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Doctoral Thesis in Technology and Health

A Socio-Material Study of User Involvement

Interrogating the practices of technology development for older people in a digitalised world

BJÖRN FISCHER

Stockholm, Sweden 2022

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He no longer dreamed of storms, nor of women, nor of great occurrences, nor of great fish, nor fights, nor contests of strength, nor of his wife. He only dreamed of places now and the lions on the beach. They played like young cats in the dusk and he loved them as he loved the boy.

***

I wish he'd sleep and I could sleep and dream about the lions, he thought. Why are the lions the main thing that is left? Don't think, old man, he said to himself, Rest gently now against the wood and think of nothing.

***

Up the road, in his shack, the old man was sleeping again. He was still sleeping on his face and the boy was sitting by him watching him. The old man was dreaming about the lions.

– Ernest Hemingway, *The Old Man and the Sea*

Abstract

Population ageing and increased digitalization each constitute an ongoing and profound transformation within contemporary modes of living, as growing advances in technological development mix and intermingle with the lived realities of older people as the final recipients. It is against the backdrop of this interplay that *user involvement* has enjoyed ever-rising advocacy to an almost normative degree. Beyond articulating methodological principles, however, the literature has remained surprisingly vague as to the practical implementation of the approach. Less appears to be known, both empirically and conceptually, about how design and user involvement are done in practice and how they would matter to bring about intentional or unintentional effects.

To engage with these developments, this thesis aims at taking the *practices* of user involvement and design to the centre of its inquiry by adopting a perspective from Science and Technology Studies (STS). Specifically, the thesis seeks to both build on and contribute to the established body of STS on the connection between technology design and older users and ask: What is there to learn about user involvement as a method, if we focus on the *practices* of *doing* user involvement? To answer this question, the thesis studies four different aspects of the practices of user involvement and design. In particular, the thesis reviews the literature on how user involvement mattered in previous empirical projects that include older people (Paper I), it examines how different configurations of participation matter in design workshops (Paper II), it scrutinizes the achievement of user involvement in corporate practices (Paper III) and it traces the circumstantial performances of such practices (Paper IV). The largest empirical piece comes from a two-year ethnographic study of a small- to medium-sized enterprise, the material from which informed Paper III and Paper IV.

The findings highlight how user involvement in practice is both contingent and transformative, as it selectively enrols different participants and performs multiple realities. In practice, user involvement appears to be dependent on a set of underlying premises and socio-material conditions and thus is always a dynamic and momentary achievement. Furthermore, the thesis shows how the practices of user involvement themselves may bring into existence different realities, articulating and materializing particular versions of objects and images of ageing. Accordingly, the thesis contributes *theoretically* by illuminating the underlying socio-material facets of user involvement, and by emphasizing ageing as a particular object/image of design. Specifically, the appended papers encompass a conceptual framework, as well as three new concepts: *design multiple*, *shifting interstices* and *viscous image landscape*, in order to theorize the underlying conditions for user involvement, its relationship with design and its entanglement with ageing. *Practically*, the thesis enunciates three main implications regarding questions of goodness, politics and ethics.

Keywords
User involvement, Older People, Participation, Socio-material Conditions, Enactment, Ontology, Configuring, Ageing and Technology, Ethnography, Method and Design Practice

Sammanfattning

En åldrande befolkning och tilltagande digitalisering utgör samverkande förändringar i dagens samhälle som påverkar äldre människors levda verklighet på ett djupgående sätt. Mot bakgrund av att vara slutanvändare och mottagare av en ständig ström av tekniska artefakter har talet om användarinvolvering kommit att bli närmast normativ. Utöver metodologiska principer har litteraturen dock förblivit förvånansvärt vag när det gäller den praktiska implementeringen av tillvägagångssätten för att involvera äldre teknikanvändare. Mindre tycks vara känt, både empiriskt och konceptuellt, om hur design och användarinvolvering går till i praktiken, och hur det skulle spela någon roll att åstadkomma avsiktliga eller oavsiktliga effekter.

Den här avhandlingen syftar sig till att studera *praktiken* av användarinvolvering och design, med ett perspektiv från Teknik och Samhälle Studier (STS). Specifikt syftar avhandlingen till att både bygga på och bidra till STS teorierna om förbindelsen mellan design av teknik och äldre användare. Avhandlingen frågar: Vad finns det att lära sig om användarinvolvering som metod om vi fokuserar på existerande design praktiker? För att besvara denna fråga studerar avhandlingen praktiken av användarinvolvering och design i fyra olika aspekter. Specifikt granskar avhandlingen litteraturen om hur användarengagemang spelar roll i empiriska projekt som inkluderar äldre människor (Paper I); undersöker hur olika konfigurationer av deltagande spelar roll i designworkshops (Paper II); granskar användarinvolvering i företagspraktiken (Paper III); och studerar effekterna av designpraktiker under de omständigheter som råder i företag (Paper IV). Den huvudsakliga empirin presenteras i form av en tvåårig etnografisk studie i ett medelstort företag, vars material informerade Paper III och Paper IV.

Resultaten visar hur användarinvolvering i praktiken är både betingat och transformerande, eftersom den selektivt engagerar flera deltagarna och skapar olika verkligheter. I praktiken tycks användarmedverkan vara beroende av ett antal underliggande premisser och sociomateriella förhållanden och därmed alltid en dynamisk och tillfällig prestation. Vidare visar avhandlingen hur praktiken av användarinvolvering kan skapa olika verkligheter, och artikulera och materialisera versioner av objekt och bilder såsom åldrande. Avhandlingen bidrar både teoretiskt och praktiskt genom att belysa de underliggande sociomateriella aspekterna av användarinvolvering, och genom att betona åldrande som ett särskilt objekt av design. De bifogade artiklarna omfattar ett konceptuellt ramverk såväl som tre nya koncept 'design multipel', 'skiftande mellanrum' och 'viskös bildlandskap' för att teoretisera de relationer av användarinvolvering med design, underliggande förhållanden och åldrande. Praktiskt bidrar avhandlingen med tre huvudsakliga implikationer när det gäller frågor om godhet, politik och etik.

Nyckelord
Användarinvolvering, Äldre Människor, Delaktighet, Sociomateriella förhållanden, Enactment, Ontologi, Konfigurering, Åldrande och Teknik, Etnografi, Metod och Designpraktik

List of Appended Papers Included in the Thesis

Paper I

Fischer, B., Peine, A., and Östlund, B. (2020) 'The importance of user involvement: A systematic review of involving older users in technology design.' *The Gerontologist* 60, no. 7: e513–e523.

Paper II

Fischer, B., Östlund, B. and Peine, A. (2021) 'Design multiple: How different configurations of participation matter in design practice'. *Design Studies* 74: 101016. – Nominated for Best Paper Award 2021, Elsevier, Design Studies

Paper III

Fischer, B., Peine, A. and Östlund, B. (2022) 'An ethnography of user involvement: Tracing shifting interstices of coalescing tensions'. Revised version under review by *Science, Technology and Human Values* xx (z), pp

Paper IV

Fischer, B., Östlund, B. and Peine, A. (2022) 'Ageing enacted in practice: How unloved objects thrive in the shadows of care'. Submitted (z), pp

Division of Work

Paper I

I independently organized and conducted the literature review, including data collection and data analysis. B.Ö. and A.P. offered valuable feedback and guidance during the process, reviewing multiple versions of the manuscript. I wrote and refined the manuscript until its final publication.

Paper II

The workshops were planned and executed by B.Ö., and I developed the study design, collected empirical material at the workshops and analysed the material obtained. I wrote the manuscript under the supervision of B.Ö. and A.P., who gave helpful comments to theoretically position the findings.

Paper III

The study design was jointly crafted by me, A.P. and B.Ö. I independently conducted the ethnography, including establishing access at a corporate event. B.Ö. supported legal negotiations and administrative work. I independently collected and analysed the data, and crafted the paper. Both A.P. and B.Ö. provided critical feedback, re-read multiple versions of the paper and accompanied my work until final submission.

Paper IV

The study design was jointly crafted by me, A.P. and B.Ö. I independently conducted the ethnography, including establishing access at a corporate event, as well as conducting interviews. B.Ö. supported legal negotiations and administrative work. I independently collected and analysed the data, and crafted the paper. Both A.P. and B.Ö. provided critical feedback, re-read multiple versions of the paper and accompanied my work until final submission.

Other Scientific Contributions Not Included in This Thesis

Journal Articles (peer-reviewed)

- Fischer, B., Östlund B. and Peine, A. (2020) 'Of robots and humans: Creating user representations in practice'. *Social Studies of Science* 50, no. 2: 221–44.

- Fischer, B., Östlund, B., Dalmer, N. K., Rosales, A., Peine, A., Loos, E., Neven, L. and Marshall, B. (2021) 'Co-design as learning: The differences of learning when involving older people in digitalization in four countries'. *Societies* 11, no. 2: 66.

Conference Proceedings (peer-reviewed)

- Fernández-Ardèvol, M., Rosales, A., Loos, E., Peine, A., Beneito-Montagut, R., Blanche, D., Fischer, B., Katz, S. and Östlund, B. (2019) 'Methodological strategies to understand smartphone practices for social connectedness in later life'. In *Human Aspects of IT for the Aged Population. Social Media, Games and Assistive Environments. HCII 2019. Lecture Notes in Computer Science,* vol. 11593, edited by J. Zhou and G. Salvendy, pp. 46-64. Cham: Springer, 2019.

- Fischer, B., and B. Östlund (2020) 'Technology Development with Older People: The Role of 'Unfettered Design''. In Human Aspects of IT for the Aged Population. Technologies, Design and User Experience. HCII 2020. Lecture Notes in Computer Science, vol 12207, edited by Q. Gao and J. Zhou, pp. 18-33. Cham: Springer.

- Östlund, B., Fischer, B., Marshall, B., Dalmer, N., Fernandez-Ardévol, M., Garcia-Santesmases, A., Lopez, D., Loos, E., Chang, F., Xin, C., Neven, L., Peine, A., Rosales, A., and Kuoppamäki, S. (2020) 'Using academic work places to involve older people in the design of digital applications. Presentation of a methodological framework to advance co-design in later life' In *Human Aspects of IT for the Aged Population. Technologies, Design and User Experience. HCII 2020. Lecture Notes in Computer Science*, vol. 12207, edited by Q. Gao and J. Zhou, pp. 45–58. Cham: Springer, 2020.

- Östlund, B., Choi, M., Spånt Enbuske, A., Kuoppamäki, S. and Fischer, B. (2020) 'Robotizing care for older people what should be automized when robots enter home care?' *Gerontechnology*, 19(0), 1-5.

Preface and Acknowledgements

Much of the work presented in this dissertation goes back many years. It started with the formative time span of my life during which I learned a great deal about physics and electrical engineering from my father. The engineering mind-set has followed me since my early years, and my father has been a great source of inspiration in many ways. A thorough engagement with the natural science occurred almost instantaneously, as my grandfather – himself a professor of mathematics in statistics – helped to complement the 'practicalities' of engineering with 'theoretical' perspectives from mathematics. I fondly remember engaging with Einstein's riddles and chess at primary school age; scientifically, I surely had great mentors. I also was fortunate to be close to my mother and grandmother, who raised my awareness of the beauties of literature, fairy tales and feminism. My close family all have been wonderful companions throughout my life, and for their unbridled support I will always thank them: Steffen, Silke, Helmut, Barbara, Olaf and Lars. *Danke!*

Given this background, it is perhaps less curious that my interests would involve a combination of the technical, hard and scientific and the social, engaged and soft. Surprisingly, though, it took me many years to obtain this clarity for myself. One important time span possibly dates back to the years 2015–2017, during which time I had the fortune to pursue a master's degree at Utrecht that would mysteriously spur many of my interests, which can be found scattered throughout this text: intricacies, practices, ethnography and STS. In my master's thesis, I had the great opportunity and freedom to extend my theoretical interests and entwine them with the empirical. The work of Bruno Latour and Steve Woolgar, *Laboratory Life*, was a great source of inspiration. But the most important sources of inspiration, those that accompanied me through the following years until this point today, were my supervisors Alexander Peine and Britt Östlund, to whom I would like to express my most sincere gratitude for their trust, enthusiasm and support. Thank you for your continued encouragement and patience, as well as for your continued faith and stamina to stay with me throughout my travails and academic ups and downs.

When I talked about my family earlier, there is an important member I have not mentioned yet and who had a great impact on this work: my girlfriend of eight years and future wife, June Lio Shu Xin. Having joined my personal life some time before I started my master's degree, she truly has been the most important and defining anchor of my life. Not only on a human level, but also intellectually: many of our interests evolved in parallel streams, as we both ventured into the depths of anthropology, sociology and the beauty of understanding what it means to be human (and nonhuman). Thank you so much for your patience, kindness, trust, encouragement, love, conversations and many beautiful moments (☺) that made doing a PhD a breeze. The thesis surely would not have come to fruition were it not for the support of this human!

But as is usual with many developments, this thesis probably entangled a lot of different influences and humans. So too does this thesis owe much to the participants in the design workshops, as well as

the members of SMCare. Without their generosity and confidence to let me into their worlds, none of my ethnographic endeavours would have been possible. It is with great regret that, due to reasons of confidentiality, none of them can be honoured by name, but I am thankful to all of them for including and integrating me into their teams and for putting up with my strange habits of observing and being around. Thank you for your trust!

I would also further like to thank the other humans in my expanded academic network, those that were there, curious to listen, give feedback, and offer apt criticism. In particular, I am indebted to the kind members of my former immediate research team at KTH, Technology in Health Care, for the great discussions, many coffees and collaborations over the years: Xin (Jesse) Chen, who shared with me a room and has grown to become a true friend. I will miss our many talks and discussions! Irini Antoniadou, who has inspired me with her care and kindness. Fangyuan Chang, with whom I enjoyed many profound talks and had the honour of co-supervising as well. Sanna Kuoppamäki, with whom I had to pleasure to build a course together. Mikaela Hellstrand, who has become to me a trusted and wise conversationalist, with whom I could communicate openly and who was theoretically inspiring. Gunilla Björling, who was equally supportive and kind; Andreas Örnehag, who has been a fantastic host and amazing collaborator; and Maksims Kornevs, who helped me boost my confidence in important times. You all have been amazing colleagues and friends to work together with!

And then, I also have to mention all my friends outside of academia, who showed me what really matters in life: Jonas, Sebastian, Siegfried, Yue, Ernest, Herbert, Katharina, Mark, Samantha, Uncle Joe, and Niyati. Thank you!

Finally, I have also benefited much from my project collaborators at BCONNECT: Eugène Loos, Nicole Dalmer, Barbara Marshall, Daniel López Gómez and Andrea Rosales, who were open and kind to include and entrust me as a junior researcher. Similarly, I am thankful to the members of the broader socio-gerontechnology network, who set great examples for collaboration in a wonderful and warm network, most notably: Susanne Frennert, Michela Cozza and Jenny-Melind Bergschöld. I am grateful for all your support.

This thesis, then, is truly a product of many. Thank you for all your encouragement and support! With the confidence you imbued in me, I look forward to stay in touch – for the years to come.

BF

List of Abbreviations

ANT	Actor-Network Theory
CD	Co-Design
CEO	Chief Executive Officer
CSCW	Computer-Supported Co-operative Work systems
HCI	Human-Computer Interaction design
NDA	Non-Disclosure Agreement
PD	Participatory Design
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SCOT	Social Construction of Technology
SMCare	Small- to medium-sized enterprise active in the Care sector (anonymized)
SSK	Sociology of Scientific Knowledge
STS	Science and Technology Studies
UCD	User-Centred Design

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Referencing Style: Harvard

1 INTRODUCTION

1.1 Setting the Scene

This thesis explores the multiple facets of user involvement as a socio-material process. I employ theoretical perspectives from Science and Technology Studies (STS) to illuminate user involvement as an open-ended approach that is both performed and performative. That is, I interrogate the social as well as material forces that are active and participate in the making of user involvement, and in turn, how user involvement impinges upon these elements and others. This thesis is, hence, first and foremost a study of the *practices* of technology development, of what and who is involved in these practices, of what makes them occur and of the enactments they amount to. Drawing on my empirical findings, the central argument of my thesis is that in practice, user involvement appears as a method that is both contingent and transformative, as it selectively enrols different actants[1] and performs multiple realities through different configurations.

But why do such a study in the first place? The motivation for this exploratory study is practical, societal and conceptual. It is *practical* in the sense that user involvement enjoys continuous popularity, both among policy-makers and in design practice (see e.g., Barnes and Cotterell, 2012; Bratteteig and Wagner, 2012; Peace and Hughes, 2010; Tritter and McCallum, 2006), yet its continued advocacy appears not to be matched by an equally profound understanding of how it is or can be implemented in practice. It is *societal* in the sense that user involvement entails many alleged benefits in developing more meaningful technologies for future societies (e.g., Ives and Olson, 1984; Schuler and Namioka, 1993), specifically for older people, as an important preliminary to such involvement procedures (e.g., Eisma et al., 2004; Newell et al., 2007), yet these appear to not easily translate into more viable technological solutions for either society or older people (Bano and Zowghi, 2015; Merkel and Kucharski, 2019). And it is *conceptual* in the sense that – with a number of exceptions in STS user studies that have critically interrogated the relationship between design and usage in practice (e.g., Oudshoorn and Pinch, 2003; Woolgar, 1991) – the underlying socio-technical dimensions of user involvement have remained relatively underexplored. Such an understanding, however, is needed to illuminate how user involvement matters in practice and for society: it allows us to shed light on the conditions that must be present for different forms of user involvement to occur, as well as how these would link to various performative effects. Against the confluence of societal, practical and conceptual interests, hence, I set out the thesis to learn more about the 'method' user involvement; to obtain more knowledge about its practices, contexts and performances.

[1] The term *actant* stems from actor-network theory (Akrich and Latour, 1992; Latour, 2005) and alludes to both humans and nonhumans as beings that can exercise agency (as compared to the more anthropocentric term *actor*). I use it for the sake of consistency with my analytical approach.

The cases I examine in the thesis commonly address a contemporary theme of user involvement: the involvement of *older people*. Older people are, as research has shown, often stigmatized and constituted through stereotypes in design (Frennert, 2016; Peine et al., 2014). It is particularly in this context of ageing populations that user involvement has been brought forward as a workable solution to address design issues in technologies targeted at the older population (Essén and Östlund, 2011). This is not surprising, given that the intervention is generally seen as having many promises: It is said that, through including representative users in technology development, designers can learn about their insights and the nuances of their lived experiences (Schuler and Namioka, 1993). This, in turn, may clear out stereotypes about old age that have been shown to commonly feature in design (Katz and Marshall, 2018) and allow designers to build technologies that appropriately target the needs of the older population (Merkel and Kucharski, 2019). At the same time, critical studies have shown that involvement itself can be a practice that perpetuates or creates images and stereotypes about older people (e.g., Compagna and Kohlbacher, 2015; Östlund et al., 2015). Technology design for older people, hence, constitutes a fruitful area to explore both the tensions and potentials of user involvement.

The normative desirability and imperative to involve people (see Bratteteig and Wagner, 2012), as well as user involvement's increasing practical applicability and implicit tensions in design projects for older people (see Merkel and Kucharski, 2019; Peine et al., 2015), made it a timely and relevant approach to study. After all, much of the success that was attributed to user involvement hinged on the practice of the method itself (Kujala, 2003). What kind of practice was this? How did it the method work in practice? What did it create? And what was necessary for it to happen, given its many promises? To answer these questions, the thesis takes us through a range of environments in which user involvement, or versions of it, have become relevant. It includes reported implementations from the broader literature on the involvement of older people in design, forms of participation in design workshops, and user involvement in company practice. The largest empirical piece comes from a two-year ethnographic study at a regional, small- to medium-sized company active in the care sector (referred to henceforth as SMCare). The ambition of SMCare was to develop digital solutions for the Swedish healthcare sector and its constituent municipalities, and including users and satisfying their needs constituted core values of the company's mission.

I selected SMCare, design workshops and the design literature as the central foci of my thesis in order to offer insights into how user involvement looks in a variety of different contexts. The literature, to begin with, was large and replete with reports on various forms of user involvement. It allowed for a broad, in-depth appraisal of how user involvement mattered across different settings, technological projects and countries (see Sections 4.1 and 4.2). I chose design workshops, then, as a second locus of inquiry to complement the insights gained from the literature review. In particular, studying design workshops allowed me to understand how participation would look in practice, and furthermore, if its different configurations would relate to different outcomes (see Sections 4.1 and 4.3). SMCare, finally, was chosen to delve into a context 'in the wild' where user involvement would find itself outside controlled settings such as academic design workshops. The company was located at the centre of the Swedish care sector – a sector that is characterized by a multiplicity of converging forces, such as marketization, digitalization, competition, municipal procurement, policy expectations and the needs of older end users (see Section 2.3) – and therefore offered a theoretically intriguing site for ethnographic inquiry (see Sections 4.1 and 4.4). In the following section, I expand upon the research community I am in a conversation with and the aims of this thesis, as well as provide a brief outline of the thesis.

1.2 Research Background

Across the world, population ageing is one of the most striking transformations of the 21st century. The United Nations (2017) predict that the population aged 60 years or older will more than double to about 2.1 billion globally by the year 2050, and the number of individuals aged 80 years or older is expected to more than triple, to about 426 million, by the year 2050. The increase in the number of older people is associated with significant challenges for our societies and burdens on existing social welfare systems (Rowe and Kahn, 1997). In this context, technological innovations are frequently suggested as solutions that could potentially compensate for age-related deficiencies (Agree, 2014; Charness and Schaie, 2003; Fisk et al., 2004) and enable older people to live independently and actively age at home (Piau et al., 2014; Reeder et al., 2013). Potential innovations for older persons, called gerontechnologies (Bouma and Graafmans, 1992), are designed not only to help alleviate the quality of later life and relieve pressure from healthcare systems, but also to create new business opportunities (Carrigan, 1998; Graafmans et al., 1998; Kohlbacher and Herstatt, 2011). Thus, the last two decades have seen major investments in gerontechnologies; however, so far they have failed to meet expectations and establish themselves within the broader market (Frennert and Östlund, 2018; Sixsmith and Gutman, 2013).

One explanation commonly put forward for this disappointment is that these technologies do not match the needs of older people (Östlund et al., 2015; Peine et al., 2014). Specifically, one critique has been that the design of gerontechnologies often takes place in contexts where older people are framed as technologically illiterate, inherently frail and vulnerable (Bailey et al., 2011; Joyce et al., 2007; Roberts and Mort, 2009; Vines et al., 2015): a portrayal that is insensitive to the lived realities and dignified self-images of older persons (cf. Durick et al., 2013; Greenhalgh et al., 2013; Joyce and Mamo, 2006; Neven, 2010). Against this background, the idea of involving older people in the design process enjoys growing popularity; specifically to help designers develop more accurate technologies targeting the situation of older people: their needs, wishes and requirements (Eisma et al., 2004; Lindsay et al., 2012; Merkel and Kucharski, 2019; Newell et al., 2007; Peine et al., 2015).

User involvement is a broad concept with various definitions and sub-categories. In the literature, these have been used relatively loosely, with a range of synonyms being deployed, such as 'user participation', 'consulting users' and 'user engagement' (Bano and Zowghi, 2015; Kujala, 2003). Earlier research by Barki and Hartwick (1989), for example, aimed to achieve a clearer delineation between user participation and user involvement. In their reading, users could be involved, but that would not necessarily imply 'real' participation. Nevertheless, there is a continuation of different usage of the term, where *user involvement* is often used synonymously with other terms. It may, thus, be more helpful to refer to *user involvement* as an umbrella term, in the way Kujala (2003) has suggested:

> *'User involvement can be seen to be a general term describing direct contact with users and covering many approaches. For example, in participatory design, users take active roles in many design activities, but in other approaches users are involved as providers of information, commentators or objects for observations.'* (Kujala, 2003: 1)

The most prominent approaches covered by user involvement include participatory design (Halskov and Hansen, 2015; Spinuzzi, 2005), co-design (Sanders and Stappers, 2008), user-centred design (Gould and Lewis, 1985; Norman and Draper, 1986), human-computer interaction (Hewett et al., 1992) and ethnographically inspired design (Anderson, 1994; Blomberg et al., 1993). Although there is a plethora of interlinkages and dependencies among the approaches, each of them denotes a more-or-less separate discipline, with its own idiosyncratic genealogy. Therefore, the approaches differ with respect to the normative degree that users are required to participate in the design process (Arnstein, 1969; Olsson, 2004). Higher degrees of participation are usually associated with participatory design

approaches (Bjerknes and Bratteteig, 1995), while lower degrees are connected to the first wave of human-computer interaction design that focused on the optimization of ergonomics and human-machine fit (Cooper and Bowers, 1995). Despite the variety of differing claims to have conducted involvement procedures and their often contradictory underlying assumptions and incommensurable conceptions, all of the approaches mentioned above may in some way be conceptualized as some form of user involvement.

Although there appears to be continuous flexibility and variety in the concept of user involvement, the literature is clearer about the purported promises of the overall approach. Specifically, in contemporary times, a more or less stable narrative has formed that takes as its starting point the observation that users should be perceived as experts on their own lives and personal circumstances (Rogers, 2012; Schuler and Namioka, 1993). Therefore, this literature argues that involving users in the design process could help designers empathize and gather more accurate knowledge about users' specific circumstances (Bano and Zowghi, 2015; Olsson, 2004). In turn, the quality of the developed products could be improved (Ives and Olson, 1984; Kujala, 2003), and, in the context of gerontechnology, the occurrence of ageist stereotypes during design could be avoided (Frennert and Östlund, 2016; Joyce et al., 2007). Being involved can also provide users with a sense of ownership (Baronas and Louis, 1988; Robey and Farrow, 1982), and user innovation research has empirically demonstrated the active and important role that users can play as creative sources of innovation (Bogers et al., 2010; Chesbrough, 2003; Von Hippel, 1976). Following this rationale, user involvement is seen as a potential solution to many of society's current problems. Technologies could be improved, many societal needs could be fulfilled, and corporate ambitions to bring new products to the market would also be satisfied, as involvement would bring about an increased acceptance of the designs produced through involvement procedures (Ives and Olson, 1984; Kujala, 2003).

While the promises outlined above may be far-reaching and alluring, they need to be seen against the background of potential challenges as well. As with the benefits, the literature is generous with research into possible obstacles and downsides. For example, Heinbokel et al. (1996) and Olsson (2004), amongst others, address potential risks of misunderstandings between designers and users. Other scholars foreground the possibility of difficulties in encouraging users (Wilson et al., 1997) and the required time and effort as potential drawbacks in business environments (Bano and Zowghi, 2015; Kujala, 2003). Older people constitute a broad, heterogeneous group of people with varied characteristics and experiences and multiple expectations towards technology (Grates et al., 2019). Thus, the definition, selection and identification of older individuals to get involved in the design bears the risk of creating a sample of participants that are not representative of the broader population of older people. Another common critique pertains to the power distribution in user involvement procedures – even those that *claim* to be at higher degrees of participation (Bratteteig and Wagner, 2012; Östlund et al., 2015). When user involvement itself turns into a very structured process, the concerns and opinions of older people may be side-lined to make room for more technical issues (Compagna and Kohlbacher, 2015).

It is precisely this apparent complexity to the approach, combined with an ongoing and growing advocacy and application in practice (Barnes and Cotterell, 2012; Bratteteig and Wagner, 2012), that make apparent the need for a more thorough appraisal of the underlying practices of user involvement (Peine et al., 2015). This is the point that I take as the starting point for my thesis: Given the diverse and often discordant views and approaches to user involvement, as well as contrasting benefits and drawbacks, it becomes ever more important to interrogate how user involvement plays out *in practice*. What is there to learn about user involvement as a method, if we focus on the practices of *doing* user involvement? In the management and design literature, user involvement is often understood as a one-size-fits-all solution, in which the inclusion of users is seen as the *sine qua non* of successful technology development (Peace and Hughes, 2010). Likewise, forms of user involvement

and participatory design have been accompanied by a plethora of guidance and key principles on how to best go about the endeavour (e.g., Gulliksen et al., 2003; Simonsen and Robertson, 2013; Spinuzzi, 2005). For as long as these rules and implementation steps are followed, it appears, user involvement would be 'appropriately' conducted. One shortcoming of conceptualizing user involvement in terms of guidance and key principles, however, is that it risks positioning user involvement as a rather stable approach. Inputs, procedures and outcomes appear unequivocally linked – as if they existed independently of the people, practices and socio-material arrangements involved in the making of user involvement.

This thesis constitutes an attempt to engage with these various challenges to the conceptualization of user involvement. In particular, it seeks to illuminate how user involvement is achieved *in socio-material settings*, by putting centre stage the practices, materials and individuals engaged in the making of user involvement. That is, I strive to move away from conceptualizing user involvement as a method that can be evaluated and improved (by identifying neatly separable heuristics or implementation steps) towards examining user involvement and design as practices that can be studied (i.e. what user involvement achieves in practice, and how it is achieved itself as a practice). In other words, placing a distinct focus on practices will help shed light on the implicit materials and agents that are relevant for any version of user involvement to succeed. Further, understanding user involvement as a socio-material practice will allow to illuminate why there are such disparate reports and claims about the purported 'success' of the method (Bossen et al., 2016; Halskov and Hansen, 2015), especially in light of apparently straightforward implementation steps (cf. Gulliksen et al., 2003). Such an understanding will also help to bring to the fore how user involvement *can* be practiced *at all*, considering the controversial nature of different approaches and contradictory assumptions. And it may work to lay bare the hidden mechanisms through which certain outcomes are performed, and not others.

To start out on this endeavour and understand more thoroughly the role of user involvement in practice, the thesis particularly draws on, and seeks to contribute to, Science and Technology Studies (STS) as a main research domain. In particular, I draw on STS insights that have long put forward an agenda that is critical of design practices and user involvement (Akrich and Latour, 1992; Latour, 1987; Latour and Woolgar, 1986 [1979]). STS scholarship has emphasized, amongst others, the interpretive, reflexive and generative elements implicit in involvement and design practices (e.g., Law and Ruppert, 2013; Woolgar, 1991). Attention has been paid to the different ways that designers configure or prescribe users (Akrich, 1992; Oudshoorn et al., 2004; Woolgar, 1991), to how users resist or disengage from embodied inscriptions (Akrich and Latour, 1992; Neven, 2010; Wyatt, 2003) and to the multiplicity of ways in which material objects dynamically configure socio-material relationships and human-nonhuman assemblages (Aceros et al., 2015; Barad, 2007; Mol, 1999, 2002; Pols and Moser, 2009; Sánchez-Criado et al., 2014). In addition, social learning perspectives within STS have highlighted how design processes evolve through several stages and iterations, whereby both designers and users continue to communicate through various avenues over time as prototypes move into the homes of potential users (Hyysalo, 2009; Lie and Sørensen, 1996; Silverstone and Hirsch, 1992; Stewart and Williams, 2005).

Taken together, these studies demonstrate how users and technologies are not pre-given entities that exist prior to the practices of technology design but rather are continuously produced and re-produced within them, by bringing users and materials into collaboration. This relationality between technologies, designers and usage make practices of user involvement particularly intriguing sites for research. In particular, they form the interface at which users, materials, images, documents, epistemes and designers connect and jointly negotiate the boundaries of one another. In following STS scholarship that has highlighted the contingent effects of performances in practice, I am hence concerned both with the practices by which participation may *enact users and objects* and with how

user involvement, in turn, can be studied as *a method that is relationally enacted* within localized design practices. To do so, I build on three core assumptions derived from the STS literature, which form the backdrop against which I pose my research questions: (See also Sections 3 and 4.1)

- The first assumption is the principle of agnosticism, which demands an impartiality with regards to the claims for truthfulness, accuracy or objectivity of any statements made (Bloor, 1976). In other words, what user involvement really 'does' or 'is' should be studied and analysed in practice, rather than taken for granted as an already stabilized fact or reality (Latour and Woolgar, 1986 [1979]). Hence, in this thesis, I am interested in the practices of engineers, designers and company staff (Latour, 1987), while attempting to put aside any preconception about what *is* or *should be* a 'correct' or 'wrong' way of doing user involvement, leaving that matter open for empirical inquiry.

- A second key insight from the STS literature foregrounds the symmetry between different actors and their free associations (Callon, 1984). In this view, society and nature, humans and nonhumans, are seen as equal entities that should be treated on equal terms in sociological analyses. Adopting a symmetric approach to user involvement, this thesis acknowledges the intricate relationality between both the social and the material (Suchman, 2007) and specifically attends to interactions among and associations between a range of heterogeneous elements (Callon, 1986; Latour, 1987; Law, 1987) in the formation of different practices of user involvement.

- A third and final core assumption of this thesis is that practices themselves are to be seen as performative, to the extent that methods can enact the presence and absence of multiple realities (Law, 2004; Mol, 2002; Woolgar and Lezaun, 2013). This perspective extends former epistemological concerns with impartiality and symmetry (Bloor, 1976; Collins, 1981a, 1981b; Pinch and Bijker, 1984) to the realm of ontology and reality-making (Barad, 2003, 2007). Thus, for example, semiotic researchers in STS user studies have drawn attention to the emergent and circumstantial properties of design work (Hyysalo, 2006; Suchman, 2002) and shed light on how usership and users themselves are situationally enacted within design and involvement procedures (Akrich, 1992; Oudshoorn et al., 2004; Sánchez-Criado et al., 2014; Woolgar, 1991). This thesis, too, recognizes the potential for practices to perform multiple realities, and adopts this assumption to study the performances of, and by, user involvement and design practices.

1.3 Research Aims

Equipped with these key assumptions, the thesis interrogates the multitude of approaches and definitions of user involvement and seeks to illuminate user involvement as a socio-material process that is practiced by both humans and nonhumans. Overall, then, the main aim of the thesis is to advance our knowledge about user involvement as a practice, using an STS perspective. It thereby cuts across a series of different empirical contexts, each aiming to shed light on a slightly different facet of user involvement. More concretely, the thesis aspires to contribute not only to the user involvement and ageing and technology literatures by examining user involvement as a socio-material practice with various purposes and ends (Paper I) but also by speaking to the body of literature from which it borrows most of its key insights: STS.

In particular, the different empirical studies included in this study aim to re-examine and extend previously held understandings in STS on method practices (Law and Ruppert, 2013) and the emergence and stability of objects (Denis and Pontille, 2015; Mol, 2002). They seek to empirically trace how different configurations of participation matter for different design outcomes (Paper II),

conceptualize how it is possible for user involvement to be enacted as a method in the first place (Paper III), and theorize the recalcitrance and durability of seemingly unrelated objects such as 'ageing' in design practice (Paper IV). Taken together, these different papers submit new concepts induced from the empirical material into ongoing debates on enactment and reality in STS in order to provoke new questions about what it takes to 'do' a method this way and not otherwise. In so doing, I wish to see this thesis as a step toward bringing into dialogue the critical perspectives within STS both with the *performative effects* of design practices as well as with the practical matters of *performing user involvement as a method itself*. Following on these empirical interests, the following sub-aims and research questions can be discerned:

- **Main Aim of Paper I:** To survey previous literature on the practices of user involvement of older people

  RQ 1. How does involving older people in technology design matter in practice, according to the literature dealing with the development of technologies for older people?

- **Main aim of Paper II:** To contribute to the literature on participatory design by shedding light on the way different configurations of participation may matter in different design practices.

  RQ 2. How do different configurations of participation matter in the practices of design workshops?

- **Main Aim of Paper III:** To extend user and method studies in Science and Technology Studies (STS) so as to illuminate how the user involvement method itself is enacted in the practices of a small- to medium-sized corporation and to trace what makes this enactment possible

  RQ 3. What does user involvement look like in corporate practice? How is it done? And how is it that it can be done?

- **Main Aim of Paper IV:** To examine the enactment of ageing as an object of the everyday work practices in the company and to contribute to STS literature on stability, maintenance and care by theorizing the enactment and re-enactment of ageing within these practices

  RQ 4. How is ageing enacted in the everyday practices of the company? (Paper IV)

1.4 Main Concepts

Before addressing the general outline of the thesis, I shall briefly offer some generic definitions of the most common concepts deployed in it. While each of these concepts will re-appear in different instantiations across the thesis, the purpose here is to offer clarification about what is meant by specific terms. I do so in particular because some of these terms may mean rather different things in different contexts. The list provided is necessarily incomplete and non-exhaustive. More concepts will be addressed throughout the thesis. The list here only is constrained to the few most important ones. As discussed previously, the main interest of the thesis is in uncovering user involvement as a practice from an STS perspective. The concepts outlined below are selected in alignment with this research interest.

Configuring: Within the scope of the thesis, configuring is understood, in line with the work by Steve Woolgar (1991), as the process by which particular assumptions about users, embodied into machines and technologies (see *technology*), may define, enable and constrain the user (see *user*). Usually, it are the designers that take active part in this configuration process by inscribing particular ideas into the technology (see *script*). In a similar vein, designers may also configure participation itself (Vines et al., 2013). (See also Section 3.2.)

Digitalization: Digitalization refers to a process whereby digital technologies are increasingly spreading through society (Frennert, 2019). In that regard, digital technologies denote a specific type of technology (see *technology*) that differs from regular technologies in the sense that they do include some element of digitization. In contrast to the societal character of digitalization, *digitization* refers to an engineering process of translating or converting analogue data into digital representations. Examples of digital technologies are vast and include ICT technologies, robots, tablets, computers, smartphones, software and the like. This thesis is particularly interested in digitalization in the care sector (see Section 2.3), especially the development of digital technologies for older people (see *older people*) and the type of societal and practical realities (see *enactment* and *object*) that such digital technologies engender.

Enactment: Enactment is a term that is increasingly used in STS due to the work of Annemarie Mol (2002). In this thesis, borrowing from Mol (2002), enactment refers to the practice (see *practice*) by which a particular reality is occasioned (see *object*). (See also Section 3.3.)

Image: Images in this thesis are objects (see *object*) with particular representative features that express a particular perception, including mental and emotive elements (McNeil et al., 2017). Within the scope of the thesis, the notion *image* refers, in general, to imaginations held by people and not machines. These imaginations may entangle a range of expectations, fears, hopes and ambitions, as well as thought processes. Specifically in this thesis, the main types of images I am concerned with refer to images of ageing (see *older people*) and images about technology users (see *user*). (See also Section 3.5.)

Object: Objects, within the scope of the thesis, are considered as any thing or being that, in some shape or form, material or immaterial, is said to exist in the world. Examples of objects include fruits and animals but also diseases and biomedical processes such as ageing. In common language, what differentiates objects from technologies (see *technology*) is that they are not necessarily socially informed or serve some purpose for people. Hence, all technologies can be considered objects, but not all objects are technologies. This becomes tricky, though, as fruits, for example, do have multiple purposes: most obviously, as nutrition for humans. Fruits are also socially informed, as social categories about what a fruit is lead to particular choices for eating. Yet, few people would consider a fruit a technology. Likewise, there is a societal impact of objects such as ageing and diseases, and they are also entangled with people's lives in a variety of ways: for example, by conditioning bodily changes. Therefore, it appears that just like technologies, objects are equally socio-materially constituted in practice (Callon, 1986; Latour, 1999b; Law, 1987). Inspired by STS studies, hence, the thesis takes objects to be dependent upon the practices (see *practice*) that enact them (see *enactment*) (Barad, 2007; Mol, 2002). That is, objects are seen as any things or beings coming into existence as they are performed in practice; their boundaries are taken to only become clear within particular practices. (See also Sections 3.1. and 3.3.)

Older people: Despite the seemingly shared category of being 'older', *older people* is a term that encompasses a very diverse, heterogeneous group of people approaching the later stages life. Generally, the thesis rejects any stereotypes about older people as passive, frail or technological illiterate and instead aims to consider older people in their broad diversity, as active individuals with their own idiosyncratic lived realities, expectations and choices (Östlund et al., 2015; Peine et al., 2021). It also therefore rejects the notion of ageing as purely referring to chronological age, but instead sees it as a socio-materially co-constituted category (Peine et al., 2015). (See also Section 2.1.)

Practice: In social science, practice itself is a broad concept that has spurred plenty of theoretical interest (see e.g., Bourdieu, 1990; Reckwitz, 2002; Schatzki, 1996, 2001). This thesis employs the term *practice* in a manner that is synonymous with activity, to denote all ways of doing and saying

(Schatzki, 1996) that encompass both human and nonhuman actors (Akrich and Latour, 1992; Callon, 1986; Law, 1987), and can be characterized by their objective (Engeström, 2000). The thesis looks at practices, hence, as a way to follow how things happen in action (Latour, 1987: 145) (see Section 3.1).

Script: Building on Madeleine Akrich's work (1992), script in this thesis refers to particular ideas and images (see *image*) about future users (see *user*) that are implemented into technology designs (see *technology*). (See also Section 3.2.)

Technology: Generally, technology may describe a range of specific objects (see *object*), including devices and applications, both material and immaterial, that are of some use to society (see *user*) (Arthur, 2009). Within the scope of this thesis, the focus is specifically on technologies for older people (see *older people*). These include all devices that are either specifically developed for – or predominantly used by – older people. Examples include social service robots, tablet applications, and smartphones, as well as fall detection sensors or ambient assisted living equipment (Frennert and Östlund, 2018). Notably, the thesis deploys an understanding of such technologies as socio-materially constituted: that is, technologies are seen as both socially informed (Latour, 1992; Pinch and Bijker, 1984) and materially co-constituted (Law, 1987; Vincenti, 1995). Technologies, in this understanding, depend both on successful linkages between materials (such as bringing touchscreen and processor into alignment when building a smartphone) and on the societal values of different social groups, such as the user images implemented in the smartphone (see *image*, *script* and *configuring*). In other words, technical artefacts can be considered to be the upshot of range of heterogeneous elements – both human and nonhuman – associating themselves with one another over time into a more-or-less durable network (Callon, 1986; Latour, 1999b; Law, 1987). Furthermore, they are considered to play an active role in shaping society (Mackay and Gillespie, 1992) and impacting users (Oudshoorn and Pinch, 2003) (see *user*). Technologies, like objects (see *object*), thus have no essential forms but instead obtain them within the social and material context in which they are developed and put to use. (See also Sections 2.1 and 3.1.)

User: Typically, *user* refers to the putative beneficiary of some developed technology (see *technology*). In the case of this thesis, the user is taken to denote a more dynamic category that is contingent on a range of practices (see *practice*). Users can be active participants in technology development (Von Hippel, 1976), they can modify and refine technologies (de Laet and Mol, 2000) and they can reject inscribed images (see *script*) (Neven, 2010). Furthermore, users themselves can be seen as the upshot of ongoing design and implementation practices (see *configuring*), since these may define and occasion the particular boundaries of users (Oudshoorn and Pinch, 2003; Sánchez-Criado et al., 2014; Woolgar, 1991). (See also Section 3.2.)

User involvement: In this thesis, user involvement refers to an umbrella term (Kujala, 2003) that captures a range of practices by which some individuals are taken to be user representatives (see *user)* and included, to some degree, into the procedures of technology development (see *technology*). It may hence describe both a method and technique (Law and Ruppert, 2013; Suchman, 2012; Woolgar, 1991), including procedures as diverse as participatory design, usability trials, user-centred design and co-design. (See also Sections 2.2. and 3.4.)

1.5 The Thesis Outlined

The thesis is organized into eight chapters. After this introduction, in chapter 2, I discuss the three main contexts from which the thesis draws its practical motivation in greater depth: older people and technology, user involvement and the Swedish healthcare context. In chapter 3, the focus then moves to five relevant theoretical themes from Science and Technology Studies (STS): actor network theory, user studies, enactment and stability, method practices and imaginaries. Chapter 4 discusses the

methodological approaches for each of the four included papers, including ethical considerations, while chapter 5 briefly outlines the main findings from each of the studies. Chapter 6, in turn, pulls together these various findings to formulate both theoretical and practical implications. As is common in qualitative research, chapter 7 then presents a reflective piece to discuss the overall approach of my study and propose promising avenues for further research. Chapter 8 offers final conclusions.

2 CONTEXTUALIZING THE THESIS

In this section, I shall outline the three main practical origins for the interests developed in this thesis. They include a background of studies dealing with older people and technology (Section 2.1), studies addressing user involvement from the design and management literature (Section 2.2), and the context of the Swedish care sector (Section 2.3). As I argue below, in different ways, each of these has raised pressing issues about the way user involvement is 'done' in practice. In part, this pertains to the increasing relevance of user involvement as an approach (for the design of technologies for older people, generally given its different promises and barriers, and in the context of increasing digitization and marketization of health care in Sweden), paired with an apparent lack of clarity on the intricate dynamics of user involvement as employed in practice.

2.1 Older People and Technology

Research on older people and technologies combines two of the most central developments of the past decades: *ageing populations*, and *technological innovation*. Already in the 1980s, ageing scholars and engineers began to explore opportunities that would emerge at the intersection between these two developments (Czaja and Barr, 1989; Robinson et al., 1984) – an interest that ultimately culminated in the formulation of a new field: gerontechnology (Bouma and Graafmans, 1992). The term *gerontechnology* was meant to denote technologies specifically designed for older people (Bouma, 2001). From the start, this had the form of interrogating how technologies would impact ageing societies, and what type of *effects* technologies could have on older people (Östlund, 2004). Human factor engineers, consequently, were preoccupied with questions of how technologies could be built that could best *compensate for* age-related declines, such as cognitive of physical losses (Carrigan and Szmigin, 1999; Charness and Bosman, 1990; Clark et al., 1990). Ageing researchers and cognitive neuroscientists, in turn, participated by collecting measurements about possible functional and mental losses of ageing individuals, with the intention for engineers to adjust the design of gerontechnologies accordingly (Fisk et al., 2004; Fozard et al., 1996; Rogers and Fisk, 2003).

In the 2000s, the idea of deploying gerontechnologies has proliferated to encompass a range of facets of ageing, including, amongst others, social connectedness, healthcare and mobility (Czaja et al., 2001; Schulz et al., 2015), and began to incorporate a range of smart innovative technologies such as advanced computer systems (Murata and Iwase, 2005), smart home devices (Liu et al., 2016), and robots (Broekens et al., 2009). This development ran in parallel to the emergence of a plethora of political and commercial agendas that highlighted the benefits of 'ageing successfully', 'ageing independently at home' or 'ageing well' (for critiques of these agendas, see e.g., Katz, 1996; Katz and Marshall, 2003; Lassen and Moreira, 2014; Martinson and Berridge, 2015; Neven, 2015) – all presumptively targeted by the intervention of novel gerontechnologies (Charness and Schaie, 2003; Higgs et al., 2009; for a critique see also Peine and Neven, 2019). Today, gerontechnologies continue to be motivated by three main benefits; first, they may benefit from targeting one of the largest

consumer segments (Higgs et al., 2009; Kohlbacher and Herstatt, 2011), second, play a role in reducing costs in the healthcare sector (Reeder et al., 2013), and, third, thereby incidentally improve the quality of later life (Fozard et al., 2000) – sometimes referred to as a 'triple win' narrative (Neven and Peine, 2017).

The ageing & technology literature has produced an abundance of insights on possible needs and requirements of older people as a possible technology-using population (Czaja et al., 2006; Fisk et al., 2004; Graafmans, 2017) – a body of knowledge that arguably is a residual from earlier interest in the impact and effects of technologies on ageing. Not rarely, studies have relied on the extraction of factors such as *perceived usefulness* and *perceived ease of use*, as articulated in technology acceptance models (TAM) (Brown and Venkatesh, 2005; Davis, 1989; Venkatesh et al., 2003). Lee and Coughlin (2015), for example, have sought to broaden the perspectives on older adults' needs by extending previous interests in technical and cognitive aspects towards aspects related to the social environment of older adults. They surveyed previous literature and identified ten possible barriers and determinants of technology adoption specific to older technology users, including 'value, usability, affordability, accessibility, technical support, social support, emotion, independence, experience, and confidence' (Lee and Coughlin, 2015: 747). Similarly, Golant (2017) examined the circumstances under which older adults would switch and opt for a new gerontechnology to continue growing old at home and argued that unsatisfied needs, larger resilience and persuasion through information were the most important. By way of a final example, Peek et al. (2016) emphasized six main themes that would influence the degree to which older adults used a novel technology, including their social network, the physical environment and personal thoughts and behavioural options. Overall, gerontechnology acceptance studies nowadays span a broad range of differing contexts, such as healthcare robots (Broadbent et al., 2009), computers (Lee et al., 2019) and assistive technologies (McCreadie and Tinker, 2005). Although they are often complemented by a social or contextual perspective, their concern with extracting requirements and needs, attitudes and factors affecting adoption rates, has remained mostly unchanged.

What emanates from these studies, largely, is that issues regarding low technology acceptance by older adults are explained by older people's inherently limited technological skills and scepticism or a simple failure to adequately meet functional –that is, physical or cognitive – requirements (Czaja et al., 2006; Fisk et al., 2004). In recent years, critics have begun to question the predominant focus on meeting older adults' needs or requirements in ageing and technology research. Such critiques are mostly situated in the emergent and nascent field of Socio-Gerontechnology. Critical scholars here investigate ageing and technology not as independent entities but as socio-materially bound together and co-constituted (Cozza et al., 2020; see e.g., Peine et al., 2021; Pritchard and Brittain, 2015; Wanka and Gallistl, 2018). To do so, they combine insights from Ageing Studies with Science and Technology Studies (see chapter 3). Drawing attention to how ageing and technology are intricately interwoven, critical scholars have argued that the overreliance on needs capturing may misconstrue ageing per se as a social category, as it tends to treat older people as a homogeneous group of people with uniform needs in relation to a possible technical solution (Mort et al., 2013; Peine et al., 2014). This streamlining, it has been argued, bears the risk of side-lining the diverse capacities and co-creational abilities of older adults that could serve as an inspirational resource for design (e.g., Lassen et al., 2015; Peine et al., 2014). Durick et al. (2013) have tackled a number of such 'ageing myths' (p. 470), and underpinned the idea that older adults are overall healthy, capable and open to technologies that they find relevant. As Durick et al. (2013) write:

> *'The risk with relying too heavily on definitions that seek similarities amongst older adults, while ignoring heterogeneity, is that addressing the needs of such a large and diverse group often leads to ill-matched and inflexible technologies, which ignore the unique social structures, abilities and histories of ageing people.'* (Durick et al. 2013: 469)

Ageing and technology scholars have found that older people are far more heterogeneous and technologically skilled than a one-size-fit-all portrayal would indicate (Grates et al., 2019; López Gómez, 2015). Their abilities, interests and backgrounds vary to a great degree in situated contexts, independent of their chronological age (Righi et al., 2017). In addition, they present a group of people that historically are well experienced with technology and thus reasonably expect new technologies to be meaningful for their own purposes and lived realities (Joyce and Loe, 2010a; Östlund et al., 2015; Suopajärvi, 2015). A variety of studies have shown how older people variously engage with technology: for example, by driving novel innovations (Essén and Östlund, 2011), by configuring technical solutions for idiosyncratic purposes themselves, in their own homes (Bergschöld et al., 2020; Joyce and Loe, 2010b) or by rejecting technologies that they do not find meaningful (Bailey et al., 2011; Greenhalgh et al., 2013). Given this, non-use – akin to a decision to use – has come to be acknowledged as an intentional and deliberate choice by older adults in relation to the imaginaries embedded in technologies, rather than an external barrier or obstacle to adoption (Neven, 2010). Taken together, critical studies in socio-gerontechnology have put forward a perspective on older people as active technology adopters, for which simple needs capturing may be an insufficient design strategy (Cozza et al., 2020; López Gómez, 2015; Peine et al., 2014).

The implicit framing of older people in terms of neatly identifiable needs and requirements, as articulated in earlier gerontechnology literature, has thus been matched with critical perspectives highlighting the evolving desires, aspirations and domestic contexts of older adults. It is against this background, then, that the idea of *including older people in design projects* has become increasingly popular. Original proposals to involve older people focused mostly on how to *elicit information* from older adults, thereby reiterating earlier concerns with cognitive and physical limitations at later age (Eisma et al., 2004; Newell et al., 2007). More recently, the proposition taken from the user involvement and participatory design literature has been that involvement procedures could provide a more holistic, inclusive approach to building technologies for the *lived realities of older people* (Peace and Hughes, 2010; Vines et al., 2015). For example, several design studies have involved older people in order to better understand older people's expectations and their life circumstances: Çarçani and Mörtberg (2018) involved older adults to understand their social life and found how older people actively explored different ways to make use of digital media to build and maintain their social relationships. Stein et al. (2017) engaged older adults to comprehend their mobility and daily habits of transportation use and used these insights to co-design an online transport platform. And Lindsay et al. (2012) report that involving older adults helped them improve their knowledge about the diversity of older people's life experiences.

The literature is replete with discussions of different methods and tools that can be utilized to better tailor the design process to involve older people. For instance, different design projects have explored the usefulness of cultural probes (Jarke and Gerhard, 2018; Maaß and Buchmüller, 2018), questionable concepts (Vines et al., 2012) and Living Labs (Müller et al., 2015) to facilitate knowledge exchange when involving older people. Other design studies have investigated various ways of visualizing technological ideas to support older people to creatively contribute to the design process, such as prototypes (Waycott et al., 2012), technology toolkits (Rogers et al., 2014) and video prompts (Lindsay et al., 2012; Uzor et al., 2012). These techniques are more directed towards enabling older people to more directly contribute to the design process. Relatedly, a few design studies have developed strategies for empowering older people so that they can actively participate during the design process (e.g., Hakobyan et al., 2015; Joshi and Bratteteig, 2016; Uzor et al., 2012). For example, Joshi and Bratteteig (2016) illustrate the steps they have taken to involve their older participants and highlight the importance of facilitating older people's to influence on the design process. A few studies furthermore highlight the creative capacity of older adults to contribute during design projects. Essén and Östlund (2011) illustrate how older adults can be engaged in early design stages and contribute significantly to articulating novel ideas for the design of a service system. Waycott et al. (2013) show

how older adults can actively participate using new technologies and be digital content creators. Uzor et al. (2012) find that older people involved in early design stages contributed significantly during their design of rehabilitation games. Hakobyan et al. (2015) actively engaged older adults and argue that older people contributed valuable insights to the design of their healthcare technology. And Vines et al. (2012) emphasize that older people contributed critical views and original ideas to the design of digital banking technologies. Together, these studies bring to the fore the potential methodologies and benefits of involving older people in the design process. At the same time, they also enrol older people as participants in technology projects, thus continuing to position technology as a solution to possible issues that may arise in later life.

Against this background, it should be noted that significant challenges remain: older people may be involved, but this does not necessarily imply that their insights have been taken seriously (Compagna and Kohlbacher, 2015). Many technologies developed for the older population still struggle to gain uptake (e.g., Lee et al., 2019), and the effectiveness of involving older people has remained poorly understood (e.g., Merkel and Kucharski, 2019). Given the large sums invested in novel innovations for the older population, the 'triple win' narrative may easily run into a 'triple sin' fallacy (Neven and Peine, 2017), wherein neither older adults nor companies nor society benefit. Technological innovation for older adults would be rendered unquestionable, thereby side-lining other, potentially more meaningful opportunities for technical innovations created through bottom-up initiatives (see e.g., Bergschöld et al., 2020). Technologies would be legitimized as solutions per se, thereby eliminating any attempt at discriminating between meaningful and less meaningful technologies (see e.g., Frennert, 2016). And technologies would be built that frame older people as a homogeneous group restrained by age-related declines, which would not fit the sophisticated self-images of older people (see e.g., Jones et al., 2008; Neven and Peine, 2017; Thompson, 1992).

The motivation that this thesis takes from this body of literature is that several lacunae have opened up in recent transformations in ageing and technology research concerning the *practices* of design and user involvement for – and with – older adults. This thesis is positioned to engage in a dialogue with the aforementioned literature on the interconnection between old age and technology design. In so doing, its aim is explicitly *not* to outline additional methodological steps, factors or barriers (or to interrogate their correctness) of designing for and with older people, as many studies already have done so (see above). Instead, its focus is on gaining new knowledge about what user involvement looks like as a socio-material practice, the relevance of socio-material arrangements in making a method such as user involvement happen and how ageing is produced as an object of design practices. Implicitly, then, the thesis intends to contribute by further unpacking the 'black boxes' (Latour, 1987: 2) of design practices and user involvement in the context of technologies for older people, raising critical questions about how ageing, older people and methods themselves emerge as socio-technical assemblages at the centre of a multiplicity of opposing factors and interests. Thereby, it also runs tangential to a second body of previous work: literature on user involvement as conceptualized in information systems design and management.

2.2 User Involvement

User involvement has been a persistent theme for intervention over the past decades in both the system management (e.g., Olson and Ives, 1981) and design literature (e.g., Bjerknes et al., 1987). With its inclusion of multiple stakeholders for the creation of meaningful outcomes, user involvement is accompanied by a genuine promise for democratic participation and societal transformation. The tradition of management and design studies offers insights into possible barriers and benefits to the method (e.g., Bano and Zowghi, 2015; Hartwick and Barki, 1994; Ives and Olson, 1984) and an array of more-or-less instructive implementation steps (e.g., Simonsen and Robertson, 2013; Spinuzzi, 2005). And, as mentioned in the introduction, a variety of approaches fall under the umbrella term

of user involvement: User-centred Design (UCD), Participatory Design (PD), Co-Design (CD), Human-Computer Interaction Design (HCI), ethnographically inspired design and so forth (Kujala, 2003).

While it is not my aim to historically unpack all these various design developments, I will briefly touch upon the key aspects of each of the approaches, primarily in order to draw out the distinctions with regard to how the user is, or has come to be, positioned in the respective approaches. One useful strategy to categorize different approaches to user involvement, I reckon, is to address their underlying assumptions with regards to the degree to which users are meant to participate. For this purpose, Arnstein (1969), but also several others (e.g., Damodaran, 1996; Mumford, 1979; Olsson, 2004) have come forward with delineations of different categories with regards to the extent to which users have an influence in the overall design endeavour. To illustrate the point, I shall distinguish three main levels: (Arnstein (1969), for her part, distinguished eight levels of citizen participation.)

- At a lower level, users would usually be only minimally involved. They could be informants, but it would also be sufficient for them to be simply observed in field studies or to be asked to answer particular questionnaires or to test prototypes.
- At a more intermediate level, users would be given more influence, but not on equal terms, and only in a few design stages. They could be consulted more frequently or be asked for direct input during design workshops, without these consultations necessarily being given equal weight.
- At a higher level, users would be considered more equal partners. Here, what matters is whether users would be able to influence design decisions in most stages, specifically the most crucial ones, such as deciding what type of design to elect.

Positioned at the highest end of the spectrum, *participatory design* (PD) encompasses ideals of empowerment and democracy and is mostly concerned with designing for the purposes of people (Bjerknes et al., 1987; Bratteteig and Wagner, 2012; Clement and Van den Besselaar, 1993; Ehn, 1988). While the histories of current participatory design approaches are debatable, the contemporary theme of participation in design owes much to its heritage in architecture and urban design (Arnstein, 1969; Sanoff, 2011), as well as Scandinavian developments for workplace standards and democracy in the face of the increasing prevalence of computers and information systems (Bjerknes et al., 1987; Ehn, 1993; Greenbaum and Kyng, 1991). One recent development within PD is *co-design* (CD), an approach which places additional attention on treating design participants as equal partners and which requires designers to adopt a more facilitating role (Sanders and Stappers, 2008). *Human-Computer Interaction design* (HCI), in turn, constitutes a broad field of academic research, combining the interests of several traditions and agendas, including psychology, cognitive science, computer science and industrial design (Hewett et al., 1992). The main focus of HCI has been to improve the match between humans and machines, predominantly by prioritizing ergonomics and human factors (Harrison et al., 2007; Rogers, 2012). Within HCI, the position of the user appears rather opaque, as the plurality and complexity of the field imply a multitude of angles on how and where to involve users. It is generally said to have gone through several waves over time (Bødker, 2006), where reductionist framings of the user in cognitive terms made way for socio-cultural understandings of users as customers with specific desires (McCarthy and Wright, 2004). Overall, it can be said that, unless otherwise stated, an earlier HCI approach likely would have involved users at lower levels, while a more recent, third wave approach may include higher levels of participation.

User-centred design (UCD) focuses on the improvement of products and categories considering user needs. Bringing together computer science and cognitive psychology, it emerged as a discipline in the 1980s, as it both departed from, and built on, the predominant focus of human-computer interaction design (HCI) on improving the connection between humans and machines through enhanced

ergonomics and human factors (Bannon, 1991; Rogers, 2012). In particular, UCD aimed to build computer systems predominantly based on the users' needs and requirements, and to a lesser extent based on technological aspects (Norman and Draper, 1986). In this vein, UCD distinguished itself from the earlier traditions of human-computer interaction design that positioned users as an entirely separate domain for cognitive scientists (Carroll, 1997; Cooper and Bowers, 1995). However, compared to participatory design, the expectations for the degree of user involvement are lower. In UCD, it is sufficient for users to be involved, for instance, through usability tests or by being merely surveyed or interviewed occasionally during the design process (Kujala, 2003; Moggridge, 2007; Vredenburg et al., 2002). *Ethnographically inspired design* is pragmatically allied to the design of computer-supported co-operative work systems (CSCW) (Greif, 1988; Hughes et al., 1993). Originally, CSCW emerged as a critique of previous design practices, dissatisfied with a lacking appreciation of socio-cultural factors in HCI design, especially in the context of work practices and workplace management (Schmidt and Bannon, 1992). This ran in parallel to a shift in theorizing plans and actions as *situated*, most notably articulated by Lucy Suchman's (1985) ethnomethodological account of photocopier usage in workplace settings. Actions, Suchman (1985) argued, did not follow plans neatly set out in the beginning; rather, their goals and intentions would only unfold as the activities progressed. Similar arguments were made by Susan Leigh Star (Gerson and Star, 1986; Star and Griesemer, 1989), who highlighted the contingencies of articulation as a central aspect in the continuation of ongoing work practices. In the HCI community, such studies raised an awareness of the importance of understanding the social context of end users. Consequently, CSCW systems were built with the intention to facilitate the localized workplace activities of teams (Greif, 1988; Schmidt and Bannon, 1992). The addition of socio-cultural insights to design eventually spurred an enhanced interest in ethnographically generated insights about the user, taking these as neatly transferable inputs for design (Anderson, 1994; Blomberg et al., 1993; Hughes et al., 1992). The direct inclusion and participation of users was considered too costly, so ethnographic observations offered a cheaper alternative to tap into additional insights (Bentley et al., 1992; Hughes et al., 1993). Unsurprisingly, while being conceived of as more complete individuals with varied socio-cultural backgrounds and needs, in ethnographically inspired design users play rather passive roles as subjects to observations.

Alongside these design perspectives on user involvement, the role of the user during innovation processes has also been addressed in the management literature (Bogers et al., 2010; Chesbrough, 2003; Von Hippel, 1976, 1986, 2005). In the writings of von Hippel (1986), 'lead users' have been emphasized as important sources of innovation in the development of novel technologies. Accounts of the user innovation literature usually portray users as core drivers of technology development, as they themselves perceive a need and explore opportunities for how best their needs can be fulfilled (Baldwin et al., 2006; Hienerth, 2006). For this endeavour to succeed, they must have a high amount of specialized, technical knowledge or else build associations with firms that have the available manufacturing capabilities (Bogers et al., 2010; Van Oost et al., 2009). Users would not just be 'involved', they would essentially be *leading* the endeavour, and their involvement level would likely be highest. A less user-led approach discussed in the management literature refers to open innovation approaches (Chesbrough, 2003). Here, the proposition has been that firms could take advantage of the innovative capacities of possibly creative users by 'opening up' the innovation process to outsiders, who could contribute their insights, such as in crowdsourcing (Estellés-Arolas and González-Ladrón-de-Guevara, 2012). Users would be consulted voluntarily throughout different stages of product developments to participate or take on a task. The choice of when and where they would be involved, however, would remain in the hands of the firm; hence, their involvement level would likely be lower.

What becomes apparent from both the design and the management literature is that user involvement as an approach is multifaceted and multiple. The understanding and positioning of 'the user' is very diverse and sometimes even conflicting (Barki and Hartwick, 1989). We could therefore say that user involvement is a method that has come to be developed as some type of catch-all approach that is

morally endorsed for a variety of reasons (Bratteteig and Wagner, 2012), yet interpretatively flexible. That is, what precisely we mean when we say 'user involvement' may be very differently understood from group to group and from individual to individual. Against a background of considerable flexibility, the literature has sought to examine the possible benefits and drawbacks to the approach. In a review of previous literature on user involvement in the 1980s, Ives and Olson (1984) cautioned that the benefits of user involvement were not clear, mainly because of methodological inconsistencies and a lack of theoretical backing for the different approaches. Similarly, Cavaye (1995) found that most studies offered only inconclusive insights into the outcomes of user involvement. A number of contingency factors have been identified that could impact the outcomes, such as task complexity, management support, user influence and willingness to participate (see e.g., Cavaye, 1995; Kim and Lee, 1986; McKeen et al., 1994). At the same time, a multitude of possible promises have been identified. Most notably, user involvement is said to lead to increased knowledge about user requirements, prevent the development of undesired features, facilitate users' understanding of the developed system and achieve higher acceptance by users (DeLone and McLean, 1992; Lucas, 1974; Robey and Farrow, 1982). Along with design-related outcomes, the PD literature furthermore highlights more idealistic benefits such as an increased empowerment of users (Clement and Van den Besselaar, 1993), mutual understanding between designers and users (Simonsen and Robertson, 2013) and an enhanced ownership (Schuler and Namioka, 1993), and therefore ultimately a better quality of products (Kensing and Blomberg, 1998).

The distinction between drawbacks and benefits has remained a main focus in the literature on user involvement. Over the past decades, the literature has seen an increase of reviews and meta-analyses on the evidence for possible benefits and obstacles (see e.g., Bano and Zowghi, 2015; He and King, 2008; Kleinsmann and Valkenburg, 2008; Shah and Robinson, 2007). In general, the main benefits that surface from these studies pertain to improved knowledge on the part of designers and conjectures about possibly improved user satisfaction (Bano and Zowghi, 2015; Shah and Robinson, 2007), as compared to key impediments like lacking resources, time constraints and user reluctance (Bano and Zowghi, 2015; He and King, 2008; Shah and Robinson, 2007), as well as managerial issues (Kleinsmann and Valkenburg, 2008). By way of illustration, in their meta-analysis of 82 empirical studies, He and King (2008) concluded that user involvement had a stronger effect on a change in user attitudes than on a possible increase of user satisfaction or adoption. Bano and Zowghi (2015) surveyed previous literature and interrogated the connection between user involvement and 'system success' and found a mixed relationship. Drawing on their analysis, they highlighted 24 purported benefits, the most prominent being a belief that user involvement would lead to user satisfaction, better understanding of the user's requirements, improved quality of the resulting technology and possibly increased usage. According to Bano and Zowghi (2015), these 24 benefits stood in opposition to a total of 21 obstacles, most of which were blamed on the user, such as lack of motivation, a disadvantageous attitude from the outset or insufficient communication abilities, or of organizational nature, such as time constraints and task complexity.

Against this background, the motivation of this thesis taken from the literature above is to engage in the development of an understanding of user involvement that goes beyond mapping barriers and benefits or possible contingency factors, towards understanding the approach from a *socio-material perspective in practice*. Given the considerable diversity of methodologies that fall under the 'user involvement' approach, I argue it is difficult to easily map fixed outcomes and barriers for a method as multifaceted and differently interpreted as user involvement. A common ground for most these approaches appears to simply be that the user is, to some degree, 'involved' in a design procedure. One could easily imagine, however, that involving a user through UCD would entail a very different practical implementation and outcome than doing so through PD. As a term, hence, *user involvement*

would thus be susceptible to the same perks and perils of any other ideograph (McGee, 1980)[2]: It bears the risk of being self-legitimizing by its own right, an unquestionable good due to its underlying appeals to participation and democracy. What appears to fall short, then, is a thorough appreciation of the situated encounters of both humans and nonhumans that occasion the various possible outcomes of user involvement. Hence, this thesis is positioned to practically address previous concerns in user involvement studies regarding the applicability of different barriers and benefits. In particular, it seeks to address the salient confusion and inconsistencies of the approach by offering an appreciation of the methodology from a different, yet equally important angle – an angle that foregrounds the role of the practices, people and materials active in the making of involvement and that is considerate of the implicit multiplicity of the approach. To do so, I will mostly draw on and contribute to theoretical work in Science and Technology Studies (STS). But first I shall briefly outline the practical context of my thesis: the Swedish care sector.

2.3 The Swedish Care Sector

In Sweden, home care and other welfare services are publicly funded and offered to all citizens in need (SSA 2001: 453). As such, the Swedish welfare sector is organized in three levels, where governments are responsible for supervision and policy-making, regional county councils for primary health care and municipalities for the provision of social services. These social services include care for all people, independent of their age, the degree of which is dependent on their circumstances, and also home care services. Originally, home care services emerged in the 1950s as a viable alternative to more traditional care models such as in nursing or old-age homes (Szebehely, 1998). The ambition was to reduce the economic burden on institutions to provide care and to allow older people to receive care services at home instead. For these purposes, Swedish policy has supported a variety of services, including person-focused care and domestic services, but also a combination of nursing care that would be offered at home (e.g., transportation or short visits).

The rights of the care recipients, as well as the organization of responsibilities, have been specified in 1992 in the so-called 'Ädel-reform' (Andersson and Karlberg, 2000). This was a legislation that eventually laid the groundwork for the current way care is organized in Sweden. Its ambition was to unify, yet decentralize, the implementation of care under a single authority: the municipalities. As Trydegård (2003: 445) argued, Sweden has had 'a long tradition of local government autonomy in Sweden', wherein 'locally elected politicians make all major decisions' and 'also determine the budget, set the local income tax and decide on the size of fees charged for local services' (p. 445). It is therefore of little surprise that municipalities were given the authority and accountability for providing care, including organizational and financial matters. However, it should be noted that while the reform set out an official guideline, it did not encompass detailed regulations. Instead, the assessment of who required care, and what precisely the nature should be of these care services, was – and remains – a professional matter. Care professionals — that is, employees working for the municipality — eventually are required to make judgement calls and decide on the amount of help an individual would receive (Trydegård, 2003).

[2] *Ideograph* is a concept originally introduced by McGee (1980) to question how rhetorical terms like *democracy* or *equality* fed into the formation of widespread ideologies. Ideographs are accredited with a normative superiority and are seen as means to their own end, even though their meaning is highly flexible and only apparent as they become applied in different contexts. Here I attempt to draw parallels between terms such as *democracy*, and the method of *user involvement*, as they both appear to possess an elevated immunity to doubts about their inherent goodness.

While many of the original ideas largely remain up until today, the Swedish care sector is now undergoing substantial changes due to digitalization (NBHW, 2010). This increasing interest in digitalization and technology is closely connected to ideas of reducing public expenditures on care services and the notion that such technological advancements would positively contribute to the quality of the welfare provided (Danielsson Öberg and Rolfer, 2017; Kierkegaard, 2013). The term *welfare technology* has been coined in the Scandinavian context to denote novel technologies specifically for the social welfare sector (Bygstad and Lanestedt, 2017; Modig, 2012). As Frennert and Baudin (2021) illustrate, welfare technologies encompass a range of technological products, such as alarm pendants, surveillance cameras, online service platforms and fall detectors. What characterizes a welfare technology, then, is that it would find some applicability in the care sector, where it could increase feelings of safety, independence and physical wellbeing (Frennert and Baudin, 2021). A second and related policy focuses on the promotion of *eHealth* (GOS and SALAR, 2016; WHO and ITU, 2012). Like welfare technology, eHealth policies have the aim of endorsing digitalization of the provision of social care services, but with a more tailored focus on the provision of access to information and communication technology systems (Oh et al., 2005). As it stands, the ambition of the Swedish state is to achieve a considerable digital transformation of care by 2025 (GOS and SALAR, 2016).

Both eHealth and welfare technology initiatives are strongly informed by technology determinist narratives, wherein technological interventions are supposed to positively affect social care and the work of municipalities in Sweden (Frennert, 2021). While the underlying assumptions of such a technology push narrative have been met with criticism for their accentuated rhetoric side-lining other care values (e.g., Frennert, 2019; Hofmann, 2013), the Swedish national board of health and welfare continues to monitor and promote the 'progress' of digitization across its 290 municipalities (NBHW, 2021). In its recent report in 2021, the national board is optimistic about the pace of digitalization of ICT, as an increasing number of municipalities have taken up digitization plans and offer a range of e-services. At the same time, the board has also noted that the general implementation of welfare technologies, with only 28% of municipalities reporting pilot projects, remains relatively low. The predominant reason for this has been accredited to organizational development in municipalities rather than problems with the technology itself (NBHW, 2021). In the Swedish care system, municipalities are therefore not only responsible for the provision of care but also increasingly for the improved digitalization of care services.

Next to digitalization, a separate but related development can be discerned in the Swedish sector: while originally much of the provision of care was intended to be public, nowadays most municipalities outsource care services to providers from the private sector (Gustafsson and Szebehely, 2009; Trydegård, 2003). That is, because the autonomy for the decision of whether or whom to contract resides within the realm of each individual municipality, decision-makers within municipalities themselves decide to consider for-profit actors for the provision of services. According to Szebehely and Trydegård (2012), this has been mostly a response to ideologically fuelled policy adjustments by the Swedish government in the early 1990s, which fostered a 'split' between the 'public' and 'private' and emphasized the notion of free choice of services. Initially, procurement thus took the form of competitive tendering, which came with the drawback that it favoured large companies, as competitions were based purely on price (Meagher and Szebehely, 2010). More recently, legislation switched to a so-called 'for-choice-model' (established in Government Bill [2008/2009:29]), which stipulated that different competitors could only be selected based on the perceived quality of the products, and not on costs. This opened the door to participation by smaller companies, who can now respond to a tender issued by a municipality, develop a technology and then be selected if the quality of their offering is perceived to be the most suitable. To highlight the alleged resulting empowerment of its end users, municipalities and companies sometimes refer to the final care receivers as 'customers' (Frennert, 2019: 637).

The practical motivation for using the Swedish care sector as a specific context for this thesis is that it allows an examination of user involvement empirically at the intersection of two parallel developments: marketization and digitalization. Specifically, the increased digitalization of the care sector is designated to open up a new market for companies seeking to develop care technologies and technologies for older people. Companies developing care technology may seek to reap the benefits from this marketization (Brennan et al., 2012); yet, in order to do so they are expected to fulfil the carefully specified requirements set out by municipalities (Hörngren, 2011), and there are no guarantees that the municipality would not find a 'better' product from a different supplier. After all, the ultimate ambition has been, and continues to be, to provide good care to all people in need. User involvement, then, has to occur in light of a multiplicity of converging and diverging forces: competition, company ambitions, the aims of the individual municipalities, larger policy transformations, tenders, increasing digitization, the assessment of care professionals and finally a consideration of the needs of the final care receivers. Given the confluence of the multitude of forces, the Swedish care sector thus offers an ideal context in which to unravel how user involvement is done in practice, with an array of socio-material actants – poised to *act*.

3 THEORY: SCIENCE AND TECHNOLOGY STUDIES (STS)

In order to examine the practices of user involvement and technology design, I predominantly draw on conceptual advancements and analytical tools from Science and Technology Studies (STS). Generally, STS constitutes a broad, evolving and multifaceted field of research combining a variety of disciplinary backgrounds, including history, philosophy, sociology and anthropology – with the general ambition of interrogating the interrelation between science, technology and society. As such, the field offers a rich and prolific body of literature containing a multitude of valuable resources for conceptual inspiration; the most relevant ones for my thesis I shall outline in this chapter. The chapter begins with a brief introduction to the most prominent themes in STS on knowledge, social constructivism and actor-network theory. Here, the conceptual relevance mainly pertains to a shared interest in understanding the entwinement of the social and the material, as well as an interest in practices. I then move on to a specific discussion of STS scholarship on users, the ontology of objects, method practices and imaginaries.

3.1 Practices, Artefacts and Socio-materiality

STS has a long tradition in critically interrogating the practices of scientists and engineers. This specific interest began to take shape particularly in the 1960s and 1970s, when social scientists started to question the allegedly intrinsic truthfulness of scientific claims. Earlier analysts, such as philosopher Karl Popper (1962), have tended to accredit the apparent 'success' of particular types of knowledge to inherent truths; success was described by reference to some type of natural foundation. Dissatisfied with such an explanation of predictable steps forward, Thomas Kuhn (1970 [1962]) instead argued that science involved revolutions that, in turn, evolved out of shifting scientific paradigms. In Kuhn's view, scientists in a particular discipline were bound together by a shared scientific paradigm that articulated particular ways of understanding and conducting scientific work to solve particular puzzles. In normal times, science would progress as usual, as scientists would go about their everyday work and operate within the prevailing paradigm. In periods of crisis, however, scientists would end up in disputes, and controversies would be resolved through paradigm shifts. In other words, according to Kuhn, science did not build up knowledge in a straightforward, easily comprehensible way but instead oscillated through more-or-less-appropriate paradigms. As Sismondo (2010 [2004]: 16) put it:

> *'This is the most radical implication found [in Kuhn (1970 [1962])]: Science does not track the truth, but creates different partial views that can be considered to contain truth only by people who hold those views!'* (Sismondo, 2010 [2004]: 16)

While the conception of abrupt paradigmatic changes has received significant criticism (mostly as scientific meanings may not change as rapidly as required by Kuhn for them to become incommensurable from one paradigm to antoher; for an overview, see, e.g., Bird (2000)), the discovery of scientific paradigms per se opened up new opportunities to interrogate the formation of

scientific truth, and specifically their underlying ideas and practices. In the years following the publication of Kuhn's (1970 [1962]) book, multiple approaches emerged dedicated to systematically interrogate the formation of knowledge claims – a field that came to be known as the sociology of scientific knowledge (SSK) (Barnes, 1977; Barnes and Shapin, 1979; Bloor, 1976; Collins, 1975; Collins and Pinch, 1982; Knorr Cetina, 1981, 1999; Latour and Woolgar, 1986 [1979]). Crucially, in the late 1970s in Edinburgh, a research group involving Barry Barnes (1977), Steven Shapin (Barnes and Shapin, 1979) and David Bloor (1976) argued that scientific paradigms could be analysed like any other belief system or idea – not just in relation to the internal dynamics of a given paradigm itself (as suggested by Kuhn), but also in relation to other, external features, including socio-cultural aspects. In so doing, they emphasized the importance of avoiding a 'Whig history' type of explanation, where current scientific paradigms would be used to explicate past ones. Such explanations would account for the success and failure of claims by different means (meaning successes would obtain a historically-grounded advantage due to an alleged 'inherent truthfulness', while failures would be side-lined as 'naturally untrue'). To articulate a research program that tackles these shortcomings, the research group that Bloor (1976), Barnes (1977) and Shapin (Barnes and Shapin, 1979) headed specified four main tenets as part of a canon for a coherent study within the 'strong program of scientific knowledge': causality, impartiality, symmetry and reflexivity. Most notably, impartiality demanded the abolishment of all a priori assumptions about the correctness or falsehood of any knowledge claim, with the explanation of each deserving equal importance. Symmetry, in turn, specified that both true and false beliefs also deserved the same *manner* of explication. Residues of both the principles of symmetry and impartiality continue to inform many of the methodological approaches in contemporary STS and also form central assumptions for my own understanding of user involvement as specified in the introduction.

In parallel, many STS scholars began to interrogate scientific knowledge as a practice that involved scientific controversies, including multiple interests and viewpoints (known as interpretive flexibility), as well as ongoing negotiations and closure (Collins, 1975, 1981a, 1985; Knorr Cetina, 1981, 1999; Latour and Woolgar, 1986 [1979]; Pickering, 1992). The argument was that, in scientific practice, many of the previously held assumptions about scientific conduct and the intrinsic truthfulness of established facts did not hold. Instead, scientific progress came to be understood as a messy, contingent, social endeavour. Most notable here is the seminal work *Laboratory Life*, by Bruno Latour and Steve Woolgar (1986 [1979]) – a study to which I will return in the later section (3.4) – which set the backdrop against which many studies examining scientific practices emerged. Latour and Woolgar (1986 [1979]) investigated the social construction of scientific truths in a biomedical laboratory in California. Treating scientists as a tribe just as an anthropologist would study ethnic groups in Ivory Coast (p. 28) (and as Latour himself did before), the study adopts the perspective of a stranger interested to uncover what lies behind the guise of status and acclaim that often surround the sciences (p. 29-30). Building on observations gathered by Latour over the course of 23 months, the book sheds light on the mundane practices of scientific discovery, providing a detailed account of scientific realities and belief systems of scientists. In so doing, the study challenges the earlier preconception that scientific practices were ordered, predictable and principled in nature (p. 36) and instead paints a picture of science activities as characterised by messiness, interpretation, negotiations and conflicts. The authors highlight the intricacies and entwinement of social facts with everyday work contingencies, such as competition and reputation, as well as both practical and instrumental aspects, such as the reliance on inscription devices.

In a sense, many of the tenets from the strong program of scientific knowledge are visible in their study. For example, in line with the principles of symmetry and impartiality, the authors remained neutral with regards to the content of the claims uttered by scientists, and their sociological analysis is characterized mostly by an interest in how particular scientific descriptions emerged in practice. Following the seminal work by Latour and Woolgar, a significant sub-field emerged that is sometimes

referred to as 'laboratory studies' (Doing, 2008: 279 ff.; Knorr Cetina, 1995: 140 ff.), specifically denoting studies where social scientists entered the everyday work environment of scientists to interrogate their activities. While laboratory approaches developed within various disciplines and using a multitude of foci (e.g., Hacking, 1983; Knorr Cetina, 1981, 1999; Lynch, 1985; Traweek, 1988), they share an interest in empirically investigating what scientists do in practice and how knowledge and facts have been socially constituted. Laboratory practices have been shown to involve sociality and various objects (Latour and Woolgar, 1986 [1979]), tacit knowledge (Collins, 1985), tinkering (Knorr Cetina, 1981), ongoing manipulation (Collins, 1981a; Hacking, 1983) and experimentation (Lynch, 1985). My own study, too, takes some of its inspiration from laboratory studies, recognizing the empirical value of tracing the constitution of realities in practice, including an appreciation of the localized particularities in work office settings.

Building upon previous advances in the sociology of scientific knowledge, STS scholars in the 1980s began to expand the critique of the making of knowledge claims and facts to include the construction of artefacts and *technological objects* themselves. One of the most relevant advances in this tradition is the Social Construction of Technology (SCOT) approach, developed by Trevor Pinch and Wiebe Bijker (1984). SCOT denotes a framework to analyse how technical objects are socially constructed. To illustrate their argument, Pinch and Bijker (1984) adopt previous assumptions from SSK on impartiality and symmetry for the analysis of the 'success' of particular objects, as well as notions from the subsequent empirical programme of relativism (Collins, 1981b, 1985) that emphasized ongoing negotiation, interpretive flexibility and closure. The example case put forward by Pinch and Bijker (1984) is the modern bicycle, which they historically show was originally but one of many different variants developed. Their argument is that the current version of the bicycle, the 'safety bicycle', emerged through a long, interactive process where multiple groups negotiated over different alternative designs based on their individual interpretations and interests. To conceptualize the process by which human agency shapes the development of technical objects such as the bicycle, Pinch and Bijker (1984) introduce several concepts, the most important ones being *interpretative flexibility*, *relevant social groups*, and *closure*. The notion of 'interpretative flexibility' (p. 409) describes the co-existence of several different interpretations with regards to an artefact. These different interpretations are held by different relevant social groups: groups of individuals bound together by 'the same set of meanings, attached to a specific artefact' (p. 414). Examples of relevant social groups for the bicycle would include engineers, manufacturers and a range of different end users, such as male riders or sport cyclists, and even anti-cyclists.

The main characteristic for belonging to a relevant social group, hence, is that there would be some type of shared view on an artefact. Due to their different interpretations, different relevant social groups would prioritize different *problems* with regards to a technology. For example, high-wheeled bicycles were viewed by women and the elderly as unsafe, while young men associated them with style and speed. The crucial point that Pinch and Bijker (1984) make is that this flexibility would lead to modifications of the technical object itself: designs of different bicycle variants. 'Thus, there was not one high-wheeler – there was the *macho* machine, leading to new designs of bicycles with even higher front wheels, and there was the *unsafe* machine, leading to new designs of bicycle with lower front wheel backwards, or reversed order of small and high wheels' (p. 423f, emphases original). The contradictory interpretations of different relevant social groups, according to Pinch and Bijker (1984), would eventually spur disciplinary conflicts with respect to artefacts: conflicts that would be resolved through a 'closure mechanism' (p. 419) in which different relevant social groups would negotiate their problems and varying interpretations in order to achieve a consensus. Once a consensus would be achieved through closure, the artefact itself would ultimately become stabilized. In Pinch and Bijker's (1984) account, two types of closure can be discerned: rhetorical closure, where argumentation would be deployed to close a technological controversy; and closure through a redefinition of the problems. Examples of the former type of closure would include the advertisement of the high-wheeler to dispel

any safety concerns. Examples of the latter type of closure would comprise the translation of the problems the air tyre was framed to be addressing: from being 'anti-vibration' towards 'performance', which satisfied the problems of both sporting cyclists and the general public. To specify the link between relevant social groups and technologies, in a later article on the social construction of Bakelite, Bijker (1987) introduced a further concept called 'technological frames' (p. 168). Technological frames, according to Bijker (1987), include cognitive conceptions, ways of problem solving and materials that prevail in a community and may both offer resources and also limit possibilities for thinking and acting with regard to a technology (Bijker, 1995). The general idea was that actors can be included to varying degrees in different technological frames, hence allowing analysts to account for how interpretations and interactions within different relevant social groups may transform or remain stable (Bijker, 1995). For example, in his account of Bakelite, Bijker (1987, 1995) employs the concepts of *technological frame* and *inclusion* to show how such an analysis can be helpful to illustrate the success story of Bakelite. According to Bijker, Baekland's success in making synthetic plastic, compared to many earlier chemists, can be explained due to his partial immersion in the technological frames of both Celluloid and electrochemical engineering, which when combined provided him with a repertoire of techniques and strategies helpful to circumvent the problems he would have encountered in either one of those.

The SCOT approach is helpful for interrogating technology innovation not as a linear process but instead as a multifaceted progression that involves human agency and social aspects in the constitution of technological objects. It also specifically highlights the agency of users and engineers: both of whom are foregrounded in this thesis as well (a topic to which I shall return in Section 3.2). At the same time, the general SCOT perspective, including its underlying assumptions, has become widely criticized. Klein and Kleinman (2002), for example, argued that SCOT's emphasis on agency has come at the detriment of a thorough appreciation of the broader structural elements of social life[3]. A more profound criticism refers to the implicit privilege of social factors in social constructivist accounts (Callon, 1984, 1986; Latour, 1987, 1999b; Law, 1987). In particular, the SSK and SCOT approaches both explicate the emergence of technology and facts through social aspects and thereby fall short of taking into account other, non-social factors – that is, *materials* themselves, as well as the mutual shaping of things and people. According to Latour (1999a), this tendency reproduces the distinction set by technological determinism that separates nature from the social. The scholarly emphasis hence shifted towards bringing back in the 'missing masses' (Latour, 1992: 225) that had been previously taken out of the analysis, an approach that is prominently foregrounded in the disparate but influential stream of thought known as Actor-Network Theory (ANT) (Latour, 2005; Law, 2009). The central argument here was that, next to prior assumptions of agnosticism and impartiality, the role of nonhuman actors – nature itself – should be given a consideration equal to that given to human actors[4]. In the ANT perspective, nature and society not only required explications on equal terms but all distinctions between the two realms were de facto abandoned altogether – a doctrine articulated by Michel Callon (1984) as the principle of 'free association' (p. 200). If any

[3] See also Russel (1986) on this point.

[4] Incipient precursors to this argument can be found in Latour and Woolgar's study (1986 [1979]), which included a consideration of many elements present in ANT, such as a consideration of materials (like inscription devices (p.51)), transformations (p.81) and networks (p.107). In part, the argument also emerged from a dialogue with historian Thomas Hughes (1979, 1983, 1986), who highlighted the systematic nature of technological work in large technical systems. In his historical study of the electrification of Western society, he illustrated Edison as a 'system builder' (Hughes 1979: 124) who needed to resolve a range of 'reverse salients' (Hughes 1983: 81) that were not just technical but also economic, social and scientific. In this view, the different spheres involved in the building of a large power system were inextricably linked into a 'seamless web' (Hughes, 1986: 281).

distinction became apparent, then this by itself warranted an examination of the type of alliances, chains of translations and affiliations that formed in practice to create such a divide (Latour, 1987).

The ANT body of literature has produced rich insights into the entwinement of humans with things, as well as the capacity of things themselves to act. Through the vantage point of ANT, artefacts came to be seen as the 'result of the shaping of many associated and heterogeneous elements' (Callon, 1986: 23), 'a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network' (Law, 1987: 113). Hence, ANT scholars emphasized, for example, the agentic capacities of petri-dishes, microbes and cattle to form alliances that were crucial to the success of Pasteur's vaccines (Latour, 1988b); the associations between wind, guns, vessels, men, compasses and currents that co-constituted Portuguese naval expansion (Law, 1987); or the formation of alliances between scallops, fishermen and scientists to constitute the development of local scallop rearing (Callon, 1984). Similar studies pointed to the role of hotel keys (Latour, 1990) and doors (Latour, 1988a) in enabling and constraining human behaviour. Crucially, human and nonhuman aspects of systems were given an incipient equal status in the description of the phenomena at hand; microbes and Pasteur, vessels and men, scallops and scientists, electrons and Renault – all received the same attention in the explication of how the alliances formed that eventually allowed networks to endure or disintegrate (Callon, 1986; Latour, 1987; Law, 1987). In line with this principle of generalized methodological symmetry, ANT refers to all entities with agentic capacities as 'actants' (Akrich and Latour, 1992; Latour, 1987), no matter if they are of human or machine origin. Actors, in contrast, would constitute anthropomorphic actants.

ANT highlights how entities, both social and material, did not exist independent of one another but are intricately linked and intertwined. The accompanying analyses illuminate how different heterogeneous entities associated with one another to form networks, 'translate' different interests (Callon, 1984: 223), engaging in different 'trials of strength' (Latour, 1987: 85) and 'enrolling' particular entities into submission to their goals (Callon and Law, 1982: 619). In practice, many of the long chains of associations and translations necessary to enrol and convince others, as well as the implicit conflicts in establishing networks, may become taken for granted, deleted and effaced – a 'black box' in Latour's (1987: 2) terms. Inscription devices, machines, vessels, vaccines, automobiles, engines and even money can be considered black boxes, with their inputs and outputs visible but with their internal mechanisms invisible. The associations between the social and materials elements that made it hold together in the first place would be forgotten. Building on many advances in ANT, STS has since developed a profound interest in interrogating various such black boxes, with a distinct eye on the relationality between the social and material. Different notions now populate the debate surrounding the connection between the social and the natural, such as 'sociomaterial' (Suchman, 2007: 268), 'sociomateriality' (Orlikowski, 2007: 1444;), 'entanglement' (Barad, 2007: 71) and 'cyborg' (Haraway, 1985: 65, 1991: 1), all of which, in different shades, emphasize how the social and material spheres are intricately interwoven.

To analyse user involvement in practice, I took from this vast body of literature an emphasis on considering both *the social and the material as mutually implicated and entwined*. User involvement, in this view, needs to be seen as a process that is both social and material. Moreover, user involvement can be considered a black box, the analysis of which would require the disentanglement of the various heterogeneous elements that make it possible in the first place. To interrogate user involvement as a heterogeneous, more-than-human, distributed process, I therefore adopted ANT's principles of *agnosticism, free association* and *generalized symmetry*, specifically with regards to treating elements and objects as existing inside networks, occasioned by the entanglements of both humans and other materials. In this sense, I regard user involvement itself as relationally constituted, involving a variety of actants, including humans, materials, engineers and users (projected and real) and their affiliations. Furthermore, I took from this literature a continued

interest in *practice*. That is, pursuing the call for following engineers and scientists 'in action' (Latour, 1987: 145), I decided that interrogating what happens in practical settings would allow me to examine not just how humans and artefacts were co-constituted in design procedures but also how user involvement itself was done as a method across time and space, involving a variety of heterogeneous actants. This understanding formed the backdrop against which I formulated my specific empirical interests in each of the four papers, a backdrop which I shall now specify in further detail, starting specifically with the constitution of 'the user' in STS.

3.2 User Studies in STS

From an STS perspective, users have been approached through an established and extensive body of literature concerned with the 'co-construction of users and technologies' (Oudshoorn and Pinch, 2003: 3). This is a literature stream that appeared particularly relevant for my study of user involvement in practice, as it specifically interrogates the relation between design and use in a variety of ways. To begin with, one of the earliest recognitions of the agency of users, as mentioned previously (see Section 3.1), comes from the SCOT approach to technology development (Bijker, 1995; Pinch and Bijker, 1984). It is one of the most influential approaches that has highlighted how user groups play an active part in the constitution of technologies. However, the SCOT approach is mostly concerned with user agency in the developmental stages of a technology, insinuating that users would be less relevant after stabilization and closure of an artefact[5]. SCOT also tends to portray users as rather stable and homogeneous entities, grouped into specific relevant social groups, and defined purely by a number of shared interpretations with regards to an artefact. These views have thus been refuted by studies that highlight the complex networks and everyday circumstances in which technologies are embedded, appropriated and adopted (Cowan, 1987; Lie and Sørensen, 1996; Silverstone and Hirsch, 1992), and studies that highlight the relevance of user agency for modifying presumably stable technologies (de Laet and Mol, 2000; Mackay and Gillespie, 1992). Cowan (1987), for example, coined the term 'consumption junction' (p. 263) to denote and make accessible for analysis the complex networks of consumption in which new artefacts would be incorporated. Likewise, the notion of domestication (Silverstone and Hirsch, 1992) aimed to metaphorically illustrate how a technology, akin to a wild animal, must be tamed and cultivated in the new, unfamiliar environment of the consumer.

Simultaneously, a semiotic or ANT-inspired tradition in user research emerged, which came with an eloquent vocabulary to investigate relationships among users, designers and materials, each being credited with their own agentic capacities (Akrich and Latour, 1992). In this tradition, Steve Woolgar (1991) ethnographically investigated usability trials for a new range of microcomputers at a British computer manufacturer, raising questions about our assumptions of intentionality and the boundaries of machines. Differing from SCOT's perception of more-or-less stable users outside of technology development practices, Woolgar's famous study showed how users, as projected entities, together with technology and designers, are actively co-constructed in the practices of user involvement. Specifically, Woolgar showed how the usability trials he observed entailed a set of design activities and negotiations that ultimately aimed at 'configuring' (p. 59) the user. Furthermore, Woolgar (1991) developed the allegory of the machine case (that is, the microcomputer case) as symbolising the boundary between insiders and outsiders to the company and argued that we could view the machine as working as a 'text' (p. 60) that the designers 'write' and 'rewrite', setting parameters to achieve the 'correct' interpretation by the users (p. 88). In this (somewhat ANT-

[5] In a later study, Kline and Pinch (1996) appear to address this shortcoming by examining specifically the actions of users after a technology was presumably stabilized. Their case study of automobiles portrays farmers as a user group that actively change and adapt technologies.

inspired) sense, the machine itself could be seen to enable and constrain the future actions of users. In another seminal study, Madeleine Akrich (1992) argued that technical objects may be inscribed with particular images of future usage, attributing directives for action and competences to both humans and nonhumans. Drawing on an anthropological study of the implementation of three electrical technologies in Africa, she developed the concept of a *script* to capture the way technologies may define, prescribe and allocate responsibilities to both users and machines. She noted how engineers can hold images of prospective users, which may work like a 'film script' (p. 208): they ascribe particular roles and frames of action to both users and technologies. Such images can become inscribed into the technology, so that the technological object itself may work to enable and constrain the actions of the future users. Akrich (1995) later outlined the inspirational sources that designers and engineers may draw on while developing technologies, something that she called 'user representations' (p. 167), and distinguished between 'explicit' (p. 169 ff.) user representation techniques (i.e. market surveys, customer testing and feedback on experience) and 'implicit' (p. 173 ff.) user representation techniques (i.e. experts and I-methodology, with designers relying on their own experiences).

Reluctant to accept the notion of lopsided configuration work by designers, Mackay et al. (2000) broadened Woolgar's (1991) early conception of designers 'configuring' the user to encompass the active role of users themselves in shaping technology and design. In their ethnographic inquiry into involvement procedures for rapid application development, Mackay et al. (2000) illustrated how the boundary between users and designers itself can be configured[6]. Moreover, they stressed that users can also re-configure designers through their actions. The preconception of designers 'configuring' or 'prescribing' users, they and other scholars argued, ran the risk of resulting in what Stewart and Williams (2005: 4) described as the 'design fallacy': the preoccupation with extracting more and more context-specific knowledge into technology design at an early stage, ignoring the fact that the socio-material shaping of a technology continues after it is introduced to its users. Also, the role of non-usage (Wyatt, 2003) came to be considered an important facet relevant to understanding usage as design processes unfold over time. Notably, in order to emphasize the agency of users after the initial technology development practices, Akrich and Latour's (1992) vocabulary of semiotics does indeed consider the possibility of users developing 'antiprograms' (p. 261) and the 'de-inscription' (p. 261) of previously embodied scripts. In this vein, it became possible to analytically address the agency of designers to inscribe certain actions, the agency of materials to incorporate specific 'programs of action' (p. 260) and the agency of users to proactively reject or adapt the initial inscriptions.

Following from these initial contributions, a range of empirical investigations emerged that sought to qualify the relationship between usage and technology design. One direction of inquiry here has been that of feminist scholars, who sought to employ the notions of 'scripts' and 'configuration' to interrogate the implicit gender roles and relations involved in the constitution of technologies (Berg and Lie, 1995; Oudshoorn, 1999; Rommes et al., 1999; Van Oost, 2003). Adopting a critical perspective on the prevailing 'hegemonic representations of gender' (Oudshoorn, 1999: 282), this scholarship has become concerned with how particular performances of gender identities are becoming part of technical artefacts while others are not. For example, examining two case studies of the design of electronic virtual cities, Oudshoorn et al. (2004) and Rommes et al. (1999) uncovered the implicit processes by which gendered stereotypes were designed into ICT innovations for a municipal web page. In another set of examples, a study by Van Oost (2003) illustrates different embodied gender identities associated with male shavers as compared to female shavers, and Oudshoorn (1999) highlights the sociocultural clashes that occurred in the development of new

[6] In that regard, it should be noted that, similar to Mackay et al. (2000), Woolgar (1991), too, observed how the identities of 'user' and 'designer' may only become clear as the involvement procedure progresses.

contraceptive technologies for men, which came into conflict with the gendered stereotypes associated with female contraceptives. As such, feminist perspectives on users emphasize the implicit power relations of technology design, specifically drawing attention to the design side of user involvement (Wajcman, 1991). Notions such as Adele Clarke's (1998: 16f., 273) 'implicated actors' point to these power dimensions, highlighting the actors that are invisible but affected by certain actions. Feminist scholarship also addresses the apparent obsession in ANT with male heroes, such as Louis Pasteur (Latour, 1988b) or Rudolf Diesel (Latour, 1987), instead seeking to foreground alternative perspectives and voices (Haraway, 1985; Star, 1991). Haraway's (1985, 1991) project on the cyborg, for example, not only sought to raise awareness of the amalgamation between humans and nonhumans but also to disrupt and subvert the 'comfortable old hierarchical dominations' (Haraway, 1985: 80) imbued with dualisms. Against the background of an increasing interest in emancipation, hybrids and politics in feminist studies, users and designers themselves came to be understood as heterogeneous collectives characterized by power relations: the one cannot be understood without the other (Berg, 1998).

Another line of research that aimed to further interrogate the co-constitution of users has to do with the role of user representatives or 'mediators' in technology design (Schot and Albert de la Bruheze, 2003: 230). As a brief background, the importance of boundary work to delineate realms of expertise has been studied quite extensively within STS (cf. Abbott, 1988; Gieryn, 1983, 1999; Lamont and Molnár, 2002). Scholars have long considered the conditional and purposive ways in which authority and expertise are acquired through socio-historical processes of boundary-making (Abbott, 1988; Gieryn, 1999). Research in this direction has emphasized the connective nature of expertise, highlighting expertise not as a property per se but as something enacted and done in practice (Eyal, 2013; Jasanoff, 2003; Knorr Cetina, 1999). What is interesting for this thesis, principally, is that experts also play a role in user involvement, as Akrich (1995) has argued. The literature on design and users has thus produced a broad variety of studies of how a range of mediators may be involved in the co-constitution of users, such as medical experts (Fishman, 2004), consumer representatives (Schot and Albert de la Bruheze, 2003), public figures and states (Rose and Blume, 2003), patient advocacy groups and policy-makers (Jessika van Kammen, 2003; Parthasarathy, 2003). According to Schot and Albert de la Bruheze (2003), a characteristic feature of such mediators is that they 'often claim to represent specific users' (p. 235), thereby positioning themselves as central to the ways users and technological products are 'defined, constructed and linked' (p. 230). The relevance of such mediators is a theme I picked up specifically in Paper II, studying how the involvement of different expert groups would matter for the enactment of the object of user involvement procedures.

Over time, STS has gradually come to question the idea of 'the user' as an established, pre-existing entity and instead developed an understanding of users as situationally enacted alongside technological practices (Hyysalo, 2006; Wilkie, 2010) that involve a broad set of heterogeneous participants, both human and nonhuman (Akrich and Latour, 1992; Woolgar, 1991). Research into the practices of designers has shed light on the role of managers in configuring users through their own identity (Summerton, 2004), the performativity of futures represented within policy documents (Wilkie and Michael, 2009) and within mass media articulations (Langstrup, 2011), as well as the relevance of working traditions in figuring users (Hyysalo, 2006). In contemporary STS scholarship, hence, usership is seen as entangled, produced and performed in ongoing design practices (Mort et al., 2009; Sánchez-Criado et al., 2014; Wilkie, 2010). Wilkie (2010), for example, ethnographically investigated how designers enrol, construct and deploy users in user-centred design. Building on the work of Deleuze and Guattari (1987), Wilkie (2010) drew attention to the entanglement of users with involvement procedures, practices that were 'assembling' (p. 57) users in a variety of ways, for a variety of ends. His study brought into view the performative effects of user involvement procedures in enacting users and socio-material futures, as well as the contingent and situated nature thereof. Likewise, Sanchez-Criado et al. (2014) portrayed users and services not as predetermined facets of

telecare technologies ready to simply be put into use, but rather as the 'concrete yet embryonic outcome of a heterogeneous composition process' (p. 696) involving technical, relational and contractual configurations of usership. The co-dependency of users and design has also been highlighted in STS studies specifically dealing with care technologies, which have drawn further attention to the relational and responsive ways in which usage is enacted through technology. For instance, Pols and Willems (2011) challenged the assumption that the goals of telecare technologies can neatly be translated into different use settings. They show that, rather than being predetermined, telecare technologies only unfold their effects once they are put into relation with the users, thereby 'unleashing' (p. 490 ff.) certain behaviours while 'taming' (p. 488 ff.) others, depending on the arrangement into which they are placed. The unforeseen effects of telecare technologies and the different ways in which telecare arrangements shape users and usage were also the subject of the study by Aceros et al. (2015), who indicated how a telecare system shaped particular forms of ageing that were contradicted by the final users. In different forms, STS scholars have thus portrayed users as complex assemblages that hold together and fall apart through the localized performances of design practices.

This thesis seeks to both build on and extend this rich body of literature on users in STS. In brief, it picks up the key themes that users and technology are co-constituted in design practice, socio-materially conditioned, occasioned by dynamic power relations and relationally achieved, and that involvement procedures themselves are performative. Much of the work done in this thesis is hence informed by a prior understanding of the highlighted notions, such as *configuration, scripts, user representations, implicated actors, co-constitution, relationality* and *mediators*. However, while drawing on the various notions outlined above, the thesis also seeks to engage in a dialogue with the aforementioned literature in a variety of ways. First, speaking to previous insights on expertise and configurations in user studies, Paper II empirically studies different configurations of participation and juxtaposes their effects for the enactment of ageing as a varied object for design. Second, embracing the notion of users as relationally achieved through a heterogeneous web of intermingling elements, Paper III, in turn, aims to contribute to this body of work by extending the analysis of different performances and effects of design procedures to the enactment of user involvement itself as a method that is socio-materially conditioned. And third, aware of the performative effects of situational enactments in design practice, Paper IV then traces how ageing is relationally achieved as an apparently stable outcome of interweaving design practices. Each study hence aims to engage with the previous literature in a slightly different form, shifting the attention from expertise and multiple configurations of participation (Paper II), towards method practices (Paper III), towards stability and imaginaries (Paper IV). In different ways, hence, Papers II, III and IV are thus also in conversation with a number of additional intellectual fields within STS, the concern of each I shall briefly sketch below.

3.3 Objects: Stability, Enactment, Multiplicity and Maintenance

The stability and obduracy of objects has been of interest to STS scholars pretty much since the birth of the discipline. For the thesis, this is a topic of interest specifically, as I am investigating how objects become multiply enacted in involvement procedures (Paper II), as well as the role of design practices in maintaining stability (Paper IV). So, how has the stability of objects been conceptualized in STS? The SCOT approach discussed above (see Section 3.1), for example, explicitly described processes of closure in which, over time, different relevant social groups would come to an agreement with regards to their conflicting interpretation of the problems and opportunities affiliated with an artefact (Bijker, 1987, 1995; Pinch and Bijker, 1984). In this view, then, the stability of objects or artefacts would be explained by reference to closure mechanisms involving negotiations among different relevant social groups. Likewise, ANT approaches were concerned with the durability of objects (Callon, 1984, 1986; Latour, 1987, 1988b, 1996; Law, 1987). Here, objects were considered through the gradual formation

of alliances among heterogeneous elements, and their stability needed to be explained by reference to the ties built within this very network. Diesel engines depended upon alliances with pumps, fuel, thermodynamics, entrepreneurs and scientists (Latour, 1987). Pasteur's anthrax vaccine was held together by a network of microbes, farmers, laboratories, practitioners and petri-dishes (Latour, 1988b). Crucially, and in a manner similar to SCOT, ANT also presumed some type of closure, as is evident in concepts such as 'immutable mobiles' and 'black boxes' (Latour, 1987: 229, 2). The idea was that, once the network had stabilized, the messy ties that went into its very formation would have become black-boxed, erased and invisible. The resulting objects then would travel as immutable mobiles through time and space, for as long as the networks would carry them. Their constituents would no longer change.

Both SCOT and ANT also offered an angle to approach the possibility of instability as well. In particular, Bijker's (1995) amendments to SCOT provided an avenue to explicate constancy and change by understanding actors as included in different technological frames, to different degrees. After all, this is how the composition of Bakelite appeared to have been possible. ANT perspectives, in turn, conceptualized the durability of objects as 'the function of the relative strength of the components in question' (Law, 1987: 129). This implied that heterogeneous aspects, and the networks among them, could be used to explicate both stability and instability. For example, Callon's (1986) well-known study of electric vehicles and Law's (1987) study of Portuguese vessels illustrate the fragility of objects as being the upshot of instable associations among networks. For one, electric vehicles require the successful affiliation of car manufacturers with car bodies, and fuel cells with electrons. If either the electrons fail to associate themselves with fuel cells, or Renault refuses to participate as a manufacturer of car bodies, electric vehicles will not hold (Callon, 1986). Likewise, the Portuguese imperial project depended on careful alliances built between wood, compasses, wind, currents, men and guns. If these associations were to break apart, then the entire project would collapse; vessels would sink and Portugal's colonial endeavour would cease (Law, 1987). From the perspective of ANT, hence, it was the heterogeneous elements forming into a more-or-less durable network that eventually created the conditions for stability or instability. If the affiliations failed to hold, then the object, too, would fail (Latour, 1996).

Notwithstanding its appreciation of ANT's insights on stability, STS 'after ANT' (Law and Hassard, 1999) began to take issue with notions such as 'immutability'. De Laet and Mol (2000), for example, studied what happened as a water pump, the Zimbabwean bush pump 'B' type, moved into less developed countries. Their study showed how, unlike a fixed object, the design and usage of the bush pump transformed as it travelled from use context to use context, from region to region and from network to network. Therefore, de Laet and Mol (2000: 226) proposed to speak not of an immutable mobile but of a 'fluid' technology with shifting boundaries and relations. Similarly, Mol and Law (1994) argued that anaemia appears to operate in fluid spaces, rather than in the topologies of networks and regions, and Law and Singleton (2005: 335) observed alcoholic liver disease as a 'fire' object that is elusive: sometimes present, and sometimes not. Taken together, these studies have complemented the understanding of objects as constituted by networks of relations among heterogeneous elements with a perspective on the nature of objects as complex and messy. First, they suggest that the relations in networks that hold objects together may be more variable than ANT initially presumed (de Laet and Mol, 2000; Law and Mol, 2001). And second, they imply that it 'takes effort' (Law and Singleton, 2005: 337) to maintain the appearance of objects as stable or fluid through the sustenance of underlying network relations. Of course, ANT has been well aware of the implicit effort it takes to align a heterogeneous set of elements into a stable network. However, the conceptual concern of earlier ANT research was with the building steps of assembling relations, and it therefore relatively neglected other arrangements and invisible work that may be rendered absent yet be silently present (Bloomfield and Vurdubakis, 1999; Star, 1991).

The notion of what an object *is* and how it *achieves* stability has thus broadened to consider the variability of relations in networks and the ongoing work required for it to appear stable. In so doing, STS scholars sought to extend epistemological concerns with objects (such as the notion of 'boundary objects' (Star and Griesemer, 1989: 388)) with an ontological perspective that understands the realities of objects themselves as actively manipulated and enacted (Barad, 2007; Mol, 1999, 2002). Most notable in this tradition is Annemarie Mol's *The Body Multiple* (2002), which presents an ethnographic study of the disease atherosclerosis conducted at a university hospital in a medium-sized Dutch town. It is based on fieldwork undertaken by Mol over the course of four years, joining and observing the hospital staff, doctors and patients involved with the disease about once a week. Focusing specifically on the practices in which atherosclerosis is discussed, treated, diagnosed and examined, the study illustrates how different *versions* of the disease are practiced at different enactment sites. The notion of '*enactment'* (pp. 33-41, emphasis my own) is central to Mol's goal of avoiding any presumptions about directionality in the designation of who or what performs an object. We are presented with a range of in-situ accounts showing, for example, how atherosclerosis is practiced differently by vascular surgeons and patients in outpatient clinics (by feeling pulsations in the patient's leg and asking interview questions) (pp. 21-26), or by pathologists and refrigerated, amputated leg parts in pathology departments (by examining and measuring the artery's thickness using a microscope) (p. 30). Drawing on her descriptions of hospital practices, Mol makes a distinct philosophical claim against perspectivism, highlighting how it is possible to step away from seeing objects as simply observed by different people with different views and move towards understanding them as enacted through different practices. Because of the various ways she observed atherosclerosis being enacted, Mol furthermore deduces that this requires objects to be multiple. 'And since the object of manipulation tends to differ from one practice to another, reality multiplies' (Mol, 2002: 5). Mol's account of atherosclerosis in the hospital also addresses how, despite this multiplicity, 'one' atherosclerosis can be achieved, as conflicts or tensions between multiple enactments can be brought into alignment (through practices of coordination) (p. 84) or allowed to co-exist separately from one another (through practices of distribution) (p. 87). In her own words:

> *"This, then, is what I would like the term multiple to convey: that there is manyfoldedness, but not pluralism. In the hospital the body (singular) is multiple (many)."* (Mol, 2002: 84)

In other words, Mol's account suggests that the stability of any object needs to be seen in light of its enactment in practice. Objects do not exist prior to these practises but rather are performed within them. A similar argument has been made by Karen Barad (2007) in her interrogation of the experiments of Danish physicist Niels Bohr that highlighted the *entanglement* of everything in the universe. To Barad, things, knowledges and discourses are all entangled with one another. In her view, objects and subjects do not exist outside of the practices that perform them but rather obtain their agentic capacities and identities only through their mutual 'intra-action' (p. 139). Each practice performs such a phenomenon, an 'agential cut' (p. 140), which momentarily stabilizes the boundaries of an object. It is in this sense that the constant entanglement of everything intra-acting with everything matters: the objects enacted become real. They obtain both substance and meaning from the 'material-discursive practices' (p. 141), the relationalities and contingencies that created them. In addition to Mol (2002), Barad (2007) does away with any distinction between epistemology and ontology and instead argues for the entwinement of the two as an onto-epistemology (p. 185), and our ethical responsibilities in the politics within.

While the degree to which this 'really' reflects an ontological shift in STS theorizing is debatable (Woolgar and Lezaun, 2013, 2015), it can nevertheless be said that STS scholars have increasingly adopted a performative view on the stability of objects. Objects that have been examined as enacted include Cumbrian sheep (Law and Mol, 2008), blood pressure (Moreira, 2006), the 'goodness' of care (Pols, 2004) and tomatoes (Heuts and Mol, 2013). As can be seen, these studies did away with any presupposition about the *content* of different types of objects: a lot of different things can count as

objects and are analysed as such. Empirically, hence, an object's stability, solidity or durability came to be studied purely from a practice perspective. As Law (2004) conjectured:

> '*And if things seem solid, prior, independent, definite and single then perhaps this is because they are being enacted, and re-enacted, and re-enacted, in practices. Practices that continue.*' (Law, 2004: 56)

Hence, notions of *closure* and *immutability* were complemented by *enactment* and an appreciation of *practice*. Objects – be they water pumps, liver disease, or atherosclerosis – needed to be maintained for them to hold stable. Otherwise, they would lose their form and their apparent stability and fall apart. Following earlier criticisms mostly from feminist STS scholars (Haraway, 1997; Shapin, 1989; Star, 1991), the concern with such invisible aspects of maintenance work became a topic in more recent STS scholarship. Here, Maria Puig de la Bellacasa (2011, 2017), using the example of SUVs and how they remain stable despite environmental concerns, emphasized the importance of recognizing how people care: that is, 'to engage with the concerns that animate those who are in favor of them' (2017: 44). This would require an appreciation of 'neglected things' implicit in how objects are maintained, by way of adding 'layers of concern' and promoting 'additional attachments' (Puig de la Bellacasa, 2011: 91).

Indeed, several STS scholars highlight the stability of objects by reference to the invisible work and tinkering implicit in *maintenance and repair* (see, e.g., Denis and Pontille, 2015; Mol, 2008; Oudshoorn, 2008; Russell and Vinsel, 2018). Studies sympathetic to this approach bring to light the practices of people caring for objects and the ontological politics (Mol, 1999) that prioritize care for certain objects over others (Lindén and Singleton, 2021; Martin et al., 2015; Murphy, 2015). For example, researchers have interrogated what type of caring practices feed into the build-up and support of data in a genetics research laboratory (Pinel et al., 2020) and how junk appears to be maintained due to intimate care practices in people's homes (Callén Moreu and López Gómez, 2019). They have also shed light on the invisible practices required for the maintenance of subway signs (Denis and Pontille, 2015), degrading artworks in museums (Domínguez Rubio, 2014) and the 300-year old St. Ann's Church in central Manchester (Edensor, 2011). Such 'maintenance and repair studies', according to Denis and Pontille (2020: 284), seek to shift the focus from the way objects obtain their original shape to the processes by which their shape is maintained and to bring into focus 'the people, workers and users who participate in the daily life of technologies, long after their invention' (p. 284). Maintenance and repair practices are usually taken for granted, whether in the context of the ongoing noise of city life (Graham and Thrift, 2007), the invisible articulation work in home care (Star and Strauss, 1999) or the upkeep of computers in offices (Orr, 1996). It should be noted that, by emphasizing the invisible work that goes into sustaining objects, maintenance and repair studies have put forward a perspective on the endurance of objects that emphasizes the entangled vitality of objects as time passes, their underlying energy threatened by decay and reliant on the overlooked practices that preserve their existence (Denis and Pontille, 2015; Russell and Vinsel, 2018).

In sum, earlier conceptions of the stability of objects by means of networks involving relations among heterogeneous elements have been complemented with a perspective on objects as messy, fluid, multiply enacted and re-enacted. Explicitly, I draw from this literature the notions of *enactment*, *performativity* and *multiplicity*, which feature across all three empirical papers. At the same time, my empirical work also engages with this body of literature in a variety of ways. Paper II extends Mol's (2002: 5, 36) notions of 'multiplicity' and 'enactment 'to different enactment sites of design workshops that are spatio-temporally separated. It seeks to contribute theoretically here with a perspective on the multiple concrete material designs that may result from different enactments of participation and specifically casts doubt on how different versions of one object (ageing) may still hang together as 'one', given the spatial and temporal separation of the various enactment sides. Paper

III adopts the terminology of enactment to methods themselves (see also Section 3.4). In so doing, it is in conversation with Barad's (2007) concepts of 'agential cut' and 'intra-action', highlighting the making of methods such as user involvement as a situated, momentary and transitionary practice. Paper IV specifically interrogates the apparent stability of ageing as an object of design practices. Here, the paper addresses previous studies on maintenance, repair and care (e.g., Denis and Pontille, 2015, 2020; Puig de la Bellacasa 2011, 2017) and argues that objects may also obtain their endurance without particular practices being specifically directed towards their maintenance or care. Instead, it shows how ageing is enacted and re-enacted as a collateral by-product of a combination of practices that do not specifically seek to maintain ageing, yet circumstantially do so.

3.4 Method Practices

In parallel with its concern for scientific knowledge and objects, STS has developed a profound – and growing – interest in method practices, which can be seen from a variety of different special issues published recently (e.g., Gad and Ribes, 2014; Law and Ruppert, 2013; Wyatt and Balmer, 2007). As user involvement itself can be counted as some type of method or technique that is produced in practice (Suchman, 2012; Woolgar, 1991), it appears relevant to consider this body of literature in greater detail.

Generally, STS has interrogated methods both in terms of the implicit performances of scientific practices and as a distinct topic with its own field of study (Law, 2004, 2017). STS scholars have therefore foregrounded the 'social life of methods' (Law and Ruppert, 2013: 229), highlighting how methods are both performed by, and perform, social realities. To start with, STS has long taken methods as an important object of inquiry, most notably in the context of scientific work. As outlined in Section 3.1, this had mostly to do with identifying the social and material aspects that co-constitute and co-produce novel scientific 'discoveries' of facts and artefacts (Jasanoff, 2004; Latour, 1993). One case example which I mentioned earlier is offered by laboratory ethnographies such as the one by Latour and Woolgar (1986 [1979]). Their study not only emphasized the messiness of scientific work activities and the social constitution of facts but also made an important claim about how such activities constitute reality itself. It were not just facts that were made in, or 'secreted by', the laboratory; nature and reality themselves appeared as the upshot of scientific methods. In their own words:

> *'Scientific activity is not "about nature," it is a fierce fight to construct reality. The laboratory is the workplace and the set of productive forces, which makes construction possible.'* (Latour and Woolgar, 1986 [1979]: 243)

In this reading, the objects of scientific investigation – scientific realities – themselves are seen as produced and performed by scientific methods. For without scientists' statements, minds, interactions, choices, instruments, papers, competitions and privileges, there would be no credible objects in the first place. In other words, scientific methods were interrogated as having *performative* capacities. Hence, ANT scholars shared an increasing interest in investigating the practices of scientists and engineers (Latour, 1987; Pickering, 1995). What seemed to be 'ready-made facts' became uncovered as more-or-less circumstantial performances of scientific methods. Around the 1990s, this interest then turned to questioning the method of STS itself. For some, the notion of studying material objects akin to humans appeared intellectually disturbing, especially as it would require a move beyond a concern with meanings and interpretations and would require social scientists to make claims about more-or-less 'foreign' disciplines (see e.g., Amsterdamska, 1990; Callon and Latour, 1992; Collins and Yearley, 1992). While the previous debates are well documented in earlier exchanges, the concern with STS's own method continues (see e.g., Gad and Ribes, 2014; Silvast and Virtanen, 2021; Wyatt and Balmer, 2007). The most prominent concerns here have been

how to find ways to interrogate and cope with differences (Haraway, 1997; Verran, 2013), how to identify suitable research designs (Hyysalo et al., 2019) and how to deal with methodological diversity (Sovacool and Hess, 2017), as well as more broadly the link between the conceptual and empirical in STS research (Gad and Ribes, 2014; Silvast and Virtanen, 2021). In so doing, STS research has become increasingly characterized by a concern with reflexivity (Schneider and Woolgar, 2015), specifically about the performances of its own interventions (Chilvers and Kearnes, 2020).

The notion that *methods perform* also has much of its roots in STS scholarship that emerged 'after ANT'. Mol and Mesman (1996), for example, interrogated the methods of semiotics and symbolic interactionism and argued that both brought with them specific 'modes' (p. 419) of conceptualization and empirical work, highlighting differences among their implicit '*political styles*' (p. 434, emphases original). The politics present in methods have also been a topic for Cussins (1996), who investigated the practices and devices applied in infertility clinics. She described the procedures through which a variety of heterogeneous elements created presences and absences as an 'ontological choreography' (p. 575). Methods, she argued, brought together bodies and treatment procedures, highlighting the capacity of methods to perform ontological realities for its subjects. Similarly, Clarke and Star (2008) interrogated the scientific methods of brain and cancer research and showed how particular methods brought together conceptual frameworks and empirical work that created 'doable' (Fujimura, 1987: 257) problems. Mol's (2002) study of atherosclerosis, which I discussed previously in Section 3.3, also had an impact on the way methods came to be understood. Her account showed how medical practices enacted atherosclerosis in a multiplicity of ways, and she emphasized the ontological effects of methods. As she argued:

> '*Studying methods empirically, then, generates another understanding of what they are. No formal guarantees, but specific mediators, interferences*' (Mol, 2002: 155).

STS research has thus shown how different method practices can enact, perform and create multiple realities. Methods are not only shaped by socio-material conditions; they are themselves active in the making of realities (Clarke and Star, 2008; Mol, 2002; Mol and Mesman, 1996). The study of methods has thus been extended from scientific practices (Latour and Woolgar, 1986 [1979]) to include experimental setups (Lezaun et al., 2013, 2017), practices of participation (Chilvers and Kearnes, 2020), ethnographic field sites (Candea, 2013) and all sorts of devices (Clarke and Star, 2008; Cussins, 1996) – all of which could perform different facts, societies, publics, diseases and patients. Crucially, those devices, as object studies (Section 3.3) have shown, could be fluid and elusive (de Laet and Mol, 2000; Law and Mol, 2001).

Recognizing the performative character of methods, Law (2004) and Law and Ruppert (2013) came forward with a research agenda that emphasizes the generative and reality-performing role of methods. Specifically, Law (2004: 14) employs the notion of 'method assemblages' to describe how methods are both shaped in their relations (which are themselves never stable but constantly in flux) as well as shaping relations (making one particular reality apparent while others are invisible). In this way, Law (2004) sees methods not only in their performative capacities to create particular realities in the present but also in how they occasion a realm of 'otherness' (p. 85) that remains absent. This, he argues with feminist scholars (such as Haraway, 1997), has political implications for how methods are (or should be) done in practice (Law, 2017) – a point that resonates well with Mol's (1999: 74) earlier concerns with 'ontological politics'. With regards to user involvement and the link between designers, materials and users, it is interesting to note that Suchman (2012: 55) drew on Law's (2004) notion of method assemblage to describe 'configuration' itself as a practice that pulls various heterogeneous elements together and occasions the reality for designers, users and materials. In this perspective, user involvement can also be conceptualized as a *method assemblage* that is both shaped by, and shaping, particular realities for its objects and subjects.

This thesis converses with this growing body of work in a number of ways. For one, I draw on notions of *methods as* both *situationally performed by*, and *performing*, *socio-technical realities*. These are concerns that can be found mostly in Papers II and IV. Paper II here interrogates the generative features of practices of participation, while also being aware of the social relations that go into different modes of participation. Paper IV, in turn, investigates the performative capacities of design practices to enact and re-enact ageing. Furthermore, the thesis seeks to contribute to this body of literature by offering an empirical account of how methods themselves are achieved in practice. What are the underlying practices and socio-material conditions that make a certain way of doing a method possible, and not any other way? Paper III seeks to address this conceptual point by pinpointing how the ever-changing nature of methods relates to constantly shifting enactments in different socio-material conditions, hence offering an empirical perspective on why methods are done in one manner (and not another one). Finally, as I shall outline in my own methodology (Section 4), I do intend to heed the aforementioned methodological concerns and debates within STS by means of a research design that is aligned with its conceptual interests and yet is reflexive about its own performances.

3.5 Imaginaries

From an STS perspective, user involvement does not only entangle objects. As Akrich (1995) has long specified, it is as much possible for designers to involve a user in the flesh as it is to conjecture particular assumptions and images about users who are absent. For the context of this thesis, this is all the more relevant, as ageing not only comprises a physical, biomedical process (Gubrium and Lynott, 1987) but also more-or-less favourable images of the ageing process (Featherstone and Wernick, 1995) and discourses about ageing (Katz, 1996; Katz and Marshall, 2003). It hence appears fruitful to briefly touch upon the way such images have been conceptualized in the STS literature.

Images and imaginaries constitute a broad and multifaceted research field, as a review by McNeil et al. (2017) shows. Their overview highlights the genealogy by which notions of imaginaries transformed over time, from initially being associated with something unrealistic (Kant, 2007 [1781]) and individual (Lacan, 2006 [1966]), towards a more forward-looking conceptualization (Fujimura, 2003) residing in collective groups (Appadurai, 1996; Jasanoff and Kim, 2009). Notable here, for example, are the works by Appadurai (1996) and Taylor (2004), which explicitly scrutinized the ability of imaginaries to bring about grand global shifts of public culture towards modernity. Donna Haraway's work on science fiction and primates (1989, 1991) also drew attention to the way specific techno-scientific visions may prefigure future societal realities. Particularly relevant for STS scholars is the work by Sheila Jasanoff and Sang-Hyun Kim (2009, 2015), who emphasized the relevance of collectively held 'sociotechnical imaginaries' (Jasanoff and Kim, 2009: 120) in shaping policy agendas and steering future society. The political force of such imaginaries to constitute future realities can also be seen to be recognized in related concepts, such as Kuhn's previously mentioned notion of 'paradigms' (1970 [1962]), Fleck's 'thought collectives' (1980 [1935]), and Foucault's 'discourses' (1972, 1977). While these concepts tend to present imaginaries mostly in epistemological and cognitive terms, other STS scholars have sought to encompass more experiential and emotive aspirations, such as is seen in the sociology of 'expectations' (Borup et al., 2006; Brown and Michael, 2003) and 'hype cycles' (Van Lente et al., 2013). Despite considerable variation, all these conceptualizations can be considered versions of imaginaries in that they entail some collective vision about the future, which in turn has the ability to constitute practices and thereby sociotechnical, modern, or public futures (Hess, 2015; McNeil et al., 2017).

This thesis adopts a stance that is relatively critical to such conceptualizations of imaginaries, because they imply a particular directionality by which images constitute practices. Drawing on the previous insights outlined in Sections 3.3 and 3.4, a slightly different conceptualization of imaginaries would entail a consideration of the entanglement and entwinement of imaginaries with *practices*. This

conceptualization more closely resonates with work that emphasizes the mutual embeddedness of imaginaries with practices (e.g., Hyysalo, 2006; Ingold, 2002; Suchman, 2007; Verran, 1998). These studies have demonstrated how, rather than images being external to or shaping practices, images and practices are tied together and intimately linked. The empirical examples span a broad array of different contexts, encompassing the entrenchments of perceptions, imaginations, people, skills and work activities in their surroundings (Ingold, 2002), the interconnection between tribal practices and imaginations of land ownership (Verran, 1998), the situatedness of goals and activities of photocopier usage (Suchman, 1985, 2007), and the boundedness of imaginaries to the practices of designers developing safety devices (Hyysalo, 2006). In a previous study, I, together with Britt Östlund and Alexander Peine, investigated how user representations were entangled with everyday engineering activities in robotics laboratories (see Fischer et al., 2020). We found that imaginaries and activities were interconnected, with certain types of activities evoking particular user representations. We termed these activities 'image-evoking activities' (p. 237) to capture the implicit ways by which practices seem to enact images, and the joint realm of the resulting user representations 'user image landscape' (p. 238) to emphasize the varying enactments and multiplicity of futures entangled with the practices. From this perspective, images can be treated in a fashion analytically similar to objects: as malleable, messy effects of the performances of enactment practices. Indeed, as is the case for ageing, the boundaries between object and image blur, as notions of physical processes coalesce with particular discourses, emotions and images (Featherstone and Wernick, 1995).

This thesis connects with the literature on imaginaries by interrogating ageing as both an object and an image that is entangled with practices. Specifically, Paper IV seeks to advance a perspective on the stability of ageing as such a hybrid and thereby contribute an empirical example that illustrates the intricate linkages between working practices and imaginaries. It hence aspires to participate in the ongoing discussion of imaginaries by raising questions about the implied guidance or effectiveness of broader sociotechnical imaginaries and argues for a more thorough consideration of the *practices* in which these are constituted.

3.6 Connecting the Dots

To conclude, to empirically approach user involvement in practice, I extensively engage with STS literature. Applying a theoretical lens on the co-constitution of users, materials and designers in practice, the dissertation deals with how practices of design and participation both enact particular realities and how the enactment of these realities is socio-materially entangled.

Hence, each of the included four papers borrows from, and addresses, a different aspect of this co-constitution work. Paper I begins with a curiosity about how the literature has thus far reported on the practical applications of user involvement of older people. It derives its interest from extant applied research on user involvement and older people (Sections 2.1 and 2.2) and conceptually interrogates these as practices that are socio-materially distributed (Section 3.1) and characterized by power asymmetries (Section 3.2). Notably, the review indicates a lack of clarity in the literature regarding the internal dynamics of user involvement as a socio-material practice, as well as the interlinkages between different performances and effects. Following from these key insights, the focus shifts to address the aforementioned gaps, by following in-situ practices of user involvement and design (Section 3.1), which is central to Papers, II, III and IV. Paper II here interrogates the role of different configurations of participation (Section 3.2) and analytically examines these as enactment practices (Section 3.3). Paper III turns to the performances of such enactment practices (Section 3.3) and looks specifically at the underlying socio-material conditions that achieve user involvement as a method (Section 3.4). Finally, Paper IV considers how practices perform the stability of ageing as both an object (Section 3.3) and an image (Section 3.5).

The interests present in the compiled papers hence entail a progression from user involvement as such to more broadly examine its different performances and effects. They move from user involvement more generally (Paper I), to a first inquiry into the relation between conditions and effects (Paper II), to the characterization of user involvement as a method in company practice (Paper III) and finally to the general performances of company practices in enacting particular realities (Paper IV). Table 1 below summarizes the different conceptual foci of the included papers.

Table 1. Summary of the conceptual interests of the included papers

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Title	The importance of user involvement: A systematic review of involving older people in technology design	Design multiple: How different configurations of participation matter in design practice	An ethnography of user involvement: Tracing shifting interstices of coalescing tensions	Ageing enacted in practice: How unloved objects thrive in the shadows of care
Main focus	Overview of how user involvement of older people has been practiced in the academic literature, including reported purposes and outcomes	The way socio-materially configured participation practices relate to different ontologies of ageing	The underlying, sometimes shifting, socio-material conditions that enact user involvement as a method	The performativity of company practices in enacting the stability of ageing as an object and image

4 METHODOLOGY

In this section, I outline the different methodological approaches I took in order to investigate the topic of user involvement in practice. This begins with a brief overview of the research designs for the four appended papers, followed by a more detailed description of the methodology of each of the four papers. Here, I distinguish methodologically between the systematic review, which is concerned with prior studies from the literature (Paper I), and the predominantly empirical studies (Papers, II, III, and IV). The empirical studies are further divided into a multiple-case study approach to investigate different design workshops (Paper II), and a longitudinal ethnographic study in a small- to medium-sized company involved in the Swedish care service sector, subsequently referred to as SMCare (Papers III and IV).

4.1 Research Designs – An Overview

Building on the STS literature, the thesis is guided by three key methodological principles for the study of design and user involvement practices (see also Section 1.2). The first is *impartiality* (Bloor, 1976) with regards to successes and failures. That is, in analysing the practices of design and user involvement, I ignore any a priori claims of objectivity and instead interrogate them independent of their alleged goodness or mistakes. Second, guided by *generalized symmetry,* the analysis treats both humans and nonhumans with methodological symmetry, with a specific eye to the relations and associations between them (Callon, 1984). This principle sensitizes me to the entwinement of the social and material and in particular allows me to attend to the heterogeneity of entities that participate in any practice. Third is the principle of *enactment of realities*, meaning that practices and methods can perform particular ontologies (Barad, 2007; Law, 2004; Mol, 2002). By following this principle, I locate human and nonhuman objects in the practices and socio-material conditions that perform them, thereby specifically tracing how specific realities are interconnected with particular contexts of design practice.

To unpack and open up for analysis the 'black box' (Latour, 1987: 2) of user involvement in design practice, the papers included in this thesis stretch across a number of different instantiations and contexts where user involvement is practiced. I began with a literature review (Paper I) specifically to map out and draw from recent literature how user involvement mattered in the context of technology development for older people. The review was driven by a conceptual interest in user involvement as a method and an object for study. In particular, I sought to obtain a relatively broad picture of the ways user involvement has come to be understood – something for which systematic literature reviews are generally considered particularly suitable (Grant and Booth, 2009). By adopting an approach from the positivist tradition in medical research (Moher et al., 2009), with clearly defined search steps and eligibility criteria, I sought to benefit from the type of thoroughness, rigor and perceived legitimacy associated with such an approach and to re-purpose it for my own theory-inducing, generative agenda. Underlying my approach, hence, was a qualitative interest in the way

previous studies have reported on their own ways of involvement. Thereby, the thesis treats the obtained empirical studies in an STS-inflected fashion as material artefacts that are relationally linked to other elements, and to the practices on which they are based (Latour, 1999b; Mol, 2002). That is to say, the thesis treats these studies not as reality-depicting representations of practices or methods but as the upshot of practices, and as active agents in the constitution of what user involvement would be (Law, 2004; Lynch and Woolgar, 1990).

Two main empirical interests surfaced from the review: *First*, it appeared that the connection between different performances of user involvement and the resulting outcomes was not well understood, or at least not thoroughly covered, in the literature. To empirically address this issue, in Paper II, I devised a research approach that would make it possible to distinguish different in-situ performances across different contexts: a comparative, multiple-case study design (Yin, 2018) specifically adapted to the 'micro-level' of participant observation of design workshops. My interest here was, again, qualitative in nature, seeking to induce new theoretical insights about how different practices of participation, involving different associations between heterogeneous elements, mattered – an extraction of theoretical advances for which a multiple case study design is considered to offer many opportunities (Eisenhardt and Graebner, 2007). What is 'micro' about this approach is that the multiple 'cases' involved different configurations of participation in different design workshops. Each workshop can be considered to entail a different 'configuration' (Suchman, 2012: 48; Vines et al., 2013: 432) of participation, informed by the changing context, especially the participants involved (Schot and Albert de la Bruheze, 2003), as well as different spatial and time-based factors. Such a consideration of configuration and context was furthermore inspired by previous STS research that highlights the importance of considering how particular performances of user involvement are reflexively tied to their context (Mackay et al., 2000; Woolgar, 1991), and their underlying socio-material conditions (Mol, 2002; Suchman, 2007).

A concern with context was also part of the *second* empirical interest that emerged from the literature review: How to think of user involvement and design as a socio-material process enacted in everyday practice? (This became a topic of concern in Papers III and IV, although Paper IV also addresses the first interest.) To investigate this question outside of the more-or-less constrained environments of design workshops, another case was needed specifically to yield in-depth insights about the everyday practices of user involvement. Here, following the tradition of laboratory inquiries in STS highlighting the value of tracing the work of scientists and engineers in action (Knorr Cetina, 1999; Latour, 1987; Latour and Woolgar, 1986 [1979]), I chose to adopt an ethnographic approach (Baiocchi et al., 2013; Hammersley and Atkinson, 2007) to interrogate how user involvement was done in company practice. What is beneficial about this approach – compared to, for example, interviews alone – is its ability to foreground practices (Mol, 2002). In particular, interviews offer a strong complement to ethnographic studies, but individually they are predominantly concerned with perspectives – which, as Mol (2002) argues, fall short of capturing the individual situations or performances of talk. In other words, a focus on practices may include the people and things involved and allow for an analysis of not just the words of those who speak but also what these words 'do' in any particular setting (Pols, 2004: 135). It is for this particular reason – an interest in *practices* – that I adopted an ethnographic approach for the large empirical part of my theory.

My example case is SMCare, a small- to medium-sized company active in the care technology service sector in Sweden. As a main warrant for my ethnographic undertaking (Katz, 1997), the selection was mainly theoretically driven. For one, the company appeared at the interface of a range of heterogeneous elements, including a transforming and digitizing care sector (see Section 2.3), evolving technologies, high values for user needs, older people and outreach activities. The entanglement of such a broad array of socio-material factors with a vibrant context in the Swedish healthcare sector made an investigation of user involvement in the practices of SMCare conceptually

interesting (Barad, 2007; Woolgar, 1991). Furthermore, the company's staff involved in building novel technologies can be considered 'elites' to some degree: that is, those that social norms usually frame as 'worthy of special deference' (Katz, 1997: 393). As Katz (1997) highlighted, it can be argued that accounts of social groups with a high social reputation may overcome the usual distance created by the moral status awarded to them, and thereby function as a suitable motivation to uncover unchartered territory deemed to be shielded by the curtain of that moral status [7].

Table 2 below offers an overview of the methodological approaches in the included studies. In the following sections, I will address the specific methodology for each of the papers in greater detail.

Table 2. Summary of the methodological approaches of the included papers

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Methodological approach	Systematic literature review	Comparative multiple-case study	Ethnography	Ethnography
Data collection	Systematic screening of literature, exclusion based on eligibility criteria	Participant observation	Fieldwork	Fieldwork Interviews
Types of data	Papers from databases	Field notes, documents, photographs	Field notes, documents transcripts	Field notes, documents, transcripts
Motivation	To generate new conceptual knowledge about user involvement based on a broad survey of literature	To induce new theoretical insights about the interconnection between different enactments of participation and their performances	To gain novel insights on how user involvement is done in company practice, especially in connection with underlying socio-material conditions	To generate further knowledge about the practices of the company and their relation to the apparent stability of 'ageing' as an object

4.2 The Literature Review (Paper I)

4.2.1 Search and Selection Procedure

As mentioned previously, the central interest of this study was to map out and analyse how user involvement of older people mattered according to previous applied research in the literature. To do so and obtain a broad picture of the process by which user involvement of older people has been conducted in practice, I followed a systematic approach in consultation with the generally preferred reporting standards in health research, known as the PRISMA statement (Moher et al., 2009). To comply with these standards, I specified a clearly formulated research question (how does user involvement of older people during technology design matter in practice?) and equally clear search procedures and eligibility criteria.

The search procedure consisted of five major steps: (1) *Identifying main search terms*. Due to the ambiguity of the definition and practice of user involvement, I adopted a comprehensive search strategy focusing on all empirical papers that have somehow dealt with the involvement of older persons in the design of technology. Hence, I singled out two specific broad terms: *user involvement*

[7] For Katz (1997), the same rationale also applies to groups with low social status. Non-elites, however, have not been the foci in my study cases.

and *older adults*. Despite my interest in design procedures in technology, I did not include *technology* as a search term, as this would have filtered out papers that deal with specific technologies (such as telecare or robots) but do not specifically articulate *technology* as a term in the study. (2) *Deriving synonymous terms*. Here my ambition was to obtain a corpus of resulting studies that did justice to the breadth and diversity of concepts such as *user involvement* and *older adults* (see Sections 2.1 and 2.2). I therefore ran a pilot search to find common practices and alternative ways of referring to these concepts. These included sub-categories, such as participatory design, user-centred design and co-design; synonyms, such as older adults or aging persons; and alternative spellings, such as *ageing* (British English) and *aging* (American English). (3) *Selecting electronic databases*. Again, here my intention was both to heed the conceptual breadth of my search and maintain topical relevance. That is to say, I selected Scopus and Web of Science as the main databases, because these two include a wide and interdisciplinary array of studies at the intersection of social science, ageing and technology studies. (4) *Compiling search strings*. Here I translated my derived search terms and interests into a language that was understandable by the databases, building search strings consisting of multiple terms connected by Boolean operators such as AND and OR. The paper's appendix illustrates one such search string. I should note that I devised my string to search the title, abstract and keywords of the papers, again to maintain as broad a search as possible. The search parameters included all peer-reviewed scientific publications in journals and conferences in the time span between 2014 and 2018. (5) *Collecting the resulting studies*. All the resulting publications were incorporated into the reference management tool Endnote. Throughout the search procedure, I stayed in close contact with my two supervisors and discussed the ongoing progress of my search.

Following from the initial database search, I removed accidental duplicates from the two databases and screened the remaining studies for their relevance to the research question. This entailed the exclusion of studies which either (1) did not report empirical insights, (2) did not have older people as a main consideration, (3) were not concerned with technology development, (4) were not clear about the way older people have been involved or did not involve older people at all, (5) were entirely technical or (6) were chiefly concerned with mental illnesses. In a first scan, I went through titles, abstracts and keywords and excluded clearly irrelevant studies according to these criteria. In a second scan, I went more in-depth by reading the full text of the resulting studies to assess whether all criteria were well met. It was sufficient for a study to be excluded if one criteria was clearly not satisfied. As I went through these two phases of significant screening and reading, I communicated closely with my two supervisors on the evolving lists of articles, and they were involved in reviewing my results.

4.2.2 Data Extraction and Analysis

Rather than seeking to ensure a 'high quality' of included papers, or an overall 'correctness', my interest was instead to understand the *process* of user involvement of older people based on prior literature. To do so, I leaned on previous STS insights in order to qualify what was reported in the included studies with regards to a number of contextual, material and relational aspects of user involvement (Akrich, 1992; Woolgar, 1991). In a first step, hence, I developed a data extraction sheet that included aspects as diverse as the reported study design, the country, the technology and project, the study participants, the reported selection procedure, implicit stereotypes about older people, reported consequences, reasons for involving older people in the first place and the degree to which older people were involved. In a second step, I then re-read and analysed the final corpus of included papers by means of qualitative thematic analysis (Braun and Clarke, 2006) to identify common features or patterns that contextualized the process of user involvement of older people. Thereby, I engaged in an iterative, explorative process where I familiarized myself with the material, identified initial codes relating to significant phrases in the papers regarding my research focus, consulted their boundaries and interrelations, compiled them and then connected them into larger themes of how

user involvement seemed to matter (Braun and Clarke, 2006).[8] In other words, I engaged in a form of analysis that would reflexively identify the shared meaning of user involvement in the academic discipline (Braun and Clarke, 2019). I did this 'manually' by writing extracts and key points and making digital annotations in the literature management tool Mendeley, drawing mind-maps and flow charts and compiling overviews in tables and Excel sheets that would bring together the emerging codes. The resulting conceptualization of user involvement of older people is thus rooted in a combination of my own interpretations, social positioning and conceptual interests and their entanglements with the representations portrayed in the academic literature that described the practices by which older people have been involved in technology projects.

4.3 Empirical Studies: A Multiple-case Study of Different Design Workshops (Paper II)

4.3.1 Participants

For the second paper (Paper II), my overall approach followed a multiple case study (Yin 2018) on a 'micro-level', in order to observe and contrast how different configurations of participation (Vines et al. 2013) would matter in different practices at design workshops. As mentioned previously, the ambition was to yield theoretical insights on how different socio-material conditions may be linked to different enactments. Hence, the design of the workshops was purposefully engineered to include different groups of stakeholders or mediators (Schot and de la Bruheze 2003; Akrich 1995) in slightly different settings. The selected participants for the first workshop included *age researchers* (n=11, six women, five men) active in the field of research on ageing and technology, with international background, recruited from academic networks. The second workshop included *care experts* (n=14, all female) experienced in managing and training care professionals and assistant nurses in Sweden, who were recruited from previous collaboration networks of my university department. The third workshop included *older people* (n=18, six women, twelve men) recruited from an alumni network at a technical university, all at least 80 years old. All groups were chosen for theoretical reasons: that is, due to their purported significance for technology design. Older adults were selected as they often are seen as a potential target group for design albeit their involvement has yet to be fully understood (Frennert and Östlund 2016), while both care experts and age researchers were chosen as they are frequently considered in the context of designing for older people (e.g., Bjørkquist et al., 2015; Waycott et al. 2012).

4.3.2 Participatory Design Workshops

Thus, the inclusion of different participants in design workshops entailed different configurations of the *humans* involved in the design workshops. But what about the *nonhumans* and *materials* that participate in method practices such as design workshops (Law 2004; Mol 2002; Latour 1992)? Generally, the workshop sites included different meeting rooms, accompanied naturally by a different organization of the space. Tables and chairs were all present but came in different colours and shapes. The workshops were also differently contextualized, occurring at different times (autumn, winter and spring), with a different background. For example, the workshop involving age researchers was

[8] This is different from a *grounded theory* approach to coding (Charmaz, 2006; Glaser and Strauss, 1967), which would have required persistent coding of all lines (rather than just key aspects in alignment with the analytical focus) and constant comparison with theory (Braun and Clarke, 2021). It is also different from *general qualitative content analysis* (Hsieh and Shannon, 2005), which is less clear about its underlying epistemological values (Braun and Clarke, 2021).

contextualized by an ongoing research project, funding ambitions and academic exchange, while the workshop involving older adults also entailed socializing ambitions beyond the design workshop in a group of adults that had known each other for a long time. For all three workshops, we brought with us different design materials that we had available, including plastic bricks, papers, sticky notes, pens and pencils, and ordered drinks and snacks for socialising activities during the breaks. Of course, these also differed from workshop to workshop. From an STS perspective, all these materials (and others, see paragraph below), as well as temporal and spatial aspects, were present and active artefacts to which our participants formed different types of relations in the localized practices of participatory design (Barad, 2007; Law, 2004; Mol, 2002).

Notwithstanding the contingencies and idiosyncrasies of socially dynamic encounters, there were also similarities among the workshops. All three workshops were organized by our department's group, with Britt Östlund as the main organizer. We came prepared to all workshops with a similar agenda, which was roughly as follows: We had introductory slides prepared, presented by Britt, which introduced us and our research interests. The slides also contained information on recent digital and technological developments (specifically robots, smart phones and home assistant devices) to help raise awareness about possible avenues to build technological solutions for older people. Following this, we crafted a 'design brief' for our participants, which gave them a task: select, modify and adapt a digital application that could be considered relevant for older people. With this, our introductory slides were complete, and the participants would build groups (usually with their neighbours) to engage in our task, illustrate their ideas of possible solutions using the materials we brought and build low-fidelity prototypes. At the end of the workshop, the groups came together to slowly go through their different ideas and discuss their underlying reasons for their choices. Altogether, each workshop took about three to four hours.

4.3.3 Data Collection and Analysis

Now, as the workshops were organized and led by Britt Östlund, this left me free to assume the role of a participating observer. That is, after briefly introducing myself, I sat next to the invited participants at one of the tables and followed and engaged in their ongoing discussions. My approach to data collection here was similar to that of an overt ethnographer, in the sense of establishing access and gaining tacit knowledge by participating (Hammersley and Atkinson, 2007); the only difference was that my engagement was neither longitudinal (the workshops took only 3-4 hours) nor was it about culture. Hence, I may attempt to best describe it as a micro-scale or rapid approach to participant observation in order to interrogate the situated practices of design (Lloyd, 2000). But as with ethnographic fieldwork (see Emerson et al., 1995; Hammersley and Atkinson, 2007; Shaw and Holland, 2014), the main source of collected data were field notes from my observations in the three different design workshops. That is, I wrote field notes regarding the practices I observed, underlying socio-material conditions and the entailed enactments of ageing. Field notes were not, however, the only data source, as I complemented them with photographs of design workshop practices and the resulting documents from each workshop.

The data analysis then followed a reflexive thematic analysis (Braun and Clarke, 2006, 2019) – similar to Paper I – which entailed an iterative coding procedure and ordering of data in line with my conceptual interests (see Section 4.2.2). Again, I conducted the analysis manually, printing and marking the field notes and documents and relating them to one another, as well as a parallel reading of STS literature, specifically a thematic engagement with empirical philosophy as articulated by Mol (2002), Barad (2007) and Law (2004). Taken together, the data analysis indicated how different configurations of participation enacted different versions of ageing. To choose a presentation style in line with the focus of my research and my emerging results, I re-cast my empirical material to present it in a realist fashion (Van Maanen, 2011 [1988]), outlining how different configurations and

enactments mattered in an apparent and purposive way that artificially removed my subjectivity from the accounts[9]. This presentation style was in line with msy research focus and emerging results, because it textually manifested the multiple realities enacted in the different practices – thereby alluding to the materialization of such multiplicity.

4.4 Empirical Studies: Ethnography at SMCare (Papers III and IV)

4.4.1 Fieldwork: Access, Participant Observation and Hybrid Space

> *It is 9.55 in the morning. Unnerved from the recent coronavirus news, I probably had a bit too little sleep. Slightly disoriented, I rub my eyes and take my laptop to the breakfast table. Actually, it is a garden table that stands inside my room, white and wooden, its surface hardly fits more than my laptop. I see that the battery is running low. Not now, I tell myself, and jump up to get the charging cable. I type in my password and search for the link that says 'Team' meeting. A web browser opens, asking for my name and video configurations. After the settings are fine, I can see my face on the screen. It is now 10.00 o'clock.*
>
> *Other faces are appearing, I don't know how many exactly. But it couldn't be more than sixteen, because I have seen in the email before that sixteen was the number of people that have been invited. I can hear different voices, talking in Swedish to each other. It is not my main language, I have difficulties following. I can hear people talk about the virus, and about how work can be organized within the company. Halfway through, Marie is asking in English: 'Is Björn here?'. I unmute my microphone and reply: 'Yes, I am here. Hello everybody!!' – '...Bianca will also give an update on the work environment later... Do you want to introduce yourself first?', she asks. – 'Sure', I reply, and she adds: '...Maybe we should switch off our videos when others present... so the focus is on them'. Others seem to agree. Slowly, live moving human faces are replaced by default images; empty, static and grey, with plain white drawings of a human upper body in the middle. Just my moving face is left. [...]*

For Papers III and IV, my focus moved to the working practices of engineers and staff at a company that develops care technologies for older people as end users, intermediated by care professionals and municipalities, who were the target consumers intended to pay for the services. As mentioned previously, I adopted an ethnographic research approach (Hammersley and Atkinson, 2007) in order to gain a detailed, in-depth understanding of how user involvement was enacted in mundane, everyday practices of a company. In the spirit of the long tradition of STS laboratory studies and actor-network theory (Akrich, 1992; Doing, 2008; Latour, 1987; Lynch, 1985; Traweek, 1988; Woolgar, 1991), my intention was to follow engineers and staff as they went about their everyday work and uncover how user involvement unfolded in front of the eyes of an STS-informed ethnographer.

In the beginning, the establishment of access is a central facet of 'doing ethnography' (Shaw and Holland, 2014: 186). In the methodological literature on ethnography, it is often emphasized that access may constitute a lengthy procedure of negotiations and the patient establishment of trust on the ground (cf. Atkinson, 2017; Hammersley and Atkinson, 2007; Shaw and Holland, 2014). My ethnographic fieldwork was not any different: it began sometime around September 2019, when I was searching for a suitable corporate outlet that would allow me inside, and, even more outrageously, observe the otherwise-secret practices that occur behind closed doors inside office buildings. Through shared emails and ongoing discussions, I eventually became aware of an online invite to a conference

[9] I should note that this is only a tendency, as the different categorizations of different presentation styles are merely ideal-typical and in that sense less easily separable in practice than in theory.

event in the private sector. The conference was organized and driven by one of the national players in care technology and organized around the principle of promoting new digital solutions for the sector, coupled perhaps with a bit of advertisement for the company's own cause. In any case, I deemed this to be a promising opportunity to get into touch with some major players, attend presentations and mingle like all the other actors and agents did (user innovators, small start-ups, company representatives, diabetes care metres, insulin pens, healthcare robots, video screens, projectors, computers, smartphones, canapés, digital healthcare solutions – and many more).

I prepared myself by reading up a bit on the various participants and asked a distant colleague to come along, in a subjective attempt to reduce potential pressure from otherwise being entirely alone in such a foreign environment. My colleague, who was primarily interested in sourcing new technological equipment, had other ambitions than I did, as I was actively looking for a viable informant or gatekeeper – this therefore constituted a mutually beneficial relationship to alleviate any distress and to mutually strengthen each other's courage to reach out to strangers. And perhaps it was this reinforcement, in conjunction with my prior preparations, that spurred me to approach the company CEO straight on, in the very end of her speech on a new vision for future care. I only had a few seconds, from what I recall, given the growing flock of people around us, but it was sufficient for me to introduce myself, my interests and draw a parallel with her company's work. Fortunately, my 'elevator talk', an ever-so brief moment of bonding, appeared to be enough for the moment, as the CEO was open to my proposed collaboration and connected me to staff inside the company responsible for dealing with research and development.

In the aftermath of the conference event, I left with lots of business cards, leaflets, impressions and a whiff of optimism. However, my way into the company had only just begun, as I soon began to realize. Following the CEO's referral, I reached out to the corresponding staff, one of my future gatekeepers indeed, who invited me to her office, but who at this point (it was late October 2019 by then) was anything but optimistic for any type of collaboration. She appeared sceptical, reluctant and protective: not surprising, as she was yet to see the benefits of my proposed collaboration – not for myself, but, more importantly, for her, her team and the company! Lengthy negotiations then ensued, encompassing several meetings aimed at delineating responsibilities, layers of contribution and what was to be excluded. My approach here was to build a sanctuary of trust with an overt and honest explication of my intentions, which were to observe the work of the staff, user involvement and general design practices at the company. Eventually, we settled our mutual concerns in two ways:

First, to address the need to present a perceived benefit to the company, I agreed to function as an expert advisor to the company on issues related to user involvement, with which I had some background knowledge. This manoeuvred me into a conflicting position navigating a 'double role' in the field, both as an observer and a participant giving advice on what was to be observed (Adler and Adler, 1987; Junker, 1960). This can prove challenging, for it can blur the ethnographer's perception if the balance tips too much towards 'going native' (Latour and Woolgar, 1986 [1979]: 39), and for that it could implicate me, as a researcher, with respect to the practices I was about to observe (Junker, 1960; Webb et al., 1966). At the same time, a more active engagement may also allow for a closer appreciation of the daily activities in the company and a more embodied integration into the company staff's lived realities (Turner, 2007). The role I adopted in the following practice was therefore one that would come closest to a marginal participant (Freilich, 1970), practically involved in meetings and work activities but careful to not provide information that would affect the gist of the practices I was about to observe.

Second, to ensure a sense of security and compliance, we came to the agreement to include a non-disclosure agreement (NDA). This by itself took several rounds of adjustments, involving an assigned lawyer from my university, my supervisor, the department dean and the management of the company.

Crucial here was for me to be able to freely carry out my research activities without intervention from the company (which might have occurred, for example, through the prevention of publications) and for the company to ensure anonymity and that confidential expertise would not seep through to other competitors. All in all, the access negotiations took another four months, with the establishment of the NDA by March 2020.

When the NDA was established, I finally was invited to introduce myself to the staff. Again, for reasons of ethical accountability and responsibility during my ethnographic research (see Hammersley and Atkinson, 2007 and Section 4.5), I chose to be upfront and clear with the staff about myself being a researcher, as well as the focus of my study. However, just as I was about to begin my fieldwork, complications emerged, as the project was interrupted by the sudden outbreak of the Covid-19 pandemic. With all the uncertainty in place, I introduced myself to the whole group online (in March 2020, see excerpt of field notes above), and, in the spirit of anthropologists viewing fieldwork as 'embodied spatial practice' (see e.g., Clifford, 1997; Ingold, 2011; Turner, 2007), decided to follow the action (Latour, 1987) into digital space (Beneito-Montagut, 2011; Hine, 2000; Pink et al., 2016). Notably, this meant that I, as much as the company employees, the virus and digital equipment, actively co-produced the shifting boundaries of 'the field' I was about to study (Atkinson, 1992).

Meetings now took place in digital space, animated two-dimensional faces would look at me from video screens (or be replaced by grey default profile pictures with a white nametag) and knowledge was communicated through chat applications. Not for me alone, but for all participants and other researchers outside my endeavour, this was a profound transformation in how to approach qualitative research (Rahman et al., 2021; Roberts et al., 2021). To learn more about such digital environments, I actively searched and subscribed to online academic networks sharing 'new' methodological approaches for the digital Covid age – one illustrative collection can be found in Lupton (2021). In another twist, over time the Covid situation evolved and a more lenient government policy in Sweden made it possible for me to move (with) the field a third time (by September 2020), into *hybrid* space, alternating unpredictably between physical and virtual field visits. Naturally, I conducted physical visits as frequently as I could, at times every day a week, and I joined virtual company gatherings and in-person after-work social gatherings, physical lunch sessions, and all types of similar social activities inside the company. This hybrid style continued until June 2021, when I began to withdraw from the field – my last virtual encounter was on 16 September 2021. By and large, my ethnography took about two years, including access, virtual and physical terrains and departure, and throughout the period I sought to stick faithfully to my ethnographic interest in the design practices and materials that I was observing inside SMCare.

4.4.2 Field Notes, Representation and Complementary Documents

> *As I ring on the door, Asher opens it for me without any ado. He greets me cheerfully and we engage in some small talk. I then bring my jacket to the wardrobe and move into the office desk section.*
>
> *I say hello to Marie whom I find sitting at her desk. She offers me to take a desk myself, an offer which I gratefully take. She explains that they have three free desks for students and other interns, and so there is no problem if I take this one. I reply that this is good to know and thank her, then quietly take a seat. After that, I ask her if it would be alright to take a hot drink. 'Of course', she replies and I go alone into the kitchen. The kitchen and lunch room are completely empty. I slowly prepare my tea, as if I were a permanent staff. I know where the bags are, where the cups are, and where the kettle is. I spend about five minutes in the kitchen without anybody passing by. 'A good opportunity to come and loiter here if I want to talk to anyone', I think to myself. But for now, I just want to experience how everyday office work is like for the staff, so I return to my desk.*

The air in the room is calmingly quiet, the atmosphere feels peaceful and spacious. Here and there I hear a clicking or clacking of some distant keyboard. But I can barely hear any distracting noise, just some faint sound of the ventilation system keeping the air of the room fresh. I look at my surrounding and a feeling of comfort overcomes me. On the right, large windows let in much sunlight and offer a fantastic view on the nature from the sixth floor. To my left, my desk is separated from the hallway through taller wooden white shelves which are beautifully decorated with green artificial plants that give the office room a soft touch. Inside the shelves, the books and folders are neatly stored away. The desks opposite and beside me are placed at least one meter apart, giving each staff plenty of space to go about their work. Behind me sit Margaret and Marie at their own desks, with also more than sufficient space for usage. I sense that they are busy with work, so I quietly take my own laptop out and work on some of my research documents. This goes on for about half an hour. Then, Nicholas comes out of one of the meeting rooms, and, as I hear him approach, I turn around to him. Over the heads of Marie and Margaret, we greet each other and have some small talk. I say I am happy to see him again, which he affirms vice versa. As I ask how he is, he replies he has too many meetings, and quickly our conversation ends as I sense I should not take too much of his time. For about another fifteen minutes, I sit quietly at my desk, working on my documents, without any noise.

Throughout all my visits, both virtual and physical, I kept detailed field notes, which formed the main data source for my ethnography. Practically, I followed the suggestions of Hammersley and Atkinson (2007) to jot down brief notes and ideas directly at the sites or during the practice and then immediately after having left the site transform them as soon as possible into more elaborate texts that recounted my experiences and observations. This form of note-taking is recommended to strike a balance between the happenings at the immediate scene and my desire, as an ethnographer, to record as much as relevant information as possible about the details of the observed practice (Emerson et al., 2001). To jot down notes in the most unobtrusive fashion while at the site, I used my smartphone for note-taking, which – in a society that is increasingly digitalized and at a company particularly invested in this endeavour – was not particularly unusual. People were on their smartphones all the time, anyway, checking calendars, emails, WhatsApp chats or, during breaks, Instagram, and so it only felt naturally that I was, too (Only that I was less on Instagram or WhatsApp and more on my note-taking application). But of course, with social moments fleeting and sometimes rapidly evolving, and lots of conversations and talk involved, my notes could only record so much (Becker, 1998). Hence, I limited the scope of my observations and note-taking to a few key points: what mattered to the observed group of people and, equally, what surprisingly did not matter – especially in connection with the central foci of my study: practices of user involvement, underlying socio-material conditions and older people.

Each time I returned from a field visit, I started on a lengthier expansion of my earlier jottings; after a usual day, I could sit for four to eight hours in the evening or the following day elaborating my field notes into texts. The composition of field notes is always a highly intimate and reflexive endeavour, involving the researcher's active engagement and positioning within the field (Atkinson, 1992; Coffey, 1999; Emerson et al., 2001). That is, field notes do not simply mirror the observed reality 'out-there' but instead are the upshot of an active and interpretive process, since they are necessarily 'selective, purposed, angled, voiced, because they are authored' (Emerson et al., 1995: 106). As such, I organized my field notes into two separate parts: a descriptive corpus, where I put on record my experiences and notes from my accumulating stream of experiences; and a reflective/analytical corpus, where I contemplated in writing about my evolving thoughts and ideas of what I observed. I did so not to pretend that the descriptive part could come any closer to reality, but rather to allow myself space to expand upon whatever strategical or conceptual notion I had picked up (Lofland and Lofland, 1995). Such 'memoranda' could help steer my attention through the field, identify emergent ideas and avoid

the 'danger of being confronted at the end of the fieldwork with an undifferentiated collection of material, with only one's memory to guide analysis' (Hammersley and Atkinson, 2007: 151).

In a way, the creation of field notes is related to a pertinent and salient theme of ethnographic fieldwork – that of *representation*. In the literature on ethnography, representation is recognized as an intricate process in which the ethnographer is actively involved in crafting and making their fieldwork into documentary reality (Hammersley and Atkinson, 2007). One notable aspect with regards to such 'representation work' can be found in the 'writing style' of field notes (Brekhus et al., 2005; Geertz, 1973; Van Maanen, 2011 [1988]). Generally, there is a broad diversity in the ways in which ethnographers choose to represent their findings. Van Maanen (2011 [1988]), for example, distinguished between a number of different writing styles, categorizing them into realist, confessional and impressionist tales, depending on the positioning of the researcher's reflexive self within the texts and the rhetorical means employed. Adler and Adler (2008: 4) distinguish four different 'faces' of ethnographic representation: classical, mainstream, postmodern and public. There is also an ongoing discussion with regards to what type of 'richness' field notes should encompass. In this debate, the collection of essays in Geertz's (1973) *The Interpretation Of Cultures* lays out an argument for 'thick description' (ibid., p. 3 ff.) that brings out the nuances and liveliness of intricate social events (Narayan, 2012). However, the notion that richness derives only from such thick descriptions has been disputed; instead, as Brekhus et al.'s (2005) discussion of Humphrey's (1970) *Tearoom Trade* nicely illustrates, both 'thick' and 'thin' forms of writing can be rich, as long as they are suitable for the respective purpose of the study. Different approaches to writing may also be 'thick' depending on their empirical scope (Gubrium and Holstein, 1997), with some supplying thick 'scenic' details on what local everyday life and culture consists of (Emerson et al., 1995; Geertz, 1973), and others thickening details on how social reality is accomplished through 'talk' and 'interaction' (Garfinkel, 1967).

Against this background of diverging styles and possibilities, I opted to construct my field notes to reflect my observed experiences, encompassing both thickness and thinness and different empirical scopes. In particular, I included both scenic elements aimed at capturing the practices, materials and sensations I witnessed across varying settings and the dynamics of talk and interaction in meetings that I partook in. Hence, along with the field, my field notes stretched, ebbed and bent in style and fashion, in a constant attempt to stay 'near' (Hess, 2001: 239) to the practices and experiences inside the company. Probably closest to the 'confessional style' of van Maanen's categorization (2011 [1988]: 73), I composed my field notes from the perspective of my reflexive self, persistently writing in the first person. I did so in order to neither foreground nor conceal my own role, but instead to position myself as an active and present participant in the observations I was narrating.

Notably, *reflexivity* has come to be considered as a central facet of ethnographic inquiry and anthropology (Hammersley and Atkinson, 2007; Pink, 2013; Tjora, 2006). In the history of anthropology, this has to do with a process in the 1980s and 1990s by which the interrelation between reality and representation became increasingly scrutinized, spurring concerns with the authenticity and authority by which ethnographers portray their findings (Atkinson, 1990; Van Maanen, 1995). In part, this is also mirrored in parallel developments in STS (see e.g., Latour and Woolgar, 1986 [1979]; Lynch and Woolgar, 1990; Woolgar, 1988). Taken together, reflexivity is meant to denote a heightened awareness of the productive relationships through which representational knowledge in ethnography emerges, to recognize 'the centrality of the subjectivity of the researcher to the production and representation of ethnographic knowledge' (Pink, 2013: 36). Crucially, this does not mean to tackle biases – a concern often stressed in positivist and naturalist orientations – but to explicitly reject the claim that subjectivity can (or has to) be avoided (Hammersley and Atkinson, 2007). Instead, the researcher is seen as part and parcel of the knowledge constructed, co-producing 'partial truths' (Clifford, 1986: 1) through relationships with other agents in the field. Connected to

this has also been the ambition of bringing back the 'voices' of the participants (Hertz, 1997), which authorial accounts by ethnographers may tend to silence (Clifford and Marcus, 1986). In response to such criticisms, reflexive accounts are concerned with a more substantive discussion of the role of the researcher in opting for a particular voice, and a 'greater sensitivity to writing and rhetoric' (Adler and Adler, 2008: 23). The notion of reflexivity in ethnography is thus meant to draw attention to how representations are relationally constructed versions of reality, politically shaped and literary accomplishments characterized by 'the orientations of researchers […], their socio-historical locations, including the values and interests that these locations confer upon them' (Hammersley and Atkinson, 2007: 15)[10].

I imported the idea of reflexivity into my field notes to contextualize the described episodes as the result of an ongoing interpretive process that involved particular strategic choices, implicit research interests as well as my own experiences of (and with) the observed participants and materials (Clifford and Marcus, 1986), thereby 'self-exemplifying' how things have come to occur (Latour, 1988c: 171). To avoid patronizing and neglecting the 'voices' of the participants (Hertz, 1997), I also included a greater consciousness of this aspect of my writing by employing relativistic phrases such as 'it appears' or 'it seems', and by documenting 'multiple voices' (Emerson et al., 1995: 52) in episodes of speech as verbatim as possible (Hammersley and Atkinson, 2007). Furthermore, by openly reporting my own evolving interests and experiences, I hoped to achieve a sense of immediacy of the data in relation to my personal positioning in the field. In doing so, at times I also sought to describe, in textual episodes, senses that went beyond the visual – which has been, and continues to be, the main focus of most ethnographic inquiry (see e.g., Grimshaw, 2001; Mason and Davies, 2009). Here, my ambition was to create descriptions of ambiences by channelling my experiences to encompass sensory elements such as movement, space, fear, taste, smell and temperature (Pink, 2015 [2009]; Shaw and Holland, 2014; Stoller, 1997). These descriptions largely occurred in contemplative moments or when I was struck by something remarkably unremarkable (Becker, 1998), such as the experience of sitting in an office, attending after-work gatherings, or observing robots being operated from a distance.

As is not uncommon in ethnographic practice (Hammersley and Atkinson, 2007), throughout my fieldwork I collected additional pieces of data. First, this took the shape of semi-structured interviews, which I conducted with two selected informants who dealt specifically with sales management and design issues, respectively. My interest in speaking to these two people in a more formal setting (along with the usual, informal ethnographic conversations that took place in everyday, mundane interaction) arose because it appeared it would be helpful to have additional data about the history of the company's work, as well as the time of imaginaries associated with this history. Thus, the interviews constituted purposefully sought-after, complementary data for conceptual reasons (Corbin and Strauss, 1990). I conducted and recorded the interviews in a typical qualitative fashion, having asked for prior approval for recording, and transcribing the audio recordings into documents for later analysis (see Bryman, 2012 [2001]). Second, my additional data also involved a number of photographs I took at the site, not with the ambition of 'visualizing' my ethnography but simply to aid my memory after particular visits. As such, the photographs were an additional participant in the crafting of my ethnographic fieldwork, having captured at a specific moment in time a demarcated sphere of interest that is nevertheless just as much constructed as any other representation of ethnographic fieldwork (Morton, 2020; Pink, 2013; Wright, 1999). And third, the additional data involved online documents from my involvement in a company forum and internal meeting chatrooms. As mentioned before (see Section 4.1), in an STS-inspired fashion, I treated these

[10] For a more critical take on reflexivity and what it would entail in STS, see Lynch (2000).

documents not as pieces of evidence but instead as objects themselves, which both emerged out of and fed back into the ongoing practices inside the company (Latour, 1987; Lynch and Woolgar, 1990).

4.4.3 Process of Analysis

> *The robot is of quite a sleek appearance, half the size of a human and with a neatly polished white surface. Standing on wheels, it carries a rectangle shaped tablet on its body, which is slightly tilted upwards, a gesture reminding me of a young child looking up to an adult. Marie bends down, waves at the tablet head and speaks to it: 'Hi Hans!' She enquires how he is doing, and a male voice replies. 'I am working with programming the… (indistinct) Can you hear and see me? ', Hans asks. 'I can hear you but I cannot see you', Marie replies. Hans and Marie talk for a bit about how they are and the progress with whatever work Hans was supposed to be busy with. What could the robot possibly have to program?, I ask myself. Puzzled, I move more towards the robot, trying to get a clue about what just happened. Marie anticipates my confusion: 'Hans is in Macedonia. He is working on making the screen work again'. I see, I think to myself, and, trying to fit in, I bend down and wave into the rectangular tablet-shaped screen. 'Hi Hans', I say, laughing.*

As is somewhat implicit in the previous chapter, anthropologists are critical of the notion that there is such a thing as 'data' independent of the researcher (Atkinson, 1992). However, this does not imply that ethnography aims to abandon all attempts at gaining knowledge altogether, as Hammersley and Atkinson point out (2007: 16). To the contrary, knowledge is seen as accumulated through an iterative process in which researchers are a central part as they move back and forth between ideas, theories, practices and an embodied engagement in the field (Clifford, 1997; Turner, 2007). Hence, while conducting my fieldwork, I constantly engaged myself with both the practices I was observing and the evolving conceptual ideas. As I have mentioned, this involved the concurrent keeping of both descriptive and analytical field notes (Hammersley and Atkinson, 2007), as well as a continuous and growing orientation in the literature.

Despite this relatively anthropological approach to data collection, it is possible to discern some overflows from qualitative sociology: that is, grounded theory as formulated by Corbin and Strauss (1990). For example, I did engage in a thorough digital attempt to manage and organize my data through the coding tool NVivo 12, and coding my own field notes in two rounds. In the first round, I obtained line-by-line codes to reflect key notions in the data with regards to my research interests in the performances of the practices of user involvement, and in a second round, I interrelated and connected these more granular codes into broader themes. I did this specifically to support my ongoing engagement in the field and to help raise my own awareness of how my descriptions and analytical reflections would match with my ongoing observations. Eventually, my evolving research interests and engagement in the field brought about the apparent need for two different analytical angles: one on how socio-materiality mattered for the conditionings of user involvement (Paper III) and one on the performances of the practices I observed (Paper IV). These were themes that gradually arose over a period of two years and which emerged in parallel to my reading of the STS literature on stability, method practices, imaginaries and enactment (see Sections 3.3-3.5).

The ethnographic principle of simultaneous reading and engagement in the field is also similar to grounded theory's emphasis on constant comparison (Corbin and Strauss, 1990). In a way, the confluences between an ethnographic and a grounded-theory approach to data analysis eventually coalesced in my representative style in the final papers. Here, I rhetorically separated my field notes from the analytic writing by use of indents and italics – a representative strategy referred to by Emerson and colleagues (1995: 179–180) as the 'excerpt strategy'. To be sure, this strategy is not without problems, as it artificially separates the collected field notes from the main analytical text, thereby bearing the risk of framing the ethnographic accounts as exemplars of 'credible' data

(Atkinson, 1990). At the same time, it can also be considered a useful strategy to illustrate the voices of others, their interactions in the field and their situational context, *showing* rather than telling more information than can possibly be analysed (Emerson et al., 1995). So, choosing an excerpt strategy gave me the opportunity to increase the depth and texture of my account, offering the reader some tacit knowledge about particular scenes, feelings and experiences (Clifford, 1997; Turner, 2007). It also allowed me to include the different empirical scopes (Brekhus et al., 2005; Gubrium and Holstein, 1997) I outlined above: dialogues, descriptions of interactions and scenic snippets, all of which could be included and analytically addressed in the main text.

4.4.4 The Company

> *I slowly move away from Marie's desk into the direction of the couch. There is just one more desk beside her, at which two young men are sitting jointly staring at apparently black screens with white texts in programming language. I cross the hallway to the opposite couch, just about three meters away from the desk with the two coders. It is a comfortable couch, one of the kind where one sinks in about the length of one's butt. I now look perpendicular at the desk of the two coders. Right of them are two more rows of two desks each. I can see Frank sit at the right most corner, the desk furthest away from the centre at which I am now sitting. Nobody talks. No sounds of movement. Just desks and computers and humans sitting still in front of me. The silence is so natural that I wouldn't notice it, would I not be doing nothing but observing. But I am actually not alone. There are some robot cats just next to me on the couch. Not just some, a lot, actually. But they, too, make no noise. Peacefully, furry and cute, they sit at their allocated spots not doing much but observe and enjoy the silence – just like me. A few minutes into my contemplation, Colette appears in the hallway, kindly greets me and shows me into the meeting room.*

The company of focus for my ethnographic field study of design practices and user involvement was SMCare, a pseudonym that reflects its nature as a small- to medium-sized company active in the care sector. As mentioned in the overview in (Section 4.1), I selected SMCare as the site for my empirical inquiry for theoretical reasons (Katz, 1997), as it was situated in the care sector, where user involvement is a central preliminary component of the design process. The case of SMCare is conceptually relevant, as it is neatly situated at the centre of the Swedish healthcare sector, which has seen a political push towards digitization in recent decades (see Section 2.3) and has involved a wide variety of different actants (Akrich and Latour, 1992; Latour, 1987), such as older people as end users, care professionals in municipalities, decision-makers in municipalities and policy-makers, as well as a range of novel digital solutions. My choice of acronym was straightforward: throughout my study, the company employed roughly 20 staff members and approximately 15 external consultants for the purposes of software and hardware engineering, and the company was active in the national sector building digital care solutions.

The office was located in a larger office building that housed several different enterprises and corporations. It had a nicely decorated interior with office cubicles that were spaciously separated from the meeting rooms by a corridor, replete with plants and multiple generous windows allowing a view of the scenery into two directions from its high floor. There was plenty of space for each employee, with their own desks, computer screens and chairs well separated from adjacent colleagues. At one end of the corridor (about fifty meters long based on best guestimates) there was a kitchen and a lunch room, and at the other was the entrance hall, with a wardrobe, shower bathroom and lavatory. Even though there were no real cubicles and the office was quite evenly distributed, the desks of the CEO and management were set apart from those of other staff by means of an additional concrete wall, painted white, which went all the way up to the ceiling and was situated about one-quarter of the way into the office space. Occasionally, I could spot one or two robots stationed at the entrance or

some piles of boxes with different types of sensor technologies heaped up along the walls flanking different meeting rooms.

As such, I should note that, although I refer to the company SMCare to allude to its sector and number of employees, the company was a rather influential actor in the national care sector in Sweden. As I did my fieldwork, the business offered and developed a number of different types of digital technologies for the care sector. These included, amongst others, home monitoring sensors, care robots, mobile care alarm systems, care meeting applications, therapeutic robots and assistive eating devices. Boxes and equipment for each were found scattered, but relatively well organized, into piles and on shelves throughout the office space. In that sense, it can clearly be said that the company's developed technologies extended well beyond simply providing healthcare support, as their products covered a broad range of different solutions for the care sector. For example, the most central technology that was developed during my study was a *digital care platform* that could be used by care professionals working in municipalities to organize the care they provided. Here, the ambition of the company was to develop the platform as some type of central node in the provision of care, by allowing its customers to link it to other services the compansy already provided (such as alarms and robots) and by building up and integrating new services (such as sensor monitoring and video meetings). In this way, other actants also became implicated: older people were the end users, municipalities were the clients, nursing homes were potential third-party adopters, care professionals working for municipalities would be able to use the platform for meetings and relatives of older people would need to provide consent for the usage of such systems. It was an early prototype of this platform that was initially presented at the conference event that I attended, and it was the one that the company actively invested resources on for development during the course of my fieldwork.

While the company's products were also available to international customers, the main competitors of SMCare were other local small- to medium-sized companies that catered to the national care sector in Sweden. As outlined in Section 2.3, two specific peculiarities of this sector are the many actors involved and the system by which competition was structured (competitive tendering through the 'for-choice-model' established in Government Bill [2008/2009:29]). This meant that municipalities would communicate a desire for a product, then companies such as SMCare and its competitors would compete for the contract, and then the municipality would ultimately choose the most qualified proposal. Another strategy worked in the reverse direction, in which the company developed a technology first, and then sought to enrol (Callon, 1984; Callon and Law, 1982; Latour, 1987) municipal representatives to convince them of its usefulness, who then in turn initiated a tender for something a particular company had developed first. Both strategies I did witness in practice. Regardless of the strategy, though, it remained within the discretion of the municipality to make a final choice; their representatives and the reputation or ties any company had with them were therefore possibly decisive factors alongside the match with technical demands. Hence, SMCare was competing with other providers of care technologies to develop better, more advanced digital solutions in the care sector. In this context, one core value – which I witnessed on posters on multiple walls inside the office and in its online presence as well – was to put 'the consumer' at centre stage. This engendered a particular interest in the consideration of user needs on the part of the company – one central aspect I could address as a 'commonality' during my initial access attempts (see Section 4.4.1).

4.5 Ethical Considerations

I undertook these different studies as part of a broader international project called 'BCONNECT', aimed at exploring and interrogating design practices for developing digital technologies for older people. This project, including its elements of collecting data and conducting design workshops, received specific ethical approval from the Swedish Board for Ethical Vetting (document file

2018/839-31/5), as well as the ethical approval boards of our international collaborators. Ethical approval was sought, in particular, because some research elements studied by project partners involved the collection of sensitive personal data from older adults. According to the Swedish ethical approval authority, sensitive data comprises data by which individuals can be easily identified, including their sexual orientation, ethnic background, religious belief or health conditions (Swedish Ethical Review Authority, 2019). In a broad reading of this definition, questions about technology usage targeted at older adults could have involved the collection of data on their health status, which is why the overall project first sought ethical approval. My own research, however, did not concern itself with such sensitive data, nor did it involve a physical intervention on humans or work with biological material. As many scholars have argued, the requirements set out by ethical review boards mostly correspond to positivist informed, biomedical research and are not well suited for assessing the ethical requirements of ethnographic research (Atkinson, 2009; Katz, 2006; Murphy and Dingwall, 2001). Hence, in close consultation with my supervisors and representatives from the ethical approval board, we did not seek additional approval for my ethnographic study, which was carried out as part of this project. Instead, as I shall outline below, I followed ethical standards that sensitize ethnographers to the ethical complications of their respective methodology (Hammersley and Atkinson, 2007; Katz, 2006; Murphy and Dingwall, 2001).

Arguably, ethnographers face a range of challenges when going about their fieldwork (Atkinson, 2009; Katz, 2006; Murphy and Dingwall, 2001). To a large extent, ethnographic research is characterized by unpredictability. The predominant foci of ethnography, such as the study of social situations and unfolding dynamics, make it close to impossible to anticipate or plan ahead for future encounters, let alone particular exchanges or interactions (Hammersley and Atkinson, 2007; Shaw and Holland, 2014). Hence, many of the requirements set out by ethical review boards need to be translated to make them applicable to the methodological sensitivities of ethnographic research (Katz, 2006; Murphy and Dingwall, 2001). While there is no single ethical viewpoint on how to most appropriately conduct ethnographic research[11], it is generally recognized to be a pivotal and crucial feature for ethnographers to address a range of tenets when it comes to their ethical conduct (Hammersley and Atkinson, 2007; Murphy and Dingwall, 2001; Shaw and Holland, 2014). Building on these methodological discussions, the most important ethical aspects I considered in my own research were 1) informed consent, 2) privacy and 3) representation.

First, I worked towards achieving continuous *informed consent* (Murphy and Dingwall, 2007), in particularly by adopting an overt approach in my research. Along with my initial written agreement and verbal introduction to the entire group, each time I met someone new, I introduced myself as a researcher interested in observing practices inside the company. The struggle here was to strive towards informed consent in the sense that participants knew not only of my observation ambitions but also the content that I was targeting. While an entirely full and free informed consent is, of course, idealistic (Atkinson, 2009; Thorne, 1980), I did pay attention in these initial introductions to make it clear that I was observing practices – practices of user involvement and everyone's design work in particular. At the same time, I did not constantly remind people of this as they were going about their ordinary activities, so as to avoid becoming too intrusive (Hammersley and Atkinson, 2007). Yet I did bring up the topic here and there when it felt less obtrusive, so as to ensure everyone was still aware of my ambitions. In this way, I treated informed consent as an ethical principle that was relational and emergent (Murphy and Dingwall, 2007): part of my ongoing endeavour in the field and hence

[11] Hammersley and Atkinson (2007: 219-220), for example, discern four different perspectives, ranging from the most stringent to the most lenient: 'ethical absolutism', 'ethical situationism', 'ethical relativism' and 'Machiavellianism'. Looking at these different categories, my own view most likely sits between 'ethical situationism' and 'ethical relativism', holding ethical conduct and the prevention of harm in high regard but not to the extent that things such as fully informed consent or privacy can be achieved in entirety.

transforming along with my own research interests and observations in the field. To heed my own standard for informed consent, I purposefully neglected any information not relevant to my communicated research foci, such as any sensitive data with regards to sexuality or religious beliefs. As mentioned previously, my main foci were topics such as design practices, work activities and user involvement, from a socio-material perspective.

A second consideration was *privacy* (Barnes, 1979; Hammersley and Atkinson, 2007). Obviously, I strove to protect the identity of those I observed, and all names and company logos are kept confidential and anonymized in the presented ethnographic excerpts. Naturally, this also involved neglecting any other sensitive information, such as sexuality, religion or status of illness, in my data collection. The same holds true for detailed technological features that could be traced back to the company. In my descriptions, I paid close attention so that any such features could be removed from the presentation of my results. I instead described features in generic terms such as 'robot', 'video meetings', 'monitoring sensors' or 'platform'. For my focus and presentation, I also purposefully discarded all detailed information on employee turnover, such as new hires or resignations, as this would have made potential individuals identifiable to outsiders. All data was stored on my private computer, as well as a private account on a cloud storage service, both of which were protected with a safe, private password. The cloud storage account had an additional two-factor authentication. However, it should be noted that despite these efforts, it may still be possible for informants to be recognizable to themselves or for attentive readers to spot idiosyncratic aspects in both the humans and their social environment – a drawback that ethnography cannot entirely circumvent (Murphy and Dingwall, 2001).

For this reason, a third consideration is of central importance: the question of how individuals are *represented* (de Laine, 2000; Gubrium and Holstein, 2012; Murphy and Dingwall, 2001). This is important because, as Murphy and Dingwall (2001) argue, a finished ethnographic text may unleash unintended consequences, entailing the risks of causing shame, disorienting individuals or disrupting previously held views on reality. For this reason, the research conducted and the representation of the findings require 'careful consideration of [their] likely effects on the people involved' (Hammersley and Atkinson, 2007: 213). I built this awareness into my ongoing conduct in the field, as well as in the final representation of my field notes. Specifically, one important ethical consideration with regards to representation was whose view would take precedence: my *own* or those of the *participants* (Gubrium and Holstein, 2012; Pollner and McDonald-Wikler, 1985). Here I was careful to follow what Gubrium and Holstein (2012: 97) called 'analytic bracketing', treating the observed realities as simultaneously produced by, and impacting on, members' practices: in Gubrium and Holstein's terms, 'the analysis of the constant interplay between the *hows* and *whats* of reality construction' (p. 97, emphases original). In so doing, I strove to neither neglect the meanings of the members inside the company (Pollner and McDonald-Wikler, 1985) nor to miss out on the benefits obtainable from my own position as an ethnographer with a sociological mind-set, which would allow me to reflexively relate the observed practices to the context in which they arose (Gubrium and Holstein, 2012). By including verbatim quotes blended with my own experiences narrated from the perspective of my reflexive self, my field notes and final representation include both these elements, and hence approach the ethical dilemma of representation by aiming to balance the views of the participants with my analytical perspective.

5 SUMMARY OF RESULTS

The thesis builds on four research papers to interrogate the practices of user involvement and technology development for older people and to address its main aim: to advance our knowledge about user involvement as a practice using an STS perspective. To do so, the four research papers deal with a range of different aspects in this regard, moving more broadly from how user involvement practices matter in the literature (Paper I), to how different configurations of participation matter in different design workshops (Paper II), to how user involvement is achieved in corporate practice (Paper III) and how ageing is enacted as an object of such design practices (Paper IV). In the following I briefly outline the main findings of each of the four papers.

5.1 PAPER I: User Involvement of Older People in the Literature

As mentioned in Section 1.3, the aim of this systematic review is to survey the previous literature on the practices of user involvement of older people and specifically to address RQ1: how does involving older people in technology design matter in practice, according to the literature dealing with the development of technologies for older people?

The first paper reviews previous studies that have empirically involved older people in design practice, with a specific eye to examining the *practices* of user involvement. The central motivation for this was the appearance of implicit inconsistencies and clashes between somewhat straightforward guidelines for user involvement (e.g., Gulliksen et al., 2003; Spinuzzi, 2005) and contradictory views on the benefits and drawbacks of the approach, to the extent that what occasioned them in practice appeared to be largely unknown (e.g., Barki and Hartwick, 1989; Cavaye, 1995) (see Sections 1.2 and 2.2). It was also practically relevant, as the involvement of older people is often taken as a central prerequisite in design processes (Eisma et al., 2004), but technologies developed for older people nevertheless appear to face continuous challenges (Lee et al., 2019) (see Section 2.1). Yet, while there is an extensive amount of literature on user involvement, including systematic reviews (e.g., Bano and Zowghi, 2015; He and King, 2008; Shah and Robinson, 2007), these studies have mostly centred on identifying benefits or challenges. They have not addressed the practicalities implicit in involving older people. It is precisely for these reasons that the review was crafted: as a way to interrogate the very nature of the *practices* of user involvement that were reported and to consider this for the example of *older people* specifically.

Following the PRISMA guidelines for conducting systematic reviews (Moher et al., 2009), the review analytically examines the nature of older-user involvement as a practice (see Section 4.2); addressing the question of *how* user involvement matters. As described in Sections 3.1 and 3.2, I did this with a background concern for how these practices would be characterized both by social and material features, as well as their implicit power dynamics. That is, in an STS-inspired sense, I treated the reviewed papers as intricately linked to the practices on which they were based, both being produced

by, and producing, what user involvement means (Latour and Woolgar, 1986 [1979]; Law, 2004; Lynch and Woolgar, 1990). Overall, the review resulted in the inclusion of 40 empirical studies that were published in either academic journals or peer-reviewed conference proceedings in the years 2014-2018.

The findings highlight how, in practice, user involvement appears to not necessarily matter in a straightforward way. Rather than guaranteeing specific outcomes, the effects of involving older people seem to be contingent on a range of aspects, such as articulated purposes, power features, technologies, designers, selection procedures and images. The included papers, for example, addressed a range of different technologies, such as smartphone and tablet applications (30%), robots (17.5%), ambient assisted-living technologies (15%) and online platforms (12.5%). Eleven of the studies specified the selection criteria for including particular older individuals, while the other twenty-nine did not. While a few studies self-reflexively problematized certain power features in designers delimiting user influence, others purposefully selected among information or restricted the influence of the involved user representatives. Still others again intentionally increased the influence of users during design procedures. There are both considerable variations among these variables and some interesting tendencies: most frequently, older people were recruited through local networks reaching into affiliated senior centres and nursing homes. Only a very few were recruited online. My analysis of the included studies also indicated that 90% of all studies implicitly framed older people in stereotypical terms, based on their age-related deficiencies and illnesses. It was also rather common for older people to only be involved at a low level (in 70% of the included studies) and in requirements-gathering and prototype-testing stages (32 and 34 occurrences, respectively). Only seven studies involved older people in the ongoing development and middle-phase design stage, and only two studies involved older people at a high level, according to Arnstein's (1969) classification.

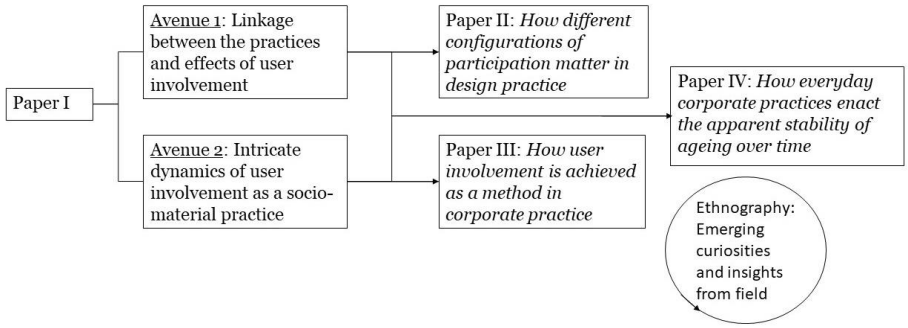
Against this background, the findings of this paper illustrate how user involvement of older people appears to be a structured yet contingent practice. They shed light on the multiple different material and social aspects (levels, technologies, stages, images, power aspects, purposes) that are present in any 'doing' of user involvement, as well as the way these different aspects converge on certain aspects. Most notably, the included studies did not report enhanced acceptance and adoption as obvious benefits of involving older people, although these benefits were often presumed in the studies. More discernible outcomes pertained to a) increased learning among designers and participants, b) adjusted design, although it remained unclear whether these adjustments were always improvements and c) an increased sense of ownership, meaning that being considered and involved per se was, in and of itself, an emotive end for the participants. It hence remains a further empirical question as to whether user involvement of older people brings about technologies that integrate well into the daily lives of the ageing population, and if so, *how*. The paper summarizes these various contingencies into an analytical framework comprising motivators, stages, levels, images, power aspects and purported outcomes of user involvement.

Crucially, the literature review emphasizes two main avenues for future research based on a review of the current literature, which informed my further empirical inquiry in this thesis. First, given the multiple socio-material aspects involved, the literature was not clear as to how different practices or premises linked up to different effects. One could ask, for example: 'What type of effects would appear if user involvement were practiced differently?' Or: 'What difference would it make, for example to recruit other participants, include older people from networks other-than-local, or position them other-than-frail?' The literature did not appear to offer any straightforward answer to such questions, and thus a more thorough appreciation appeared to be in order. Paper II seeks to address this first avenue by interrogating how different configurations of participation could be linked to different effects for ageing. Second, and relatedly, a deeper understanding of the intricate dynamics and experiences of user involvement appeared to be needed – specifically in order to interrogate user

involvement as a practice that is socio-materially constituted. Here, the central questions were: 'How is user involvement at all achieved as a method in practice?' And: 'What are the collateral effects of such practices for ageing?' Paper III connects to the second avenue by interrogating how user involvement is done in company practice, while Paper IV connects to both the first and second avenue by examining what type of collateral effects design practices, per se, have on ageing. An overview of how the different papers connect, including their links to the ongoing ethnographic engagement in the company, is shown in Figure 1 below.

In summary, Paper I contributes to the existing literature by offering a rigorous overview of how older-user involvement has been conducted in empirical practice: not of its challenges and benefits, but instead of the way in which the approach has been practiced. It thereby allows for a refinement of the conceptualization of user involvement as a structured, yet contingent, practice, by emphasizing a range of relevant socio-material features, including designers, power aspects, images and technologies. The resulting analytical framework may practically inform future researchers and practitioners who are interested in adopting an approach that is conscious of such broader contingencies. Furthermore, the paper informed my own empirical interests, by pinpointing specific research avenues centring on the relationality between performances and effects, the intricate dynamics of user involvement as a social process and the broader role of technological practices for ageing.

Figure 1: An overview of the links between the different papers



5.2 PAPER II: Different Configurations of Participation and Ageing

Following from the finding in the literature review that there is an apparent lack of understanding of the interlinkages between different ways of doing user involvement and its effects, Paper II aims to shed light on how different configurations of participation, facilitated through the inclusion of different stakeholders, matter in different design practices. Thereby, it squarely addresses RQ2: How do different configurations of participation matter in the practices of design workshops? (See Section 1.3.)

The second paper illustrates how different configurations of participation matter by enacting different versions of ageing. In particular, it draws its interest in part from critical design studies and in part from STS scholarship on users, and specifically the role of mediators. Critical design studies have highlighted the ambiguous and negotiated nature of participation and laid bare how participation itself can be differently configured (e.g., Frauenberger et al., 2015; Vines et al., 2013). STS user studies, for their part, have shed light on the implicit ways in which users and technology design are intricately interwoven as particular values or ideas may become incorporated into materials (e.g.,

Akrich, 1992, 1995; Oudshoorn and Pinch, 2003), and in turn how these embodied scripts may configure users (Woolgar, 1991). Notably, as discussed in Section 3.2, experts and user representatives have been shown to be important mediators in design (Schot and Albert de la Bruheze, 2003). Pulling together these various insights, Paper II argues that it is possible to conceive of different instantiations of design as consisting in different 'configurations of participation', and furthermore, that it is possible to observe material effects of such different configurations. That is, the inclusion of different mediators, such as older adults, ageing researchers and care experts, may co-constitute different ways of 'doing participation', and these different configurations of doing participation can be contrasted by examining how they matter across design workshops.

Drawing on a comparative micro-level multiple-case study (Yin, 2018), the study relies on empirical data gathered during participant observation of three different workshops involving different groups of participants: older adults, age researchers and care experts (see Section 4.3). During data analysis, the study also engaged with additional STS literature on stability (see Section 3.3), which has foregrounded how objects can be multiply enacted and come into being at different enactment sites (Barad, 2007; Law, 2004; Mol, 2002). Building on this analysis, Paper II finds that different configurations of participation matter by enacting different versions of ageing. In particular, in the practices of the participatory design workshop with *age researchers*, ageing was enacted as relating to loneliness and impairment and as an object for design that could be served by existing technologies. The configuration of participation with *care* and *nursing experts*, in turn, enacted ageing as an object of daily frustration and mishaps in old age, as well as a desire to remain connected in later life. Finally, the involvement practices with *older people themselves* enacted ageing as an object of continuity in later life, characterized by desires for control, familiarity and change. Across all three workshops, these enactments became materialized as they took the shape of articulations, drawings, low-fidelity design objects and simple paper-based prototypes.

Importantly, building on STS insights on enactments (Law, 2004; Mol, 2002) and performances (Barad, 2007), the study illustrates how neither technological solutions, nor ageing, exist outside of the practices of configuration that enact them. It shows how it is only through particularly configured practices of participation and the accompanying socio-material arrangements that specific versions of ageing become real. In this view, the object 'ageing' emerges as *multiple*, as different configurations entangle different practices of participation and socio-material aspects, including different materials, participants and design concerns. From configuration to configuration, from one practice of participation to another, a different version of ageing was enacted – *a different ageing*, if we were to paraphrase Mol (2002). And, as the study deals with design workshops, the findings also show how these enactments not only enacted different versions but also *materialized* into different design ideas, such as prototypes or paper-based ideas for radios, smartphones and smart home devices. Indeed, these technical designs appear relatively different from one another, in terms of both their technical scope and the way they could relate to particular versions of ageing.

The paper contributes conceptually to the STS literature by introducing the notion of a *design multiple*. This concept is introduced to offer an extension to Mol (2002). In particular, Mol's (2002) notion of 'multiplicity' in atherosclerosis entailed the need for disaggregated versions of objects to 'hold together' (p. 42)– to be 'more than one, but less than many (Law, 2002: 3). The findings of Paper II, instead, appear to show that the differently enacted realities of ageing stand relatively independent of one another. For example, the boundaries of ageing as an object of daily frustrations, which entangled a prototype of a waterproof smart home device, were materially very differently shaped than those of ageing as a continued life course, which entangled smartphones with control features. It is plausible to imagine that, once enacted, these different materializations of ageing could move along relatively separate future paths, leaving open the question of whether and how such different designs could still somehow co-relate to one another into achieving 'one' ageing. Precisely to make

such multiple enactments of the same object (in this case, ageing) in the design workshops accessible for further investigation, the paper introduces the concept of 'design multiple'. This concept specifically sensitizes us to the possibility that, in design practice, objects such as ageing can be multiply enacted *and* materialized.

In so doing, the paper also contributes to the growing literature of critical design studies, specifically by foregrounding the *ontological consequences* that different ways of doing participation in design may have. In particular, the concept of 'design multiple' allows us not only to study how different objects are represented in design practice, but also to trace how the very existence of objects can be constituted in such design practises. For the design literature, this directs our attention away from the discussion about how ever-more-relevant perspectives can be included in participatory design and towards questioning the intrinsic, reality-making politics of design and participation per se. If different configurations of participation may enact different versions of objects, this instead raises the question: What would be a 'good' way of 'doing' participation? Finally, the study also makes practical contributions by highlighting a range of issues of concern that designers could pay attention to. Specifically, it raises awareness of the ontological impact that particular configurations of participation may have, emphasises the implicit multiplicity of participation and points to an increased reflexivity about the types of goals, materials and participants involved in any particular procedure.

In summary, Paper II shows how different configurations of participation, facilitated by including different stakeholders, can matter in design practice. It illustrates how participation is a practice that can be multiply 'done', and that such diverse practices can matter by having ontological consequences, enacting and materializing multiple versions of ageing. The study contributes conceptually by introducing the notion of *'design multiple'* to take note of the embodiment of multiplicity into different designs, and practically by raising questions about the different features that designers have at their disposal to alter as they implement participation in design practices.

5.3 PAPER III: An Ethnography of the Method of User Involvement

The third paper is concerned with the second avenue for future research identified in the literature review (see Section 5.1): the need for a more profound understanding of the intricate dynamics of user involvement as a practice and how its practice is related to different socio-material aspects. Specifically, the main aim of Paper III is to extend user and method studies in STS so as to illuminate how the method of user involvement itself is enacted in the practices of a small- to medium-sized corporation, and how it is possible for this enactment to occur in the first place. In so doing, it seeks to answer RQ3: What does user involvement look like in company practice? How is it done? And how is it that it can be done? (See Section 1.3.)

Conceptually, the paper is in conversation with previous studies in STS on users (Section 3.2), enactment (Section 3.3) and method practices (Section 3.4), with the intention to both draw on and expand this previous and extensive body of STS literature. Specifically, studies on the socio-material constitution of users (e.g., Oudshoorn and Pinch, 2003; Sánchez-Criado et al., 2014; Woolgar, 1991) have long highlighted the emergent and situational nature by which design practices constitute users. Likewise, studies employing the notion of enactment (Mol, 2002) to interrogate the social role of methods (e.g., Barad, 2007; Law, 2004; Law and Ruppert, 2013) have increasingly put forward a perspective that problematizes the performative, reality-making effects that methods may impose upon our world. In different shades, both these streams of literature highlight the circumstantial effects of design methods, the types of users they can enact and the multiple realities they can achieve. The paper is meant to extend the notions of 'situational enactment' of users and the 'performative effects' of methods to interrogate the achievement of the *method* of user involvement itself. That is,

rather than exploring what user involvement does or effects, this paper contributes empirically and conceptually with an understanding of *how the method of user involvement itself is accomplished in practice*, shedding light on how user involvement is brought about in its relationship and entanglement with ongoing design practices and underlying socio-material arrangements.

Drawing on empirical material obtained during ethnographic fieldwork conducted at SMCare (see Section 4.4), Paper III highlights how user involvement is not a straightforward method but rather is varied and situationally enacted in diverse forms to address and navigate a backdrop of ongoing tensions and frictions. To begin with, the findings show how, inside the company, user involvement is sometimes positioned as a *risk* and sometimes as a *solution*. It may be a risk, for example, because involving clients may result in a bad reputation due to an incomplete product, and it may be a solution, for instance, because involvement procedures promise a closer consideration of customer needs. User involvement may bring consumers closer to the company and bridge possible spatial and temporal distances, but the insights obtained from users may also not be relevant to the concerns of the company, and users may meddle too much with the underlying technology. Following on this, the ethnographic insights reveal how in corporate practice, these frictions are continuously coped with, worked out and bypassed in order to make a situational enactment of user involvement feasible.

In so doing, the paper identifies a range of *interstices*: that is, spaces in between the tensions where user involvement was made momentarily feasible. These interstices, the paper shows, can be of various form and shape: test users, software environments, sales representatives, feedback sessions, test cases and user stories. The point the paper makes here is that each interstice made it possible to coalesce competing versions of user involvement – of risks and of promises – to allow a new version of user involvement to be enacted that momentarily resolved these risks. To illustrate this point, let us look, for example, at the 'staging environment', which is a virtual software environment to conduct technical tests without the possibility of affecting the underlying 'core' software. In its very deployment, the staging environment acknowledged the potential downsides of involving test users, who could interfere with the underlying technology, by making tests feasible in a separate environment. At the same time, it allowed test users to contribute and identify potential technical failures and 'bugs' that could be fed back to the group of designers working to improve the overall quality of the 'core' software. Similarly, 'test cases' articulated neatly defined steps and guidelines for test users to follow, thereby hedging against undesired user behaviours while at the same time benefiting from their inputs. The ethnography offers insights into how interstices such as the 'staging environment' and 'test cases' were repeatedly formed in order to *momentarily coalesce* different competing promises and benefits.

Furthermore, the findings show how these interstices were not stable, but rather, *shifting* from one instantiation to another: not the same, but not entirely different either. The staging environments, for example, evolved as new insights were fed back into technological adjustments, out of which new staging environments were borne. As another example, there were about more than 500 different test cases and user stories, which were constantly modified and improved, and each of which hence formed a different interstice for the enactment of user involvement that involved test users. But all of them were also similar in the sense that they all sought to structure and guide the involvement procedures. Finally, to provide an example of a 'human' interstice, the study shows how the enrolment of test users itself constituted an interstice that circumvented the risk of obtaining a bad reputation through customer contact, while working towards the promises of improvements of technical functionality. However, test users were not the only participants in the observed user involvement practices; practices of functionality tests alternated with other practices that enrolled sales representatives rather than test users. Notably, each enrolment formed an interstice that situationally brought together the enacted frictions revolving around user involvement in its own distinctive way. Test users were enrolled as closer to the technology but rather remote from consumers, while sales

representatives were enrolled as closer to customers but relatively far away from technology. The study also shows how different involvement sessions were similar in their attempts at guiding and structuring feedback or tests, yet different in the precise nature of the guidelines, the enrolment of participants, the feedback or test results obtained, and the assessment thereof. In other words, the ethnographic fieldwork brought to the fore how the observed interstices were similar in seeking to bring together frictions and tensions, but different as they did so in varying ways.

In summary, Paper III contributes to STS scholarship by showing how user involvement is enacted in shifting interstices of coalescing tensions. Specifically, the study speaks to previous STS scholarship that highlights the performative effects of methods and design practices by interrogating the enactment of the method of user involvement itself (Barad, 2007; Law and Ruppert, 2013; Suchman, 2012). In so doing, the paper contributes conceptually by introducing the notion of *'shifting interstices'*, as well as empirically with an ethnographic illustration of the different practices, tensions, actants and objects involved in the practical achievement of user involvement. Theoretically, the paper puts forward a perspective on user involvement as a method that is varying and transitory, encompassing a stable core such as configuration work and power imbalances, but also fleeting objects, distorting tensions and ephemeral practices. Based on its empirical material, the paper theorizes that any enactment of user involvement depends on a plethora of different features, such as software, tablets, company staff, testers and sales representatives, and as their relationships shift from practice to practice so too does the method of user involvement itself. Furthermore, the paper makes practical contributions by formulating implications for how to 'intervene in', and possibly 'remake', user involvement. Here, it argues that the main foci for ambitions to improve user involvement should be the underlying socio-material arrangements that operate for any particular enactment of user involvement becomes feasible. The paper contends that tracing shifting interstices in this regard can offer a starting point to identify the various materials, tensions and promises that are active in the making of user involvement, and can ultimately help us to understand how it is that user involvement is enacted this way – and not otherwise.

5.4 PAPER IV: Corporate Practices and the Apparent Stability of Ageing

The fourth paper puts the unintentional, performative effects of corporate practices on centre stage. Being concerned with both the intricate dynamics inside corporate practices and their performative effects, thereby, Paper IV addresses parts of each of the two avenues for research previously identified in Section 5.1. Its main aim is to examine the enactment of ageing as an object of the everyday work practices in the company and to contribute to the STS literature by theorizing the enactment and re-enactment of ageing within these practices in the shadows of care. Hence, it addresses RQ4: How is ageing enacted in the everyday practices of the company? (See Section 1.3.)

The main motivation for this paper emerged from the confluence of an ongoing engagement in ethnographic fieldwork, previous research interests identified in the earlier three papers and a continuous reading of STS literature. In particular, Paper IV engages with previous STS literature on the stability of objects (Section 3.3) and images (Section 3.5) – again, both with the ambition of building on and contributing to this body of literature. Specifically, recent STS studies have highlighted the importance of usually taken-for-granted practices that care for, and thereby maintain, objects so that they can remain stable (e.g., Denis and Pontille, 2015, 2020; Puig de la Bellacasa, 2011, 2017, see Section 3.3). Implicitly, then, these practices are taken to be characterized by a particular intentionality in which, whether neglected or not, people and things more-or-less purposefully team up together to maintain and care for objects. While this is certainly a valid analytical angle, building on ethnographic fieldwork, the paper argues that there is another possibility for objects to remain

stable: they can also be *unintentionally* enacted through ongoing practices as side effects. They thus may thrive, the paper argues, in the forgotten zones of care. (For a beginning critique of the exclusions and ambivalence implicit in care – without specific mention of how objects may thrive in such excluded zones – see e.g., Duclos and Criado (2020), Giraud (2019), Martin et al. (2015) and Murphy (2015)). The paper here seeks to contribute to this extensive and growing body of STS literature on object stability and care by offering an empirical example of how one object manages to emerge and re-emerge in the dusky and shaded corners of care practices: ageing. Ageing, the paper suggests, can be treated both as an image and an object. It does have physical incarnations through bodily decline and materializations in technology designs; at the same time, it entails emotive responses and imaginaries about the ageing process. Mobilizing insights from STS scholarship that highlight the close entanglement of images with practices (e.g., Hyysalo, 2006; Verran, 1998, see Section 3.5), the paper thus seeks to contribute conceptually and empirically through an example of how an object/image hybrid such as ageing may be sustained over time.

Building on ethnographic fieldwork at SMCare (see Section 4.4), Paper IV shows how ageing is enacted *in the shadows of care* through everyday corporate practices that are not purposefully aimed at enacting ageing. These practices, the paper highlights, do not directly have ageing as their main object but instead care about other things: client needs, expanding technological possibilities and sales and marketing. In other words, the study demonstrates how inside SMCare, ageing emerges in the shadows of other care activities that are not principally concerned with ageing. One example is the activity 'gearing towards client requirements': The paper shows how this activity entangled various practices having to do with client needs such as offering a meeting platform with certain features for videoconferencing, forced entry or being able to adjust the volume of participants. All the observed practices to do with this activity, hence, were geared towards fulfilling the needs articulated by the municipality. And inside the corporation, that was the main aim of the practices: to fulfil these client wishes. At the same time, although the activity was focused on gearing towards client needs, it also silently enacted particular versions of ageing. For instance, the design of a feature for 'video meetings' between older people and care professionals, the study reveals, enacted ageing in terms of cognitive impairment, as designers began to imagine how people with cognitive impairment would prefer longer visits in a virtual space over shorter visits in person. Hence, while ageing was not the direct aim of gearing towards clients, it was enacted and maintained on the side roads of this activity. In a similar fashion, the ethnographic account includes multiple such examples of how corporate practices not targeted at ageing (but instead concerned with technological, marketing or client matters) enacted and re-enacted ageing on their side-lines.

In corporate practice, the study shows, ageing was enacted and inscribed into technologies as a *disturbing, worrisome object* through other care practices that did not care for, or love, ageing. For instance, 'forced entry' was a feature that would allow care professionals to forcefully enter the video of older care recipients without these older care recipients necessarily being asked beforehand. The 'volume adjustment' feature, in turn, gave care professionals the control to mute or shut people off as much as to bring them in. These were indeed desired features from the perspective of the clients – the municipalities. In corporate practice, though, the development of both forced entry and volume adjustment became closely allied to images of ageing as passivity and inability, thus enacting ageing individuals as frail and devoid of technological skills and rendering it acceptable to infringe on their privacy and control. To name another example, the paper shows how the activity 'expanding technological possibilities' also enacted and re-enacted ageing on the side-lines, with negative connotations. The example in the paper concerns specific sensor technologies able to locate humans, which, the paper shows, were originally built purely for technical interests. In the shadows of these technological interests, the paper illustrates, the development of sensor technologies also enacted and re-enacted images of ageing as a process that needs to be monitored, to the degree that older people should be treated akin to criminals with electronic ankle tags, and as beings that should be measured

and quantified. The ethnography thus illustrates how, alongside the activities of technology development that focused on technical objects (and not ageing), images of ageing as passive, abstract, powerless and in need of surveillance became enacted and incorporated into the emerging technical objects and products.

Furthermore, the paper addresses the question of the *temporality of ageing* by showing how ageing is enacted and re-enacted as a collateral outcome of corporate practices that continue over time, only slowly and sluggishly transforming – depicting ageing as a '*viscous image landscape*'. Here the paper shows how ageing is a dynamic and contingent side-effect of the ongoing everyday activities inside the company that enact and re-enact ageing over time. One example refers to the previously mentioned sensor technologies. The paper includes multiple instances of re-enactments of how ageing needs to be measured and controlled as the sensor technology is concretized. Similarly, the development of forced entry features and video meetings, as well as the platform per se, incorporated and thereby perpetuated the previously enacted images of ageing. Ageing, in this vein, became situationally stabilized as abstract, passive and in need of surveillance through multiple re-enactments in practice. Beyond these in-situ re-enactments, the paper also sheds light on how, despite situational contingencies, ageing appears to remain stable *over several years*. In particular, the paper relates this apparent stability to the seeming durability of the practices that sustain ageing over time, including their underlying socio-material arrangements. For several years, the paper shows, staff, municipalities and care technologies continued to engage in similar practices, issuing tenders, relying on prior technical knowledge and sharing similar backgrounds. Older people in the flesh, in turn, were continually kept outside of these practices. These persistent practices hence continued to produce and reproduce a rather stable version of ageing as passive, unable and declining. If at all, the study shows, then ageing would only reluctantly transform, as its re-enactments would indolently shapeshift over time. For example, the study shows how the perception of older people as technophobes changed over time, mostly due to broader socio-material shifts that now made certain technical devices nearly indispensable. Along with these sluggish transitions of socio-material conditions, the practices of older people and staff changed as well, and so, too did the object of ageing slowly adapt.

In summary, the fourth and final paper contributes conceptually to STS scholarship on the maintenance and stability of objects (e.g., Denis and Pontille, 2015, 2020; Puig de la Bellacasa, 2011, 2017) by offering an understanding of how objects are maintained over time and space in corporate practice, even though no individual practice explicitly aims to do so. It thus also contributes to the STS care literature (e.g., Duclos and Criado, 2020; Giraud, 2019; Lindén and Lydahl, 2021; Martin et al., 2015; Murphy, 2015) by theorizing how certain objects may be enacted and re-enacted 'in the shadows' of other care activities, shedding specific light on the excluded zones of care that may all-too-easily be ignored. Furthermore, it introduces the notion of '*viscous image landscapes'* to allude to the sluggish and recalcitrant ways in which such objects/images transform and shift and to emphasize the hard work and socio-material reconfigurations necessary for any change to occur. It also expands the STS body of literature on imaginaries (e.g., Hyysalo, 2006; Verran, 1998) by providing an example of how images are tied to objects in practice. Practically, the paper contributes with a perspective on the adjustments that would be required to change particular enactments of ageing that appear to resemble stereotypes of old age. It does so specifically by highlighting how ageing (and ageism) is an object/image that is more-than-human, implicitly constituted as a by-product of everyday practices. In this vein, the paper makes accessible for investigation how changes could be brought about. It indicates that any change would have to begin with a realignment of the constituents that participate in the ongoing everyday practices that produce, co-produce and re-produce ageing (and ageism). Corporate work practices are imbued with the vitality of a range of all-too-ordinary and yet, more often than not, stubbornly resilient objects and people. Ambitions for change, the paper therefore argues, need be contextualized in light of a powerful hinterland: the practical realities inside the company.

6 DISCUSSION

As I outlined in the preceding sections, the thesis involves four papers that shed light on different aspects of user involvement in practice. Thereby, they slowly progress from interrogating practices of user involvement in the literature (Paper I) towards design workshops and their configurations (Paper II) and finally into corporate environments (Paper III) and how such corporate practices participate in the enactment of particular realities (Paper IV). While each of the appended papers comes with a separate discussion of its main contributions, the purpose of this section is to pull together the overall findings and discuss how they commonly relate to previous theory and their implications for policy-makers and designers. The section begins by discussing the joint theoretical implications, both with regards to user involvement and ageing, and then moves on to main practical considerations.

6.1 Theoretical Engagement: On User Involvement and Ageing

In different shades, the four papers contribute theoretically by illuminating the underlying socio-material dimensions of user involvement as a method that is both transformative and conditional and by emphasizing ageing as a particular object/image of design. As such, the thesis offers several theoretical contributions to the previous literature on Management and Design, Science and Technology Studies (STS) and studies on Ageing and Technology. More specifically, first, it contributes to previous management and design literature by emphasizing the dynamic nature and multiplicity of the method of user involvement and by deepening our understanding of the underlying socio-material conditions of user involvement. Second, it contributes to the STS literature by conceptualizing the achievement of user involvement in practice, as well as the performative effects of participation. Here, the thesis has its most central contributions in suggesting three new concepts to be explored and further developed in future research: 'shifting interstices', 'design multiples' and 'viscous image landscapes'. Third, it contributes to ageing and technology studies by joining current discussions on the mutual relatedness between ageing and technology and theorizing ageing as an object and image that is more-than-human, accomplished in and through design and user involvement practices. As I will elaborate below, the outlined theoretical contributions and concepts may open up new directions into future research on the entanglement of user involvement, socio-material conditions, ageing and technology in practice.

To begin with, predominant framings in the management and design literature have tended to portray user involvement as a relatively stable approach, suggesting particular key principles or guidance procedures that can be implemented, both generally (e.g., Spinuzzi, 2005) and for older people specifically (e.g., Newell et al., 2007) (See Sections 1.2, 2.1 and 2.2). This portrayal of user involvement, the thesis shows, is problematic, as it ignores the practical contingencies of doing user involvement in different settings. Here the thesis reveals how different premises (Paper I), stakeholders (Paper II) and situational contexts (Paper III) each may work to enact and practice very different ways of doing user involvement. Taken together, the studies included in the paper thus offer

an understanding of *user involvement as a dynamic and varied practice*. In the different papers, the thesis reveals that, depending on the underlying socio-material conditions, each enactment of user involvement may resemble one another yet also be critically different from one enactment to another. The contribution of the thesis here is that it sheds light on the complexities underlying the approach of user involvement. In particular, it shows how user involvement may have a core of particular similar features, such as power imbalances (see, e.g., Akrich, 1992; Suchman, 2012; Woolgar, 1991) but also a rather malleable shape, coming in different forms at different times and in different practices, depending on different underlying conditions. Approaches highlighting key principles and guidance principles may address the core, but they may gloss over the malleable shape. In contrast, the thesis theorizes user involvement not as a stable technique solely guided by principles but as a practice that is socio-materially distributed and transformative.

A second point often highlighted in the management and design literature is that user involvement may both yield benefits and confront several challenges (Bano and Zowghi, 2015; Kujala, 2003). It is, however, notable – as I argued in Sections 1.2 and 2.2 – that the literature is not clear about the success of the method, as various incommensurate and conflicting reports and claims indicate (e.g., Barki and Hartwick, 1989; Bossen et al., 2016; Cavaye, 1995; He and King, 2008). In my reading, the thesis contributes conceptually with an understanding of such apparent contradictions by means of pointing to, and deepening, our knowledge of the *underlying socio-material conditions, relationships and configurations* in which user involvement is differently practiced. Paper I specifically offers an analytical framework of user involvement based on a review of previous literature that empirically involved older people, highlighting the importance of different purposes, selection methods, images, levels and stages of involvement, each configuration of which offers the potential to lead to different outcomes and challenges. Papers II and III also highlight different facets of such different configurations. Paper II, for example, shows how different configurations of participation may lead to drastically different outcomes and realities, while Paper III points to the ever-shifting nature of the underlying conditions. I wish to see the contribution of this thesis as a way to offer a starting point to disentangle and open up for analysis the 'black box' (Latour, 1987: 2) of user involvement, by beginning a conversation about the relationships between premises, conditions and outcomes. In particular, while the thesis is in alignment with previous literature that recognizes the importance of conflicting drawbacks and promises of the approach, here I highlight that in addition to barriers and benefits, there are a range of socio-material features that deserve additional attention. It is of the relationships between these underlying features and their presumptive outcomes, then, that the thesis offers a more profound conceptual examination. And it is here, as I shall discuss in the following paragraphs, that the thesis identifies also the most promising opportunities for future research.

Delving deeper into the underlying socio-material conditions of user involvement, the thesis principally contributes to the body of STS scholarship. In particular, the thesis contributes to the STS literature on users by *conceptualizing the achievement of user involvement as a method per se*. As I have outlined in Section 3, specifically Sections 3.2 and 3.4, STS has a long tradition of exploring the emergent effects of practices, including the circumstantial performances of design practices to create users (e.g., Sánchez-Criado et al., 2014; Wilkie, 2010; Woolgar, 1991) and of method practices to enact different realities (e.g., Barad, 2007; Law, 2004; Mol, 2002). Beyond an interrogation of such performances for the case of user involvement and design, the thesis specifically shows how it is even possible at all to 'do' user involvement against the backdrop of ongoing tensions, contradictions and controversies regarding its benefits and barriers. To do so, the thesis specifically brings into play the implicit materials, people and agents involved in the making of user involvement. Most notably, Paper III shows how, for user involvement to be practiced, there need to be socio-material arrangements in place that balance out different tensions and promises with regards to user involvement inside the company. The paper here contributes theoretically to the STS literature on method practices by introducing the notion of '*shifting interstices of coalescing tensions*'; referring to 'in-between' spaces

that temporarily open up in corporate practices for user involvement to occur. In so doing, Paper III lays bare the hidden mechanisms through which particular ways of doing user involvement are performed, and others not.

The conceptualization of such 'in-between' spaces adds to the existing STS literature by extending the focus on the effects of methods (Barad, 2007; Law and Ruppert, 2013) and design practices to enact different forms of usership (Sánchez-Criado et al., 2014; Wilkie, 2010) towards the enactment of the methods themselves. By deploying an analytical lens on '*shifting interstices*', theorisers can become aware of, and attuned to, the different situations that allow for user involvement to be conducted. The concept thus draws attention to the relationship between temporality and spatiality by showing how user involvement changes and morphs more-or-less synchronously alongside shifting underlying conditions. Summarizing its main constituents, the notion highlights three important dimensions for user involvement in practice: First, user involvement in practice depends on a range of underlying material and social conditions. Second, for user involvement to happen, these conditions need to be arranged a certain way so that various tensions and contradictions can be momentarily stabilized. And third, because such socio-material conditions are changing, so, too, is user involvement always enacted in a slightly different way, with different people, relations and different materials involved. By highlighting these three dimensions, the concept captures how every enactment of user involvement is momentary and therefore transitory, and that it involves different materials and individuals from practice to practice. It thus enables theorisers to analyse how and why user involvement occurs this way and not otherwise, as well as how and why it transforms over time. Looking at '*shifting interstices*' may help us identify the different elements that make user involvement possible, as well as trace how these elements build up new relations, disappear and re-assemble.

A second way in which the thesis contributes to STS scholarship is by *highlighting the different effects user involvement may have*. That is, not only does the thesis offer concepts that allow us to trace different performances of user involvement to their underlying conditions, or 'interstices'; it also brings to the fore how practices of user involvement and participation may perform different realities. Again, previous STS studies have long highlighted how users are enacted in design practice (Akrich, 1992; Oudshoorn et al., 2004; Woolgar, 1991), showing how the user is not a stable category but rather an emergent feature of such design practices (Mort et al., 2009; Sánchez-Criado et al., 2014; Wilkie, 2010). (See Section 3.2.) At the same time, STS studies have also emphasized how practices and methods may enact different realities (Law, 2004; Mol, 2002; Woolgar and Lezaun, 2013) and how imaginaries may be tied to particular practices (Hyysalo, 2006; Ingold, 2002; Verran, 1998). (See Sections 3.3 and 3.5.) Notably, the thesis extends these various lacunae of interest to consider how user involvement practices may not only enact users and technologies but also particular realities of ageing. Specifically, Papers II and IV each show how these different practices may matter to the enactment and materialization of different versions of ageing. In so doing, Paper II emphasizes the relationship between user involvement, changing socio-material conditions, stakeholders, technologies and ageing, bringing to the fore how these seemingly unrelated features are brought into relation in design practice to enact particular realities for ageing. Paper IV, in turn, emphasizes how such particular realities for ageing can be unintentionally sustained as the upshot of continuous enactments and re-enactments over time within corporate practices.

More specifically, Paper II contributes to the literature on the enactment of objects (e.g., Law, 2004; Law and Mol, 2008; Law and Ruppert, 2013; Mol, 1999, 2002) by introducing the term '*design multiple*' to capture how in design practice, different configurations of participation may not only articulate different versions of ageing, but also *materialize* them into multiple designs. The concept seeks to complement previous conceptualizations of ontological multiplicity that highlighted objects that are multiply practiced yet still 'hang together' as one (Law, 2002; Mol, 2002). Specifically, it does

so by aiming to raise awareness of the possibility for different enactments to bring into existence different versions of objects that may no longer hang together as they become incorporated into separate designs. By tracing design multiples, so the idea goes, theorisers have an analytical tool at their disposal to interrogate the possibility of different versions of realities 'drifting apart'; this allows them to question how different versions of objects are linked to different configurations of participation and to one another. Making a similar argument, Paper IV then shows how corporate practices, too, can enact and materialize different versions of ageing and that they can do so repeatedly over time. In the paper, this ongoing way of enactment is subsumed conceptually under the notion of '*viscous image landscapes'*, to address the sluggish and slow processes by which practices and enactments transform. The notion of apparent stability here is an addition to previous STS studies, which so far have focused on objects remaining stable by means of particular practices that directly aim to maintain and care for them (Denis and Pontille, 2015, 2020; Domínguez Rubio, 2014; Edensor, 2011; Puig de la Bellacasa, 2011) and on the relevance of the excluded, unsettling aspects of care practices (Duclos and Criado, 2020; Martin et al., 2015; Murphy, 2015). Paper IV here adds a conceptualization of how objects can also be enacted as by-products, rather unintentionally, of other practices that are not directed specifically towards maintaining this very object, as was the case with ageing.

Taken together, the thesis hence contributes with an understanding of how different practices of user involvement can be differently configured and thereby enact different realities of ageing over time. These different realities, the thesis theorises, can become incorporated into different technology designs and thereafter move along disaggregate and divergent paths, thereby making separate realities. And, the thesis theorises, the apparent stability of such realities can be examined by putting centre stage the practices that keep enacting and re-enacting them over time.

As is somewhat implicit in the previous paragraphs but hitherto not sufficiently addressed, by means of interrogating the emergent properties of user involvement and design practices in bringing about objects such as 'ageing', the thesis also speaks to the body of literature on ageing and technology. Notably, ageing and technology scholars active in the growing field of Socio-gerontechnology (see e.g., Peine et al., 2021) have increasingly put forward a perspective that conceptualizes ageing and technology as co-constituted, thereby refuting prior interventionist or technological solutionist conceptualizations (Peine et al., 2015; Peine and Neven, 2019, 2021). (See Section 2.1.) By 'co-constitution', this body of literature refers both to how technology informs ageing, including societal imaginaries and the lived realities of older people, and to how these, in turn, may constitute gerontechnologies themselves (Peine and Neven, 2021). Scholars in this field have thus demonstrated the mutual interconnectivity among domains as diverse as the practices of design, the everyday lives of older people, technological artefacts and imaginaries about ageing (see e.g., Cozza et al., 2020; Katz and Marshall, 2018; Lassen et al., 2015; López Gómez, 2015; Wanka and Gallistl, 2018).

The thesis here contributes conceptually by *highlighting how ageing is a more-than-human accomplishment that is enacted and re-enacted over time in and through design practices*. For example, Paper II shows how ageing is linked to particular design worlds that configure different ways of doing participation, as well as materialized and embodied in the resulting technological artefacts. Paper IV also indicates the entwinement of ageing with ongoing practices of design and their underlying socio-material conditions, conceptualizing ageing both as an object and an image. Each of these papers, as addressed in the previous paragraphs, also comes with separate concepts to theorize the connection between ageing, technology and design practices. The idea of '*design multiple*' describes the possibility for multiple enactments of ageing being embodied into design, while the idea of '*viscous image landscapes'* describes ageing as an image/object hybrid that may be enacted and re-enacted over time through design practices. Furthermore, Paper I provides a conceptual framework that links images and stereotypes about older people to practices of design and technology

development. The thesis hence engages theoretically with previous literature on ageing and technology by extending our understanding of the mutuality between ageing and technology and by submitting new concepts and frameworks into the ongoing theoretical debate about how ageing and technology are intricately intertwined.

To sum up, overall, then, the thesis is in conversation with the diverse literature streams of STS, Ageing and Technology studies and the Management and Design literature. Its theoretical contributions consist of a heightened understanding of the underlying socio-material conditions of user involvement, the dynamic and ephemeral nature thereof, as well as how different configurations of user involvement may yield different realities. In various ways, each of the papers can be seen as an attempt to further unpack user involvement as a socio-material practice, shedding light on the relations between outcomes and performances, shifting interstices, implicit materials and agents, its underlying tensions and contradictions and its contingent effects. Furthermore, the thesis contributes by offering a range of concepts and frameworks to theorize the relationships and entanglement of user involvement and ageing with ongoing practices and evolving socio-material arrangements. It is my hope that future research may find these concepts useful and interrogate their relevance in other contexts.

6.2 Practical Implications: On the Politics of User Involvement

The observation that user involvement is a socio-materially distributed and dynamic process that nevertheless has the capacity to bring about particular effects needs to be situated within its wider socio-political context. Here I single out three main ways in which the findings of the thesis practically relate to questions of goodness, politics and ethics. More precisely, the three main implications include an enhanced clarity about the way in which user involvement should be implemented, an increased awareness of the full breadth of the socio-material conditions that inform user involvement in practice and a critical approach to the consequences of design and participation for older people.

First, the thesis shows that user involvement does not translate particular inputs into specific outcomes in an easily discernible or straightforward way. Rather, practices of doing user involvement, and their respective effects, appear to differ and shift shape from locale to locale, from situation to situation and from context to context. Part of the challenge, the thesis shows, is to map and anticipate how different configurations of different variables may link up to different outcomes of user involvement. Furthermore, the thesis shows how different ways of doing can produce radically different realities. Taken together, these insights throw into question the overarching advocacy of user involvement by policy-makers and designers alike (Bratteteig and Wagner, 2012; Peine et al., 2015). The findings suggest that innovators and decision-makers need to be careful with such demands, as they bear the risk of turning the very notion of 'having done user involvement' into an ideograph (McGee, 1980). Such a framing would lend legitimacy to *any* design practice, for as long as one could claim that some users have been involved, without considering its situational achievement or distinguishing between different levels or stages of involvement. Rather than simply demanding for user involvement, the thesis encourages policy-makers and management to become more aware of the transformative nature of user involvement as a method, their own role in providing incentives and structural conditions, as well as the heterogeneous elements surrounding the method.

Specifically, the thesis invites practitioners, policy-makers and the public to *enhance the clarity about what a 'good' way of doing user involvement would be*. To be sure, 'goodness' itself could be seen as situationally enacted and therefore flexible across time and space (Heuts and Mol, 2013; Mol et al., 2010; Pols, 2004). But ultimately, 'good' user involvement is a matter of tinkering and ongoing adjustment as it is defined and refined by the main actants involved (Mol, 2008; Mol et al., 2010). Practically, then, the thesis incentivises policy-makers to move away from treating user involvement

as an 'inherently good black box' that can easily achieve 'user-friendly' technologies or foster particular technologically interventionist agendas towards opening the floor to the public to discuss openly the alleged 'goodness' and 'badness' of particular agendas and methods of user involvement. This would involve relatively unfettered engagements that encourage various stakeholders to articulate and exchange their views on the implicit normativities within different agendas, while policy-makers would need to remain open and critical about their very own views of the inherent goodness, so as to jointly deliberate more broadly on what the agenda should be in the first place. Policy-makers, too, may wish to specify the type of realities *they* aim to promote by means of user involvement and the ones they intend to dissolve, and they may deliberate on the desired forms of recruitment, levels of engagement and imaginaries this should foster. Such an awareness, the thesis suggests, could be built into future policy agendas and political frameworks and thereby help articulate what is to be desired and what is to be apprehended.

Second, the thesis has revealed how user involvement operates in a corporate context against a complex backdrop of ongoing tensions and contradictions. This observation emphasizes a problematic friction that appears inside the situated practices of doing user involvement: Any practice of user involvement is dependent upon a range of enabling and constraining socio-material conditions, while at the same time it nevertheless produces particular effects and realities – of users, technologies, older people, ageing and other objects. Research has long problematized how practices of user involvement may dynamically occasion particular users (Oudshoorn et al., 2004; Rommes et al., 1999; Sánchez-Criado et al., 2014) and perpetuate particular stereotypes about older people (Bischof and Jarke, 2021; Compagna and Kohlbacher, 2015; Neven, 2010). (See Sections 2.2 and 3.2.) In a way, these studies can also be read as pleas to remake the particular ways in which participation and user involvement are conducted, akin to calls for remaking democratic publics (see e.g., Chilvers and Kearnes, 2020). In that regard, the findings of this thesis foreground the elements at play in any attempt at changing user involvement. Specifically, they imply that, in order to incentivise practical adjustments to the method, policy-makers need to be aware of underlying conditions of user involvement being done in one certain way and not another way.

By matter of illustration, to me, one example appears to be particularly striking: In the empirical case of SMCare, the thesis emphasizes how particular tensions between promises and risks cut through the work inside the company. The tensions involved the risk of users interfering with technology and of the company appearing less reputable to outside clients. In part, then, the tensions also involved the broader healthcare context and the way municipalities procure and source new technologies in general – a topic previously addressed in Section 2.3. Notably, in the Swedish model, it is within the authority of municipalities to issue tenders and to decide on the type of technology to be procured (Andersson and Karlberg, 2000; Trydegård, 2003). In practice then, the Swedish healthcare context produces an additional terrain of uncertainty that companies need to navigate. In this terrain, municipalities are positioned as the ultimate decision-makers and the paying clients, and technologies are positioned as drivers of increasing digitalization (NBHW, 2010). Furthermore, in contrast to usual company-customer relationships, the quantity of paying customers is much lower, as the realm of potential customers is unified into single municipalities. Due to their limited number, having a good reputation with municipalities appears to be central to any company's success, as much as their needs for certain types of technologies. At the same time, municipalities base their articulation of needs on their internal expertise from care professionals (Trydegård, 2003). Hence, any form of user involvement is targeted towards the needs perceived by care professionals and municipalities and not those perceived by older adults, the final recipients or end users. The empirical example of the thesis thus brings to the fore a particular mesh of systematic politics in which user involvement as a practice of SMCare is embedded: municipalities have disproportionate power, care professionals are valued consultants, technologies are sacred and older people are, in turn, relatively excluded. User

involvement in corporate practice, the thesis implies, could only be redone if these socio-material conditions would change.

For practices to change, the thesis reveals, many more variables of socio-material conditions would need to be considered: Next to those mentioned in the prior paragraphs, there are also concerns about power imbalances – not just between municipalities and older people, but also within design practices between designers and older people who may unwittingly impose particular standards or agendas into their procedures. Hence, managers, designers and policy-makers need to be *aware of the full breadth of the underlying socio-material conditions*, including the materials and humans involved, as well as the degree of agency and freedom accredited to the different participants. In other words, the thesis can also be read as a call for a higher level of self-reflexivity built into user involvement initiatives: a reflexivity of choices, of who and what is involved and of how these practices may bring about very real effects and objects that may manifest particular realities and futures – both for older people individually and for society at large. To achieve such heightened reflexivity, future research could shed light on how reflexivity could become part of policy agendas that support designers in involving people, as well as what conditions at large would need to change for broader shifts in doing user involvement to occur.

Third, the thesis has highlighted 'ageing' as a circumstantial but dedicated object of design procedures. The different appended studies have shown how technology designs may include and materialize multiple versions of ageing and how such versions can become articulated and made obdurate as technical objects further move into the homes of older people. These implemented images of ageing, the thesis has shown, do not only appear to function as technical supports or technological improvements; to the contrary, they may also stigmatize older people by delimiting their abilities for action, by constraining them and by framing them negatively. Accordingly, the thesis implies a need for designers, care professionals and policy-makers to be more sensitive to the uncanny underbelly of design practices, which may not only seek to enact technical objects as invariably beneficial to older people, but also as means to infringe on privacy and to forcefully restrain, patronize or mute them. In other words, the thesis invites practitioners to *be mindful and critical of the potentially unintended consequences of design and participation, and their ethical impacts on older people*. In that regard, the thesis seeks to open up a conversation about ethical practices of user involvement by offering concepts such as *'design multiple'*, *'shifting interstices'* and *'viscous image landscapes*' as analytical tools to disentangle and scrutinize the mechanisms by which particular imaginaries of ageing become enacted and re-enacted into technology designs.

7 REFLECTIONS: IN SEARCH OF CLARIFICATIONS AND A WAY FORWARD

As is common practice in interpretive, qualitative research, this chapter presents a critical reflection on the overall approach of my study and discusses promising avenues for future research. In particular, I touch on the different methodological choices, the role of my reflexive self in co-producing the field, and critically reflect on the capacity of this approach to create a unique representation of user involvement in practice. Following from this, I propose a number of directions for future research, emphasizing the 'stories' my findings seem to warrant.

In the previous sections, I outlined the main methodologies, findings and conceptual and practical implications of the thesis, all with the intention of showing how user involvement is and has been differently done in practice. To persuade policy-makers and managers that socio-material conditions of user involvement indeed deserve more attention, I downplayed the interpretive and necessarily entangled nature of my thesis with my own subjectivity. I put great effort at articulating, in a (hopefully) argumentatively sound way, a relatively 'solid' representation of the practices in corporate reality, building on – equally 'solid' – field notes attempting to present reality-as-observed. To convince designers and professionals of the risks of stereotypes in design, I produced analytical concepts to depict and express the entanglement of ageing with design. And to assure the research community of the validity of my findings, I included (again, hopefully) neatly organized sections, distinguishing between introduction, theoretical reflections, methodological choices and clear-cut results. Taken together, my work hence may appear to sketch out a relatively 'firm' picture of what user involvement is and looks like – a representation of reality.

This is, of course, not so. As is with any type of research, the findings can only be read as the upshot of the researcher's own – *my* own – engagement. That is, my intersubjective engagement with the previous literature, with people, with things, in the field, jointly produced and enacted the very material presented in this thesis. By and through my presence alone, particular actions and interactions were elicited that otherwise would never have occurred. Here we may think of the beginning of my access negotiations, my enrolment as an external consultant as some type of 'expert' on users, or simply my intruding gaze onto the intimate practices inside SMCare. And of course, my analysis and personal reading of the literature produced its very own categories and artefacts that populate my different writings. But this does not mean that nothing could be learned. To the contrary, it is precisely through these embedded linkages between the researcher and the field that particular truths may surface that otherwise would not become visible (Hammersley and Atkinson, 2007; Pink, 2013). So, while some may see the subjective engagement of the researcher as a limitation, I side with many others in the qualitative and ethnographic traditions (e.g., Ashmore, 1989; Atkinson, 1990; Lynch and Woolgar, 1990) to argue that this interconnectedness is an inevitability for *all* research that can nevertheless produce accounts of aspects of 'truths' – truths that are situated and partial (Clifford, 1986; Haraway, 1988, 1997). The point, then, is that it was only through my very

engagement in the company, including my own background and theoretical concerns, that particular issues and perspectives onto user involvement came to the fore.

I can hence say that, due to its intimate engagement with the field, it is a strength of my research to have produced a unique account of user involvement, an account that may in some way be more truthful than any of the existing positivist representations. On the flipside, though, this way of framing my thesis may run the risk of positioning my text as one that has produced a more advanced, more accurate representation of user involvement in practice. By way of reflection, I wish to challenge this. In particular, I would like to assert that my findings, though they are unique, should not be seen as any more definitive than those of any other account – let alone those of the staff working within SMCare (Gubrium and Holstein, 2012). Managers, policy-makers, designers, corporate staff, and – yes – users: all have their own perspectives on user involvement, and their own embodied experiences of it. These experiences, I wish to stress, need to be taken seriously. Whether it is my account or any other depiction of user involvement, then, is irrelevant, for they appear as equally important – and equally co-produced – accounts of reality. It is just that they shed light on different aspects of the same phenomenon. Thus, I plead with the reader to view the thesis as *one of many*: One of many unique stories about reality, one of many unique representations, one of many unique viewpoints. Ultimately, the significance of this story will be in the hands of its audience as it travels to, and unfolds its meaning in, new places and contexts (Latour, 1987), where it may effect different changes, be modified, stall or slip through those very hands, replaced by new, potentially more advanced, more accurate stories – that remain nevertheless partial.

In any case, my thesis *does* something; it *enacts* a certain reality (Law, 2004; Mol, 2002) – a reality of user involvement as contingent and transformative, a socio-material practice both performed and performing. What to make out of this reality? I suggest that in one striking way, the thesis highlights how many more stories are needed to clarify the nature and meaning of user involvement as a socio-material practice. For example, there is a need for stories about variations in the underlying socio-material conditions of particular practices of design. While the thesis has shown how different configurations of participation, by including particular stakeholders, may matter for ageing, further research on other interlinkages appears necessary. One may ask, for instance, how implementing user involvement at different stages and levels – or involving different images, technologies and selection procedures – would produce different realities. How do different conditions enable and constrain particular ways of doing design? What are the interlinkages between different socio-material factors and their effects onto practices? These are some of the many possible questions to be empirically addressed in future research.

We may also seek stories answering questions about the broader context. Notably, the thesis involves studies within corporate and design environments. While these entail some variation, they are still narrowly situated within the Swedish healthcare context. How far the findings of my thesis are transferrable to other cases, or are convertible into broader representations of reality, remains an empirical question for further research. Questions about different performances and enactments of user involvement as a socio-material practice, I suggest, could be examined in different environments and cultures and across different spaces. Such an understanding may further sensitize us to the relationship between user involvement and different locales and cultures, both at a local as well as a multi-sited level. Relatedly, the scope of analysis could include this very context. So far, the thesis has been mainly concerned with situational enactments and practices inside closed settings. What has fallen outside its analytical scope, for the most part, is how these localized performances connect to the wider context. This involves addressing questions such as how particular images of older people in design practices are linked to broader discourses, how situated imaginaries are bound to broader socio-technical ones and how user involvement is politically positioned within other contexts and spheres. Picking up these questions could provide promising paths for future research.

Finally, there is a need for stories about ethics. A certain way of doing and performing a reality always has ethico-political consequences (Barad, 2007; Law, 2004; Mol, 1999). But what would 'ethical' user involvement engender? And what would a 'good' way of configuring participation be? Is user involvement 'good' at all? Where and for whom? What roles do the different stakeholders play? What types of presences are created and what types of absences? These are questions that remain largely unanswered by this thesis. To be certain, the thesis does encourage a particular line of inquiry into the implicit presences and absences of socio-material conditions and their complicity in enacting ageing. But the thesis has not examined these performances beyond their circumstantial enactment. Another array of questions would open up that addresses an instrumental and interventionist dimension of user involvement. How to introduce new images about older people? How to alter current practices of user involvement and participation and their underlying socio-material conditions? And to what extent can and should we intervene? The issue of user involvement thus remains open and mobile, ready for new encounters and modifications.

8 CONCLUSIONS

As stated right in the beginning, the overall aim of this thesis has been to advance our knowledge about user involvement as a practice, using an STS perspective. To do so and learn more about user involvement as a method, in this thesis I particularly sought to zoom in on the *practices* of *doing* user involvement and to build on and contribute to a growing and extensive body of STS research on objects, practices, users, stability, reality, methods and imaginaries. I was hence concerned both with the practices by which participation may enact particular realities and with how user involvement, in turn, can be studied as a method that is itself circumstantially brought about within situated design practices. The studies appended to this thesis stretch across a range of different contexts in that regard, each seeking to examine a particular facet of user involvement. They include studies of how practices of user involvement mattered in the empirical literature developing technologies involving older people (Paper I), how different configurations of participation may enact different versions of ageing (Paper II), how user involvement can be achieved in corporate practice in the first place (Paper III), and how such corporate practices themselves enact particular realities for ageing in a durable fashion (Paper IV).

So, what was there to learn about user involvement as a method, if we focused on the practices of doing user involvement? As this thesis has shown[12], user involvement appeared to be a practice that was both contingent and transformative, as it selectively enrolled different actants and performed multiple realities through different configurations. Rather than being a straightforward method with clearly and easily identifiable implementation steps and outcomes, the thesis shows how user involvement, as a practice, is instead dynamic, practiced differently from site to site and has the potential to yield an array of different outcomes and realities, not just for users and technologies but also for unrelated objects. In particular, the thesis emphasizes the importance of the underlying socio-material factors that condition different practices of user involvement. It brings to the fore how practices of doing user involvement depend on a range of premises and features, such as underlying images, levels and stages of involvement, selection procedures, the materials and participants involved and broader tensions and frictions. Moreover, the thesis reveals how these diverse and momentary practices and performances of user involvement themselves occasion and bring into existence different realities, articulating and materializing particular versions of objects and images

[12] 'This thesis has shown' may suggest that there is a reality that I have shown that is external to my involvement as a researcher. But to reiterate my concerns in the preceding section, I should be clear about that it is *me* who wrote it, so it should be read more as I have shown, or I in the field have shown, or I together with the humans and nonhumans in 'the field' have shown. But can I / we be sure to have shown? Not entirely, as I also discussed in the previous section. Maybe, I can say that I or we purely believe to have shown. But how to convince, then? For matter of pragmatism, I decided to stick to 'this thesis has shown' in this conclusion.

such as ageing. Thereby, the thesis also shows how ageing can be understood as an object and image that is inconspicuously embroiled in the practices of design and user involvement.

Theoretically, then, the thesis contributes with three new concepts that seek to theorize the relationship between the underlying conditions for user involvement, practices of design and their effects: 'design multiple', 'shifting interstices' and 'viscous image landscape'. Each of these concepts seeks to capture a slightly different dimension of user involvement in design practice, in order to grasp its materially multiple effects, its transitory and momentary nature, and the persistence and recalcitrance of the emergent objects, respectively. *Societally* and *practically*, the insights presented in the thesis invoke a number of implications for contemporary questions of power, politics and ethics. Specifically, they call for an enhanced reflexivity among policy-makers, professionals and managers regarding the entire scope of underlying socio-material elements that appear to condition different practices of user involvement. Given the observation that user involvement can take diverse forms, the thesis asks policy-makers and management alike to become clearer about, and openly discuss, precisely what forms of user involvement are desired and which ones are not. This, the thesis shows, appears all the more relevant because design and implementation of user involvement can have unintended – but nevertheless long-lasting – consequences for old age. *Further research* is therefore needed to bring clarity regarding the ethical and political dimensions of user involvement, and to tackle the challenge of thoroughly comprehending the interlinkages between different socio-material factors and their effects on practices of design and user involvement. Without such research and clarification, user involvement may just all too comfortably slip into its old attire: a black box masquerading as another ideograph.

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