# HomeCare: Supporting Independent Living with Dementia

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## Abstract

We describe HomeCare, a companion application which supports people with dementia and their carers. HomeCare uses the Alexa voice platform to empower people with dementia and their carers to feel confident, be independent, and remain socially connected – with simple access to the right care at the right time. We seek to do this using a 'Smart Speaker' that is tailored to the needs of people affected by dementia. This is underpinned by a service allowing people to escalate directly to NHS healthcare professionals. Our service will help the person with dementia remain in the comfort of their own home for longer – saving significant amounts of money on the cost of care.

## 1 Introduction

Accenture have developed in collaboration with AgeUK London, Hanover Housing Association, NHS EPUT and Amazon – a platform called "**HomeCare**" which offers support to those living with dementia.

The starting point for this project was a hackathon that looked to "use Artificial Intelligence (A.I) for good" in the spring 2017. We chose to focus on older adults, building an Alexa-based platform that helps older adults in their day-to-day life.

At its heart, our idea adds a specific set of skills to Alexa that are enjoyable and helpful to people with dementia. We have a web portal that allows family members to see activity on Alexa and help manage their one's day-to-day life without taking over completely.

HomeCare integrates with other solutions people use, like fitbit, digital calendars on their tablet or phone – but making information available in an easy way. Alexa doesn't only offer things that people need but also things that people want –

which is incredibly important to make sure the service becomes part of peoples' routine over time. We see HomeCare as a companion through the whole journey of dementia: initially a tool to help the person retain autonomy and independence as much as possible, as well as a fun way to interact with the world – and later a calm, reassuring presence that can playback saved memories on command.

Of course, carers need a similar companion for a different journey – it becomes more a useful tool over time to log and track information that helps reduce the burden on them day-to-day. Our complete service couples this tailored, enjoyable and useful day-to-day device with human healthcare assistants, who can remotely monitor and provide a single escalation route into existing health & care services.

## 2 Alexa Platform

We chose the Amazon Alexa platform for several reasons.

Alexa is voice controlled; our research with older adults shows us that a combination of touchscreen and voice is the easiest way to interact with technology. In addition, Alexa hardware is widely available and priced for the consumer. Alexa uses natural-language artificial intelligence technology to interpret speech, assess the intent, and provide an appropriate response. For example, if a person asks

*"Alexa, what is the time in Chelmsford?"*

Alexa would respond aloud with the current time in Chelmsford.

We believe it is fundamental to any new technology that it is both enjoyable as well as valuable. Alexa can be enjoyable to use every day, with games, radio, weather.

Cloud-based services offer rapid development and deployment with a global reach. We chose Alexa

because it is a market leader and currently has the best hardware that is easily available. We were quickly offered additional support by Amazon in the initial development of HomeCare.

Our solution is innovative because it uses emerging technologies (cloud, voice recognition, A.I., 'Internet of Things' smart devices and sensors) together with human-based services to help a vulnerable and often neglected population. This can be the foundation for a wider ecosystem of digital integration across disparate organisations, because it's in someone's home and part of their daily life.

We are building our solution ethically and responsibly – and in a way that can scale rapidly. We have worked with a team of lawyers to drive privacy-by-design and ensure GDPR compliance.

Below we outline how HomeCare and Alexa is designed to meet the dementia use case in terms of the evolving disease, mental wellbeing, and access to a support network.

# 3 Supporting dementia sufferers through an evolving disease

Dementia is a progressive disease, and thus each sufferer's needs change with time. Our solution can evolve with the needs of people over the course of their dementia journey. Early memory problems can be alleviated by the individual using HomeCare with simple access to general reminders, to-do checklists, and calendar appointments. All services provided in HomeCare can also be easily toggled on or off depending on the person's specific needs and circumstances. They can also be knitted together in simple personalised routines at any time.

As the disease progresses, there is usually an increasing burden on family members to look after their loved one and take over more tasks. HomeCare makes it easier to monitor, share and organise. For example, the management of calendars for multiple health appointments, the tracking of medicine reminders can be done remotely by carers. HomeCare also provides the peace of mind that a group of specialised dementia healthcare professionals is continuously monitoring the service and is there to respond to any anomalies, calling the right services at the right time 24/7.

## 3.1 Mental wellbeing

Loneliness and isolation are huge problems impacting those with dementia – and just having a friendly voice in the home can bring a lot of happiness (as we learned in our pilot with AgeUK London and Hanover Housing Association).

Alexa is not going to be frustrated, and a person with dementia embarrassed, when answering repeated similar questions

Music has been shown to reduce anxiety for some people with dementia – and music can be easily accessed: we would like to pre-configure a playlist for people, much like Terri Craig at EPUT's work with "Music Mirrors" (REFS)

For many people it is incredibly frightening to slowly lose their identity. By adding a rich narrative to life-story work, and having this available on-demand, will help anchor people within their own memories.

## 3.2 Simple access to support network & community

Local community support, like dementia friendly cinema screenings or support groups, can be viewed in a simple way:

*"Alexa, what are my local events?"*

Care professionals can provide people with a short, readable, list of questions to access and digest in their own time

*"Alexa, what are the symptoms of vascular dementia?"*

Access to social-technology goes some way to bridge the 'Digital Divide', particularly for older adults. Voice can be a way to interact with technology in a more natural, conversational way; *"Alexa, call Jane"* is far simpler than putting on your glasses, finding & unlocking your (charged) tablet, selecting Jane from the contacts menu, and finally pressing 'call'.

# 4 A Person Centred and Impactful Solution

User-centred design and testing has been central to the development of HomeCare since the very first prototype made with AgeUK London.

We hosted 12 'Techy Tea Parties' and 3 all-day design-thinking workshops to design and refine our prototype based on real user needs and feedback. In two 6-month trials, first with AgeUK London and second with Hanover Housing Association, we tested our prototype with 65 older

| MUSIC MIRRORS | ROUTINES | MEDICINES | ACTIVITY | PICTURES | SHARE LISTS | VIDEOS |
|---|---|---|---|---|---|---|
| Dementia care work for music reminiscence | Simple one-command routine that goes through many features | Schedule medicine reminders | Linking with FitBit devices to monitor activity | See pictures from family members every day | Share a shopping list by SMS | Custom video content from admin users e.g. NHS anxiety course |
| MEMORY BOX | COMMUNITY | SECURITY | CALENDAR | ANNOUNCE | ESTATES | FEEDBACK |
| Dementia life-story work with rich narratives | Browse local events hosted by charities or community groups | Create a security checklist to complete | See past and future appointments | Share announcements with a group of users | Add building-specific events for estate managers | Feedback on the service through on-device questions |

Figure 2 HomeCare Features

adults (mean age 78). We did this by visiting them at home, setting them up with an Alexa device, and checking back in with them regularly over a 6-month period. We found these home visits very informative.

When Accenture and NHS EPUT partnered in Challenge Dementia, we interviewed HOW MANY different people with dementia, and their family members, as well as HOW MANY clinicians to better understand how we could take the groundwork of our generalised "older persons" prototype and shape it into something specific for dementia support.

We surveyed 9 people with dementia in Essex and 9 of their carers, to understand which features they valued in HomeCare. We found that some features were more popular, and that carers and people with dementia were generally aligned in their preferences, with no significant difference found between carer responses and those of people with dementia.

This was followed by a demonstration with the same focus group with amended existing features, and finally an interactive design workshop to co-create new features. We are taking the feedback into our design for how to create a rich narrative for life story work, in a virtual memory box, as this feature was what surveyed users wanted to see.

To make sure that any product we make for people with dementia is produced and tested in accordance with the NHS regulatory framework, we have completed the IRAS form for a pilot study and are working towards the submission to the Research Ethics Committee. The local health and social economy has responsibility for meeting needs of people with dementia, so this research is necessary to adapt our solution for this economy.

The key change because of our research so far is moving from a purely personal solution, to one that links with professional support and care. Whilst there is definitely value in a dementia-specific HomeCare skill by itself - people also need easier access to the range of health and social care service. This is why we want to design and develop a new service that uses professionals to link people with all the right support that is available at the right time.

## 5    An integrated solution

HomeCare complements existing care pathways in that we help connect the person with dementia and/or their family with the correct service, faster. Our aim is to use the service data to learn and improve over time – and help identify trends and anomalies before they become a crisis.

As part of the bigger system - state and private care agencies may find this an attractive option to reduce costs.

Our vision for the service will connect people with dementia to care staff, and in future directly to wider services. We are placing A.I. at the front end, enabling it to signpost to routine services, and the proposed HomeCare staff to more urgent services. This structure that we want to make will enable us to link in with the local health and social care economy through two pathways for our population

1.    The A.I. solution directly
2.    The HomeCare staff

# USER FEEDBACK

*This is **easy for me**, this is why everybody should have it (Mary, Estate Manager)*

*This is the **future** (Feyzi, 81)*

*Actually, it's **almost like having company**. When you live on your own, and there are dark nights, it's quite nice (Hilary,81)*

*My wife has been joking that **Alexa is almost part of the family**! (Gurdial, 77)*

*She makes me feel **I'm not alone**. (Andrew, 76)*

*It brings me more **enjoyment** from being at home (Tony, 79)*

*The more I learn the more I want to use it (Alan, 88)*

*When she [late wife] was alive, she kept the social diary; so, if people were coming to us, she would let me know every day. **Now I have Alexa.** (Steve, 85)*

*It's a novel device I can make use of, **it will be a time-saver** (Steve, 85)*

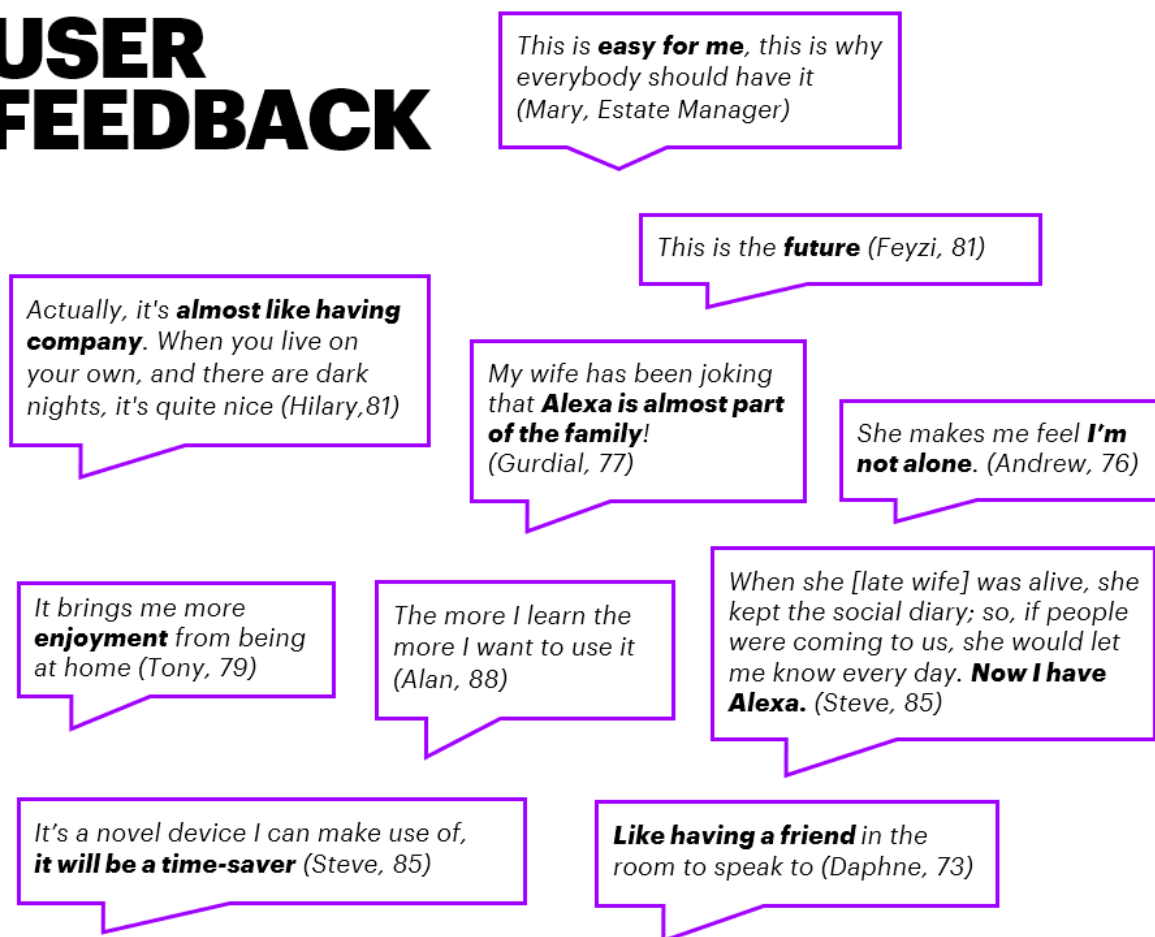***Like having a friend** in the room to speak to (Daphne, 73)*

Figure 3 User Feedback

Whatever we build in the short to near term must continue to improve and work for future generations. The best way to do this is to look carefully at the challenges outlined in our local STP.

- Signposting efficiently to routine services that may be underutilised, and which may prevent escalation to other costlier and less appropriate parts of the health and social care economy. We can this without the need for costly staff intervention by means of the A.I. technology.
- Looking to support people at home to be more independent (by means of accessing the right services at the right time) and delaying the transition to costly care homes.
- To use the HomeCare staff to assess the need for more urgent service access enabling another mechanism for ensuring timely and appropriate access to services

- To work towards building care algorithms after the necessary preparation which would be tailored to the individual needs of the person (e.g. a follow-up question about loneliness after an appropriate interval) which can be useful to other care providers in decision making about care provision
- To gather data on service usage and follow-up data to ascertain the effectiveness of specific care pathways. This will be used to revise the care pathways (e.g. keyword matching to services) and the information can be fed back to commissioners.
- Connecting people with the solution through the video conferencing facilities to both challenge isolation / loneliness and to connect a person with a growing community of users.

- Using the data to learn about patterns of service use and to explore whether this learning can support preventative work
- The potential to explore the primary care and hospital interfaces in the future

## 6    Cost Efficiency

Cost pressures on families and CCGs for dementia care are high: According to the Alzheimers Society "The cost of a care home for someone with dementia can be between £600-1,200 a week, and good quality dementia care in the home costing at least £20 per hour. People with dementia and their families can be paying these costs for a number of years. Alzheimer's Society calculations suggest that it costs an average of £100,000 for an individual's dementia care."

Delaying moving into a care home or paying for physical home care, even by a few months, means remote monitoring and efficient escalation to existing services makes financial sense for those paying for care, as well as quality-of-life improvements to those receiving it. Further, care has better outcomes if it's administered before crisis point – by monitoring and escalating faster we hope we can improve outcomes for people with dementia.

The service will be sustainable when it saves money on care. This will happen when people get the right care before a crisis, when people feel independent to stay at home, and when fewer carers reach burn-out. With a modest team of healthcare assistants augmented by data directly from users, we believe we can achieve a significant reduction in the cost of care.

## 7    Conclusion

We know that people with dementia want to use HomeCare because we have co-created it with them. It is not a panacea, or suitable for every individual – but we believe our service will be useful and valued by the broad and diverse group of people affected by dementia.

Our solution is competitive in the marketplace because it works for families as a low cost 'always-on' companion that is enjoyable and valuable for people with dementia. We reduce the strain on the family that dementia can make, and help people retain independence for as long as possible. The family can gain some much-needed peace of mind.

People may not need formal care for many years, dependent on their type of dementia, and are just looking for that extra bit of help and reassurance.

As the disease progresses, HomeCare remains enjoyable and useful – e.g. moving from a smart way to track doctors' appointments and medicine schedules, to a calming and reassurance companion.

Technologically – our solution is highly scalable. There is no reason to doubt it could cover all of the UK, and with multi-language support, other parts of the world. The reality is there will always be a human being at the other end – it's more than plugging in an Alexa device and connecting it to the internet.

We don't want to be another technology solution that infantilises those with dementia and tells them what they must use – rather – we want to show them that what they choose to use can be enjoyable *and* valuable in their day-to-day life: We believe this is the only way to make a sustainable product. We will consider carefully how to make the setup as simple and dementia-friendly as possible - in other words – **how we package the service for a person to take into their home is important**, and something we can continually improve**.