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## Abstract

Digital automated and connected technologies are playing a central role shaping how home life is experienced and understood. This emerging digital ecology is also reconstituting the home as a site of research and the methods required to study it. This article introduces a collection of contributions that highlight methodological issues and avenues for researching life in technology saturated home environments. The contributions make the case for qualitative, creative, collaborative, computational, and quantitative methodological approaches.

## Introduction

The presence of connected, and automated technology devices, data, and algorithmic systems is increasingly becoming a constituent part of everyday life in the home. The home currently constitutes a complex technology environment with gadgets such as laptops, tablet computers, digital home assistants, smart fridges, and robot vacuum cleaners becoming part of home life. The materiality of technologies, their affordances, and corresponding affectivity are contributing to a reshaping of ideas about the home and relationships between the home and the outside world. The home constitutes an ideal site for understanding how digital technologies are shaping everyday life. the home is both physical and metaphorical, local and national, a place of belonging and exclusion. It is at the heart of the most seemingly mundane spaces and experiences – the site of quotidian activities such as eating, washing, raising children, and loving. Yet it is precisely the purportedly banal nature of the home that masks its deep importance for the underlying assumptions that structure cultural and political life (Cox & Buchli, 2017: xii).

This offers researchers who have the home as a site of research opportunities for developing new understandings of everyday life in automated domestic environments. It also poses considerable methodological challenges given the complexity of the digital infrastructures and the experiences, spaces, infrastructures, visions, and ethics involved.

This special issue (SI) is part of work connected to an ongoing research project, RELINK, a Norwegian Research Council-sponsored research project that aims to build knowledge about digital vulnerabilities in digitally connected homes, and to contribute to reducing vulnerabilities in households in the future. It underlines our desire to dialogue with a growing international community of researchers to explore the ontological concerns, methodologies, research tools and techniques, to address current future and issues raised by living with technologies at home in the present and future.

This SI brings together the work of social science, humanities, design and computer science scholars and researchers who have developed a series of critical positions, frameworks, strategies, and resources for approaching methods of research on the digitally connected home. The contributions to this SI comprise of a rich mix of qualitative, creative, collaborative, computational, and quantitative methodological approaches spread across

different places such as Norway, Australia, and the UK. The contributions illustrate the use of these different methods in the study of diverse domestic phenomena such as play, energy consumption, work, and care. They propose pragmatic, innovative, and conceptual responses to methodological challenges related to issues such as access, imaginaries, participation, measurement, and ethics.

### **The contributions**

The digitally connected home is a particularly challenging research site given that the home is one of the most intimate spaces of everyday life. It requires methods that enable the researcher to access, observe, dialogue, and engage with people, and the socio-material environment of the home. Many of the articles in this SI were carried out during the COVID-19 crisis. Researchers who had planned in-person fieldwork in homes had to resort to alternative remote method approaches using digital technologies. For researchers, this posed the question of whether they could develop a rich understanding of people's everyday domestic living with technology from a distance through mediated approaches. As Pink (2022: 5) points out "this is not a simple task of transferring something that was in-person, into an online format, but involve significant new curation, communication, and practical activity». The question of the skills and routines associated with deploying digital technologies for research in the home was equally central.

In their article Melisa Duque and colleagues suggest that the uncertainties that arise in contexts such as the COVID-19 pandemic require the development of creative and ethical methodological approaches. They propose the notion of troubleshooting as a conceptual and practical way to understand and act when the circumstances of research demand creative and rapid adaptation. Drawing on an Australian project that sought to explore ageing people's experiences with smart home devices, the authors demonstrate how sustained remote engagement with research sites required several adaptations. These adaptations took the form of new activities, equipment acquisitions, and ethical amendments between researchers, participants, and technologies. They identified these adaptations as a valuable starting point for methodological innovation. Cristina Paupini, Helene Teigen and Laurence Habib take up a similar theme in their article based on fieldwork in Norwegian households within a context of social distancing. They underlined the importance of continuous flexibility during fieldwork, highlighting the need for attention on the ways in which researchers and research subjects interacted, the spaces they inhabited, and the tools available to them. They demonstrated how during remote digitally mediated fieldwork, research participants in their homes acquired an increased agency, as they held the power of shaping the perspective of the researchers through the lens of their webcams.

Another set of uncertainties engendered by digital connectivity during the COVID-19 pandemic regarded the reshaping of the socio-spatial boundaries surrounding activities in the home. During the period of social distancing, technologies took a prominent role as the home emerged as a site in which time-space boundaries between activities such as learning, parenting, work, entertainment, and remote medical care increasingly became blurred. Uncovering these dynamics requires methods that make visible and acknowledge the textures, feelings, and embodied perceptions that are part of material and social atmospheres of the home (Pink et al. 2017). Larissa Hjorth, Gretchen Coombs, Kelly Hussey-Smith, and Julienne

van Loon explore the blurring of boundaries between work and care drawing on a study of everyday experiences of primary carers who are also creative professionals working and caring from home during the COVID-19 pandemic. The article explores the capacity of digital technologies in the home to erode work/life boundaries drawing on Melissa Gregg's (2011) notion of "presence bleed". The authors demonstrate how creative practice ethnography techniques such as photos, drawing and creative writing can make visible the emotional geographies of the home as a space for competing tasks and temporalities as it increasingly becomes embedded by digital work and life rhythms.

It is now established that the home needs to be understood as a domain where online and offline, virtual, and physical life, are intricately intertwined as domains of living and research (Schulte-Römer and Gesing, 2022). Homes populated by digital technologies are spaces where increasingly virtual interactions intersect and blend with bodies in physical space. The contribution by Jane Mavoa, Bjørn Nansen, Marcus Carter, and Martin Gibbs proposes a method for capturing rich descriptions of children's play with the game Minecraft within children's social, technical and physical contexts by synchronizing observation of multiple perspective data, including children's bodies in physical space and on-screen action. The authors maintain that the method provides an effective solution to the problems of gaining access to the intimate spaces of digitally connected homes and playthings that have been difficult for researchers to view and record thereby broadening insight into children's contemporary gaming worlds. The multi-perspectival gaze, they argue, demonstrates the tensions inherent in the task of researching children's digital play and household media use more broadly in a context in which sociality is enacted and distributed across private, physical, and digital spaces.

Accounts of the adoption of digitally connected home technologies have emphasized the intricate ways in which power and agency are distributed between human and non-human actors, such as data, algorithms, platforms, infrastructures, and IoT devices. Many connected home technologies operate through gathering and sending data, often in ways that the owners of the technology are unaware of. Accessing and studying data might constitute a challenge in a context where such data flows through an opaque and complex ecology of devices, applications, platforms, and infrastructures in and out of the home. Friday et al. attempt to untie the methodological knot regarding the understanding of how energy consumption and technologies are related to the performance of domestic practice. They propose a methodological approach which they call Resource Trace Interviewing. The approach comprises of collecting and visualizing data on energy resource use collected from sensors deployed in the home, combined with qualitative accounts (interviews, diaries, home tours) to develop shared understandings of the impact of energy resource consumption between researchers and participants. The authors argue in favour of seeing qualitative and quantitative methods not as separate but as complementary approaches deployed to reveal the relationships between home activities, the growing footprint of digital and connected devices, and energy consumption. They propose their method as a contribution to gather knowledge about techniques for studying and interpreting the impact of practices, including but not limited to, energy demand in the home

Homes and technologies are not just are not just physical and material contexts but are symbolically constructed realms. As is evident in the title of our introduction to this SI, the notion of the "connected home" is central to current understandings of digitally connected domestic

environments that comprise digitally integrated and automated systems. It is only one of several descriptors that are used to convey both today's digital domestic spaces and imagined automated future home. These include notions such as "smart home", "intelligent home", "networked home" and the "home of the future" (see Harper, 2011; Chambers, 2016). The idea of the smart home has represented an optimistic vision of future living, promising enhanced comfort, security, and leisure, and has drawn attention from consumers, policy makers, companies specializing in technology, and others. Underpinning this utopia (Strengers 2013) is a smart ontology that frames ICT and quantitative data as the unique pathway to social transformation and technology is positioned as the ultimate solution, capable of securing and improving our everyday lives. Such visions flatten the complex and messy socio-cultural realities of domestic life and are often disassociated from everyday experiences of residents.

Researchers seeking to move beyond technocentric and reductionist conceptions and turn towards more people-centric and contextually situated views of homes of the future have been inspired by methodological approaches from design anthropology, Human Computer Interaction, and speculative design (Akama et al., 2018; Jensen et al. 2018; Smith et al. 2016). Building on this work, the article by Becker, Haupt, Berger, and Pentzold examines how narrative methods for researching and designing future homes engage with issues of creativity and participation. Their survey of existing academic HCI and design research literature reveals that although methods from these disciplines invite people to suspend disbelief, be creative and imaginative, it was difficult for them to separate imagined versions of future homes from the realities of current ones. Ever present in the imagined future homes were the same everyday interactions with technologies, gendered domestic roles, and emotional attachments. The authors invite us to see people's difficulty in uncoupling visions of smart dwellings from current everyday lived experience as evidence of the importance of the role of materially bound and socially contextualized realities in the shaping of future home narratives.

## **Conclusion**

In its inception, this SI solicited methodological reflections about possibilities and challenges related to understanding the connected home as a research site. The contributors have significantly engaged in these concerns through accounts of experiences from the field, research designs and interventions, and by raising conceptual, procedural, ethical, and ontological issues.

The articles in this SI firstly highlight the necessity of interdisciplinary collaborations across a wide range of disciplines and methodological practices to address key questions arising from the increasing digital connectivity of the home. The papers illustrate how, for example, computational methods can come into dialogue with ethnographic approaches, and how numerical data and experiential accounts can complement each other. They highlight the importance of collaboration between researchers, research subjects, experts, users, and even with the automated technologies themselves, sometimes acting as participants in research (see Pink, 2022). Secondly, the SI contributions underline the importance of adopting flexible, adaptable, and creative approaches to methods for understanding the messy, shifting, and contingent relationships between people, technologies, processes, and environments in the

home. Thirdly, the contributions emphasize the agency of methods in shaping the meaning of the home through the way they foreground (or obscure) experiences, material environments, and visions.

The COVID-19 pandemic provided a particularly interesting context for examining methods for studying the digitally connected home. The emerging “COVID digital home assemblage” that have shaped the sociomaterial choreographies of everyday domestic life (Watson et al. 2021: 1) has underlined the importance of developing methods capable of engaging with people, things, environments, activities, and narratives of the home as they shift, change, and acquire new meanings. We hope the articles in this SI highlight key issues but also break new ground as the task of devising methods for studying digitally connected home increasingly becomes a complicated one.

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