Press.

Hassenzahl, M., & Tractinsky, N. 2006. User Experience - a research agenda [Editorial]. Behavior & Information Technology, 25(2), 91-97

Hinton, S. Hjort, L. 2013. Understanding social media. Lontoo: SAGE Publications.

Hirsjärvi, S. Remes, P. Sajavaara, P. 2009. Tutki ja kirjoita. 15.-16. edition. Helsinki: Tammi. In Finnish.

Hislop, D. & Axtell, C. 2009. To infinity and beyond?: workspace and the multilocation worker. New Technology, Work and Employment, Vol. 24, No. 1, s. 60-75.

Hyrkkänen, U. Nenonen, S. Kojo, I. 2012. The virtual reality of work-how to create a workplace that enhances well-being for a mobile employee. In Virtual reality and environments. InTech.

Igbaria, M. Guimaraes, T. 1999. Exploring differences in employee turnover intentions and its determinants among telecommuters and non-telecommuters. Journal of Management Information Systems, 16, 147–164.

Ilgen, D. Schneider, J. 1991, International Review of Industrial and Organizational Psychology, Vol.6, Chapter 3, 71-108, Edited by Cooper and Robertson, John Wiley & Sons Ltd..

International Organization for Standardization. 2009. Ergonomics of human system interaction - Part 210: Human-centered design for interactive systems

Jansen, K. Kristof-Brown, A. 2006 Towards a Multidimensional Theory of Person-Environment fit. Journal of Managerial Issues 18: 193-212.

Jones, L. V. 1952. Test of hypotheses: one-sided vs. two-sided alternatives. Psychological Bulletin, 49(1), 43.

Kaplan, R. Kaplan, S. 1989. The experience of nature: A psychological perspective. New York: Cambridge University Press.

Kaplan, S. 1995. The restorative benefits of nature: Towards an integrative framework. Journal of Environmental Psychology, 15, 169-182.

Kojo, I. Nenonen, S. 2012. Workplaces for social ecosystems: User experiences in coworking places, Proceedings of EFMC2012, 23rd - 25th of May, 2012 Copenhagen, Denmark.

Kojo, I. Nenonen, S. 2014. User experience in an academic coworking place: the case of Aalto University’s Design Factory. In Proceedings of the CIB Facilities Management Conference, Copenhagen, Denmark (pp. 21-23).

Kojo, I. Nenonen, S. 2016. Typologies for co-working spaces in Finland–what and how?. Facilities, 34(5/6), 302-313.

Kurland, N. Bailey, D. 1999. When workers are here, there, and everywhere: A discussion of the advantages and challenges of telework. Organizational Dynamics, 28, 53–68

Langensiepen, C. Lotfi, A. Puteh, S. 2014. Activities recognition and worker profiling in the intelligent office environment using a fuzzy finite state machine. In Fuzzy Systems (FUZZ-IEEE), 2014 IEEE International Conference on (pp. 873-880). IEEE.

Laudenslager, M. Holt, D. Lofgren, S. 2004. Understanding air force members intentions to participate in pro-environmental behaviors: An application of the theory of planned behavior. Perceptual and Motor Skills, 98, 1162-1170.

Law, L-C. Roto, V. Hassenzahl, M. Vermeeren, A. Kort, J. 2009. Understanding, scoping and defining user experience: A survey approach. Proc. CHI '09. 719-728.

Lievonen, A. 2017. Investors’ insight to co-working spaces in Finland. Master’s thesis. Aalto University.

Margolin, V. 1997. Getting to Know the User. Design Studies. p. 227-234.

Maslow, A. H. 1943. A Theory of Human Motivation. Psychological Review, 50(4), 370-96.

Maslow, A. H. 1962. Toward a Psychology of being. Princeton: D. Van Nostrand Company.

Maslow, A. H. 1970a. Motivation and personality. New York: Harper & Row.

Maslow, A. H. 1970b. Religions, values, and peak experiences. New York: Penguin.

Maslow, A. H. 1987. Motivation and personality (3rd ed.). Delhi, India: Pearson Education.

Meerwarth, T. L., Trotter, R. T., & Briody, E. K. 2008. The knowledge organization: Cultural priorities and workspace design. space and culture, 11(4), 437-454.

Meister, J. Willyerd, K. Foss, E. 2010. The 2020 workplace: How innovative companies attract, develop, and keep tomorrow's employees today (p. 5). New York, NY: Harper Business.

McFarland, D. Sibly, R. 1975. The behavioural final common path. Phil. Trans. R. Soc. Lond., 270, 265–293.

McLeod, S. A. 2017. Maslow's hierarchy of needs. Available: www.simplypsychology.org/maslow.html

Mäkelä, A. Fulton Suri, J. 2001. Supporting Users' Creativity: Design to Induce Pleasurable Experiences. Proceedings of the Conference on Affective Human Factors, eds. Helander, Khalid and Tham. London, Asean Academic Press , 387-391.

Nenonen, S. Rasila, H. Junnonen, J. Kärnä, S. (2008). Customer Journey–a method to investigate user experience. In Proceedings of the Euro FM Conference Manchester (pp. 54-63).

Nenonen et all. 2012. Towards the User Experience – Integration of the Measurable and Non-Measurable conditions of Indoor Environment.

Nenonen, S. Kojo, I. 2013. Experience of places – six dimensional model for capturing the user experience, Proceedings of ECFM13, May 22-24, Prague, Czech Republic.

Nenonen, S. Nissinen, K. 2005 Usability walkthrough Usability Walkthrough in Workplaces – What, how, why and when. Proceedings. CIB 2005, Combining Forces – Advancing Facilities Management & Construction through Innovation Series, Vol IV, pp. 413-422. 13-16.6.2005, Helsinki, Finland.

Pallasmaa, J. 1996 The Eyes of the Skin: Architecture and the Senses. London: Academy Editions.

Parsons, F. 1909. Choosing a vocation. Houghton Mifflin.

Pine, B.J. II & Gilmore, J.H. 1998. Welcome to the Experience Economy, Harvard Business Review. p. 97.

Preiser, W. 1989. Building Evaluation. New York, NY: Plenum

Preiser, W Rabonowitz, H. White, E. 1988, Post-occupancy Evaluation. New York; Van Nostrand Reinhold Company.

Rajasekar, S., Philominathan, P., & Chinnathambi, V. 2006. Research methodology. arXiv preprint physics/0601009.

Rantala, M. 2017. Digital profiles of knowledge worker. Master's thesis. Tampere University of Technology.

Rasila, H., Nenonen, S., & Kärnä, S. 2012. Rakennetun ympäristön käytettävyys - Käyttäjän ja tilan vuorovaikutusta tutkimassa. In Finnish. Helsinki: Unigrafia Oy

Ross, L. M. 2016. The human side of virtual work: Managing, trust, isolation, and presence. New York, NY: Business Expert Press.

Oseland, N. 2009. The impact of psychological needs on office design. Journal of Corporate Real Estate, 11(4), 244-254.

Nigel Oseland. 2018. An environmental psychology perspective on workplace design. [ONLINE] Available at: http://workplaceinsight.net/an-environmental-psychologists-perspective-on-workplace-design/. [Accessed 21 May 2018].

O'Reilly III, C. Chatman, J. Caldwell, D. 1991. People and organizational culture: A profile comparison approach to assessing person-organization fit. Academy of management journal, 34(3), 487-516.

Sward D. MacArthur, G. 2007. Making user experience a business strategy. In E. Law et al. (eds.), Proceedings of the Workshop on Towards a UX Manifesto, 3 Sept. 2007, Lancaster, UK (pp 35-40).

Tay, L. Diener, E. 2011. Needs and subjective well-being around the world. Journal of Personality and Social Psychology, 101(2), 354-356

Tuan, Y. F. 1977. Space and place: The perspective of experience. U of Minnesota Press.

Tähtinen, S. Kojo, I. Nenonen, S. 2016. User experience of creative class district: Punavuori neighborhood. Facilities, 34(9/10), 580-594.

US Census Bureau. 2002 Economic Census. Census Bureau, U.S. Department of Commerce. Available: www.census.gov/econ/census02/advance/TABLE2.HTM

UXnet. 2008. [ONLINE]. Available at: www.uxnet.org. [Accessed 3 May 2018]

Van Meel, J. (2011) 'The origins of new ways of working'. Facilities, 29 (9/10): 357-367.

Van Meel, J. & Brinkø, R. (2014) 'Working apart together'. FM World. British Institute of Facilities Management. [ONLINE] Available: http://www.fm-world.co.uk/features/featurearticles/working-apart-together/ [Accessed on 17 May 2018]

Vartiainen, M. Gersberg, N. Hyrkkänen, U. Kauttu, M. Nenonen, S. Palonen, T., ... & Tuomela, A. 2006. Workspace methodologies: studying communication, collaboration and workscapes.

Vartiainen, M., Hakonen, M., Koivisto, S., Mannonen, P., Nieminen, M., Ruohomäki, V. & Vartola, A. 2007. Distributed and mobile work. Helsinki: Yliopistokustannus University Press Finland.

Venezia C. Allee, V. 2007. Supporting mobile worker networks: components for effective workplaces. Journal of Corporate Real Estate, Vol. 9, No. 3, s. 168-182

Virtaneva, M. 2017. Interaction culture and coworking. Master's thesis. Aalto University

Vischer, J.C. 1989. Environmental quality in offices. New York: Van Nostrand Reinhold.

Vischer, J.C. 2007. The effects of the physical environment on job performance: towards a theoretical model of workspace stress." Stress and Health 23.

Appendixes

Appendix 1. Correlation matrix between background variables and usage of digital tools

	Age	Gender	timespe	Field	Degree	Typeofc	inMaric	Workst	Workst	Workst	Phone l	Researv	Non-res	Cafeter	Informc	Event sp
Text-based n	0,00	-0,44	-0,30	0,23	-0,34	-0,6*	-0,18	-0,16	0,33	0,11	0,08	0,13	0,13	0,16	0,16	0,16
Social netwo	0,00	0,02	-0,11	0,03	-0,27	-0,21	0,04	0,00	-0,21	-0,16	-0,23	-0,16	-0,25	-0,03	0,02	0,06
Task manag	-0,09	-0,33	-0,38	-0,31	-0,41	-0,54*	-0,27	0,07	0,06	-0,35	-0,22	-0,22	-0,21	-0,01	-0,21	-0,03
Note applica	-0,15	-0,67**	-0,21	-0,16	0,05	0,10	-0,20	0,13	-0,33	-0,28	-0,16	-0,25	-0,49*	0,05	0,28	0,31
Online proje	0,00	-0,19	-0,31	0,01	-0,04	-0,01	-0,27	-0,22	0,37	0,34	0,40	0,51*	0,23	0,34	0,26	0,39
Online colla	-0,28	-0,42	-0,37	-0,25	-0,06	-0,04	-0,16	0,02	-0,06	0,04	-0,01	-0,21	-0,24	0,10	0,23	0,35
Phone for ca	0,00	-0,45	0,03	-0,10	-0,29	-0,24	-0,01	-0,19	-0,26	-0,11	-0,29	-0,06	-0,15	0,10	-0,17	0,12
Teleseminar	-0,27	-0,56*	-0,05	0,08	-0,04	0,45	-0,18	-0,02	0,00	0,16	0,19	0,15	0,11	0,20	0,21	0,22
Teleseminar	-0,39	-0,53*	-0,20	-0,09	-0,09	0,39	-0,22	0,12	-0,04	0,28	0,30	-0,04	-0,04	0,07	0,6*	0,42
Voice comm	-0,10	-0,39	0,07	0,07	-0,18	0,31	0,08	0,10	0,17	0,29	0,59*	0,23	0,04	0,05	0,30	0,40
Gesture cont	-0,17	-0,20	0,03	0,00	-0,20	0,37	-0,05	0,04	0,11	0,43	0,38	0,30	-0,06	-0,05	0,5*	0,53*
Access contr	0,09	0,12	-0,56*	-0,17	0,03	-0,26	-0,53*	-0,18	0,24	-0,02	-0,34	-0,03	0,09	0,06	0,11	-0,03
Info screens	0,5*	-0,01	-0,65**	-0,08	-0,06	-0,32	-0,53*	0,00	0,67**	0,20	-0,08	0,30	0,39	0,32	0,07	0,18
Virtual lobb	0,22	-0,25	-0,06	0,02	0,17	-0,25	0,00	0,20	0,17	0,24	0,45	0,36	0,38	0,58*	0,35	0,63**
Meeting roo	-0,28	-0,01	0,24	0,39	0,04	-0,10	0,45	0,26	0,02	0,25	0,39	0,23	0,23	0,46	-0,01	0,12
Videoconfer	0,38	-0,06	-0,07	-0,14	0,07	-0,18	-0,26	0,15	0,43	0,11	0,35	0,61**	0,47	0,36	-0,05	0,24
Slack for inf	0,12	-0,09	-0,44	0,21	0,44	0,28	-0,31	0,16	0,20	0,19	0,04	0,26	0,34	0,48*	0,39	0,30
Email for inf	0,00	-0,33	-0,43	-0,52*	-0,26	-0,01	-0,36	0,17	0,18	0,18	0,05	-0,03	0,17	0,35	0,04	0,38
DigitoolsSUM	-0,09	-0,64**	-0,52*	-0,21	-0,14	-0,02	-0,43	0,12	0,28	0,26	0,29	0,28	0,14	0,47	0,44	0,66**

(* = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0,001$)

Appendix 2. Correlation between digital profile and usage of digital tools

	Correlation	P-value
Text-based messaging applications (Wha	0,21	0,409
Social network services (LinkedIn, Twitter,	0,65	0,005
Task management tools for individual us	0,20	0,435
Note applications (OneNote, StickyNotes)	0,49	0,043
Online project management tools for coll	-0,14	0,598
Online collaborative content creation too	0,04	0,880
Phone for calls and meetings ()	0,66	0,004
Teleseminar application on laptop with a	0,38	0,138
Teleseminar application on laptop with a	0,31	0,233
Voice commands for using any applicatio	0,37	0,141
Gesture controls for using any applicatio	0,34	0,179
Access control application in smart phone	-0,46	0,061
Info screens around premises for informa	-0,47	0,056
Virtual lobby for guest / Guest arrival not	-0,25	0,333
Meeting room reservation by phone (via	-0,08	0,751
Videoconference equipment in meeting ro	-0,47	0,056
Slack for information about events etc. or	-0,27	0,285
Email for information about events etc. o	-0,21	0,429
SUM	0,07	0,782

Appendix 3. Correlation between between background variables & usage of different spaces and user experience statements

	Age	Gender	timespe	Field	Degree	Typeofc	inMaric	Workst	Workst	Workst	Phone l	Researv	Non-res	Cafeter	Informa	Event sp	9. Wha
Satisfaction	0,38	0,38	-0,10	0,00	0,10	0,11	0,00	-0,02	0,25	-0,04	0,00	-0,18	0,14	-0,26	-0,16	-0,34	0,13
Cosy	0,10	-0,40	-0,07	-0,27	-0,13	-0,31	-0,08	-0,29	-0,04	-0,21	-0,11	-0,34	-0,34	-0,24	-0,22	-0,13	0,06
Exciting	0,00	-0,52*	-0,56*	-0,29	0,17	-0,11	-0,46	0,05	0,10	-0,18	-0,03	-0,15	-0,11	0,19	0,19	0,09	0,19
Alive	0,12	-0,10	-0,32	-0,20	0,20	0,21	-0,21	0,22	0,24	0,32	0,30	0,22	0,40	0,5*	0,26	0,36	0,31
Visibility	0,21	-0,29	-0,34	-0,47	0,03	0,09	-0,41	0,29	0,17	0,02	0,11	0,01	0,11	0,24	0,18	0,35	0,13
VisualSUM	0,13	-0,44	-0,42	-0,38	0,08	-0,05	-0,38	0,08	0,14	-0,04	0,07	-0,10	0,00	0,20	0,13	0,20	0,22
Pleasant	0,20	-0,21	-0,55*	-0,53*	-0,16	-0,39	-0,62**	-0,10	-0,05	-0,59*	-0,61**	-0,55*	-0,62**	-0,53*	-0,05	-0,30	0,03
Inspiring	0,20	-0,18	-0,51*	-0,58*	-0,01	-0,02	-0,61**	0,10	0,18	-0,12	-0,02	-0,08	0,01	0,04	0,10	0,10	0,20
Selecting	0,11	-0,37	-0,6*	-0,51*	-0,09	-0,11	-0,74***	0,29	0,16	-0,03	-0,12	0,06	-0,11	0,12	0,44	0,38	0,20
Acoustics	0,22	-0,53*	-0,67**	-0,57*	-0,13	-0,02	-0,76***	-0,11	0,13	-0,08	-0,28	-0,03	-0,19	0,11	0,20	0,35	0,22
AudioSUM	0,22	-0,38	-0,7**	-0,62**	-0,12	-0,17	-0,82***	0,05	0,12	-0,26	-0,31	-0,19	-0,28	-0,09	0,20	0,14	0,19
Scent	-0,21	-0,19	0,04	0,02	-0,25	0,26	0,19	-0,29	-0,18	0,13	-0,06	-0,37	-0,29	-0,27	-0,08	-0,02	0,17
Pleasant43	0,00	-0,30	-0,37	-0,28	-0,29	-0,20	-0,41	-0,18	0,22	-0,06	-0,09	-0,08	0,02	-0,11	-0,16	-0,15	0,51*
Fresh	0,00	-0,39	-0,41	-0,32	-0,19	-0,24	-0,48*	0,01	0,14	-0,33	-0,09	-0,28	-0,28	-0,30	-0,03	-0,26	0,29
Cosy44	-0,16	-0,36	-0,36	-0,26	-0,32	-0,16	-0,30	-0,41	0,10	-0,12	0,02	-0,28	-0,38	-0,33	-0,10	-0,16	0,30
ScentSUM	-0,14	-0,45	-0,36	-0,26	-0,32	-0,07	-0,33	-0,26	0,03	-0,15	-0,13	-0,34	-0,41	-0,34	-0,04	-0,17	0,39
Materials	0,29	-0,37	-0,39	-0,52*	0,19	-0,02	-0,35	0,02	-0,10	-0,26	-0,38	-0,29	-0,20	0,10	-0,07	0,10	0,28
Clean	0,27	-0,53*	-0,40	-0,11	0,40	0,02	-0,43	-0,19	-0,11	-0,37	-0,30	-0,24	-0,46	-0,17	0,31	0,06	-0,23
Draft	0,00	0,37	0,03	0,54*	-0,03	0,03	0,13	0,00	0,22	0,22	0,08	0,18	0,15	-0,19	0,27	-0,20	0,12
Temperature	-0,11	-0,15	-0,22	-0,73***	-0,12	0,5*	-0,38	-0,08	-0,19	0,14	-0,05	-0,01	-0,03	0,12	0,10	0,35	0,37
FeelSUM	0,23	-0,34	-0,45	-0,36	0,22	0,22	-0,48	-0,12	-0,09	-0,16	-0,31	-0,18	-0,27	-0,06	0,27	0,14	0,22
Peaceful	0,10	-0,51*	-0,32	-0,40	0,22	0,02	-0,44	-0,08	-0,18	-0,28	-0,26	-0,25	-0,42	-0,10	0,24	0,12	-0,01
Vibrant	0,12	-0,14	-0,22	0,04	0,22	-0,16	-0,04	0,12	0,11	0,08	0,13	-0,11	0,02	0,03	0,32	0,11	0,18
Simultaneou	0,47	-0,08	-0,06	0,13	0,65**	0,27	-0,11	0,42	0,08	0,16	0,35	0,43	0,32	0,46	0,62**	0,47	-0,03
Flow	0,32	-0,14	-0,24	-0,41	0,14	0,05	-0,37	0,49*	0,02	-0,12	0,07	0,05	0,13	0,24	0,24	0,24	0,19
History	0,62**	0,37	-0,02	-0,11	0,44	0,04	-0,02	0,39	0,15	-0,08	-0,07	0,27	0,34	0,23	-0,07	0,01	0,28
TempoSUM	0,47	-0,15	-0,25	-0,24	0,47	0,06	-0,29	0,38	0,05	-0,08	0,05	0,11	0,11	0,24	0,37	0,27	0,18
Individual	0,21	-0,38	-0,59*	-0,35	0,16	0,01	-0,71**	0,16	0,27	-0,11	-0,11	0,22	-0,02	0,16	0,25	0,14	0,28
Collaboratic	0,35	-0,09	-0,26	-0,18	0,26	0,08	-0,26	0,06	0,00	-0,30	-0,32	-0,21	-0,15	-0,10	-0,12	-0,24	0,16
Spontaneous	0,00	-0,46	-0,16	-0,29	-0,18	0,04	-0,10	-0,35	-0,16	-0,03	-0,24	-0,27	-0,30	0,02	-0,25	0,09	0,25
Adjusting	0,10	-0,35	-0,34	-0,77***	-0,15	0,08	-0,52*	0,02	-0,09	-0,17	-0,20	-0,16	-0,12	0,08	-0,14	0,18	0,26
Option	0,36	-0,12	-0,33	-0,36	0,21	0,15	-0,44	0,24	0,14	-0,03	-0,13	0,24	0,17	0,30	0,04	0,17	0,30
FuncSUM	0,24	-0,34	-0,41	-0,48*	0,06	0,09	-0,5*	0,03	0,04	-0,15	-0,24	-0,04	-0,10	0,11	-0,05	0,09	0,30
Knowing	0,20	-0,12	0,25	0,09	0,35	0,20	0,17	0,30	0,06	0,39	0,39	0,58*	0,61**	0,69**	0,18	0,55*	0,11
Finding	0,00	-0,33	0,10	-0,19	0,12	0,18	0,12	0,11	-0,02	0,32	0,30	0,25	0,41	0,6*	-0,02	0,52*	0,20
Modifying	0,24	-0,30	-0,54*	-0,36	0,17	-0,10	-0,49*	0,31	0,15	-0,13	-0,10	0,03	0,08	0,30	0,20	0,22	0,32
Safe	0,36	0,24	-0,28	0,00	0,40	0,28	-0,29	-0,18	0,05	-0,09	-0,31	-0,12	-0,12	-0,30	0,20	-0,11	-0,18
Feedback	0,32	-0,04	-0,03	0,25	0,46	0,28	-0,02	0,30	0,09	0,14	0,25	0,34	0,36	0,44	0,28	0,19	0,09
EaseSUM	0,28	-0,15	-0,10	-0,05	0,39	0,22	-0,11	0,22	0,08	0,18	0,16	0,31	0,37	0,48	0,22	0,38	0,14
Story	0,44	0,28	-0,40	-0,02	0,40	0,08	-0,25	0,26	0,12	0,14	-0,11	0,22	0,05	0,19	0,6*	0,37	0,23
Visible	0,49*	0,43	0,01	0,01	0,37	0,12	0,14	0,19	0,20	0,35	0,20	0,31	0,5*	0,28	0,21	0,33	0,29
Activities	0,24	-0,02	-0,13	0,04	0,13	-0,23	0,00	-0,12	0,23	0,15	0,29	0,03	0,28	0,10	0,18	0,20	-0,01
Brand	-0,10	-0,44	-0,23	-0,24	0,23	-0,03	-0,17	-0,08	-0,36	-0,33	-0,24	-0,33	-0,47	-0,02	0,14	0,01	0,09
Area	0,11	-0,03	-0,17	-0,18	0,29	-0,01	-0,16	0,03	-0,21	-0,27	-0,22	-0,23	-0,18	-0,10	0,07	-0,15	0,13
StorySUM	0,30	0,02	-0,25	-0,12	0,39	-0,03	-0,12	0,06	-0,03	-0,01	-0,03	-0,03	0,02	0,11	0,31	0,19	0,19
Comeback	0,13	-0,06	-0,35	-0,08	0,08	0,01	-0,18	-0,16	0,12	0,14	-0,06	-0,03	0,05	0,00	0,17	0,11	0,39
Tiding	0,25	0,29	-0,48*	-0,25	-0,29	-0,24	-0,48	0,00	0,21	-0,18	-0,38	-0,06	-0,33	-0,36	0,04	-0,15	0,25
Owning	-0,11	-0,28	-0,39	-0,13	0,04	0,16	-0,29	0,06	0,14	0,33	0,13	0,27	0,20	0,42	0,38	0,52*	0,31
Important	0,00	-0,21	-0,43	-0,12	0,05	0,06	-0,22	0,07	0,17	0,17	0,07	0,01	0,08	0,20	0,25	0,28	0,38
Memories	0,00	-0,13	-0,32	-0,05	0,09	0,16	-0,13	0,08	0,28	0,38	0,31	0,19	0,38	0,30	0,30	0,35	0,48*
ImportanceS	0,03	-0,15	-0,45	-0,13	0,04	0,08	-0,27	0,02	0,21	0,25	0,08	0,11	0,15	0,21	0,30	0,32	0,44
UXSUM	0,26	-0,29	-0,45	-0,38	0,17	0,06	-0,42	0,07	0,10	-0,02	-0,05	-0,03	0,02	0,15	0,20	0,23	0,32
Profile	-0,32	-0,34	0,30	0,07	-0,30	0,15	0,32	-0,16	-0,53*	-0,07	-0,13	-0,30	-0,42	-0,16	-0,02	0,10	-0,01

(* = p < 0.05, ** = p < 0.01, *** = p < 0,001)

Appendix 4. Correlation matrix digital profile and user experience statements

6T Statement	Correlation	P-value
Cosy	-0,05	0,86
Exciting	-0,29	0,26
Alive	-0,43	0,08
Visibility	-0,35	0,17
VisualSUM	-0,35	0,17
Pleasant	-0,03	0,92
Inspiring	-0,45	0,07
Selecting	-0,23	0,37
Acoustics	0,01	0,97
AudioSUM	-0,21	0,41
Scent	0,49	0,05
Pleasant43	-0,04	0,88
Fresh	-0,11	0,68
Cosy44	0,06	0,82
ScentSUM	0,24	0,36
Materials	-0,18	0,49
Clean	0,10	0,70
Draft	0,23	0,37
Temperature	0,07	0,78
FeelSUM	0,09	0,73
Peaceful	-0,07	0,78
Vibrant	-0,28	0,27
Simultaneous	-0,26	0,31
Flow	-0,22	0,39
History	-0,41	0,10
TempoSUM	-0,36	0,16
Individual	-0,30	0,24
Collaboration	-0,16	0,53
Spontaneous	0,26	0,31
Adjusting	-0,15	0,56
Option	-0,28	0,28
FuncSUM	-0,16	0,55
Knowing	-0,22	0,40
Finding	-0,14	0,58
Modifying	-0,26	0,32
Safe	-0,17	0,51
Feedback	-0,15	0,56
EaseSUM	-0,25	0,34
Story	-0,16	0,54
Visible	-0,39	0,12
Activities	-0,31	0,23
Brand	0,12	0,66
Area	-0,11	0,68
StorySUM	-0,22	0,39
Comeback	-0,05	0,84
Tiding	0,02	0,94
Owning	-0,03	0,92
Important	-0,09	0,73
Memories	-0,20	0,44
ImportanceSUM	-0,10	0,71
UXSUM	-0,23	0,37

Appendix 5. 6T survey form

1. Your age:

- <25
- 25-35
- 35-45
- 45-55
- 55-65
- 65<

2. Gender:

- Female
- Male
- Other

3. Your organization:
4. How long have you worked in you current organization?

- Less than 1 Year
- 1-3 years
- 3-6 years
- 6-10 years
- 10 years or more

5. What is your education (Master of Science, Bachelor of Economics, etc.)?
6. Which kind of office are you most used to working in?

- Enclosed offices (1-2 person office rooms)
- Open office (workstations in open office, formal meeting rooms for meetings)
- Activity-based office (different kind of spaces and zones for different tasks and activities)

7. How long have you worked at Maria 01?

- Less than 2 months
- 2-6 months
- 6-12 months
- 1 year or more

8. How often do you use the following spaces in Maria 01? (Daily-Weekly-Monthly-Seldom-Never)

- Workstation in dedicated office room
- Workstation in team space
- Workstation in open office area
- Phone booths
- Researvable meeting rooms
- Non-reservable meeting rooms or spaces
- Cafeteria, restaurant
- Informal spaces (eg. hallways, lobbys etc.) for individual work or collaboration

- Event spaces

9. What proportion of your working hours do you spend outside Maria 01 (eg. at home, at client)?

- Less than 33%
- 33-66%
- More than 66%

10. On a scale of 1 (not at all) to 10 (entirely), how digitalized is your daily work?

11. How often do you use the following digital tools for work? (Daily-Weekly-Monthly-Seldom-Never)

- Email
- Text-based messaging applications (Whatsapp, Skype, etc.)
- Social network services (LinkedIn, Twitter, etc.)
- Task management tools for individual use (eg. Todoist, Trello, Outlook)
- Note applications (OneNote, StickyNotes)
- Online project management tools for collaboration (eg. Asana, Trello, Wrike)
- Online collaborative content creation tools for eg. brainstorming or writing documents together (Docs, Stormboard, Mural, etc.)
- Phone for calls and meetings
- Teleseminar application on laptop with audio (skype etc.)
- Teleseminar application on laptop with audio and video
- Voice commands for using any application or device
- Gesture controls for using any application or device

12. How often do you use or utilize the following digital tools in the premises? (Daily-Weekly-Monthly-Seldom-Never)

- Access control application in smart phone
- Info screens around premises for information and navigation
- Virtual lobby for guest / Guest arrival notification
- Meeting room reservation by phone (via browser)
- Videoconference equipment in meeting rooms
- Slack for information about events etc. or reporting issues regarding premises
- Email for information about events etc. or reporting issues regarding premises

13. Overall, how satisfied are you with the digital tools that you are using?

14. Do you have enough digital tools at your disposal?

- Yes
- No, too few
- No, too many

15. Statements about the Atmosphere in Maria 01 (1=disagree, 5=agree):

Visual perception

- The space is cosy
- The space is exciting

- The space is alive
- It is easy to see what is happening around me

Audio

- The soundscape is pleasant
- The soundscape is inspiring
- I can select my soundscape
- The space has good acoustics

Scent

- The space is associated with certain scent
- The scent is pleasant
- The scent is fresh
- The scent creates a cosy atmosphere

Feel

- Interior materials in the space are pleasant
- The space is clean
- The space is drafty (ie. there is unpleasant movement of air)
- Temperature in the space is even/stable

16. Statements about the experience of Time in Maria 01

- The mood of space is peaceful
- The mood of space is vibrant
- There are many things happening at the same time in the space
- Different activities are well connected in the space (ie. there is a pleasant flow between them)
- There are elements that tell about the history of the place

17. Statements about the Functionality in Maria 01

- The space supports individual work
- The space supports collaboration
- The space supports spontaneous meetings
- Conditions of the space (eg. temperature) can be adjusted
- The space offers options for performing different tasks

18. Statements about the Ease of use in Maria 01

- I know how to use the space
- I easily find what I need
- The space can be modified to fit my task
- The space is safe
- It is easy to give feedback about different aspect of the space

19. Statements about the Story in Maria 01

- The space has a story
- The story is visible in the space
- The space tells about the activities in the space
- The space has a brand
- The brand is aligned with the brand of the area

20. Statements about the Importance of Maria 01

- I gladly come back to the space
- I want to keep the space tidy and in good shape
- I think of the space as my own
- I know that I'll come across important persons, things and thoughts in the space
- Memories are made in the space

Digital profile

- I prefer traditional methods, such as a paper calender and post-it notes, over digital tools. Learning to use new applications or devices is a challenge and I'm usually not eager to do it. I'm also usually not that interested in technology or digitalization. I'm not active on social media and prefer traditional means of communication like phone calls and face-to-face conversations.
- I'm not that interested in technology, but willingly use digital tools when they boost my productivity and are actually helpful, otherwise I stick to traditional methods. When digital tools work properly and I know how to use them, using them feels effortless. I feel that digital tools are too often used to boost productivity when in reality they just increase the amount of unnecessary work. I use social media when its useful or necessary for my work.
- I'm interested and willing to use different digital tools and open to replacing traditional methods with them, but for some reason (usually lack of time for learning or lack of support from organization) I'm not able or cabable of taking advantage of them as much as I'd want to. I actively use social media, sometimes for work also, and I'm interested in the possibilities it can offer.
- I'm extremely interested in technology in general and actively follow development of digitalization and new innovations. I'm eager and open to trying new tools even though they might still be unproven. Learning to use new to tools is effortless. Using technology feels natural and efficient and I'm most likely to be totally paper free, only rarely resorting to taking notes on paper. I'm often an active and innovative user of social media.

In case you want to add some comments about your experience in Maria 01, please feel free: