

A Review of Digital Technology Solutions to Support Caregivers

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1. Introduction

Three out of five people in the UK are expected to be caregivers at some point in their life. Around 17% of the adult population in Scotland (759,000 people) are classed as caregivers^[1], with women more commonly reporting being caregivers than men. Looking to the future, it is estimated that 40% more caregivers will be needed across the UK by 2037.^[2]

Although caring for someone can be hugely rewarding, there is a large body of research that highlights “carer burden”, carers’ unmet needs and negative consequences arising from this for the health and wellbeing of caregivers. Care for older adults is provided by formal (paid) and informal (unpaid) caregivers, both of which increasingly care for people with higher levels of acuity and complex conditions. There is an increasing array of technologies that can support care givers. The ‘AgeTech’ sector focuses on new technologies that cater for an ageing population. These can represent a compelling business opportunity, particularly among companies developing technology solutions to support older adults.^[3]

The purpose of this research report aims to provide a broad understanding of relevant technologies designed to support formal and informal caregivers.

More specifically, the report seeks to:

- identify digital solutions – both services and tools/products - which are currently available on the Scottish and UK market to support caregivers; and
- discuss whether these solutions are aimed specifically at formal or informal caregivers.

These insights are delivered in the form of a high-level horizon scanning report, which was used to inform a facilitated co-design session for the Healthy Ageing Innovation Cluster (HAIC), that took place on 4th March 2020.

It is important to note that DHI does not endorse or promote any of the solutions and products listed as examples in this report.

1.1 Formal and informal caregiving

The DHI is preparing to make an application for the CAN DO Innovation Challenge Fund on behalf of the Healthy Ageing Innovation Cluster (HAIC). HAIC has identified eight key challenges to healthy ageing that are being discussed, and the one that is most advanced is the one aimed at Care Givers. The Care Giving challenge (as identified by HAIC) is:

“Care for older adults is provided by informal (unpaid) and formal (paid) caregivers, both of which increasingly care for people with higher levels of acuity and complex conditions. Family caregivers— who are often juggling other family and work responsibilities while living remotely from the care recipient—need better support, training, resources and tools to support their loved ones and themselves. On the professional side, staff shortages and quality concerns require new solutions to help attract, train, develop and leverage scarce human capital.”

Formal care (also referred to as domiciliary care, social care, or in-home care) is supportive care provided in a person’s home. Care may be provided by licensed healthcare professionals who provide medical care, or by professional caregivers who provide daily care to help with activities of daily living. This sector can also include Personal Assistants (PAs), who provide

low level personal care, and sometimes work as part of a team of PAs, supporting their employer at work, education or in social activities.^[4] There are several challenges facing the formal caregiving sector, including staff shortages and quality concerns.^[5]

Informal, or unpaid care is defined by the UK Government as a private arrangement whereby someone cares for a family member, a friend, or a neighbour.^[6] Rising levels of need and declining access to local authority care services have placed increasing pressure on unpaid carers, and evidence suggests that people are caring at greater levels of intensity than in the past, with informal carers meeting increasingly complex needs.^[7] Informal caregivers – who are often juggling other family and work responsibilities while living remotely from the care recipient – need better support, training, resources and tools to support their loved ones and themselves.

1.2 Methodology

The report is based on desk-based research to find out what types of digital solutions are available for care givers.

Given that this research focussed on exploring new and emerging technologies, the sources of information for this report primarily came from grey literature (i.e. research that is either unpublished or has been published in non-commercial form).

An initial web search established that there are many organisations that represent – and support – caregivers across the UK, both on a local and national level. The following list of activities that caregivers might typically seek support was collated from the information they publish on their websites:

- ✓ Coordination of care and dissemination of information among a (controlled) group of family members, friends and care providers;
- ✓ Remote monitoring;
- ✓ Managing medication (including obtaining prescriptions and refills, and helping people they care for adhere to their medication schedule);
- ✓ Navigating all aspects of the healthcare system and associated documentation (including financial/insurance benefits and claims, medical procedures and records, legal procedures and records);
- ✓ Connecting with other carers for peer support;
- ✓ Restoring balance to their lives, and feeling less lonely or guilty;
- ✓ Finding and recruiting quality backup care;
- ✓ Managing their own health & wellbeing;
- ✓ Sustaining employment;
- ✓ Accessing advice and information;
- ✓ Keeping the care recipient informed and involved.

Sources: Carers UK, Carers Scotland, Princess Royal Trust for Carers, Care for Carers, Carers Trust

This increased knowledge and understanding of the issues and challenges facing caregivers led to the development of a longlist that could be used to carry out online searches. This included the following search terms and keywords:

- Apps for caregivers/ carers/ care providers;
- Peer support apps;
- Family portals;

- Homecare tools for caregivers/ carers/ care providers;
- Technology to help caregivers/ carers/ care providers;
- Software to support caregivers/ carers/ care providers;
- Online support for caregivers/ carers/ care providers;
- Support/ meeting the needs of caregivers/ carers/ care providers;
- Social robots/ companion robots/ robot caregivers/ robot companions/ personal robots/ robot carers/ home care companions;
- Voice assistant technology/ voice control apps;
- Smart homes/ home hubs/ home assistant devices;
- Smart speakers/ smart displays/ smart video calling;
- Online caregiver training/ free courses for informal caregivers/carers/ care providers; and
- Upskilling caregivers/ carers/ care providers.

A broad range of web pages were accessed, including product websites, blog posts, care organisation's websites, think tanks and charities relating to older people, platforms that review and compare technology, local and national news reports, discussion forums and academic sources¹.

The research findings indicated that there is a range of solutions (using both existing and new technologies) that can be used to support caregivers in providing care and to monitor the needs of care recipients. Whilst this is not an exhaustive list of tools or products, the findings should be considered examples of the kinds of technology that are currently available. Whilst most products are available in Scotland/ the UK, other examples are provided (for instance US designed software applications) to further illustrate the range of solutions that are on the market.

2. Technology solutions for caregivers

For the purposes of this report, the digital technology solutions have been categorised as:

- home assistant devices (including smart speakers and smart display devices);
- wearable technology;
- care apps;
- software platforms; and
- social robots.

Each category is discussed separately below.

Please note however, this is not an exhaustive list and no detailed analysis has been undertaken of any issues such as interoperability requirements, usability or impacts.

2.1 Home assistant devices

The desk research found a wide range of internet-connected devices that respond to voice commands (and interact with users) to provide content and services. The two main categories – smart speakers and smart displays - are discussed in turn below.

¹ These are outlined in detail in Appendix 1

2.1.1 Smart speakers

Rather than developing costly, bespoke IT solutions, there are many technology providers entering the care market with existing technologies that are ready to be adapted for new uses.

This type of technology – which includes voice assistant (or smart speaker) products like Google Home, Amazon Echo, Sonos, Facebook Portal and Apple's HomePod - can control other devices around the house, make calls, provide entertainment, and answer questions. The fact that they respond to voice commands means that people with limited vision, limited mobility or reduced finger dexterity can easily use them.

One example of an application that uses of the capabilities of smart speakers to support caregivers is Lifepod (<https://lifepod.com/>). Lifepod is a voice assistant that can be set up and controlled by a remote caregiver using an online portal to configure and schedule proactive-voice check-ins, reminders, and other content providing virtual companionship [8]. Unlike traditional voice assistants, LifePod can be set up and controlled by a remote caregiver using an online portal to configure and schedule proactive voice check-ins, reminders, and other content to provide virtual companionship.



Source: Lifepod (<https://lifepod.com/how-it-works/>)

2.1.2 Smart display devices

Smart display products are effectively smart speakers with touch screens attached to them. There are several smart displays on the market (using both the Alexa and Google voice assistant platforms), all of which allow caregivers to communicate with and check in remotely with those they care for.

- **Google Nest Hub:** The Home Hub was Google's first own-brand smart display product, combining Google Assistant and advanced smart-home control into a digital photo frame. Unlike other smart displays, the Home Hub did not have a camera on it, which may have made some people feel more comfortable setting it up in their home. The Nest Hub does have a camera, which probably opens the device up to a whole new range of uses, particularly video chat and security.



Source: Google website (https://store.google.com/gb/product/google_nest_hub_max/)

- **Amazon Echo Show:** This device has a screen that lets users make and receive Wi-Fi video calls with others who own a device, or who have an Amazon Alexa app installed on their smartphone. Care recipients can create a list of people who have permission to do such video drop-ins to their device.



Source: SlashGear website (<https://www.slashgear.com/amazon-echo-show-5-is-a-90-alexa-smart-display-with-privacy-in-mind-29578396/>)



Source: Portal website (<https://portal.facebook.com/gb/>) make contact using a phone. The Portal can also enable multi-party calls: up to six people with Messenger; and up to three people with WhatsApp.

- **Facebook Portal:** Facebook's first ground-up piece of hardware is an Alexa-compatible smart display. As with other smart display products, caregivers can use the Portal as a teleconferencing device to communicate with care recipients via Messenger or WhatsApp. Caregivers don't have to own a Portal themselves but can

It is likely that there will be an increased focus on integrating voice-activated smart assistants into other products in the future. At CES® 2020², companies demonstrated the ways in which their designs could improve people's homelife beyond the growing variety of smart speakers and smart displays, with voice assistant integration in cars, bathroom mirrors, and even smoke alarms. [9]

2.2 Wearable technology

'Wearable' technology in health and care include electronic devices that consumers can wear, such as smart health watches, fitness trackers (e.g. Fitbits), ECG and blood pressure monitors and biosensors. [10] The research identified several examples of recent developments in the field of wearable sensors and systems relevant to the support of caregivers.

² CES - formerly an acronym for 'Consumer Electronics Show', CES is an annual trade show organized by the Consumer Technology Association (CTA).

CarePredict Tempo has been developed in the US and is described as the ‘world’s first wearable for seniors that autonomously observes changes in their daily activity and behaviour patterns’. The device observes changes in daily activity and behaviour patterns and has an end-user app designed for the caregiver. CarePredict Tempo uses artificial intelligence (AI) and machine learning (ML) to predict possible malnutrition, depression, mild cognitive impairments, and increased risk of falling. Smart algorithms are used to correlate increased night waking with greater likelihood of falling as well as more frequent bathroom visits with a heightened risk of urinary tract infections. It also flags self-care neglect, such as showering less, as an indicator for depression³.



Source: CarePredict website (<https://www.carepredict.com/>)

DFree is a wearable device that can support caregivers looking after people with urinary incontinence. The product is a small ultrasound machine that monitors bladder fullness and sends alerts to a smartphone or tablet when it is time to go to the bathroom via the DFree app (free to download from the App Store and Google Play). The sensor is attached to the lower abdomen using medical tape or the company’s reusable holding pads. When it is time to go to the bathroom, the user receives a notification on their smartphone or tablet.

The app also analyses data of how often the person uses the bathroom, so they can plan out their travel and activities. ^[11]



Source: DFree website (<https://www.dfreeus.biz/>)

2.3 Care apps

The desk research found many examples of apps that have been designed to help and support families better coordinate caregiving responsibilities. Table 1 indicates a brief selection of these types of apps. These often have similar features, such as Facebook-like interfaces that allow multiple family members to post care updates and comments, a calendar feature for important appointments and for coordinating care coverage by family members and a messaging tool to enable direct communication with other family members.

³ More information can be found at: <https://www.digitalhealth.net/2020/01/emerging-tech-and-trends-to-watch-from CES-2020/>

Some of these can also be connected to devices around the home, such as activity and door sensors, fall detection wristbands and panic buttons.

Name of App	Description
WhatsApp	WhatsApp is a freeware, cross-platform messaging and Voice over IP service owned by Facebook. It allows users to send text and voice messages, make voice and video calls, and share documents, image, user locations and other media
Jointly	This app enables carers to set up a circle of care around the person they care for. Carers can then invite others involved in providing that care (family, friends, neighbours, health and care professionals) to join so everyone is kept in the loop.
Birdie	This app allows relatives, care workers and doctors to share information about older people trying to remain in their homes. It digitalises notes taken by care workers during visits which can be more easily shared between professional carers, other health practitioners and family members, helping to coordinate care.
CareLineLive	This is a software platform built specifically for home care agencies. The Carer Companion App enables carers to have instant access to rotas, care plans and client information. The Families and Friends website meanwhile provides the care recipient's family and friends to access visit schedules (including dates, time and length), visit confirmation, carer details and communication of any issues or updates, and continuity of care information.
Carely (US)	This app co-ordinates caregiving responsibilities and supports communication between family members and friends.
TCARE (US)	This software uses algorithms to create individualised care plans, enabling family caregivers to keep their loved ones at home longer.

Table 1. Examples of care apps (see Appendix 1 for sources)

For informal caregivers who may feel overwhelmed or stressed by their caring responsibilities, there are general apps (available from the App Store or Google Play) which can support their self-care. The Headspace app (<https://www.headspace.com/headspace-meditation-app>) guides users through the meditative process, with five and ten minute practices designed to fit meditation into people's busy schedules. Meditation has been linked to improvements in anxiety and stress, as well as better sleep and focus. Sanvello (<https://apps.apple.com/us/app/sanvello-stress-anxiety-help/id922968861>) is another app that can support people in working through emotional challenges and helping to address stress, anxiety and depression with tactics based in cognitive-behavioural therapy and mindfulness.

2.4 Software platforms

The desk research found a wide range of examples of software platforms and packages that are used for care management and communication. Table 2 provides a shortlist of examples of this type of software product.

Some of these enable real-time and transparent communication for all care stakeholders (including caring professionals, managers and family and friends of care recipients), others perform a 'matchmaking' service, connecting care providers with those needing care.

Name of software platform	Description
Cera	This is an uber-like technology platform that matches patients with carers.
Vida	Care technology platform that matches professionals to clients that require at home care, aligning needs such as skills, gender, culture, location and other variables.
PASSsystem	Digital care management platform providing a single view of care records from enquiry, medication and task changes.
NurseBuddy (Finland)	Platform for managing carers that visit clients in their own homes and is also used in care homes. There is also an app that carers can download, and a family portal.
Hometouch	A homecare marketplace connecting families looking for home care to professional carers.
Elder	An online platform that focuses on connecting people requiring care with homecare service providers.
Cariloop (US)	A bilingual, tech-enabled care support platform to help caregivers and families plan for and manage care. The platform enables families to securely communicate across all devices and store important health, financial, and legal documents.
Livpact (US)	Facilitates coordination, communication, monitoring and service provision for family caregivers directly from their phone, tablet, computer or voice platform. The platform offers a 360-degree view of patient care, and allows family members to connect with each other, with local community services and with online resources and partners.
Torchlight (US)	This software platform enables employers to provide a tool which can support their employees where they need help with navigating the caregiving landscape and the stresses associated with providing care for family members.
Roobrik (US)	An online platform that helps care recipients and their families make informed health and care decisions and connect to the products, services, and programs that can help.
Wellthy (US)	Wellthy provides expertise and support for families with chronic, ongoing care needs. Families are matched with a dedicated care coordinator (like a personal project manager) who is familiar with the healthcare system.
CaringBridge (US)	This software has similar functionality to a blog, and makes it easier for patients, caregivers, families and friends to exchange information about a patient's medical condition or disease on an ongoing basis. The service allows family members and friends to receive consistent information via a single website, eliminating the need to place and receive numerous telephone calls.

Table 2. Examples of care apps used by informal carers (see Appendix 1 for sources)

There are also online training courses for caregivers, many of which are free.

Some examples of this include:

- ‘**Caring for adults**’: delivered by OpenLearn, this free online course is aimed at carers (or those considering a care role) in a variety of settings. It addresses several key questions on topics including communication, mental health awareness, palliative and end-of-life care, positive risk-taking and looking after yourself (https://www.open.edu/openlearn/health-sports-psychology/caring-adults?in_menu=368967); and

- ‘**What about me? A personal development course for carers in Wales**’: a free online course that has been developed by The Open University and Carers Trust Wales. It is designed for caregivers of any age and ability and helps them to recognise and reflect on their skills and experiences. The course also includes carers from Wales sharing their own experiences of balancing their caring responsibilities with education and employment. The course can be used for free by carers groups or carers studying on their own (<https://www.open.edu/openlearncreate/course/view.php?id=2121#>).

2.5 Social robots

Some interesting examples of devices that incorporate artificial intelligence (AI), facial and voice recognition technology and motion/touch sensors are currently being used in care settings, and advances in robotic care technology are constantly developing. The demand for social robots is expected to grow as the population ages and the adult social care workforce faces skills shortages. Social robots use AI to decide how to act on information received through cameras and other sensors.^[12] They can help in stimulating and reducing stress for patients in care facilities and can act as a wellness aide (such as reminding elderly people to take walks and medication and prompting them to call family members).^[12]

- **Pria:** The voice-activated robotic companion, Pria is an ‘automated medication management and home healthcare assistant device’. This product can support caregivers by providing them with day-to-day insights into a patient’s adherence to both prescribed and over the counter medication. It can schedule up to 28 medication doses, provide reminder alerts, dispense medication at the scheduled time, and provide two-way access to caregivers or family members through voice commands.^[13] It also provides a communication link between caregivers and users and enables caregivers to conduct audio or video drop-in calls through the Pria device’s screen. If a caregiver is alerted (via feedback on their phone) that the person they care for has missed some doses, the system allows the caregiver to contact them - either by phone or video call.



Source: Voicebot website (<https://voicebot.ai/2019/10/18/pillo-health-launches-pill-dispensing-robot-companion/>)

- **temi:** Whilst not strictly a social robot, this product does offer several benefits for caregivers, as well as for older adults living at home. It is a multipurpose Alexa-enabled device with a built-in smart display (essentially an Echo Show). Unlike the Pria (and other similar stationary robots) temi uses motion sensors - to avoid obstacles - and facial recognition to follow people around their home. Other useful features include an integrated tray (that enables it to carry objects), and the ability to play music and videos, answer questions and facilitation of video chat functionality. The ability of temi to move around freely negates the need for smart speakers (or smart display products) in every room, and the face-following capability of the device means that video calls feel more ‘natural’.



Source: temi website (<https://www.robotemi.com/>)

- **Care-o-bot:** This product has been developed to provide more complex and comprehensive care, and to enable older people to stay in their own homes and live an independent life.



This type of robot can support caregivers by carrying out simple tasks such as carrying food and drinks to people from one room to another. It can also entertain care recipients by suggesting motivational activities, prompt people to look after themselves by reminding them to eat, drink and take medication, and can call for help if a person is in trouble. [13]

Source: Fraunhofer Institute for Manufacturing Engineering and Automation website <https://www.care-o-bot.de/en/care-o-bot-3/application.html>

2.6 General online support

There are a number of organisations with either a national or local focus on improving the support, services and recognition for anyone living with the challenges of caring (for example, Carers Trust, Carers UK, Care for Carers and Carers Network). These provide information for carers (such as looking after their health and wellbeing, how to access counselling services, training and personal development courses available to carers etc) and often link to other relevant websites and resources.

Within these websites, there are often forums and chatrooms designed to encourage carers to communicate and share experiences with each other. These are targeted at both adult carers and young carers/young adult carers. Some examples of these include:

- Carers UK Online Forum (<https://www.carersuk.org/forum>)
- Carers FIRST's Carer Forum (<https://www.carersfirst.org.uk/forum>)
- [Simplyhealth Care Community forum](https://healthunlocked.com/care-community?utm_source=referral&utm_medium=website&utm_campaign=carerstrust) (https://healthunlocked.com/care-community?utm_source=referral&utm_medium=website&utm_campaign=carerstrust)
- Sue Ryder Online Community (<https://community.sueryder.org/>)
- The Mix (<https://community.themix.org.uk/>) – providing online support for young people ages 13-25 years of age
- YACBook (<https://www.yacbook.co.uk/>) - an online community and resource centre for young adult carers across the UK which has been developed by Carer Support Wiltshire

Other features of these websites include information for caregivers relating to taking breaks from caring duties, and relevant news stories and issues that may impact on caregiver's lives.

3. Conclusions

Digital and technological support for caregivers is already a reality in the UK.

Software applications can support caregivers in a variety of ways, such as enabling communication between care stakeholders, and performing matchmaking services, connecting care providers with those needing care. This is of particular significance for informal caregivers, allowing families and friends to arrange, schedule and manage care at home.

Where informal caregivers are comfortable with computers, there are numerous software platforms, apps and websites that can deliver communication tools, emotional support and practical advice. There are also online training opportunities available to this group, and these are generally free or cheap, and easily accessed.

Digital technology products such as smart speakers can be used to relieve the pressure on care providers and are readily and relatively inexpensively available. Two-way visual contact meanwhile is available through smart displays. These devices enable formal and informal caregivers to 'look in' on an older person and their home remotely. Wearable technology is also widely available and acceptable amongst the general population. Caregivers can track daily activity, behaviour patterns and physical activity, as well as monitor vital signs in real time via apps that are connected to wearable devices.

Whilst not as prevalent as cheaper digital solutions, the use of robotic technology in providing caregivers with support must be considered. As well as incorporating smart displays - therefore enabling two-way communication between care recipients and providers - these products can undertake minor, repetitive tasks (such as fetching food and drink, and carrying objects around safely). Some products simulate the appearance, feel and behaviour of humans which can have benefits for caregivers, as well as for older adults living at home.

Appendix 1

A desktop review was undertaken to explore examples of apps and software platforms/packages designed to support formal and informal caregivers.

These examples were taken from a range of sources, including websites aimed at supporting and representing the rights of carers, think tanks and charities relating to older people, platforms that review and compare technology, and general news sites.

These are listed in the table below:

Name	Website address
Age UK	www.ageuk.org.uk
Apple App Store	apps.apple.com
BBC News	www.bbc.co.uk
Careskills Academy	careskillsacademy.co.uk
Carers Trust	https://carers.org/
Carers UK	www.carersuk.org
Computer Weekly	www.computerweekly.com
Crunchbase	www.crunchbase.com
Digital Health	www.digitalhealth.net
Forbes News	www.forbes.com
Kings Fund	www.kingsfund.org.uk
Mashable	mashable.com
Nuffield Trust	www.nuffieldtrust.org.uk
Open University	www.open.edu
PC Magazine	uk.pcmag.com
Scottish Government	www.mygov.scot
TechCrunch	techcrunch.com
Venture Beat	venturebeat.com
World Health Organisation	www.who.int

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