

Towards Ethical and Sustainable Technology-Supported Ageing at Home in Finland – KATI Programme

Full paper

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Abstract. The population of Finland is ageing with greater demand for health and social care; homecare workers are over-burdened with keeping up with this change whilst ageing themselves. Technology is seen as one of the most promising solutions to tackling these challenges. In the national KATI programme, six regional projects will implement technology solutions and adopt new technology-based practices in a coordinated manner to support the ageing of older people at home as well as the homecare professionals and services. In this article, we give an overview of the variety of technology solutions being implemented and the first ethical questions that have been raised by the projects in the early phase. Thereafter, we highlight three different theoretical approaches that support the ethical and sustainable technology implementation advanced by the programme. The approaches 1) emphasize the holistic perspective on the health of the older person and the method of discourse ethics to seek for consensus about the technology solutions, 2) learn from safety research and the change theory for better ethical design of AI systems, and 3) analyse the technology implementations and the programme from a systemic perspective within the framework of socio-technological transition. Our expectation is that the approaches will provide theoretical tools and heuristics that can be used to ensure that the ultimate goal of the KATI programme, a national, continuing collaborative model of technology-supported ageing and care of older people at home, will be ethical and sustainable.

Keywords: ageing, home, technology, AI, ethics

1 Introduction

Finland is one of the fastest ageing countries in the world. Although ageing people are healthier compared to earlier decades, the Finnish workforce, care professionals among them, are getting older. People are expected to work longer and retire later, but simultaneously, there is a lack of care workers. The economy is facing challenges due to increasing service needs and the weakening dependency ratio. Among earlier governmental strategies and programmes, the recent technology policy report (Technology Advisory Board 2021) underlines the better utilization of technology as the most promising solution for the sustainability challenge created by the ageing population. There is an urgent need to apply new technologies, data and artificial intelligence (AI), and digitalization of services to prevent diseases, support ageing at home as long as possible and increase the effectiveness of early-phase care.

Finland is not alone but the sustainable provision of elderly care is a topic of debate in most welfare states (Essink 2012). The debate mainly relates to quality and affordability of care.

Digitalization and the implementation of technologies in elderly care are expected to play an increasing role in meeting the anticipated sustainability gap in elderly care services (e.g. Kapadia et al. 2015; Malanowski 2008; Peine et al. 2015). Implementing these technologies entails a range of challenges, including a lack of suitable technologies and immature existing ones (Pekkarinen, Melkas & Hyypiä 2019). However, to a great extent, the challenges are related not only to the technologies alone but to their integration into the user contexts, such as the services in which they are used. In particular, the ethical aspects of the wide technology integration into care services should be of interest. The major ethical issues concern, for instance, a sense of autonomy, human dignity, informed consent – particularly in the case of cognitive impairment, data management issues, affordability and distributive justice (potential socio-economic disparities) and impacts of technology use on human contact and empathy (see e.g. Wangmo et al. 2019; Niemelä et al. 2021).

This article introduces a governmental programme called ‘Smart Ageing and Care at Home’ (‘KATI’ for the Finnish Acronym) to systematically and purposefully advance the implementation of new technologies and digital services for well-being, ageing and care of older people at home in Finland. The programme steers six regional projects that implement new technologies in services supporting ageing at home and home care. The projects themselves already raised some ethical questions in their early phases. The programme aims to bring these into the public discussion.

The programme is supported by an Ethical Advisory Board of expert members that bring different ethical and scientific approaches to ensure the ethical and sustainable technology implementation advanced by the programme. The approaches concern the holistic perspective on the health of the older person and the importance of engaging older persons and professionals in the development, the challenges in the current design of ethically sound AI systems and services, and the changing practices of ageing at home and care services as socio-technical transition. In the discussion, we analyse how these approaches support developing the KATI programme towards a continuing national-level practice of collaboration, learning and sharing of experiences and

knowledge to ensure the sustainable, ethical and systematic adoption of technologies in the ageing society.

2 A national programme to support well-being, ageing and care at home with new technologies (KATI programme)

The main goal of the KATI programme is to advance and support the integration of new technologies into care services for older adults as well as independent living in Finland. Utilizing technologies is embedded in the quality recommendation to improve the well-being of older people and renew services (Ministry of Social Affairs and Health 2020). The programme itself is a coordinating activity that steers six regional projects across seven regions in Finland (Figure 1) to reform the services of living at home and home care with technology. The project consortia include municipalities or associations of municipalities, actors from both the third and private sectors, and universities as partners. The projects follow their own regional plans for technology deployments under and in collaboration with the coordination body from the Finnish Institute for Health and Welfare (THL). The Technical Research Centre of Finland Ltd (VTT) participates as an expert of technology solutions.

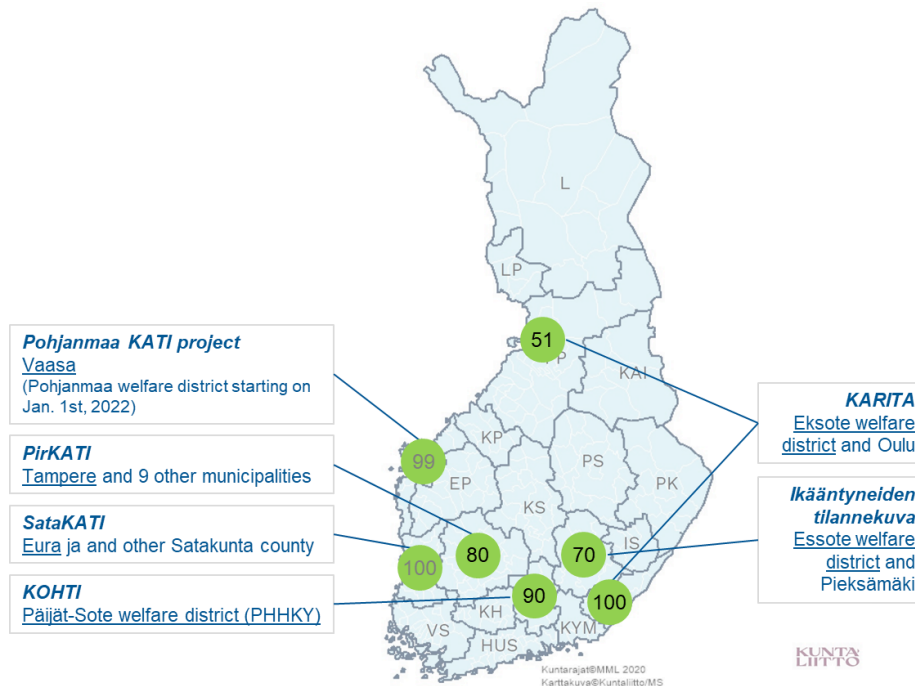


Fig. 1. The regional KATI projects on a map of Finland. The number in the circle refers to the population coverage of the project in the county.

The regional projects carry out pilots and deployments of various technology devices, applications, services and systems. The projects also use technology to collect health-related data to be used in care services to support independent and safe living at home. The projects co-develop by engaging the users in piloting and adopting technologies together with independent older adults, homecare customers, family members and care professionals. Moreover, the projects educate and train homecare professionals for technology use; develop new care work roles, procurement processes, support services and registries for devices and application; and produce health technology assessments by using the national Digi-HTA criteria and procedure (Haverinen et al. 2019). Overall, the programme encourages the projects to co-develop with the stakeholders, involve end users in the early phases to plan the deployment and use of technology solutions, and ensure the solutions' ethics. The vision of the KATI programme is illustrated below (Figure 2).

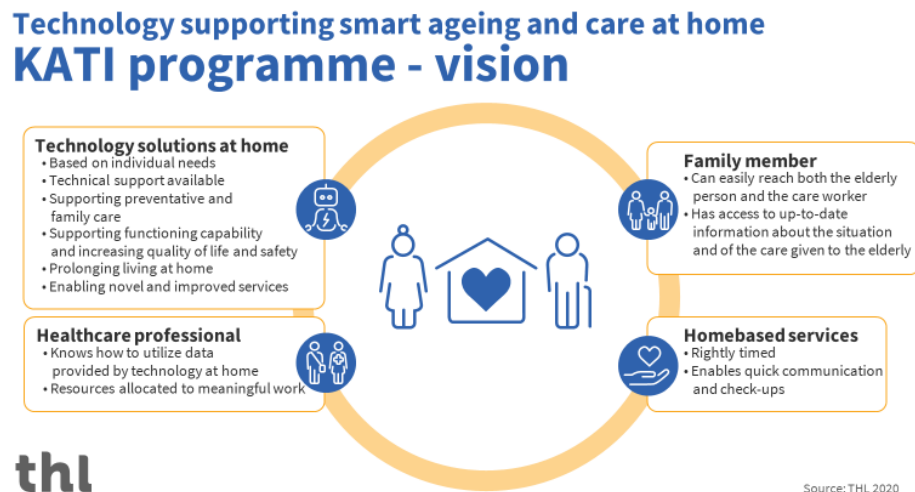


Fig. 2. The KATI programme vision.

All projects participate in impact assessment coordinated by THL and VTT. The impact assessment of technology systems will be done in a multi-perspective way. The focus will be on well-being at home, care professionals and work, costs, processes and infrastructure to utilize technology, technology aspects such as feasibility, integrability and scalability, business and innovation, and ethics.

The KATI programme is funded by The Ministry of Social Affairs and Health for the years 2020–2023. It is part of the Horizontal National Programme on Ageing 2030 (Ministry of Social Affairs and Health 2020), which supports good health and functional capacity of older people. In addition, KATI is part of the national welfare development strategies and implements home living measures of the Well-being and Health AI and Robotics Programme (THL 2020). In total, the programme and projects have a budget of approximately 10 million euros.

3 Technology solutions and ethical concerns in the KATI regional projects

The KATI projects were launched in February 2020. The overview of the technology solutions that are being implemented by the KATI projects has been collected in two phases. In online discussions with the KATI projects in the latter phase, we also enquired if the project had ethical worries in mind related to the technologies. The ethical concerns we raise in this chapter are based on this project input and do not systematically cover all ethical concerns related to the technologies in KATI.

First, in February–March 2020, we arranged a survey for the regions to collect information about the technologies they were planning to pilot, adopt or strengthen in their KATI project. The survey data were collected as an Excel table from each region (the local project coordinator). The table also included questions about expected pilots, level of usage, integration into other systems, scalability and support services related to each single technology mentioned by the region.

The aggregated data include dozens of different technology solutions. The most popular solutions are various monitoring (e.g. sleep, activity, falling, nutrition) and remote health measurements, Internet of Things (IoT) and integration platforms with data collected at home, and AI analytics. In Table 1, we have categorized the technologies into seven groups.

Table 1. Technology solutions to be adopted in the KATI projects

Solution category	Examples
Remote health measurements (attached to the older person)	Measurements of vital signs or weight at home are automatically transferred to care information systems
Monitoring technologies	Sleep, activity and nutrition monitoring
Safety-increasing solutions	Wearable safety solution with GPS localization; medicine-dispensing robot and medicine reminder; monitoring falling or risk of falling
Solutions supporting social activity	Virtual peer groups and coffee groups, social robot
Technologies installed in the apartment	Home condition measurements: temperature, humidity, lights; safety monitoring system at home
Technologies for care professionals	Electronic homecare optimizing system; home and remote rehabilitation solutions, exoskeletons, virtual homecare or consultation visits, Virtual Reality–based training
IoT and integration platforms	Data from devices, applications and services at home are collected in a platform to be further analysed by care professional or AI

Second, in May 2020, we arranged online meetings with each project to discuss the first months of the project and elaborate on plans for piloting and implementations. In this phase, we found that the projects were starting the implementations somewhat slower than we initially expected, and many pilots and implementations were scheduled for the next autumn or even the next year. Nevertheless, we collected information about the plans related to pilots, purchases, support and training services and expected impacts and challenges of the technologies and their use. We also asked the projects whether they have already identified ethical questions related to the technologies. The projects named four types of worries that they perceived as being ethical (Table 2).

Table 2. Ethical worries raised in the KATI projects

Ethical worry	Ethical values at stake
When must there be a physical homecare visit and when is a remote visit sufficient? A professional can judge that remote care is enough, but the relatives or the client are against it. There are unclear cases.	An issue of expert knowledge vs (recognition of) patient's (perceived) needs
Wide 24-hour monitoring strives for safe, independent living for the client. Homecare workers as well as relatives should have access to the data. What kind of ethical issues concern privacy?	Many values ranging from surveillance to rights of access to data
In remote care, e.g. remote care phone application for the homecare worker who has the phone in her pocket: How can a client with memory loss give consent for data viewing and sharing?	An issue of autonomy and the possibility of meaningful consent
Data are widely collected in information systems and can also be viewed for other purposes (secondary use). How do customers and relatives experience the monitoring and (extensive) utilization of data?	Right for data protection and security

Based on the data and discussions with the project, it is obvious that homecare services with physical visits at the older client's home are strongly shifting towards various technology-enabled remote homecare and health services, to the extent that technology-based remote care will be provided as the default service. Thus, we also present two case descriptions that highlight challenges in the negotiations of remote care, as raised by one KATI project:

Case 1. The client's relative refuses to implement and pay for a drug reminder. The client has a mild memory disorder. The home services attempted to get her a medicine reminder because she is still coping relatively well with her daily activities. Her only problem is remembering to take medication, which she sometimes forgets. The client still carries out other tasks independently, except for banking matters. The client agreed to try the medication reminder. However, her sister refused to implement it, arguing that the nurse would no longer visit the client daily. The home services suggested that instead of a daily visit, three visits a week should be sufficient after implementing the drug reminder, as the visits served no other purpose than to monitor medication intake. The sister and the client were also informed that if the medicine is not taken, the home care will receive an alert, in which case the customer will be either called or visited. The sister refused to implement a drug reminder for the client and will not pay a monthly fee of €35 for the drug reminder.

Case 2. Check-up visits according to the client's wishes. When returning from the hospital department, the client wishes to have a check-up visit, even if there is no need for home care. The client and relatives want to check that everything is fine. According to the criteria, check-up visits are not possible without a real need. In this situation, a video connection to the customer may be offered. If the client does not agree to this or does not want a remote connection, he or she will not be provided with a homecare service. This easily creates a problem for the caregiver because they want to be 'good caregivers'. At the same time, a strong commitment from the caregiver is required for the given criteria. This applies to all other caretakers; they promise check-up visits even if there is no justification other than the client's wish. As a caregiver, it is often difficult to refuse a client's request.

To summarize, the KATI projects will pilot and implement dozens of various technology solutions to support home care and independent living of older adults. Monitoring and remote care applications are emphasized (and not, for instance, physical robots). It seems that the many single devices, applications and systems adopted will also be integrated into IoT and integration platforms that combine different health data collected at the client's home. The platforms may also utilize AI to automatically analyse the data and raise (non-critical) alerts. These involve many ethical questions. The KATI projects themselves have provided some technology-related worries that they perceive as ethical in nature, and it is clear that a more systematic ethical review needs to be done on the technologies. In this paper, we start by discussing three theoretical approaches that we have initially focused on in order to understand and tackle the ethical concerns.

4 Approaches of ethics and sustainability

4.1 The older person's health as 'homelike being-in-the-world'

The World Health Organization (2021) has defined health as '*a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.*' This definition from 1946 is over 70 years old, but it seems we are still failing to achieve the spirit of that definition, which is to see human beings as complete

individuals and not to look at only the biomedical state or let the disease define the people. Therefore, there is a need for other viewpoints that respect patients as individuals with their own needs, desires, fears and backgrounds.

For this, we derive the definition of health from Svenaeus (2001), who presents it as '*a homelike being-in-the-world*', a concept based on Heidegger's being-in-the-world in his magnum opus, *Being and Time* (Heidegger 1929). Svenaeus' view of being focuses on the medical context and gives rich insight from the phenomenology of health and hermeneutics of medicine. Svenaeus' idea is that that we should focus not only on medical problems per se but should instead shift focus towards individuals' experiences of their own life and their meaningfulness (see Svenaeus 2001). From this viewpoint, as a premise, the individual is healthy if they are homelike with their life and can pursue meaningful and personal goals. In the sense of health as homelike being-in-the-world, some diseases do not necessarily mean that the patient is not healthy – they may just have some medical condition, such as diabetes, that needs to be noted and taken care of, if needed. Thus, this definition of health is a good approach for promoting different roles in health care so that peoples' needs are taken into account instead of their being treated as mere patients. Koskinen (2010) shows that health, when seen as homelike being-in-the-world, is compatible with patient-centredness and patient empowerment – issues at the core of the KATI programme.

However, to be able to create health technologies that support health as homelike being-in-the-world, we need to bring the citizens and different professionals together to ensure that all needed insight is brought to the table. To be able to find consensus about what kind of technology supporting smart ageing and care at home would be needed, we need open communication between all stakeholders. Without proper communication, some viewpoints will override others, and usually, the weakest part is bypassed, which is ethically problematic.

As an approach to prevent this, we propose to utilize discourse ethics in the KATI project. Mingers and Walsham (2010) noted that discourse ethics can be seen as a practical ethical approach for developing the information services. Likewise, Stahl (2012) supports this idea that discourse ethics – based on Habermasian rational discourse – provides a mechanism to consider different moral views and intuitions. Discourse ethics (Habermas 1992) is based on rational discourse, which is presented in communicative action theory (Habermas 1984, 1987) and further developed in his work, *Between Facts and Norms* (Habermas 1996).

Rational discourse is based on the view that all stakeholders can participate in discourse and that discourse itself is rational (Habermas 1996). All arguments in rational discourse are evaluated in terms of how convincing and plausible they are. Arguments can be based on logic, ethics or another justified basis. A crucial aspect of rational discourse is that no strategic games are allowed: they must be rejected. A strategic game is a way of influencing others where some participant is trying to end up with an outcome by using an action other than a better argument, and this is not allowed. These strategic actions can be bargaining, hidden agendas or use of authority over others (James 2003).

4.2 Seeking resources for ethically sound AI systems and services

Along with the great expectation attached to the design and use of AI systems, there are still worries over the negative impacts of the ongoing development. To prevent and mitigate the ills, several suggestions for how to design ethically sound AI systems have been formulated. The existing AI ethical codes cover a variety of approaches from high profile declarations to normative rules of thumb for users and practical checklists for designers (Mittelstadt 2019, 501; Jobin, Ienca & Vayena 2019). Two things are common to the ethics documents: first, they share the aim to support the ethical design of AI, and second, they presuppose that it is possible to formulate AI ethics that will serve as the theoretical basis for deducing morally sound practical solutions for AI (Morley et al. 2019).

Evidence from the AI ethics endeavours is rather depressing. Studies show that attempts to secure ethical sustainability has not been effective (Hagendorff 2020, 118). Both theoretical and practical reasons suggest that the approach to tackle the moral problems should be wider than the present conceptions of AI ethics.

One of the reasons why the current ethical approaches have not been successful is that they do not pay enough attention to the specific features of AI. Typically in AI, the products and outcomes are not just single devices or services but sets of programs and applications within larger, often extremely complex systems. It is not possible to extract AI from the rest of the system. Most of the development and applications are carried out as commercial enterprises within the market economy. AI is a general means that is applicable to almost any human activity, which provides innumerable possibilities to employ it. Such features of AI have moral relevance, and they should receive due attention in formulations of AI ethics (Boddington 2017, 93).

To better account for the specific features of AI systems, we need a wider variety of resources than just the traditional ethical apparatus characteristic of the current AI ethics codes. During the past century, safety research has developed into a rigorous academic study that is tightly connected to the empirical reality of hazards and risks. There are several useful conceptions within safety studies that could help detrimental chains of events from taking place, even when implementing AI into elderly care (see Reiman & Oedewald 2008, 39–47 and Hollnagel 2014 about the development).

The aim of AI design and development is to change people's lives for the better and to positively impact the targeted issues. Recent studies on the factors involved in bringing about change and making a desired impact also offer tools for improving the ethical quality of AI. The theory of change and the Impact Management Project offer methods for organizations and companies to better keep track of the change they intend to bring about and the actual effects of their work on reality. Both approaches have their starting point in the complexities of the current world, where it is often difficult to plan and follow straightforward strategies. In favourable circumstances and with the right kinds of measures, the desired change emerges (Weiss 1995; Theory of Change).

4.3 Technology implementation in elderly care transition – the socio-technical transition framework

A central question is how innovations – both technologies and related innovative practices – contribute to broader societal changes in an ethically and socially sustainable way. This is also an issue to be considered in the KATI programme. To respond to this question, systemic views that highlight the relationships of technical, human and social aspects are needed. One of these systemic frameworks is the framework of socio-technological transition. Because this approach highlights the interdependence and mutual adjustments between technological, social, political and cultural dimensions (Bugge, Coenen, Marques & Morgan 2017; Smith, Voss & Grin 2010), it is a fruitful approach in studying processes taking place in the digitalization of the elderly care sector. The introduction of technologies into society and the development of technological innovations require a deep transition that entails the simultaneous development of technologies, service operations and people's practices and mindsets (e.g. Geels 2002, 2005; Truffer & Coenen 2012).

The multi-level perspective of socio-technical transitions tackles transitions as co-evolutionary processes on three interrelated conceptual levels: the socio-technical landscape, the socio-technical regime and bottom-level niches. The socio-technical regime can be seen as the way services are currently organized regarding infrastructures, service structures and products (using both high and low technology). It also includes mindset-related issues, such as people's preferences about the products and services they use and consume and related ethical values, the market, public sector and policy views, and the responses of such actors to people's wishes and requirements (Pekkarinen et al. 2020). In other words, elderly care is perceived as a socio-technical system consisting of services, technologies, science, infrastructures, user preferences and cultural meanings as well as ethical values (see Geels 2002).

Established socio-technical regimes are resistant to change, but transitions take place when changes at the landscape level, such as population ageing, exert pressure on the regime and make it unstable (Geels & Schot, 2007). The destabilization of the regime creates windows of opportunity for niche innovations, which are emerging social or technical innovations that differ radically from the products and practices in the prevailing socio-technical system and regime (Kemp et al. 1998; Geels 2018).

The various technologies and technology-based practices created and implemented in the KATI programme projects can be viewed as these niches. It may be difficult for new technologies to gain ground if they face a mismatch between the existing regime and the landscape. Until external circumstances are right, for example, the regime is destabilized, creating a window for opportunity for these radical novelties. This is why the niche innovations are called 'seeds for change' (Geels 2005). Examples of niches in social and health care and elderly care include service robots, various monitoring devices, technology for self-diagnosis and novel service configurations or care-work practices (Pekkarinen et al. 2020). The selection of new technologies and innovative practices is more than mere adoption. Users must also integrate novelties into their practices, organizations and routines (Geels 2002), and niches frequently collide with the regime because of existing practices' inertia and lock-ins. More than the 'singular

disruption' of niches, the question is about 'system reconfiguration' (Markard & Truffer 2006; Geels 2018). A wider breakthrough is followed by a stabilization and new types of structuring. These dynamics and interplay at different levels reinforce each other and lead to system changes and transitions (Geels & Kemp 2007).

5 Discussion

When adopting new technologies to support ageing and care services at home, the care professionals will need to tackle various ethical issues, of which we gave examples in Section 3. The KATI programme will raise these into public discussion in order to support the regional projects to find acceptable and sustainable solutions, whether based on technology or on the renewing practices of care. In addition, we described three approaches to ethical and sustainable technology implementation into elderly care. First, we introduced a concept of homelike being-in-the-world as a patient-centred and participatory approach and how the utilization of discourse ethics can be used to support open communication and understanding between all stakeholders. Second, we highlighted the theory of change and the Impact Management Project, which offers methods for homecare organizations to better keep track of the change they intend to bring about and the actual effects of their work on the patients. And third, we discussed the framework of socio-technological transition and how bringing several new technologies into home care is an evolving 'system configuration' where single solutions are seeds for a larger socio-technical change.

The homecare services would benefit from adding these perspectives in their practical care ethics in several ways. Every single worry that care professionals identify in their everyday work should be collected and discussed. This gives information about possible risks and lack of safety and tackling these at early phase increase care ethics for each single client situation. Taking the wider perspective and applying the method of Discourse Ethics could help to discuss and solve concrete problematic cases. For instance, in the two case examples from the KATI projects, the rules and care principles of the homecare are not understood either by the relatives, the client or the homecare workers. We argue, however, that using the presented principles and methods even these problems could be solved. This may require wide discussion from several angles and change of viewpoints of all participants.

Nevertheless, the approaches should work best on the programme level to support its development and national coordinating activities towards the sustainable technology-supported aging at home. For example, the KATI programme itself can be seen as a 'window of opportunity' for innovative niche technologies and practices to at least be experimented with, if not adopted, in the prevailing homecare service system, thus expectedly contributing to a wide-scale systemic change. The approaches provide theoretical tools and heuristics that can be used to ensure that the ultimate goal of the KATI programme – a national, continuing collaborative model of technology-supported ageing and care of older people at home – will be ethical and sustainable.

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