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Learning for Life: A Workshop Report

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Impressum

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Learning for Life: A Workshop Report

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Abstract. In today's complex society we need to learn on a daily basis during our whole life, especially when it comes to new digital tools on which our lives are increasingly more dependent. However, the way digital tools are designed is not well adjusted to learning how to use these tools in the later part of life. As a result, many older adults struggle with the integration of digital tools into their daily lives. Recently, older adults started to be involved in design through sustainable participatory approaches. However, this group is very heterogeneous and characterised by varied needs that have to be addressed with a fitting approach that is currently missing in E/CSCW and participatory design. In this workshop we therefore brought together different disciplines to develop new approaches that will help us to design for sustainable tech-learning networks of older adults.

1 Introduction

The "Non scholae, sed vitae discendum est" Annaeus Seneca, Lucius. Epistulae morales ad Lucilium, CVI.

We must learn not for school but for life: an old latin proverb points to the importance of gaining knowledge which we should use not only within the given educational context but mainly during our regular daily life. Learning for life or life-learning can be described as any learning taking place through daily living. Life-learning is more than training or continuing education (Fischer 2000). It differs from formal learning, which is organized in specific educational institutions, and non-formal learning, where learning is organized outside of formal educational organizations (Findsen & Formosa 2011). As Lave and Wenger (1991) have pointed out, life-learning is rather about developing the ability to participate in activities connected to a specific community of practice. People within such a community learn by mutually interacting with each other as well as with the given socio-material environment, the tools and the resources that the community uses (Lave, 1991). This view on learning however considers only people and hence communities which are quite homogenous. Fischer (2001) suggests that learning

also takes place when people from different communities of practice get involved in common activities. Furthermore, people can also learn not only when being connected by deeper connections as they might be within communities of practice or interests but even by weaker connections within networks (Brown & Duguid, 2017). However, these kinds of connections are more difficult to sustain than in traditional communities of practice. The "group" of older adults is initially held together only by age and is extremely heterogeneous, e.g. in terms of social class education or technical skills. Therefore, we consider the activities of life-learning of older adults as such a network of older adults, networks from which communities (of practice) can grow.

Life-learning during the whole life becomes especially essential today when the daily life in global society is becoming highly complex, and in turn also requires its members to continually adapt on a daily basis. This is especially true in relation to new digital tools on which our lives are increasingly more dependent. Digital tools hold promising benefits for increasing the quality of life of older adults (Kolland 2014). However, many barriers exist for a successful appropriation of technology, such as usability problems and lacking understanding of needs and preferences of this group (Czaja & Lee 2007). For digital tools to become everyday means to support the wellbeing of older people, it is necessary to open the discussion and research on usage barriers beyond the description of failures in the design of IT products and in requirement analysis. Many older adults struggle with the appropriation of digital tools that could or should support their daily lives. Successful appropriation is influenced by a number of factors, starting with the motivation to engage with technology, the actual use of technology, and support options for appropriation. Older people are not averse to the use of technology per se, but rather to the claim that technology automatically generates a meaningful added value for their lives. Older adults tend to be critical of technology if they do not see the meaningfulness of technology for their everyday lives. However, if they find it useful and meaningful for life and see concrete possibilities for its use, they can gain a positive attitude and would become motivated to deal with it (Bengs et al., 2018).

Concerns and fears also inhibit trial and error learning, such as lack of trust and the fear of undesirable costs caused by the use of digital tools and related supporting services (Müller et al., 2015). These circumstances are already addressed by E/CSCW, practice-based and participatory design approaches. By including concrete usage contexts and involving potential older users in the design process, the aim is to achieve a better fit of digital tools, increased usability and better appropriation (Wulf et al., 2015). Design studies have shown that the low-threshold examination of commercially available technology, which is oriented towards the

everyday practices of the older participants, can create common spaces for imagination, where possible uses can then be imagined (Müller & Wan, 2018). The group of older adults is not homogenous; on the contrary, older adults have very different (not only learning) needs. Hence, supporting learning for life of older adults is a multifaceted challenge that cannot be solved by one discipline only. To meaningfully explore questions on ways for supporting older adults' quality of life with and without digital technologies, it is worthwhile to bring together scholars from disciplines such as gerontology, anthropology, sociology of later life, special education, social work, care sciences and user-oriented IT research and many more. Fostering interdisciplinary approaches for developing concepts and methods which aim at designing sustainable and meaningful learning spaces for older adults thus seems to be a helpful solution in order to overcome a preoccupation which is predominantly top-down and technology-centric. Recent literature in Science and Technology Studies, but also in CSCW and HCI is criticizing the majority of IT research approaches in the ageing domain for neglecting interpersonal and everyday social aspects in technology-mediated relationships (Toombs et al. 2018). Social and critical gerontology provides important knowledge in regard to e.g images of age and ageing, of how the heterogeneity of the ageing population may be better addressed when designing interventions (Wahl & Oswald 2016 ; Wanka & Gallistl 2018). Special education provides perspectives on the specificities of later life learning (Korjonen-Kuusipuro et al. 2019) and qualitative sociology and STS provide knowledge on how to understand interaction with digital technology against the background of a diversity of older adults' life worlds (Kolland 2014). Also, it is worthwhile to consult approaches in care sciences, especially communitybased research, especially in regard to "caring communities". Here the cooperation and interaction processes of different local actor groups (the older adults, their social networks informal and formal care providers, communal actors and others) are of interest and solutions are being sought for on a local level to develop new models of care and for ageing and wellbeing at home. The role which technology may play or not is also an important question which is under investigation and by this, the question of how to support long-term community-based caring and learning relationships among the different actors (Muller et al. 2019).

Recent research on digital tools appropriation by older adults emphasize that digital tools uptake and appropriation are spanned up in different discourses and tensions between micro- and macro levels, such as images of ageing, forms of technology acceptance, attitudes, as well as different stakeholder interests (Thimm, 20 13). Many of the above presented studies focus only on the local, interactional level such as an older adult teaching another older adult how to use a specific digital tool. However, the problem of supporting learning for life of older adults is impacted not

only by the local level, but also by a mesa level (how communities and networks are organized) or even the macro level (national policies funding strategies, surveys, etc.). To be able to solve the problem of supporting life-learning of older adults in tech-learning networks, we need to attend this problem on all these levels.

Hence, we want to draw on the sustainable participatory approach and complement it by approaches from various disciplines to understand the problem of older adults' life-learning on these three different levels. In this special issue, we are therefore interested in how we can understand supporting learning for life of older adults in tech-learning networks as an interdisciplinary problem that requires a sustainable participatory approach. This text is another step in our continuous focus on the issue of aging and life-learning from various disciplinary approaches pushing more for exploration of the relationships between socio-technical environments, caring communities/networks of practices and life-long learning.

2 Workshop Results

In this report we bring five contributions from the domain of aging and IT in the context of E/CSCW. Each contribution represents a discipline or its combination: feministic research, interaction design, sociology, CSCW work and psychology.

The first contribution by Kaspar and Müller focuses on the concept of "machines for learning". By drawing on urban studies, they conceptualize learning as translation, coordination and dwelling in relation to the broader socio-technical context. They conclude that the main concept is normative, hence pointing to the relevant design space of the socio-technical systems in which learning and design should be mutually interconnected.

In the second contribution, Mylonopoulou reflects over her own coping with preestablished categories about her older participants and discusses how designers can overcome their own biases towards normalization and medicalization of older adults when designing for and with them.

Third, Nauwerck's contribution maps the macro level of aging, IT and learning in Sweden by focusing on initiations within the public sector, civil society, private sector and academia. In his reflection, he concludes that due to the increasing complexity of the technological landscape, CSCW researchers would benefit from exploring the links between participatory and universal design, which in turn could create opportunities to impact the macro level as well.

The fourth contribution by Bevilacqua and Strano starts from understanding the commonalities of participatory design and health literacy research. By exploring connections between these two, the authors point out barriers common for training

for e-Health literacy. They conclude by providing the reader with three steps which would help us achieve standardization of such training.

In the final contribution, Cerna and Müller focus their conceptual contribution on how learning of older adults can be fostered by redesigning of spaces into learning places, proposing a basis for a meta-design space approach.

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Socio-technical systems as "machines for learning"

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Abstract. In this position paper, we take a concept – or parts of it – and run away with it (Mol 2002) to explore its potential to better understand the non/appropriation of technologies by people in later life. We introduce the concept of the city as a machine for learning developed by Colin McFarlane (2011) in the field of urban studies. We identify elements we consider inspiring for the study of socio-technical systems, translate them to smaller entities of human-technology interactions and test their usability to analyze how older people in later life integrate digital technologies in their everyday lives. We do so from two distinct vantage points, i.e. empirical contexts: A participatory design project of a neighborhood platform and related privacy issues from the perspective of older tenants, and the introduction of a new automated emergency call system in seniors' apartments in a serviced senior living facility. We conclude with the suggestion to understand the concept "machine for learning" as a normative notion and a claim to accept the challenge it implies.

1 Introduction

In the field of technological innovations to improve quality of life in later life, learning seems to fail both on the side of the developers and the end-users of technologies. Science and Technology Studies demonstrating engineers' misconceptions of end-users – sometimes despite user inclusion (see e.g.

Neven 2010) – are abundant. So are developers' laments about older people's unwillingness or inability to see the benefits technology could bring to their lives. If we understand learning as a process of producing new knowledges through the transfer and translation of knowledge between different or even disparate contexts, rather than an isolated and individual cognitive act of processing information, this double failure collapses into one malfunction: the unsuccessful, sometimes even untried translation of knowledge.

Translation is a key aspect of Colin McFarlane's (2011) conception of learning, together with coordination and dwelling. McFarlane (2011) developed his conception of learning for the field of urban living and planning. He argues that cities are key sites to study learning for life because the city constitutes a context that constantly prompts – actually demands – learning, because cities are

"spaces of encounter and rapid change, of concentrations of political, economic and cultural resources, and of often perplexing unknowability – [they] are constantly sought to be learnt and relearnt by different people and for often very different reasons, from coping mechanisms and personal advancement to questions of contestation and justice" (McFarlane 2011: 362).

We translate the conception from the city to socio-technical arrangements for people in later life, because we think that many of the mentioned characteristics apply to socio-technical systems, too, though differently. Translation, hence, requires analytical care. We elaborate why we think translation is worth the effort and suggest that understanding socio-technical arrangements as 'machines for learning' bears the potential to fundamentally and sustainably overcome some of the key hurdles in the development and appropriation of technologies for people in later life.

2 Machines for learning

We run away with McFarlane's (2011) conception of the "city as a learning machine" and state that any entity or environment that spurs and requires learning on a constant and everyday basis can be viewed as a machine for learning. A machine is an apparatus that does a particular type of work (Cambridge Dictionary, Dictionary.com). Usually that work involves transforming things such as cleaning dirty clothes or cutting a loaf of bread into slices. A machine for learning does the work of prompting learning, in other words: providing or creating environments and situations as opportunities for learning.

Cities can be viewed as socio-materio-technical systems, but our focus here scales down to a city quarter and to households and people with some sort of functional limitations, often due to old age. Hence, we are dealing with environments that are not as complex, diverse, contested, opaque and fast-paced as cities, but they are multifaceted, polyvalent and changing, particularly in later life when physical and cognitive functions start dwindling and therefore the home in- and outdoor environment is experienced differently.

In the field of knowledge management and economics, learning had been given a focus in regard to cooperation structures in IT industries, e.g. with concepts such as "learning regions", "regional innovation", or the shift from the so-called first wave of knowledge management (i.e. storage of knowledge in IT systems) to the second wave of knowledge management acknowledging the socio- cultural embedding of knowledge production, transfer and learning with concepts such as "communities of practice" (Wenger 1998) or "networks of practice" (Brown & Duguid 2001). So far, these perspectives have hardly been elaborated for the area of IT-supported living in higher age; the focus has mostly been on the area of work and organizational learning from an economic perspective.

Living labs as environments of co-production and co-design among various stakeholders also include perspectives on joint learning, and recently, a focus on sustainability in IT design emphasizes a joint perspective on technology design and appropriation within local communities (Meurer et al. 2018). However, we still are lacking concepts which take the more subtle and mundane learning processes of all stakeholder groups into focus, and especially of those of the very end-user group, older adults.

3 Translation, coordination and dwelling as three interrelated processes of learning (in) socio- technical arrangements

In McFarlane's (2011) conception, learning consists of three interrelated processes: translation, coordination and dwelling. **Translation** describes the process when knowledge moves between different contexts. Knowledge is contextual, i.e. embedded in socio-material contexts, that is spaces, of which it is productive and a product. Translation is the work performed when knowledges move, that is get de- contextualized at one site and re-contextualized at another site. "[T]ranslation emphasises the spatialities through which knowledge moves and seeks to unpack how they make a difference, whether through hindering,

facilitating, amplifying, distorting, contesting or radically repackaging knowledge" (ibid: 363).

When engineers read about age-related visual impairments in Geriatric journals and accordingly adapt the design of interfaces, knowledge moves from medicine to engineering. On the way, it gets transformed and it transforms engineering.

Translation engages various sites, actors and action and hence requires **coordination**. Coordination is the effort taken to enable learning by "linking different forms of knowledge" (ibid: 373). A conference is a classic example of coordination, so is the field test of a prototype.

While learning can be structured through coordination, learning also works through aesthetics, i.e. sensing and inhabiting the world. McFarlane calls this process of learning **dwelling**. Knowledge shapes how we perceive and sense our environments; learning entails "the educating of attention" (ibid: 373) and shifts in ways of seeing.

A key strength of McFarlane's conception of learning is his understanding of translation, coordination and dwelling as constituted through and constitutive of **everyday practices** and **materialities**. Another strength is the attention to **power relations**, inequalities and exclusions inherent in learning. This sensitivity to power allows seeing negative aspects and detrimental effects within the predominantly positive notion:

- People might call it learning, but the covert motivation is to confirm and legitimate – what is already known (McFarlane 2011: 362).
- «learning may be reduced to a direct or indirect process of imposition or instruction rather than dialogue and reflection" (ibid: 363).

4 Empirical examples

Co-design of a city quarter portal: privacy issues

We conducted a long-term participatory design (PD) project with tenants of a city quarter in a German mid-sized city. The project aimed at establishing socio-technical measures to support mutual help and social inclusion. One of the measures included the development of a web-based neighbourhood portal. We developed the portal in a participatory design process together with interested, voluntary tenants as our co-designers. All of the interested tenants

were between 60 and 86 years of age and had no prior knowledge in the area of new media and ICT.

For over 36 months, we conducted regular workshops with interested elderly tenants (and younger ones in a much smaller number) on the one hand to investigate the approaching and handling of tablet PCs and online services and thus, to enable the establishment of a shared common thinking space for the later usage of the portal. On the other hand, our measures aimed at preparing all participants for taking an active role in the participatory design process (Hornung et al. 2017).

In the course of the appropriation of the tablet PCs which were handed out to the participants, in personal chats with the participants and during the PD workshops and common prototyping endeavours, topics repeatedly emerged, which can be allocated to the current privacy discourse. On the one hand, this happened due to our efforts to prepare the participants for potentially arising threats in the use of ICT. On the other hand, the participants uttered security concerns by themselves. We conducted several interviews to firmly understand the individual behaviour, attitudes and concerns regarding the information flow of the participants.

During this study, we were able to learn about the participants' privacy and safety concerns and their related measures they apply in their every-day life to keep their environment safe. In mutual discussions and observations (the older participants observed how we, the researchers, behaved in our own manipulation of internet tools and we observed the local actions of the participants) activities of translation, coordination, and dwelling took place.

Translation: Introducing mobile devices and internet tools, such as social media and the platform to older adults, who were not familial with those applications, first of all made us aware of our responsibility. We not only needed to hand over the devices and possible usage concepts, we also felt the need to help the participants to navigate the new "online world" in a safe way. One issue was with passwords: We introduced several strategies which may help in dealing with passwords, e.g. mnemonic tricks. We also handed over a notebook and a folder for sheets to help keeping their passwords in one place. Here again, we had to decide for a working strategy: usually one would not recommend to write up a password.

However, due to their problems with reminiscence we did so in this case.

Coordination: To set up a continuous learning and also support space between the bi-weekly meetings, among others, we introduced the instant messenger app "telegram" and showed the participants how to make screen shots and how to send them to us. By this, we were able to help with problems with the tablets from remote. It turned out that telegram was being used in manifold ways by the participants and that they started to communicate with each other via the tool, e.g. sending birthday wishes, wishes for a nice week-end or sending a "hello" when being in the hospital. The messenger served as a linking tool between participants and researchers and was being used intensively, as problems with the tablets occurred in manifold ways. The tool served as a digital learning and communication space and enabled learning processes as "mimicry" in the beginning of the process, i.e. participants saw how the researchers communicated digitally and they partly copied this when formulating their messages.

Dwelling: In regard to the question of "how will I be seen by other tenants in the online portal", it turned out that the participants applied a lot of "analogue" privacy-preserving measures which they then transferred to their possible usage of the portal. "My home is my safe space", "When I close the door, then I am safe", or practices to cut out the address part from paper envelopes before putting them into the publicly accessible wastepaper box were such mundane activities. Interestingly, there was a difference in thinking about and feeling affected by adverts in the participants' email inboxes: Here, their general method of handling unknown correspondence was to mostly ignore and immediately delete it. Usually participants did not think further about these emails and did not question them as much as the physical letters. This may hint at a difference between the negotiation of privacy boundaries in their personal *physical territory* which was of high importance and was considered potentially harmful, and their *digital territory* which they just recently started to explore and construct and where such potential threads were not perceived.

The examples show socio-technical approaches to privacy and security issues in the elderly by taking in the perspective on privacy as socially negotiated boundary management and disclosure in a social system as well as demonstrating ways of conceptualizing the challenges in building systems for the elderly.

Mutual learning processes were possible between researchers and participants in the bi-weekly workshops and via the instant messenger. Privacy and security issues were transferred from the ways people were navigating their "analogue" relationships and activities in their local environment and gave much food for thought for reflecting and testing out digital tools for the neighbourhood. Further, the researchers themselves and their digital practices were learning sources for the participants. A lot of micro-learning activities happened which – too often – happen to be neglected in AAL approaches.

5 Introducing a new automated emergency call system to residents in a serviced senior living facility

The setting is an institution running a nursing home and an adjacent unit with serviced apartments for seniors. The institution promotes independent living and warrants security. Contracts with residents include a 24h-emergency call service. In autumn 2019, the current system was replaced by a new automated system: Motion detectors note motions within the apartment, door sensors note absences, a mobile device allows actively calling for help and an interphone allows talking to nurses answering emergency calls. The introduction had been planned considerately, with learning being a key element, though limited to certain occasions and directions of knowledge transfer.

Coordination: Four occasions for learning have been set up:

- A person from a facility that has adopted the same technology recently has been consulted to learn from their experiences in implementing the new system.
- An accompanying study has been commissioned to evaluate the implementation processes to learn from the experience for the implementation in other facilities.
- An event to inform residents has been organized.
- Individual teaching took place at the same day of the installation.

Translation and dwelling: The former two occasions constitute coordinated occasions of translation: Consulting and evaluation study facilitate the movement of knowledge between care institutions. The latter two occasions were designed to inform and teach seniors about the new emergency call system. The 'look-and-feel' of the new system was given priority. At the information event, the system's components were passed around while explaining how it works and how it differed from the current system. After installation, a social worker visited each apartment, explaining again the components and testing system it to reassure

residents they know how to handle it and *that* it works at all. Through collective information and individual teaching/testing the institutions made sure that residents were in a position to intellectually understand and practically know how the system works. However, the potential of these occasions for the institution to learn about residents' needs was missed, as these occasions had been designed as one-way learning occasions, only. After the explanations from a representative of an institution that had already implemented the system, there was room for questions. Several residents articulated various concerns with respect to data protection and privacy as well as the mandatory use of the system. These concerns were impatiently and flippantly shrugged away, rather than answered. This is not just unsatisfactory for residents, but a missed opportunity to learn about concerns and needs. The articulated fear of being watched and surveilled in the apartment can be understood as a desire of untouched privacy and the question regarding the modalities to opt-out as a manifestation of autonomy. For an institution promoting independent living for people in later life, these are essential moments to learn about residents' contextualized priorities. Essential questions such as: Under which circumstances is somebody ok with giving away some of her/his privacy? Can be discussed, negotiated and deployed to foster autonomy as a lived quality, rather than an element in a contract determining people's living and working conditions.

With a more holistic and practice-oriented understanding of learning as suggested by McFarlane (2011), the learning potential could have been exploited more fully. Furthermore, the introduction of the new technology could have been used to empower seniors rather than patronizing them.

6 What we learn from the empirical cases – what are socio-technical arrangements as machines for learning?

McFarlane (2011: 361f.) suggests that his conception of learning can be taken elsewhere and applied to what he calls non-urban contexts. But what do we gain with this novel conceptual approach for the better understanding of the non/appropriation of technology in later life? The notion of "machine for learning" is not a particularly accurate definition or description of sociotechnical systems. We suggest it as a notion with a normative implication: Sociotechnical systems should be designed, developed, distributed, implemented and appropriated as machines for learning. This seconds McFarlane's (2011: 373) statement:

"But the critical purchase of the concept of urban learning is not simply in a call to know more of cities, but to unpack and debate the politics of knowing cities by placing learning more centrally on the urban agenda".

The concept of "machine for learning" opens up a corridor for coupling design activities and learning activities. In socio-technical design approaches, the concept of appropriation already includes a focus on learning. However, micro processes and mutual learning perspectives are not spelled out in detail so far. What is especially lacking is an engagement with mutual learning processes with older and not technology affine persons in a long-term, sustainable designoriented perspective. It is all the more important when thinking about regional or city quarter-oriented approaches, and we think that the concept provides new viewpoints for fruitful discussions.

However, we also see limitations: technologies as machines for learning require a certain level of abilities to learn and interest in engaging with the digital sphere. When we think about persons with limited cognitive abilities, then the concept itself will have limitations. The suggestion of a new conception of digital media as machines for learning can thus not be transferred to all kinds of AAL technologies.

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Our little boxes: preconceptions and empathy on design for older adults

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Abstract: To deal with the world's complexity, we often categorize people. Sometimes, we may think that we design for a specific user group e.g. older adults, but we may base our design on social preconceptions deeply rooted in our subconscious. This creates distance between the designers and the users. Lately, I conducted a literature review to collect design guidelines for designing technology for older adults. This made me reflect to my practices as a designer. Do I really understand the users' needs or am I just blind from how the society I am leaving in perceive older adults? This opinion paper presents my reflections on how our preconceptions influence empathy creation, and when we use teaching as a patch solution to bad design.

Key Words: Design practice, older adults, empathy, preconceptions

1 Introduction

In the song "little boxes" by Malvina Reynolds, people are described as shaped by the society to "look just the same" have similar activities and habits, based on the place in their lifetime. It is in human nature to place people, concepts, ideas, even the perception of our own self into boxes, to categorize them. It helps us deal with the complexity we live in. Of course, most people will agree that stereotyping is unwanted, but it seems impossible to have a completely blank slate for every person, and respectively for every user of the technology.

In the past, I worked in the field of designing technology for supporting behavior change. In this field, the first stage for change is awareness of an issue (Weinstein, Blalock, & Weinstein, 2002). Only few months ago, I started working on understanding the technological needs of seniors in Sweden. The mentality of our group is to design for seniors without assuming they are novice users of technology. My first task in the new position was to read related literature chosen by a multidisciplinary team of experts and extract design considerations. Through

this literature I became aware of my attitude/behavior as a designer/researcher working with senior users.

In this opinion paper I would like to discuss the problematizations emerged by reading the literature regarding designers' attitude and behavior towards designing technology for older adults. The approach in this paper is more reflective rather than analytical, as I try to investigate how my "little boxes" influence me as a designer of technology. More specifically, I will present the literature not as a review but as a basis for my problematizations related to my practice as a designer currently working with older adults. After the presentation of the literature and the design considerations derived from it, I will discuss the two main problematizations in relation to designers' attitude and behavior that can be reflected through the design and unwittingly perpetuate an undesired image of older adults.

2 The literature.

The multidisciplinary design team working on the literature collection consisted of five researchers in the fields of engineering, adaptive systems, humancomputer interaction, social media studies and psychology. The researchers proposed 65 articles based on their expertise and what they thought relevant to designing technology for seniors and adaptive interfaces. From those articles, each researcher picked at least three, as "must to read", resulting to 14 (see table 1) focused on seniors. My task was to summarize the articles and extract the design considerations to use in our project. The literature was divided in two categories: the articles attempting to understand seniors and the ones presenting seniors. More details about the methodology you can find at (Vasiliki Mylonopoulou, Weilenmann, Torgersson, Jungselius, & Bergstrand, 2020)

Title	Reference
Multi-layered interfaces to improve older adults' initial learnability	(Leung, Findlater, Mcgrenere,
of mobile applications.	Graf, & Yang, 2010)
Designing User Interfaces for the Elderly: A Systematic Literature	(Dodd, Athauda, & Adam, 2017)
Modeling the Oldest Old: Personas to Design Technology-Based	(Reeder, Zaslavksy, Wilamowska,
Solutions for Seniors	Demiris, & Thompson, 2011)
Interviews with digital seniors: ICT use in the context of everyday	(Quan-Haase, Martin, & Schreurs,
life	2016)
An age-old problem: Examining the discourses of ageing in HCI	(Vines, Pritchard, Wright, Olivier,
and strategies for future research	& Brittain, 2015)
Rethinking Age in HCI Through Anti-Ageist Playful Interactions	(Ferri, Bardzell, & Bardzell, 2017)
"Tell It Like It Really Is": A Case of Online Content Creation and	(Brewer & Piper, 2016)
Sharing Among Older Adult Bloggers	
A literature survey on older adults' use of social network services	(Coelho & Duarte, 2016)
and social applications	
	Title Multi-layered interfaces to improve older adults' initial learnability of mobile applications. Designing User Interfaces for the Elderly: A Systematic Literature Modeling the Oldest Old: Personas to Design Technology-Based Solutions for Seniors Interviews with digital seniors: ICT use in the context of everyday life An age-old problem: Examining the discourses of ageing in HCI and strategies for future research Rethinking Age in HCI Through Anti-Ageist Playful Interactions "Tell It Like It Really Is": A Case of Online Content Creation and Sharing Among Older Adult Bloggers A literature survey on older adults' use of social network services and social applications

9	Usability Analysis on online Social Networks for the elderly	(Chen, 2009)
10	Computer use by seniorsA multi-disciplinary review	(Wagner, Hassanein, & Head, 2010)
11	Factors Predicting the Use of Technology: Findings From the Center for Research and Education on Aging and Technology Enhancement	(R.Giudicessi & J.Ackerman, 2006)
12	Cognitive Aging and Computer-Based Instructional Design: Where Do We Go From Here?	(Van Gerven, Paas, & Tabbers, 2006)
13	"My Hand Doesn't Listen to Me!": Adoption and Evaluation of a Communication Technology for the 'Oldest Old'	(Neves, Franz, Munteanu, Baecker, & Ngo, 2015)
14	"Who over 65 is online?" Older adults' dispositions toward information communication technology	(Vroman, Arthanat, & Lysack, 2015)

The articles trying to understand seniors are descriptive and mostly based on empirical (1, 4, 7, 13, 14) rather than literature studies (8, 11). Article 1 supports that seniors prefer static adjustable menus. Articles 8 and 13 list factors that made new technology and social media networks adopted. Articles 14 and 11 present different seniors' profiles using technology. Articles 3 and 7 focus on understanding which older adults' needs are covered by technology. The articles trying to present seniors are based equally on literature (2, 12) and empirical studies (3, 9). Articles 2 and 12 focus on the seniors' cognitive and physical aspects and even compare them to people with disabilities. Article 3 suggests two personas of seniors living in a care facility, and article 9 conclude that seniors do not use social networks because of cognitive, physical, and behavioral differences. Finally, article 6 is focused on gamified design that supports caregivers to empathize with the seniors; and article 5 underlines the vocabulary used in ACM literature to describe seniors inviting the community to avoid perceiving seniors as a socio-economical problem.

Based on the literature, I suggested a long list of design considerations to the team. Here, I present the most relevant to the discussion. These design advices are: (1) address senior's *socio-cultural needs*, (2) offer *multimodality* in interaction, to accommodate for different physical and mental abilities, (3) fix basic usability issues by designing intuitive interfaces and follow *Nielsen's heuristics*.

3. Discussion – Identification of my little boxes

The two main issues to be discussed are the importance of normality and medical model of disability - which seem deeply to influence designers when designing for seniors - and the lack of communicating empathy through the design tools.

Medicalization – Little box of normality. It was interesting to see article 5 exposing the biases in ACM publications towards seniors, concluding that we should stop unwittingly perpetuate the impression that seniors are a socioeconomical problem. Seniors (and people with disabilities) often considered depended because of defective mental and physical abilities, as the articles mentioned e.g. 2, 8, 9, 14. This is a residue of the medical model of disability (Jackson, 2018) that assumes there is a normal healthy body and mind and when someone deviates from it, they should be fixed with the use of modern medicine. The model has been criticized that diminish people to only mind and body excluding their social context as a source of their defectiveness (Wendell, 1996), namely, the same person in a different environment may have be perceived as normal. Noting that different environment in the digital world can be different ways of interacting, if we choose to not facilitate *multimodality*, we force users to interact in a specific way which may not be optimal for them.

When designing technology, many factors influence the designers' decisions (Harold G & Stolterman, 2003) one of which is culture, and when it comes to health related technology, the culture of the condition itself (V. Mylonopoulou, Väyrynen, Stibe, & Isomursu, 2018). Therefore, if the medical model is inherent in a society the designer may act accordingly, thinking that seniors have deteriorating abilities and in order to become independent they must recover their previous abilities, supported by technology. Of course, designers collect data from the users and try to understand what users need, want, and value (Nelson & Stolterman, 2012) but how we can be sure that we really listen the users and we are uninfluenced by the medical model?

Article 3 presents two senior-users personas inspired by the interpretation of qualitative and quantitative data. Designers use personas to focus on the specific user group, e.g. seniors (Chang, Lim, & Stolterman, 2008). The personas are fictional characters created by the data gathered from the interaction with the users (Grudin, 2006). However, how we gather and analyze the data, and what data we choose to attribute to the persona, can be influence by the assumptions inherited to the society e.g. medical model. In that way we unwittingly perpetuate specific mentalities.

It was striking that some articles (e.g. articles 2, 3, 8, 9, and 13,) suggested recommendations for designing technology for seniors, long ago discovered for casual users – e.g. *Nielsen's heuristics* (Nielsen, 1994). Similarly, the importance of *intuitiveness* in good design (regardless the age of the audience) was also discussed in the past e.g. (Djajadiningrat, Wensveen, Frens, & Overbeeke, 2004). Why these were senior-specific recommendations? It feels like we are used to technology giving us trouble (e.g. because the copy icon is misplaced or because we cannot cancel the action we chose). We are expected to deal with it, if we cannot, we need training. Similar point was raised by Perez in her book invisible women (Criado Perez, 2019) (p.151). It presents that women needed education on how to use the new bio stoves while the problem was that the designers focused on improving the air quality without considering other *socio-cultural needs*. This shows that designs focused on what they see as important, discard the users' wants, needs, and values resulting on users training to overcome issues they face with the new artifact.

When one focuses on what seems to be important e.g. physical and mental normality as prerequisite to function, may miss what is important for the users. For example, in the workshops we had with seniors rarely physical issues considered a big problem. A user, for instance, had shaky hands they used a pen to interact with a cellphone, instead, they were concerned about their online privacy and their data. Some of them had a sophisticated folder structure for bookmarks, others used applications on their phone, and some preferred to use laptops. As an observer, I fail to see the difference to other users, as some can remember/comprehend more information, and others can think/act faster. Why we think that the physical and mental decline is an issue if people experiencing it as an everyday reality?

Lack of Empathy – Little box of user's needs. Empathy lacks definition (Elliott et al., 2011), but, (Battarbee et al., 2002) described it as "the users' emotional understanding". Only article 6 referred to empathy-building (for caregivers). In design empathy with the users is vital for the product quality (Haag & Marsden, 2019). Many cannot imagine how their life would be if they lack an ability, they consider normal (Wendell, 1996). If the designers perceive the user group as "different", they may keep distance from the user (Visser & Kouprie, 2008).

Due to practical limitations (e.g. budget and time) often the people contacting the users are different than the people designing leading to an empathy barrier. One tool to build empathy with the users is the persona mentioned before (Ferreira, Silva, Oliveira, & Conte, 2015; Haag & Marsden, 2019). However, things like quotes and pictures can raise empathy they were excluded in the suggested senior personas of article 3. Another tool is a framework that helps designers to get into the shoes of the user and then take a step back (Kouprie & Visser, 2009). The point is to understand the user, experience the user's reality, and then take distance and reflect on how you experienced the users' reality and how they experience it. Probably for someone "healthy young" person, shaky hands or defective memory are a problem, but this may be a senior's everyday/normal life, and therefore, less of an issue.

4. Conclusions

Before reading the literature, I was unaware of my "little boxes", like many of us are. Now, I try to reflect on what I think is normal for and an issue of a person I encounter, especially seniors. Through the workshop, I hope (1) to experience participatory design (2) to discuss what it is rational to expect seniors need to learn, and where we use teaching as a patch to bad design (3) to start being aware of my preconceptions when planning teaching for seniors.

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When I'm Sixty-Four. Towards Successful Aging in a Platform Society

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1 Introduction

According to the United Nations (2019), the population aged 65 and over ("the third age") is growing faster than all other age groups globally. This also means that the societal resources to support older people are decreasing, in financial terms as well as in terms of human resources. Information and communication technology (ICT) is increasingly seen as the solution to the equation of how to support an aging population. At the same time, there is a rapid shift towards ICT enabled processes in all sectors of society, meaning that everyday interactions increasingly call for high levels of computer literacy and proficiency (Sayago et al., 2013). Thus, there is a need to support the older people's appropriation of technology, through training as well as co-development (Repetto & Trentin, 2008, Fischer et al., 2019). These are complex issues and the discussion here will be necessarily brief, drawing primarily on an overview of macro level actors in Sweden. It is also not possible here to define the central concepts or even to problematize them, rather terms such as ICT, learning, literacy and even ageing (c.f. Settersten & Mayer, 1997) are here understood boundary concepts, bridging various disciplines.

2 Macro Level Initiatives

Cerna et al. (2020) note that previous studies in Computer-Supported Cooperative Work (CSCW) related to older adults have focused on the micro level, with less research addressing the meso and/or macro levels (c.f. Light et al. 2015, Müller et al., 205). For a discussion on micro-meso-macro levels in relation to lifelong learning, see Boeren (2017). Here, the emphasis is primarily on the macro level. As a structured review is beyond the scope of this paper it will focus on examples from the Swedish context. A possible way to frame this macro level approach is through the concept of triple-helix, that is linkages between academia, government and industry or even more parts (Leydesdorff & Etzkowitz, 1996, Carayannis & Campbell, 2009). Much of the applied research in CSCW and human-computer interaction can indeed be understood as small scale examples of these forms of collaboration (c.f. Sjölinder et al., 2016). The idea of quadruple-helix collaboration is visualized in the figure below (adapted from Själinder, ibid).



The examples are taken from the Swedish context. However, as noted by Boeren (2017): "even in research concentrating on one single country, it is recommended to put its' situation in perspective in relation to other lifelong learning systems". Such differences are identified by Oñate et al. (2015) in a cross study between France, United Kingdom and Spain.

Public Sector

There are international policy initiatives that have an impact on the national level, ranging from the UN, over OECD to the European Union and bilateral agreements (Sixsmith et al., 2013). On a national level there are various public actors, supporting lifelong learning as well as the introduction of IT in healthcare, social care etc. This includes authorities such as the Swedish Agency for Participation and the Swedish Association of Local Authorities and Regions. In many of these cases, there is also a close collaboration with academia, and monitoring these initiatives thus provides opportunities for researchers to engage with and make impact on the

macro level. Funding agencies also play a strategic role here, perhaps especially Sweden's innovation agency, Vinnova, which is funding helix-based projects and contributing to arenas such as living labs.

Civil Society

Two important actors here are SPF Pensionärerna and SeniorNET. SPF Pensionärerna (The Swedish Association for Senior Citizens) counts 260000 members, organizes social activities but also lobbies for the benefit of seniors. They have a policy on digitalization and have worked with education provider Studieförbundet Vuxenskolan on material (including a TV-show) for study circles related to digital literacy. SeniorNet was founded back in 1986 in the United States (Furlong, 1995), an affiliated Swedish chapter was established a decade later, in 1997. Mynatt et al. (1999) see SeniorNet as a classic case of computer supported, cooperative work due to its strong focus on learning and working together. Even though this is an NGO, it should be noted that the Swedish chapter received governmental support and also was linked to a governmental commission that formulated a national internet strategy. SeniorNet Sweden still remains an important actor with 9000 members and 45 local groups, providing a community infrastructure promoting lifelong learning among senior citizens. It should also be mentioned that there are individual senior citizens who clearly take on the role as influencers, such as Sweden's oldest blogger Dagny Carlsson, now aged 108 and blogging since she was 99 (Bergström & Edström, 2018).

Private Sector

Similar to SeniorNet, Aging2.0 is an international organisation with a Swedish chapter. Aging2.0 strives to strengthen the Swedish innovation ecosystem related to elderly care and assistive technology by supporting startups and innovators. There are a number of private companies that in various ways strive to promote and support older people's use of technology. One such example is Funka, an IT consultancy company focusing on accessibility, also through research collaborations and EU projects (c.f. Johansson, 2016). Funka has worked with SPF Pensionärerna. A different example is a collaboration between MasterCard and SPF Seniorerna aimed at supporting seniors with online banking.

3 On Clouds, Information Infrastructures and Platforms

The examples above demonstrate some of the macro-level actors. What seems missing is the IT industry in general and the IT giants in particular. (Of course, they are not entirely missing, for instance Google for startups support Aging2.0.)

In recent years, the IT landscape has changed radically in the wake of cloud computing and platforms (Monterio et al., 2013). This also has an impact on the prospect of participatory design. Indeed, authors have stressed the emergence of information infrastructures and how this radically changes not only design but also the position of the researcher. Thus, Fitzpatrick & Ellingsen (2013) note that: The size, complexity and dependencies imply that the role of the CSCW researcher is just one of many stakeholders that voice opinions in these circumstances.

This is a challenge that must be taken seriously when engaging with the current IT landscape. This is even more critical as platforms display numerous characteristics which make them difficult to manage for older users. Thus, even a well-designed application is never stronger than the whole chain of the existing information infrastructure. A study by Almao & Golpayegani (2019, p. 16) illustrates this issue:

Although, it was also observed that most of the Apps (95%) supported the platforms accessibility settings [...]. However, a major issue with this [...], is that older people are being forced to find such settings in the platforms menu, which generally represents a complexity for them.

Many issues may be addressed through universal design, which has been argued as an approach to support successful aging (Carr et al., 2013). Thus, one answer to the call for new approaches to participatory design (Cerna et al., 2002) would be to explore the links between participatory design and universal design, not least how this might inform policy making (Lazar et al., 2015). Especially–I would argue–this could be mounted as a design critique of existing platforms, giving voice to the needs of older people, rather than developing short lived prototypes. Ultimately, this might lead to collaboration with the platform providers, for the benefit of all. Finally, working with seniors' interest organisations is an important route towards strengthening older users on their own terms.

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eHealth literacy for the Promotion of Technology Acceptance for the Older Adults

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Abstract. Promote the use of technology by the older adults is an imperative for the enhancement of health in ageing and this is the common aim of Participatory Design(PD) and eHealth literacy. To achieve this goal, PD studies the usability of technology tools, while eHealth literacy focuses on the skills that older people need to use these devices. In the eHealth domain, there is a multiple set of barriers personal, socio-cultural, political, legal, economic, technical and legal limitations. These limitations hamper eHealth interventions and older adults' access and use of health technologies. In addition, the absence of a standardized training is a main barrier in this field of research. The standardization of an eHealth literacy training could be achieved in three steps. The first is the systematization of terms and definitions adopted in the research field to harmonize the current evidence and knowledge on eHealth literacy. The second consists in the definition of the contents of the eHealth literacy training by adopting a multidisciplinary approach. Finally, the third step should be characterized by the implementation of RCT study design, in order to provide validated and applicable results.

1 Two domains tailored to older adults' use of technology: Participatory Design (PD) and eHealth literacy

The promotion of the appropriate use of technological devices for health is of paramount relevance for the ageing society, with the overall purpose of making the older people aware users of technology (Lattanzio et al., 2014). There are two actions that can be adopted to support the appropriation of technology and the inclusion in the digital world: the Participatory Design (PD) approach , that promote the usability of devices, through a set of techniques inspired by User Centered Design (UCD), by involving end users during the development stages of any technologies; and the eHealth literacy, focused on the achievement of skills for the effective use of electronic, digital and mobile health technologies (Norman and Skinner, 2006). Both the disciplines intervene in the path to the technology appropriation and use, by focusing on the improvement of the devices' characteristics through PD, and by empowering the older users with new competences through eHealth literacy.

Older adults make limited use of technology, especially in the area of eHealth (Vicente and Madden, 2017). The reasons behind this have to be deeply investigated, in order to provide strategies for researchers and policymakers to widespread the use of such devices for the health support. While the importance of PD is a well-known issue in the literature, the pragmatic role of eHealth literacy is still to be proved as there are scarcity of Randomized Control Trials (RCT) in the field that support the evidence of a direct impact of these devices on health outcomes (Watkins and Xie, 2014). Moreover, the absence of a standardized learning training on eHealth literacy, that should guarantee the achievement of a minimum set of skills to deal with technological world, does not allow the identification of the motivation behind the misuse of a technological artifact: is it a question of usability – implying a failure in the design phase – or of low competences of the user – as no learning training is available to detect problems of eHealth literacy -?

2 Barriers to the development of eHealth literacy training

There are several barriers that explain the failing relationship between older adults and the use and knowledge of eHealth tools and the development of eHealth literacy training, as extensively analyzed in the Report on the public consultation on eHealth Action Plan 2012-2020 by European Commission (2012). Critical barriers are composed by cultural issues, such as the lack of users' awareness and confidence in eHealth tools, the health professionals' acceptance of eHealth solutions, and the limited users' skills in using ICTs. In this regard, the scarce health and eHealth literacy skills represent a critical personal barrier, mostly typical in older adults, that inhibits the use of tools (Coughlin et al. 2018).

Political barriers are also relevant, as the lack of leadership by policy makers and local managers. In fact, a greater European Union cross-border governance is necessary because progress toward eHealth within the 27 EU member states has been inconsistent (Currie and Seddon, 2014). Other limitations are technical, as the interoperability between eHealth tools, and juridical, as the inappropriate legal frameworks, reimbursement schemes, and a particularly sensitive issue for older adults as the lack of security, guaranteed privacy and data protection. Moreover, in the healthcare system, there are evident constraints, as a missing large scale evidence for potential improvements of healthcare organization, and cross-sectorial coordination/integrated healthcare schemes.

Economic barriers, as the budgetary constraints or the shortage of funding for large-scale project and long term sustained investment, remain very severe. More recently, it has been observed that inadequate funding is a permanent criticality, whereas the technological progress of eHealth tools is increasing their efficiency in terms of management of care, quality of life and cost-efficiency of health interventions (Melchiorre et al., 2018). Nevertheless, the actual cost of mobile and eHealth technology remains high, especially for older people, generally living with a low/medium-low income. The expensive price, in fact, increases the sense of exclusivity of these technologies. It enlarges the digital divide and reinforces the barrier of complexity of these devices perceived by older people. Furthermore, other enduring impediments subsist, as concerns about privacy and security that make them ineffective and invasive in the eyes of the older adults (Kruse et al., 2017).

The complex of all these barriers creates impairments to learning interventions and limits eHealth literacy training opportunities for older adults. In addition, research in the field cannot rely on a systematic theoretical framework. eHealth literacy, in fact, is still in a grey area because the practical domains of intervention should be better defined and structured, while the theoretical landscape is very fragmented, without a 'gold standard' on definition and measurement (Griebel et al., 2018).

3 A standardized eHealth literacy training for older adults: a benefit for research and a guideline for policies

In order to overcome the barriers related to the scarce use of eHealth tools, the enhancement of older adults' eHealth literacy should be reinforced, through the availability of a standardized learning training, with aim of corroborating the results on the benefit of technology use already highlighted in the literature, such as the improvement of the psychophysical well-being, the reduction of anxiety connected to technology use and technophobia (Kokol and, 2011; Millán-Calenti et al., 2015; Xie and Bugg, 2009).

The standardization of an eHealth literacy training could be achieved in three steps. Firstly, through the systematization of terms and definitions adopted in the research field to harmonize the current evidence and knowledge on eHealth literacy, to be reached through a common consensus of the scientific community. The second step consists in the definition of the contents of the eHealth literacy training by adopting a multidisciplinary approach. In order to collect information and expectations of the target population, PD techniques should be used to design the content of the training in a user-centered perspective. Finally, the third step of the standardization should be characterized by the implementation of RCT study design, only recently applied (Summers et al. 2018; Mitzner et al., 2019), in order to provide validated and applicable results.

The availability of a standardized eHealth literacy training will provide policymakers with an effective tool to improve the diffusion of eHealth technologies for the ageing population. Moreover, it would allow to organize standardized interventions effectively tailored to older people, in line with the guidelines and recommendations expressed in the Territorial Agenda of the European Union 2020 (Walsh, 2012).¹

Finally, the standardization of eHealth learning training can represent a benefit also for the research field, by properly responding to the need of development of interventions that apply high-quality research design (Watkins and Xie, 2014).

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From design space to learning place: conceptualization for meta-design space for and with older adults

Abstract. Our society is increasingly becoming a highly digitalized place. We know that *where* one learns will impact *what* one will become capable of learning. Given that we live in a rapidly aging society, there has been an unproportionable lack of places where older adults can explore, envision and appropriate digital tools. Participatory design done in a sustainable manner, holds the potential to become such a space as it builds on mutual learning of all the involved stakeholders. To be able to build such environments, we first need to create suitable conceptualization for learning places for older adults. In our theoretical paper, we create a conceptual framework through which we want to understand how we can use the design-informed distinction between space and place and use it to develop our understanding of (participatory) design related learning in aging society. We illustrate the conceptual framework on an empirical case where a group of older participants and younger researchers came together to explore online collaboration. We conclude with a meta-design space proposal, which brings together the relevant aspects of participatory design of older adults and how it can be situated into a particular place.

1 Introduction

Learning is something that does not end with education - as our society is increasingly becoming complex, we will need to continuously learn during our whole life. One of the key elements of the increasing complexity in our society is the growing number of services and activities facilitated by digitalization. This poses new requirements on all the members of our society to be digitally literate, making digital literacy and its fostering of key importance. This is especially true for those groups, where formal education or informal learning to engage with the new, often digitalized, aspects of society has not been fully established - such as older adults. As a consequence, older adults often experience unfamiliarity and fear when dealing with digital tools (Hill et al., 2015) and other frustrations. Even though solutions are already in place to foster digital learning of older adults, such as local computer clubs or peer-to-peer support groups, they often lack resources and cannot provide help to everyone who needs it. Hence, we need to find solutions on a broader scale. One such solution is to transform traditional (semi-)public spaces into learning places in a way so that older adults can foster their digital literacy by interacting with these places. Currently, having access to (semi-)public

spaces for older adults can mean a difference between experience of inclusion and exclusion of them (Buffel et al., 2013). Semi- and public spaces are defined by their purpose, which is that they should be accessible to everyone. This can be an issue both in physical context (for example, missing lift or lack of barrier-less entrance) as well as the online one (lacking digital tools that are matching the needs of the participants). We can imagine for example a town square, where people can meet and talk but also as an open online forum. All spaces struggle with the issue of access - if there are only stairs leading to a square, it will not be accessible to those with mobility issues. If access to an online space will be way above the digital competence of the people, they will not be able to reach them. Meanwhile in the physical space, understanding the possible barriers is much more explicit (you either can open a door, or you cannot; you can go up the stairs or you cannot), in the online spaces we need a much more granular understanding of how one can access them and in turn take part in them. The material aspect of the learning environment in the context of older adults has been so far overlooked (Wahl et al., 2012). According to Brookfield et al. (2020), learning environments for older adults need to be democractic, inclusive yet flexible as a response to the heterogeneity of older adults as a group. For learning places to become like that, a good option are participatory approaches, such as participatory design which heavily builds on mutual learning. This type of approach requires that involved stakeholders through mutual interaction develop together relevant skills or competencies. For older adults, this set of skills can be for example using digital tools in an autonomous way. Even though the necessity to support this learning has been already recognized (for example, Müller 2015), we still lack broader conceptual understanding of how to bring the need for space creation and learning in the aging society together. This text is a step in this direction and aims to elaborate on a theoretical framework that would help us to understand this conceptual space better. The main aim of this paper is: How can we conceptualise design space as a learning place for the context of aging society? We then illustrate this framework in a case of a participatory design project that has been fully moved online and the challenges these transitions brought with it.

The text will be developed as follows. First, we will explain the basic assumptions connected to space, place and learning in the aging society, which we will integrate into a model. Next, we will use this model into the empirical case of older adults going online to highlight how design space can become a learning place for older adults in online PD. We conclude with a meta-design space proposal, which brings together the relevant aspects of participatory design of older adults and how it can be situated into a particular place.

2 Conceptual framework

In this section, we outline our conceptual framework which consists of making a distinction between space and place, highlighting the role of participatory design and learning in the aging society.

2.1 Space and place distinction in design

The metaphor of space is often used in design related sciences. One of the key papers focusing on space and place was written by Harrison and Dourish (1996). By drawing on architecture and urban studies, they point out that there is a difference between space and place:

"appropriate behavioural framing, is not rooted in the properties of space at all. Instead, it is rooted in sets of mutually-held, and mutually available, cultural understandings about behaviour and action. In contrast to "space", we call this a sense of "place". Our principle is: "Space is the opportunity; place is the understood reality"." (p.67)

What the authors describe is that what we will understand as possible to do and do as a consequence in a certain environment will be impacted by a set of particular socio-cultural relationships connected for us to that particular environment. Which kind of actions will be taken in this space will depend on how we will make sense of the space i.e. which meanings we will choose to draw on. Especially the last phrase then highlights the crucial difference between the space and place: space as a set of possibilities; place is then how we make sense of them. The key aspects of spaces are then the way they are organized into places and how to become able to navigate in this landscape as a consequence.

Later, Dourish revisited their idea and admitted that also space involves meanings (2006). He points out that the space/place is not a dualistic distinction, both are socially produced, but each by a different set of practices. Space is not only spatio-temporal but also socio-material. Meanwhile spatio-temporality points to the fact that everything in our world has physical properties and exists in time, these exist in a mutual interplay with the social relations and meanings assigned to them. It means the properties of space are determined by both the physical properties of the space (such the size of computer room) but also the cultural meanings that are assigned to the particular physical properties (for example, a local senior computer club needs parking lots, otherwise its members will have difficulties joining the common activities). As a consequence, space is a set of resources which are organized in a certain way. The resources are organized according to

"classification", i.e. "a spatial, temporal, or spatio-temporal segmentation of the world" (Bowker & Star, 1999, p.10). In learning contexts, we need to aim to organize space in a way so it supports co-creation and knowing.

2.2 Participatory design and the aging society

As established above, there is a conceptual difference between place and space and we will further use this distinction for the context of participatory design in the aging society. We understand space as a set of opportunities and place as a space where meanings were assigned to these resources. we want to extend use of the term space into the participatory approaches. Participatory design aims to create a shared thinking space for experience-based learning, which also encompasses further stakeholders and industry partners (Müller et al., 2015). Further, the aim of the participatory project is to "create common spaces for imagination, where possible uses can then be imagined ." (Müller & Wan, 2018). Thus, participatory design can be viewed as a set of possible options or opportunities, which often can be explored by diverse activities and prototyping. It can be viewed as a space for imagination; being able to imagine what the digital artefacts could do and what our community could become through them, is a skill that needs to be fostered. This is when the potential of participatory design connects to the needs of the aging society: participatory design has the potential to become a learning place for the older adults, so that developed tools better address their needs but that the older adults also learn how to use (for them) new digital tools. Involvement of older adults into the design process is necessary and beneficial (Lindsay et al., 2012). However, there is also a range of challenges facing such involvement. As overcoming these challenges is often connected to enabling older participants through learning, we need to conceptualize learning in relation to design the aging society.

2.3 Learning in the aging society

We understand learning in the aging society as life-long, situated and aiming to know oneself.

2.3.1 Life-long learning

Life-long learning puts emphasis on non-formal and informal learning, which take place outside of the traditional educational venues, such as schools. Life-long learning places emphasis on *time*. However, that does not mean that learning will be taking place all the time, but rather life-wide, at different phases of life (in contrast to only at the beginning of our lives) (Findsen & Formosa, 2011). However, it is not only the when and how but also the *where* that impacts what people could learn. Socio-material approaches emphasize the need to take into an account the materiality and physicality of the places where any social activity is taking place (Hopwood, 2016). Learning does not occur equally everywhere - there are spaces which are more suitable for life-long learning to occur. As the physical environments where people live gain importance with higher age (Wahl et al., 2012), we need to get a better understanding of how to make spaces into learning places.

2.3.2 Situated character of learning

To understand how we can conceptualize space and place for the aging society, we need to conceptualize what learning is. In this paper, we view learning as always situated and as an emerging yet central feature of becoming knowledgeable in a particular domain (Lave & Wenger, 1991). This perspective means that learning needs to be understood in the social and historical context in which it emerges (Vygotsky & Cole, 1978). More specifically, we draw on Lave's concept of situated learning. To explain this concept, we will first present our understanding of communities of practice and legitimate peripheral participation in relation to learning, as well as present Lave's unpacking of situatedness. First, I chose this approach as it builds on the same theoretical assumptions as practice theory but explicitly talks about learning. People's actions are organized through mutual interdependence: individual participation constitutes communities of practice, which at the same time, constitute individual participation (Lave & Wenger, 1991). This is important as it shifts our focus to the actual interaction taking place instead of what is taking place only on an individual level. The idea of communities of practice originated from Lave and Wegner's work on apprenticeship, and they described it as a group of people who come together because of a common interest or concern that the group aims to solve. These people are related to each other by a set of relationships that also involve artifacts and take place in time and space (Lave & Wenger, 1991).

Second, even though this approach is explicitly interested in learning, it shifts our focus from a traditional approach to learning to the social interaction. Learning is a central feature of participating in a certain community of practice. Those who get

involved with a community of practice go through a process Lave and Wenger (1991) called "legitimate peripheral participation.". This participation is on one hand peripheral, as the people start as outsiders, at the edge of a community, and by continuous mutual interaction with others gradually move towards the center of the community the more knowledgeable they become on the given problem. But at the same time, the participation is also legitimate, as it is an accepted way of becoming a member of the community. Finally, learning is always situated, as it does not exist outside of the social context within which it takes place. In turn, learning is always learning of something, learning of a specific phenomenon by a specific group of people in a specific environment. Lave (1991) unpacked and contrasted three different views on situatedness to help us better understand it. The "cognition plus view" views a person (and his or her learning) as an individual act that is impacted by the social context. The second approach, called the "interpretive view," places situatedness into social interaction or language use. This approach shares some of the key aspects with Lave's take on situatedness, such as relational interdependency between the learning of the person and the world or that sense making is placed in "interested, intersubjectively negotiated social interaction." (p. 66). However, this approach misses that "subjects are fundamentally constituted in their relations with and activities in that world" (p. 67) which is one of the key assumptions of Lave's situated view, which is the third approach. In other words, the situatedness of learning does not only mean that individuals' learning takes place in a social context, but that they and, in turn, their learning are constituted and formed by the relationships they find themselves in, as well as constituting and forming the relationships they are in. They are not separate but mutually dependent.

2.3.3 Learning to know oneself

Learning to know oneself is a long-life process of dealing with transitions and becoming who we are. One transition we all go through (despite in a much less visible manner) is aging. Despite that aging is a gradual and at times not so visible change, it is a change that has profound consequences. These consequences do not take place because of some inner processes but rather because the speed with which our society develops and which does not match to the kind of changes that are common to us all. Learning who we are heavily impacts our capabilities as we will be able to take action only when we recognize ourselves as capable of taking that action.

Despite that we need to learn about ourselves does not mean it takes place in isolation. On the contrary, we become who we are through taking part in various communities of practices and interests (Fischer, 2001; Lave & Wenger, 1991). In context such as participatory design or chronic care, it is through other people that

we become capable of understanding of who we are and what we need (Cerna et al., 2019). This identity work is not a simple endeavour and especially in the context of the aging society, in which the spaces where learning to get to know one are often embedded with images of aging. For example, researchers in a participatory project experienced problems when they introduced their envisioned identity (an old or older person) to their potential future users, that did not did not match the participants' perceptions of their own identities (Riche & Mackay, 2010). These findings indicate that identity work is necessary when people are taking part in PD. Brule and Spiel (2019) further showed how PD can become a space where identities are negotiated during the process and hence should be supported.

2.3.4 Summary

To sum up, space is a range of socio-material resources. Only when we assign these resources specific meanings, we can use them to support learning of those who need it. The aging society is characterized by learning that takes place throughout one's life (in contrast to only at the beginning), in a range of places (not only in formal settings) and collaborative and potentially participatory processes (instead of direct teacher-centered learning). To make participatory design meaningful for the purpose of the aging society, we hence need to recognize which resources are available during the PD processes and create ways to assign these meanings in a way that is meaningful to the older adults and other relevant stakeholders in the aging society. As a consequence, participatory design can become a learning place that will enable people to recognize themselves as capable of using digital tools.

3 Zoom as a design space or a learning place?

There are various places where older adults in Germany learn about digital tools and how to use them for their life, for example the local senior computer club. However, in light of the recent developments connected to COVID-19, many of the local activities had to be either interrupted or moved online. The latter also heavily impacted our empirical work. In this section, we describe how we as a group of younger researchers used Zoom as our online design space and how we made sense of it with our older participants to make it a learning place. The workshops' goal was to develop a mobile demo-kit (a set of online didactic resources for learning), which proved to be difficult, as the workshops could proceed only in an online format due to the global pandemic. We proceed to use our above described conceptual framework to make sense of our data.

Similar to other online environments, even Zoom, a video conferencing tool, draws on the metaphor of space and as a consequence involves elements such as the main room, break-out rooms or a waiting hall. These elements form the design space and are the opportunities for any user to engage with them. That is it is *possible* to use them, if certain conditions are fulfilled, such as the user has access to the internet or knows how to use Zoom.

For all our older participants, using Zoom was a new thing to learn. Their learning to use Zoom was the more demanding because they had to learn to use Zoom *through* using Zoom (so not only *by* but actually *through* the tool itself). As described above, their learning happens in a mutually constituting relationship with the researchers. Both parties need to learn: the older adults how to use Zoom, the researchers how to support older participants in using Zoom. But that is only possible through interacting with each other and gradually exploring what is possible and what yet is not.

Finally, for the older adults to become capable of using digital tools not only within the design space but also outside, it is necessary for them to recognize themselves as actual *users* i.e. as someone who is *capable* of using digital tools. Through engagement with the design space, together with the researchers, they need to go through a transition in which they will not only become a different person but mainly see themselves as a different person.

4 From design space to learning place in aging society: the proposal of meta-design spaces

To sum up, in this paper we aimed to create a conceptual understanding of how learning, spaces/places, digital literacy, and participatory design can be connected and understood for the purpose of overcoming the challenges of the aging society. By drawing on a case of older adults participating in a participatory design process taking place online, we have shown how this model can help us understand the different facets of these practices.

Design space and learning places are closely related and impact each other. They can be meaningfully brought together and combined in a meta-design approach (Fischer & Herrmann, 2015). Further building on this work, Fogli et al. (2020) points out the need for creation of creative spaces, which will ensure that the current socio-technical systems build lead to an inclusive society. The above mentioned conceptualization can then serve as a basis for a meta-design space in which people will have access to learning regardless of their age.

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