



Digital Mindset for Carers

RESEARCH REPORT

European Level

WP2 GROUNDWORKPAPER – RESEARCH

This research report is part of WP2 and identifies the present state of technology deployment in the care sector at the European level. It analyses European projects and initiatives and maps frameworks and training needs with respect to digital skills of care workers.

Die Berater, Vienna, March 2023

PROJECT INFORMATION

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| Project title | Digital Mindset for Carers |
| Project number | 2022-1-AT01-KA220-VET-000085278 |
| Funding programme | Erasmus+ KA220-VET - Cooperation partnerships in vocational education and training |
| Workpackage | WP2 Groundwork Paper |
| Linked task | Research report about the role of technology in the care sector and trainings needs of care workers regarding digital skills at EU level |
| Project coordinator | Die Berater, Austria |
| Project partners | ÖJAB, Austria ENAIP, Italy SOSU, Denmark Landstede, Netherlands |
| Authoring partner | Die Berater, Austria |
| Date of finalisation | July 2024 |



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EXISTING PRACTICES

Digital transformation is taking place in elderly care as in most other sectors. High end Technological solutions are rapidly developing: - Technical assistance systems in the living environment (Smart Homes, AAL - Ambient Assisted Living), e.g. floor sensors to trigger, emergency call systems etc. - Robotics: Technical systems that support or perform nursing activities and services, e.g. robotic arms in nursing beds for raising or positioning, or even cuddly toy-like robots for stimulating emotions, etc. But also much simpler technologies can support and improve quality of care, e.g. with regard to: - Coordination of mobile care assignments and tour planning - Electronic care documentation - Telecare, e.g. provision of care instructions or video connection via a video connection - Care apps, providing exercise instructions for physical mobilisation or memory training, - Reminders for taking medication, etc.

Ambient assisted living (AAL) makes “use of information and communication technologies (ICT) in a person's daily living and working environment to enable them to stay active longer, remain socially connected and live independently into old age”. Research efforts in AAL have increased rapidly to support independent living, as the social and economic impact of aging population has become a more concrete problem in our European society. AAL aims to provide assistive solutions for people affected by a wide range of physical and cognitive challenges, in particular elderly persons. **AAL applies the paradigm of the Internet of Things** where sensing technology is embedded in objects, or in the environment or worn on the person to promote health and enhance wellbeing, or to help maintain an independent life at home. These devices however need maintenance and more pressing – they need to be introduced to their users. Thus, an aware and self-determined use of ICTs is pivotal for successful implementation of new technologies. **The role of carers will therefore shift from not only maintenance but also introduction and facilitators of technology.** Even though this will happen on a low end user level, the necessary skills and competences of understanding, motivating and filling in, in daily situations will become increasingly part of carers’ skill repertoire. (caring4U, Final Report).

Thus, ICT skills concern not only the elderly but also their carers’. Within EU policy, the care sector is target of a number of European projects, with the “CareNet project, INNOVAGE, Care+” being some of them. Most projects target care receivers and work on digital and technological improvement of self-care. However they are highly relevant for informal and lower qualified carers since these groups are inevitably confronted with any changes in their field of work. Carers thus are stakeholders and also act within the parameters of any digital and technological change. This is also evident in all the following projects where carers are also addressed though not being the primary recipients of the projects.

THE PRESENT STATE OF TECHNOLOGY USE IN LOWER QUALIFIED CARE PROFESSIONS IN ELDERLY CARE

The following table is an overview of the state of technology across Europe as presented in relevant publications (Zigante 2020 and Liu et al. 2016):

Touchscreen technology (TT)

TT includes tablets and provides access to a range of applications which can be used for reminiscence therapy and engage with the user's current and past interests. It is an accessible medium which, once set up, requires little input from care staff or informal carers.

Assistive technology (AT)

Devices and equipment that compensate for sensory, physical/mobility, and cognitive impairments. Includes voice recognition software, text telephones, accessible keyboards, speech recognition software. The utilization of assistive technologies serves two main purposes:

- Supportive technologies: helps older people to perform daily activities that they would not be able to do without the functional support of the technology.
- Empowering technologies: train and empower older people to improve their functional capabilities, thus improving some of their capabilities that are required to maintain independent living.

Ambient assisted living (AAL)

Assisted living technologies based on ambient intelligence. Ambient intelligence is a new paradigm in information technology aimed at empowering people's capabilities by the means of digital environments that are sensitive, adaptive, and responsive to human needs. This vision of daily environments will enable innovative human-machine interactions characterized by pervasive, unobtrusive, and anticipatory communications. AAL can be used for preventing, treating, and improving wellness and health conditions of older people and assist with activities of daily living. Includes medication management tools and medication reminders, mobile emergency response systems, fall detection systems, and video surveillance systems. Connect and communicate with their peers, as well as with their family and friends.

"Smart home" technology

Includes different ICTs integrated in older people's homes to help them to perform activities of daily living independently. They include remote-controlled home automation systems, which have various sensors for doors and gates, microwaves or normal stoves, security devices, lighting, and an on/off switch for various appliances and home entertainment. The ICT components are programmed to react and communicate with each other through a local network, and with the surroundings via the Internet, ordinary fixed telephones or mobile phones. The technology can be used to monitor, warn and carry out functions according to selected criteria.

Artificial Intelligence (AI) and Robotic technology

AI and robotics are a relatively new development for the delivery of social care and evidence suggests that there are currently only a limited number of robots being used in social care until now – with upward tendency.

Personal care robots are designed to improve the quality of life of humans, on a non-medical basis. Care robots are machines that operate partly or fully autonomously with the aim of supporting potential users, older people and relatives as well as professional caregivers, in providing physical, cognitive or emotional support.

They can be broadly categorised into the following three groups:

- Physical assistance robots (PAR)

They are designed to either support care workers to perform physical tasks (lifting and carrying) or to operate independently. E.g. Robotic arm "Obi"

- Socially assistive robotics

These robots aim at improving the overall well-being of its users through companionship and support people through individual non-contact assistance. E.g. Pepper is the first humanoid companion robot that is able to recognize and analyse the facial expressions and gestures of the person interacting and to adapt its behaviour to the mood of the person.

- Cognitive assistance robots (CARs)

These robots can support users with cognitive impairment (e.g. people with dementia or Alzheimer's disease) in performing cognitive tasks. They may offer chatbots and interactions through voice commands and provide help in monitoring and self-managing care. E.g. Hector is designed as a companion robot for older people living alone to help them remain independent and secure through integrated fall detection mechanisms or remote monitoring services.

PROJECTS AND INITIATIVES

Several European projects have been implemented to explore the potential of ICTs and innovative technologies in supporting caregivers and older persons. Here is a selection of these projects:

CARICT

The [CARICT-project](#) was a 2-year European research project carried out between 2011 and 2012. The main goal of CARICT was to investigate the potential impact of information and communication technologies (ICTs) on informal and formal carers of older people in the community. Fifty-two different ICT-based initiatives for caregivers in 12 European countries were analysed. Telecare and emergency alarm were found to be the most frequent technologies to carers. Training sessions on digital competences for carers (and older people) to use ICT devices were considered crucial to help ensure the success of these services and overcome fears and prejudices towards new technologies.

CareNet

The [CareNet project](#) was a Life Long Learning programme, funded by the European Union (2012 to 2013). It involved 8 partners from 7 member states. It was aimed at developing a critical set of ICT competences for two identified 'at risk' target groups: care-workers and older persons. The project was designed to work in a synergistic way to tackle identified problems in the low skilled and under professionalised care-worker sector while at the same time promoting social inclusion and enhancing the quality of life of older people. The project developed resources based on cooperative learning between care workers and care recipients to facilitate care related digital competences, addressing ICT competences for employability and self-development (care workers) and ICT competences for active ageing (older people). A pilot programme took place in two European countries: Spain and France, involving the two main audiences of the project: care workers and care recipients. It was aimed at implementing and validating the learning architecture, pathways and resources produced by the project.

Carer+

The [Carer+ project](#) aimed to develop the digital competences of care workers and informal carers by designing and implementing learning paths and educational resources for mobile and work-based learning. The project aim was to equip European care workers (CW) with a set of digital competences to support older peoples in their use of ICTs and AAL (Ambient Assisted Living) technologies. It was intended to address significant challenges to their professionalisation, such as isolation, access to

technology, flexibility of study modes, lack of support and motivation, formal accreditation, recognition of prior experience, and scalability. The learning environment and training program were piloted in 13 sites across five countries, involving 500 users. The positive impact of the piloting experience was confirmed, with over 70% of care workers and informal carers stating that their homecare was enhanced and enriched by digital competences and tools. The project has also developed a website with comprehensive information and resources addressed to key stakeholders, including care workers, VET providers, researchers, and policymakers.

The project was supported by a blended-learning approach with peer-to-peer and intergenerational learning methodology. The training and testing included:

- The use of Internet Tablets as user-friendly, intuitive and handy ICT devices and acting as simple Smart Networked Objects enabled with Wi-Fi, 3G+, and RFID technologies, via NFC readers and tags integrating all-in-one solutions for inclusion.
- The creation of micro-certification processes based on a certification and motivational badge system
- The active inclusion of care recipients during this process.

The project also launched a campaign to engage decision-makers and stakeholders, reaching approximately half a million people. This outreach played a crucial role in securing the sustainability of the project's outcomes, particularly in terms of promoting the Digital Competence Framework, continuing the Carer+ learning environment and training programme, and sharing the Carer+ system for certifying digital competences in the social care sector.

ENTWINE

The aim of the [ENTWINE](#) (running 2018-2023) is to investigate the broad spectrum of issues concerning the development and use of innovative psychosocial and technology-based interventions that support willingness and opportunity to provide informal care. It first detailed the current and future caregiving challenges and motivations for diverse groups of informal caregivers and their care recipients, and society, in different countries that have different care systems (using an intensive longitudinal cohort study). It then established who needed support, what kind and when, and examined whether specific interventions, services and technology-based interventions (eHealth, social robots) could empower caregivers and reduce their burden. In that case, it looked how best to deliver the interventions, services (e.g. internet platforms) and tools to sustain willingness to care, experience optimal outcomes of their role, and improve quality of life amongst informal caregivers.

The methods include experiments, factorial designs, and persuasive profiling. The focus is on overcoming barriers following a user-centered, stakeholder-driven implementation to promote the adoption and implementation of innovative technologies in support of informal carers.

IN-ICT-CARE

[IN-ICT-CARE](#) is a 2-year Erasmus+ project that was launched in 2019 and aimed at the improvement of ICT skills among staff in care homes to ease the implementation of advanced ICT-enabled care services. This included digital health, electronic health (transfer of health resources and care by electronic means), technology-enabled care (TEC) services (use of telehealth, telecare, telemedicine) and wearable devices (e.g. sensors applied to the body). Unfortunately, little is available about the results of the project.

INNOVAGE

[INNOVAGE](#) was a three-year project aimed at promoting social innovations to support active and healthy ageing in Europe. The project was developed to address the demographic challenge facing Europe, the need to improve lifelong health and well-being for all, and the promotion of social innovation. It was also aligned with the European Innovation Partnership pilot initiative on Active and Healthy Ageing (EIPAH), which aimed to increase the average healthy life expectancy in Europe by 2 years by 2020.

The project involved developing and testing social innovations that improve the quality of life and well-being of older people, while also contributing to the extension of healthy life years in Europe. The project's objectives were to directly address the major barriers to innovation and healthy life year extension in the EU.

INNOVAGE had four social innovations which include a Housing App, which is a tool to help older people understand and predict housing accessibility in their present or future dwellings; the InformCare web platform, which provides internet-based support services for informal carers; iStep, a web-based intergenerational social innovation that aims to encourage exercise in everyday life to reduce obesity; and the Long-Term Care in Motion project, which promotes physical activity-related behavior in nursing homes to reduce a decline in motor function.

The INNOVAGE web platform (InformCare) provided internet-based support services and contributed to improving informal carers' quality of life and health status; With a consequent increasing in the long-term of their healthy life expectancy, as well as to empowering carers in the provision of better care for older people. It was available in 32 versions for 27 member states of the European Union (EU-27)

in 23 languages. InformCare was developed by the Italian National Institute of Health and Science on Ageing (INRCA) and Eurocarers in collaboration with a wide network of non-profit organizations and stakeholders across the EU-27. In the information resources section of the platform, users could read and access relevant information on several topics of interest, such as descriptions of most common impairments in older age, indications of what public care services are available in the national territory, suggestions for coping strategies and care management, explanation of financial and legal issues connected to the older person's status, and list of useful contacts and associations for getting further help. In the interactive services area, users could interact with other carers in similar situations through different communication tools, like a dedicated social network, forum, private messages, chat, and video-chat.

UNCAP (App for Android)

[UNCAP](#) aimed to address the market barrier of the lack of open standard ICT platforms in creating new care and assistance paradigms. UNCAP delivered an open source and scalable ecosystem based on existing technologies for bio sensing, indoor/outdoor localisation, and home-automation.

This ecosystem (still partially available and seemingly in use in 2023) allows for continuous non-invasive monitoring and assistance of aging people, including those with cognitive impairments, to help them live independently. UNCAP thus developed a product suite for formal and informal care environments, including the UNCAP BOX, UNCAP App, UNCAP CLOUD, and UNCAP certification suite.

UNCAP's achievements were assessed through several pilots in private homes, rehabilitation centres, daily nursing facilities, and homes in various EU countries. These pilots involved a large number of users and caregivers.

In detail: The UNCAP Android app is designed for use on Android-based TVs, tablets, and smart phones. Its main features include easy access to bio and health parameter measurement, historical data overview, video communication, reminders, and entertainment. The final release includes full driver AIDL API support, an offline mode with limited functionality, secure communication with the cloud backend, an entertainment section, historical charts, video call support, localization support, and bug fixes.

The web application is intended for use by caregivers, doctors, and elderly patients themselves. It provides an overview of collected data and enables interaction between the caregiver and the patient. Its main features include support for multiple chart types and table views, real-time display of ongoing measurement data, built-in video calling functionality, personalized GUI, patient alerts and caregiver

locations display, support for external service integration through single-sign-on, multiple levels of access.

The following document provides a comprehensive overview of the app:
<https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b779667d&apld=PPGMS>

FORTE

[FORTE](#) is a 2-year European project that was launched in 2022. The aim of the project is to gather evidence and highlight the needs of the social services sector with regards to skills and training. One focus lies on the impact of technology and digital solutions on the work and workload in different models of care and the skills needed to manage these digital solutions.

ANALYSIS

In general most projects share similar challenges with issues around technology reducing human contact and leading to increased loneliness for elderly living at home, issues related to practical usage and malfunctioning of technical solutions – which is also linked to **the level of trust users can and will have in the device or software**. Insufficient digital skills among older people and their carers is also a major challenge, as well as competent handling of data, i.e. **data protection**, which remains and is likely to become an increasingly challenging issue. (Zigante 2020).

The literature emphasises that a deeper understanding of the technologies will be increasingly relevant and carers will need to develop skills beyond functional instructions. To consider informal procedures and tacit knowledge (Aaen, 2019), as well as “invisible work practices”, that is, undocumented work required to maintain and support digital devices. However, informal and formal carers also benefit from assistive technology use by care recipients. Even if assistive technologies do not reduce the hours of care, it may be that intensity is reduced and strain on informal caregivers likewise.

The impact of technology on work processes seems to be a conflictual relationship. There is the evidence listed above, where great potential is experienced. On the other hand, Saborowski and Kollak (2015), carried out a qualitative exploration of formal care professionals’ views on working with technology and how they “care for or look after technology”. Findings included that care staff experience difficulties using technology such as malfunctioning (e.g. false alarms), are unreliable and difficult to manage. On the other hand, when the technology worked well, care professionals were more than happy to use it and to explore all functions and possible benefits. The authors argue that it

is crucial to research how care professionals integrate technology in their daily practice in order to understand how work processes can be improved and to support their role as users and facilitators of assistive technology.

A more detailed case study by Hassan 2022 published within the ENTWIN project showed that the frequent use of the Internet to access digital support services among Italian and Swedish informal caregivers in the study was associated with caregiver's

- age
- health status
- educational attainment (most significant)
- total household income (most significant)
- care recipient relationship to the caregiver (most significant)
- gender of care recipient (most significant)
- age of care recipient
- hours per week spent caring (most significant)
- the level of dependency of the care recipient

Thus, digital support services could be important tools to empower and support informal caregivers. On the other hand, it also needs to be recognized that informal caregivers are a diverse population, living in a wide range of personal and social circumstances. When it comes to policy and practice in relation to caregivers, similarly to other broad vulnerable groups, there is no 'one size fits all' approach, and it is therefore important to consider the specific characteristics and needs of both caregivers and care recipients. (Hassan A. 2022).

The **INNOVAGE** project on the other hand provided results showing that use of the InformCare platform was well accepted by users who reported benefits from exchanging with other carers and professional staff such as psychologists or social workers. Users felt empowered by becoming more self-aware of their own situation, receiving helpful advice from peers and moderators, and sharing their experiences and feelings with others in similar situations. The use of this social innovation has a positive influence on the quality of life of informal carers, which could indirectly contribute to better health status and an extension of their healthy life expectancy.

However, some issues need to be taken into account for implementation, including the low level of digital skills of many informal, lower level and professional staff, the **need for stimulation strategies** to improve active usage of web services, and the need for making carers more self-aware, particularly in contexts where they have low or no social and cultural recognition.

The social innovation process within the INNOVAGE project showed to be increasingly attractive in the New Member States (NMS) of the EU, as it was perceived to have the potential to bring profound change without requiring large institutional changes.

MAPPING OF TRAINING NEEDS AND OFFERS FOR HOME HELPERS AND CARE ASSISTANTS WITH REGARD TO DIGITAL COMPETENCES

Carer+

In line with the new and vital role for care workers as a “Carer+”, and the need of recognition and professionalisation of home care professionals across the European Union, a process for a certification of ICT competences for care workers was drafted. Following a survey carried out to identify the stakeholders particularly relevant in the field of ITC competences and home care, 3 national workshops (ES, FR and IT) were organised, together with a European workshop in Brussels

Identified key topics on future European ageing

The first challenges are over-arching issues for promoting participation and inclusion in its widest sense, cutting across all social relationships and socio-economic activities. A further set of more specific key priorities can furthermore be distinguished between barriers or enablers experienced in the community and those in the labour market. The challenges and main research questions are listed below:

ICT-supported caregiving

- How can ICT-based tools support caregiving?
- What is the role of ICT-based solutions in improving the quality of long-term care provided by formal and informal carers, as well as their quality of life?
- Which impact can ICT have in reducing the direct and indirect costs attached to caregiving?
- Which ICT-solutions are most easily transferrable and implementable on a large scale, also in contexts in which no strong tradition nor digital competences exist in using ICT?
- What role can ICT and virtual networks play in facilitating social inclusion?
- What are the effects of ICT-tools in terms of intra- and intergenerational relationships?

- Which measures are most effective in reducing or preventing the digital divide in using new technologies? And this especially in fields like long-term care, where they represent a crucial support tool for both formal and informal care providers?

AAL Programme

[AAL](#) is a funding program that supports projects to create market-ready products and services for older people. These projects involve SMEs, research bodies, and end-user organizations, and address issues such as chronic condition management, social inclusion, and access to online services. AAL aims to foster innovative ICT-based products and services for ageing well, create a critical mass of research and innovation, and help create market conditions for healthy ageing products. Since 2008, AAL has funded over 300 projects.

MAPPING OF EUROPEAN FRAMEWORKS

European Qualification Framework (EQF)

Over recent years, discussions on the qualification standards in the health and social care sector have increased. One reason is the mobility of professional care workers across Europe.

The **European Qualification Framework (EQF)** was adopted in 2008 with the aim of making the different education and training systems in Europe more readable and understandable. There are 8 reference levels that allow an objective description of learning outcomes (knowledge, skills and abilities).

Common Training Framework (CTF) in the health care and social sector

Based on the EQF levels, the **Common Training Framework (CTF)** is an instrument that enables to clarify and define the core competences of different care professions across EU Member States. So far, there is no common training framework (CTF) for lower qualified healthcare professionals. In 2018, a study that was carried out on behalf of the European Commission with the aim to explore the feasibility and interest among EU Member States for adopting a common training framework for health care assistants. The study identified a large gap between the clear need for a common training framework across Europe and its feasibility. Difficulties were mainly related to the current differences between countries, especially in the level of education and autonomy of health care assistants. Not all countries provide an official curriculum regulating education and training. As the education is regulated at the

discretion of the federal states in some countries it may result in a multitude of possible training and qualifications across the states.

DigComp

The [DigComp project](#) is an EU-wide framework designed to identify and develop digital competence in 5 key areas and 21 specific competences. It also provides eight proficiency levels and examples of knowledge, skills, and attitudes, as well as use cases in education and employment contexts. The framework is used to enhance digital skills of the population and is an important tool to support the EU's Digital Education Action Plan 2021-2027, Next Generation EU, and priority 'A Europe fit for the Digital Age.' DigComp is used for various purposes, including designing competence assessment tools, creating training courses and materials, and identifying professional digital profiles. The fourth iteration of the framework, DigComp 2.2, was released in March 2022 and includes more than 250 new examples of knowledge, skills, and attitudes, with a focus on emerging technologies such as AI. There are two Communities of Practice (CoPs) hosted by All Digital to support the implementation of DigComp in Member States, which are free and open to all stakeholders to join.

Other European frameworks

The Road Map 2015-2020 aimed to contribute to the Europe 2020 strategy objective to develop a competitive and resource-efficient economy based on knowledge and innovation. It sought to integrate a wide range of stakeholder interests in the ageing research and general ageing fields – encompassing both research, activist and business input. This Road Map 2015-2020 and the Demographic Report 2010 included the promotion of active ageing, increasing healthy life years and the integration of migrants. The Road Map also spoke directly to the Digital Agenda for Europe in recognising the potential of Information and Communication Technologies (ICT) to offset some of the impact, of later life loss of function and to promote social inclusion among older people. In addition, there had also been an entirely separate road map project on ageing and ICT development, BRAID (Bridging Research in Ageing and ICT Development) 2010-2012.

In the field of Ambient Assisted Living, the AALANCE and AALANCE2 2011-2014 (The European Ambient Assisted Living Innovation Platform), sought to utilise the rapid developments in ICT to enhance the lives of people as they age.

MAIN FINDINGS OF INTERVIEWS

In addition to the literature review, four interviews were conducted with experts in assistive technologies and digital health who provided insights into the current state and challenges of using digital tools in the care sector.

The interview guide used to conduct the interviews can be found in the appendix.

Interview partners

- **In total 4 interview partners** (3 women, 1 man) were interviewed
- **Profile of the interview partners:**
 - 3 researchers in the field of assistive technologies and digital health (WU Vienna research institute of ageing, European Centre for Social Welfare policy and research, Johanneum Research).
 - 1 EU-project coordinator of the CARE+ project.
- **Duration of the interviews:** 20-30 minutes
- **Type of interview:** 1 f2f and 3 online interviews

Use of digital tools in the care sector

According to some interviewees, the use of digital tools in the (mobile) care sector is mainly concentrated on information and documentation purposes until now. In much of Europe, care professionals still do not use ICTs extensively in their work. However it was stated that „the care profession is permanently confronted with a technical update“. The example of Health apps was cited that provide a great variety and possibility for users, e.g. for measuring the blood sugar level, including applications that enable direct data transfer of the determined values to compatible end devices (cloud solutions) and can be accessed by clients or other authorized persons.

Also many European projects, especially in the field of active and assisted living (AAL) support the development of care-related tools and technologies. Most AAL projects aim at maintaining mobility and independence of older people focusing on safety and risk-reduction for clients (e.g. fall prevention, light sensors or electronic emergency call systems) on health-improvements for caregivers (e.g. exoskeleton) or on improved care management.

Currently, research focuses on the following digital aspects in the care sector:

Improvement of the information flow between all different kinds of stakeholders that are involved in the care process through **ICT-enabled services**. These communication technologies provide new ways of collaboration, assistance and information exchange in order to improve the effectiveness and efficiency of information flow and workflows. **Central communication platforms** were mentioned as

one example that connect people in need of care, caregivers and relatives by a computer, smartphone or tablet and allow for sharing data between stakeholders, managing visits, calls and daily life activities.

There is increasing research focus on **digital tools in the context of dementia care** that ensure the security and safety of the older person. Popular types are wearables, smart watches or skin-friendly patches that collect data on physical activity, nutrition, sleep, stress, blood glucose, etc. These refer to the area of behavioural self-management that also raise issues on data privacy (see challenges). Smartphone Apps help people manage daily activities and communicate with their families. Lifestyle tracking devices can monitor the sleep quality of dementia patients and detect abnormalities.

Monitoring systems that are based on data collection through mobile app or different sensors that allow for detecting risks associated with independent living. This includes among others GPS trackers for patients at risk of wandering, wearable fall protection and safeguarding assistance with location-augmented voice service.

Voice-recognition systems that use voice as the most natural interface are also getting quite popular. This type of technology may assist people with cognitive impairments or those who have difficulties using their hands. CARU cares was mentioned as one example, a device that enables users to make a phone call by pronouncing a simple keyword and announces the arrival time of the care workers.

Augmented reality technologies via glasses and smartphones are also in the interest of research and increasingly used to upskill care workers through simulation and interactive experiences. In this case, however, digital tools rather serve training purposes and are not supporting the actual care work.

Identified benefits of care technologies

When implementing digital tools in the care sector, the following aspects seemed relevant to interviewpartners:

- Reduced time or work effort e.g. care documentation
- ICT for an improved interface management in the health care sector (family, GPs, therapists, ...) and coordination of services
- Protection of health of care staff and preservation of evidence (e.g. bodycams)
- Preventive nature for older people (e.g. memory training)
- Entertainment to tackle loneliness of older people

Challenges of technical innovation and competence aquirement in the care sector

The following issues were raised with respect to challenges of applying and pushing digital technology in the care sector

- **Data privacy and ethical issues:** Ethical issues seem to be an important aspect when it comes to the use of care-related technologies, in particular when it comes to surveillance technology and sharing patient health and social data. The question on how to ensure patient privacy, confidentiality of data was considered crucial among all interview partners.
- **Technology acceptance:** There is a widely encountered scepticism among formal and informal carers about the use of ICTs in care. Also, care managers and decision-makers express reservations about the benefits of ICTs. Therefore, efforts have to be made to convince the stakeholders of the benefits of care-related tools and
- **Engaging all stakeholders:** The deployment of ICTs and other care-related technologies requires that not only professional caregivers but all stakeholders involved in the care process (the person in need of care, informal caregivers, middle management e.g. care managers) acquire a range of specialized knowledge. Also pedagogical staff in the training sector needs to have the relevant digital skills to actually train the care workers adequately. Informal carers need to be recognised as co-providers of care and to be integrated in the formal system as relevant stakeholders.
- **Isolated solutions:** So far there seems to be a lack of common ground and understanding of the competences to be taught and the technologies to be considered with respect to digital upskilling of care workers. A uniform structure of competency requirements agreed by care practice, care science and informatics would be useful.
- **Differences between mobile and stationary care sector**
- **Lack of technological infrastructure:** Despite all the technological possibilities there is still a fundamental lack of technological infrastructure and a lack of financial resources to acquire IT materials in most social and health care organisations. Also, in most clients' homes there is little basic technology available. Thus, upskilling care workers is one side of the coin, but on the other side, a technological upgrade of care providers and of private homes where the care services are delivered are required in order to actually match the digital skills with the work environment.

Learning needs of the target group in terms of digital skills

Caregivers should not only be considered as users of care technology but also play an advisory role in helping clients make decisions about the purchase of technological tools → Knowledge of technological tools in terms of possible advantages and disadvantages and of costs and availability.

Acceptance of care technologies: The acceptance of technologies is closely linked to the expected benefits of the technology that needs to be clearly recognizable for caregivers in order to use technological tools or promote them to their clients.

Competences that care workers should acquire in the context of digital literacy according to the interview partners:

- Knowledge on guiding the client to find reliable and appropriate information
- Ability to motivate clients to use certain care-technologies
- Ability to support clients in using certain tools and technologies
- Basic digital competences in using the computer and mobile devices: computer skills, ability to use smartphones, tablets and headset. Basic skills should be given sufficient space as they have a considerable lifespan compared to knowledge on digital products.
- Competence in using ICT (also different kinds of Apps, e.g. WhatsApp) and its benefits for cognitive and physical rehabilitation
- Care-specific digital competences with respect to independent living, social integration of carers, care coordination
- E-health, telematics, telehealth
- Practical skills should be supported directly at the workplace
- Healthcare professionals must acquire at least basic digital skills. These skills will also enable them to take advantage of digital educational resources and the flexibility they offer.
- Ethical aspects in the digital world (e.g. digital communication rules, harmless handling of digital media, people locator systems) personal data protection (client data)
- IT-security (locating the route with GPS, passwords, copy rights, etc.)
- Self-awareness in mastering the IT-basics and further skills

REFERENCES

Aaen, J. (2019) 'Competing Concerns in Welfare Technology Innovation: A Systematic Literature Review', 10th Scandinavian Conference on Information Systems.

EC (2018): Core Competences of Healthcare Assistants in Europe (CC4HCA). An exploratory study into the desirability and feasibility of a common training framework under the Professional Qualifications Directive, European Commission, Brussels.

Flórez-Revuelta, Francisco (2014) 'caring4U - A study on people activity in private spaces: towards a multisensor network that meets privacy requirements' Final Report.

Hassan A. P-88 Predictors of digital support services use by informal caregivers: a cross-sectional survey BMJ Supportive & Palliative Care 2022; 12:A41-A42.

Liu, L. et al. (2016) 'Smart homes and home health monitoring technologies for older adults: A systematic review', International Journal of Medical Informatics. Elsevier Ireland Ltd, pp. 44– 59.

Saborowski, M. and Kollak, I. (2015) "'How do you care for technology?" - Care professionals' experiences with assistive technology in care of the elderly', Technological Forecasting and Social Change. Elsevier Inc., 93, pp. 133–140.

Skills for Care. Using Technology in social care, accessed March 2023, <https://www.skillsforcare.org.uk/Support-for-leaders-and-managers/Managing-a-service/Digital-technology-and-social-care/Using-technology-in-social-care.aspx>

Zigante, V (2020) 'Social Situation Monitor The Role of New Technologies in Modernising Long-term Care Systems A Scoping Review'.

Annex

Interview Guide: Researchers

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| Open questions: |
| What is your position/job title? |
| What do you personally think of the use of digital tools in the care sector? |
| What are you currently focusing on in your research? |
| Where do you see the benefits of digital technologies in care? |
| Where do you see the biggest challenges when it comes to the implementation of digital technologies in the care sector? |
| What does a successful digital transformation of the care sector require? |
| Which basic digital competences do you consider necessary for home helpers and care assistants? |
| What other digital aspects do you consider important in the care sector? |
| What do you think the target groups needs to learn in terms of digital skills in order for them to feel more competent? |
| How do you consider the awareness of home helpers/ care assistants on data protection/ethical issues regarding digital data? |