28 FEBRUARY 2018

D7.1 Needs, Values and Suggestions to Co-Design

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

DELIVERABLE ID:	**WP7/D7.1/TASK NUMBER 7.1**
DELIVERABLE TITLE:	Needs, Values and Suggestions to Co-Design
RESPONSIBLE PARTNER:	SHU
CONTRIBUTORS:	Dr. Claire Craig, Prof. Paul Chamberlain, and Nick Dulake
NATURE	Report
DISSEMINATION LEVEL:	PU
FILE:	NESTORE_D.7.1_Wp7_20180330_V2.2
REVISION:	V2.2
DUE DATE OF DELIVERABLE:	2017.12.31
ACTUAL SUBMISSION DATE:	2018.04.28
CALL	European Union's Horizon 2020 Grant agreement: No 769643
TOPIC	SC1-PM-15-2017 - Personalised coaching for well-being and care of people as they age

Document History

REVISION	DATE	MODIFICATION	AUTHOR
0.1	2018.01.31	Document Creation, initial TOC	SHU
1.0, 2.0,2.1	2018.02.28	Main Input	SHU
2.2	2018.04.30	Last revision	SHU

Approvals

DATE	NAME	ORGANIZATION	ROLE
2018.04.20	Yossef, Paola Nonini	Flex	Reviewer
2018.04.25	Estelle Huchet, Ilenia Gheno	AGE	Reviewer

2018.04.30	Giuseppe Andreoni	POLIMI	Scientific Coordinator

Short Abstract

This report discusses the findings arising from activities undertaken as part of Task 7.1 - Identification of needs, values and suggestions for co-design. This phase of the research sought to build understanding of the factors that potential end users of NESTORE identify as being important. Utilising the co-design method exhibition in a box, researchers in Sheffield engaged with over 80 community living older people in the United Kingdom. A broad range of factors were identified in relation to the requirements of the system which the report documents.

Key Words

Co-design, participatory methods, seniors, enablers to technology, barriers to technology, meaningful activity, values.

Table of Contents

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

Table of Figures

List of Tables

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

1. Needs, values and suggestions to co-design

1.1 Introduction

This report documents the first phase of research undertaken as part of NESTORE Task 7.1 - Identification of needs, values and suggestions for co-design (collaborative design). It describes the background to co-design in the context of the research and details the method utilised in this study. Key findings are considered in relation to: the co-design methodology, values expressed by participants, priorities identified of the user requirements of technology and factors that promote and inhibit use. The report concludes with a summary of the needs, values and suggestions to co-design and an overview of plans for the next phase of the research within Work Package 7 - User Perspectives: from Co-Design to Piloting.

2. Summary of key findings from this phase of the research

2.1 The value of the method in relation to co-design

The use of a method using objects to elicit responses called exhibition in a box found to be a suitable methodology in context of co-design within this research project. Participants shared rich descriptions of their experiences of and relationship with technology and older people expressed appreciation of the tangibility of the objects and their sensory qualities, acting as a physical prompt.

Rather than being dependent on fixed interview schedules whereby the researcher had pre-defined questions the method very much gave preference to the views of participants. This is integral to the co-design process.

The method was extremely helpful in this initial phase when exploring the broader perceptions and values in relation to technology.

2.2 What do participants identify as being meaningful / important in context of hobbies, work and leisure?

The range of hobbies and activities people described as being important was broad and wide-ranging. Individuals did not express particular health concerns but there was a general recognition of the need to keep physically well and engage in health promoting activities.

Mental wellbeing was also valued and creative pursuits were seen as mechanisms to promote self-expression, provide an opportunity for learning and for self-reflection.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

Participants spoke at length about the social dimension of activity as a motivating factor for engagement. Other motivators included a sense of challenge, the setting of personal goals, and the embedding of activities in routines.

Across all the workshops participants spoke of barriers to engagement including lack of confidence, the difficulty of taking the first step, lack of time and financial resources. This was especially true of participants in the 50-65 age bracket who were simultaneously working and caring for children and/or parents.

2.3 Attitudes to technology, barriers and enablers to engagement and adoption

Perceptions of technology were broad and participants described and identified this in a number of ways. In order to establish a broad range of experiences on people's encounters with technology there were no inclusion criteria for the participants involved in the workshops. All participants with the exception of five owned a phone and/or tablet and had access to the internet.

Attitudes to and responses to technology across all workshops were polarised. Digital technologies were seen as mechanisms through which to access information, and to offer vehicles and opportunities for new learning and to connect to interests. At the same time individuals framed technology as having potential detrimental effects on health and posing a threat to the present way of life.

Barriers to engaging in technology included the speed of change leading to challenges in new learning at a point of cognitive decline, questions relating to privacy and trust in terms of who is able to access and use the data generated and the reliability of the technology and the information and readings created. Prohibitive costs and lack of technological infrastructures were also seen as challenges.

Design considerations, which were identified as supporting engagement and adoption, included the potential for personalisation, portability and considerations in relation to ergonomics. Features that promoted control and the building of self-efficacy were also valued. These are discussed in the report.

Above all it was necessary to consider how technology relates to other elements of the person's life and how it fits with self-concept and value system.

3. Context and background

3.1 The research team

The research team (Prof. Paul Chamberlain, Dr. Claire Craig, and Nick Dulake, (Sheffield Hallam University, UK) have a strong track record in the area of co-design. Chamberlain and Craig are co-directors of Lab4Living, a trans-disciplinary research group at Sheffield Hallam University (SHU) based on a collaborative community of researchers in design, healthcare and creative practice.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

The focus of Lab4Living is to work in partnership with end users to develop products, services and interventions that promote dignity and enhance quality of life by applying design skills and methods to identify and formulate questions, build understanding and create solutions. Key to this work is working in collaboration with people who use products and services recognising their inherent strengths and knowledge based on their personal and professional experiences.

3.2 Co-design in the context of this project

Literature highlights that the reason for non-acceptance of health technologies is complex (Sligo et al. 2017, Standing et al. 2018, Bentley et al, 2014). The context where the technologies will operate and how they relate to the end users' lives are key factors. A number of researchers have suggested that the poor design of many devices may directly be attributed to the failure to find ways to engage end-users and to elicit understanding of their requirements.

NESTORE therefore adopts co-design tools and methods that will seek to engage and draw out information related to perception, acceptance and usability of technology to support healthcare. Such methods have been shown to be beneficial in the evaluation and design of healthcare interventions (Greenhalgh et al 2016). The methodological approach followed in NESTORE provides for users to be involved in the design of the solution throughout the project duration and permeates the work of all the project Work Packages (WP).

Participatory methods are centred on the principle that participant engagement can provide value throughout research planning and implementation, yielding findings that directly reflect on a community's needs and perceptions. Participants are given an active role, allowing them to shape the direction and methods of the research itself. Multiple benefits are associated with the use of participatory methods when used in healthcare settings including developing collaborative and productive partnerships with participants, providing participants with a voice and harnessing participant engagement to stimulate positive change and the design of better products.

Multiple levels of engagement are possible at various stages in this paradigm and these will change and develop as the project evolves. Within NESTORE we adopt the definition of co-design, which is the creativity of designers and people not trained in design working together in the design development process.

Using the Design Council Double Diamond (Figure 1) as a framework, co-design in the early phase of the project (1 – Discover) utiliszes methods to better understand and interrogate the requirements of the product, the issues facing individuals. Methods here are more open (thinking with things, critical artefacts) as the design process seeks to ask questions rather than offering solutions. A co-design approach will continue in an iterative manner throughout the project and the user requirements will be determined in the Define phase (leading into and informing WP7. T.2). Technological concepts and prototypes will be developed in phase three (Develop) once again with input from stakeholders. Final NESTORE solutions will emerge through the Delivery phase and for the pilot evaluation.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

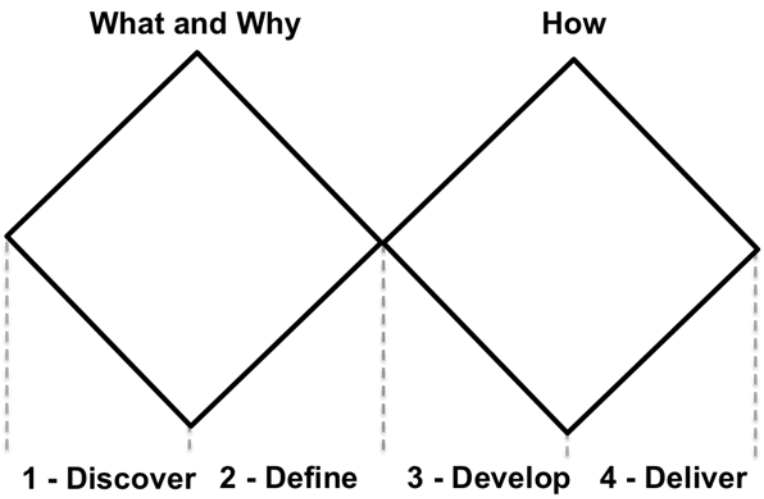

Figure 1: Design Council Double Diamond (Design Council UK)

PHASE	AIM-ALIGNED TO WORK PACKAGE	CO-DESIGN INTERVENTION	CO-DEISGN PARTICIPANT
DISCOVER	WP7	Exhibition in a box – critical artefacts for user workshopss	Participants (number x 80) UK
DEFINE	WP7	Definition of user requirements	Select older users
		Creative probes. Prototypes (physical and virtual) to capture and convey user insights	Researchers Stakeholders (to include technologists , health specialists and end users)
DEVELOP	WP3,WP5	Prototypes – product iterations	Stakeholders
DELIVER	WP7	Pilot project - evaluation	60 older persons will be recruited to engage in the pilot study across the country partners in IT, ES, NL.

Table 2 Translation of Double diamond design process set out as NESTORE work plan

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

3.3 Aim of the project Task 7.1

This report documents the first phase of research undertaken as part of NESTORE Task 7.1 - Identification of needs, values and suggestions for co-design, the aims of which included:

- Build understanding of user requirements of the technology: factors that promote and inhibit use;
- Explore potential contexts of where technologies will be used;
- Identify priorities regarding the health concerns of this population;
- Provide an opportunity for refinement of the methodology in preparation for other phases of the research.

The initial NESTORE kick-off event in September 2017 also highlighted the importance of understanding the hopes and aspirations of participants to gain insights as to what activities individuals find meaningful. Collecting such information would steer project partners in their development of activities, hobbies and suggestions NESTORE may offer to engage and motivate users of the product.

3.4 About the methodology

The methodology of the present study drew on an existing body of work developed by the authors (Chamberlain and Roddis, 2003; Chamberlain and Yoxall, 2012; Chamberlain and Craig, 2013) which uses objects and artefacts as methods to stimulate and scaffold thinking, offering valuable vehicles through which the complexities of lives can be understood. The concept of exhibition is embedded within the culture of art and design and has a long history as a form of gathering employed to prompt academic discourse.

Exhibition in a box (Chamberlain and Craig, 2013) takes the form of nine objects (keys, pencil, glove, post card, stones, dice, wrist watch, soap, plastic spoon) defined through user work- shops across multiple research projects. The objects have been carefully selected to code, represent and prompt further discussion on themes that have emerged through earlier research. The objects form the basis of an exhibition, contained in a box "à la Duchamp" that can be transported to diverse environs including the home. Just as exhibition, pieces invite individuals to express ideas and opinions and to articulate deeply held values and opinions so the objects provide an opportunity for participants to express their emotional responses, to respond to and describe things of importance in the context of the research theme.

Whilst traditional qualitative research methods using structured and semi-structured interviews can preference the views of the researcher who can make assumptions about what the issues are, Exhibition in a box offers participants the space to reflect, discuss, explore and define the real questions. The objects offer scaffolds for communication because at one and the same time they are both concrete and abstract.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

Figure 2 exhibition in a box and user workshops

3.5 Description of the study

Ethical approval for the study was granted from Sheffield Hallam University Ethics Committee in October 2017. Between October 2017 and January 2018, 82 older user representatives were recruited from across organisations in Sheffield, UK (Sheff Care, De La Salle Club, Lifestyle Matters group, Ministry of Craft) to participate in a series of NESTORE co-design workshops. Given the intended demographic of this phase of the study, university organisations and council departments within Sheffield were also targeted as a source of recruitment.

Inclusion criteria for the study were:

- Community living older people aged 50 and over;
- Individuals able to give informed consent;
- People who had some degree of familiarity with the use of technology (reflecting future groups of people who may use NESTORE).

Individuals recruited to the project have engaged in the research. The original intention was to facilitate 8 workshops with 10 people in each workshop but transcription of workshops containing such large numbers was prohibitive. Smaller workshops have therefore been facilitated alongside larger workshops (minimum four participants) tto ensure accurate data capture (see further explanation in section 3.6.2).

Workshops were facilitated across a number of different venues including community centres, people's homes, and the user-laboratory space within Lab4Living at Sheffield Hallam University.

Each workshop lasted on average between one to two hours. The workshops began with a general introduction from the research team and an invitation for participants to share (verbally) activities they engaged in and found meaningful, with a particular focus on hobbies or leisure. Exhibition in a box was then introduced and participants were invited, in turn, to select and use the object to explore their ideas further (this might relate to the objects form, its sensory quality, function, memory association or a more metaphorical use). This was shared with the broader group. Participants were then invited to share associations that came to

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

mind when they heard the word technology. Again the critical artefacts were used to explore and interrogate these themes further.

With permission, each workshop was audio-recorded and then transcribed. With the exception of one workshop (due to a failure in the recording equipment), this was achieved. In the one workshop where audio-recording did not occur, notes were taken.

An expert user group are involved in undertaking the analysis of the data. The project is aiming to develop insight and understanding of the complexity and diversity of older people's lives (potential NESTORE users). We adopt the term expert as we are positioning older individuals as experts and best informed to tell us about their lives. Initial analysis of the extensive data has been undertaken using thematic analysis (Attride-Stirling, 2001). This will be on-going and triangulated in the next phase of the research (Task 7.2 - Transferability of participants' perspectives to technologists).

The preliminary findings from this analysis are presented in this report.

3.6 Reflections on using a critical artefact methodology within the context of this research

3.6.1 A number of strengths in relation to the exhibition in a box method were identified

The objects transcended boundaries of culture, language and age and whilst the objects remained unchanging, the associations they prompted and the stories they elicited were dynamic and ever changing. Across the various workshop/focus groups, different objects elicited the same themes of conversation. Particularly powerful were the keys, which very much related to security and the dice which participants used to talk about parity of access.

Participants shared rich descriptions of their attitudes towards and experiences of technology and a depth of information was offered within the first few minutes of the workshop beginning.

Older people expressed appreciation of the tangibility of the objects and their sensory qualities, acting as a physical prompt. The method also enabled individuals to achieve some distance when sharing more personal stories by 'speaking through the objects' or using the objects metaphorically.

Rather than being dependent on fixed interview schedules whereby the researcher had pre-defined questions, the method very much preferenced the views of participants. This is integral to the co-design process.

Individuals participating in the workshops expressed enjoyment of the experience and reflected on their learning and the new insights they had gained through the process. This positive experience led to an expressed interest in participating in other elements of the study.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

3.6.2 The research also highlighted some considerations when utilising the methodology

The interviews elicited rich conversation but the workshops were long and it was important to keep individuals on track.

The researchers have reflected on the size of groups: larger numbers worked well but there were difficulties in transcription where numbers were over six participants. Smaller workshops (4 individuals) promoted a greater depth of conversation which could be recorded more easily but more workshops were required in order to meet recruitment targets.. Reflecting on the workshops the optimum number of participants is six which suitably fits the one and half hour workshop format. Two NESTORE researchers facilitated each workshop to share observations and reflections post workshop.

It is important to consider the diverse environments that NESTORE might be used. Consequently workshops were held in a variety of contexts, for instance where people might work, meet socially or in the home. The context of delivery of the workshop sometimes impacted on the conversations that were elicited and, participants could relate their experiences to objects and surroundings.

4. What do participants identify as being meaningful / important in context of hobbies, work and leisure?

As anticipated, there was a large amount of variation in the types of activities individuals engaged in and identified as being meaningful. In part socio-economic class, health considerations and mobility, work, caring and family commitments as well as access to amenities and resources dictated this.

Participants in the 50-68 age bracket who were approaching retirement spoke of the potential opportunities and challenges this transition might pose and the need to re-think routines, activities and to focus more on health promoting activity. This was perceived as both an exciting opportunity and a challenge as exemplified by the following quote:

I think actually keys do make doors open and I think that's the sort of stage that some of us might be reaching soon where we start to think if a door opens it's something more exciting coming up on the other side of it – not routine, not what we do for the last 30 years or whatever it is, but something completely different.

Many of the oldest old participants were still keen to pursue activities such as walking, cycling, cooking, games, gardening continued learning and also stressed the importance of being social and keeping in contact with family.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

4.1 Hobbies and activities

The range of hobbies and activities people described as being important was broad and included: listening to music, playing instruments, walking, gardening, drawing, art, creative writing, golf, cricket, football, and engaging in cultural pursuits such as reading, visiting museums and galleries. Older participants were more likely to talk about the importance of spirituality and faith and a number of individuals described the importance of attending church in relation to their emotional and spiritual wellbeing.

Interestingly because a number of participants were still in employment, the value of work was described in some depth as an area which offered structure to the day, a role and a sense of identity. The following quote is very typical of what others described:

> *Work matters to me more than I probably ever thought it did, just because it's entwined with who I am. And I think a lot of things I do are expressions of who I am as an individual and I'm still unpicking what that means in terms of how that is, but it's really important to me.*

There was recognition, particularly amongst participants in the 50-60 year age bracket, of the need to keep physically well and to engage in health promoting activities. This was identified as a motivation to engage in a range of pursuits although it was also acknowledged that healthy lifestyle choices could be difficult:

> *Being physically active is important to me. And that's going to get more intense as I get older, because it's trying to deny what is inevitably going to happen. Drinking is way too important to me, probably because I enjoy doing it. It shouldn't be important.*

4.2 Physical activity

Physical wellbeing was regarded as important and a number of participants engaged in a range of exercise including running and walking. However exercise was not seen only in terms of physical wellbeing but also as offering an opportunity for relaxation and for the maintenance of mental wellbeing. Access to outside space and spending time outside was seen as key particularly as people grew older:

> *I think for me, I like being outside. As I've got older I think I appreciate being out in the open, because I just like to see the sky. It's good to see the expanse and appreciate the outdoors more than I probably ever have done now.*

> *And I love being outside. And I specifically like long walks in different places with different friends as well. We do different walks. I really like that.*

The social dimension of exercise was a motivating factor – participants found purpose when being with friends or pets

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

I like being outside 24 hours, I think, generally – with a dog if possible…but with people generally. I think people are the most important thing for me. Being outside with people and a dog.

4.3 Social dimension of activity

Socialising and engaging in activities with other people was a significant theme that ran throughout all workshops. Participants spoke of the importance and value of interacting with family, engaging in intergenerational activity and of being with others:

And I think it's quite interesting, because as you get older, I don't know whether this rings true, but it's almost like… you really value your friends.

Friendship and socialising were seen as key to maintaining good mental wellbeing. At times individuals spoke of the social dimension of the activity being the motivating factor and at other times keeping connected and spending time with friends became an end in itself:

The thing I look forward to the most in running is when we do the big runs. So, the Manchester 10k – I think it's about 35,000 people do that race. It's an incredible experience. There's this big sense of sociability and doing something together and achieving something with all those people…I'd much rather run with somebody.

It was the fact that you're doing things with friends and family, and I really enjoyed it. I realise now that it comes back to being in a band, and things like that, and I enjoy being part of something.

… because what's a really important detail is sociability and social-ness is really important to me – so, interacting with other people. I really enjoy other people. Yeah, I do enjoy that sort of thing.

I like doing things… I like socialising but I also like doing things with people. And I think my favourite things to do with people are creative things. So I'm in a band. And I love doing that, and it's something to do with creating together - and that really, really, lights my candle. It's that creating together. I'm not the sort of person that likes to sit on their own and do their creative… I know that a lot of people are like that, this is my space, and I do my creativity on my own, but mine is very much relational.

4.4 Creative activities

A significant theme that arose during the workshops was the value that participants placed on creative activities and in attending cultural events. Creativity was regarded as an outlet for self-expression, a way to reflect and to make sense of situations. Creativity was also seen as a form of problem solving, as a way to identify and to think about solutions. The idea of making something tangible and of engaging with physical

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

materials in the creation of new things was linked closely to legacy and of the act of creating and making a mark that would live beyond the participants' lifetime:

Some of them will be here long after me.

Across all also workshops individuals identified creativity, art, writing and drawing as ways of keeping mentally and cognitively well and as a way to retain a sense of curiosity and new learning. For a number of individuals it offered a sense of balance and was key to emotional wellbeing:

It is about balance. As I've become older, I realise that the things I do outside of work are for survival. They're for mental health and to re-balance the very demanding roles that we have here. It's a way of re-connecting with other parts of yourself that you don't use in your work roles. So for me that's been really about survival. If I don't do those things, I kind of shrivel up quite quickly.

It is also the need to learn, finding out new things, those new discussions and being inquisitive and expand my horizons.

Travel was also seen as a way that participants expanded their horizons, particularly in relation to seeing and experiencing different cultures.

4.5 Factors that promote and maximise engagement

Some factors that promoted and maximised engagement were also identified in this phase of the study. Individuals were more likely to engage in health promoting activities if they were part of a routine particularly if they were in full or part-time employment:

I walk to work every morning. I'm fortunate that I live close to Endcliffe Park, so I can walk through the park and that's the nice bit of the walk in the morning…. But I do that every morning. I walk to work. I enjoy that. And also I enjoy walking socially with friends, so we do that as well. I play bowls on a Sunday.

Participants spoke of the importance of the social element of activities as a motivating factor, particularly if they could be undertaken with friends and family. For one person who was bereaved, netball was something she had taken up and it was the sense of being part of a team that encouraged and motivated her engagement and which ultimately led to the development of friendships that then acted as a further motivator:

I like being part of a team. So for me that is what I enjoy about the netball – it's good fun. I'm not very good at it, but I get good exercise, but there's something about as a team you're trying to support each other. We're not overly competitive but we're very supportive… but actually I've really enjoyed it, and we do socialise together. So they're not

my closest friends, but they're a different group of friends who bring something different when we go out socially. So I've really enjoyed that.

Having a sense of challenge or a goal to work towards was also seen as being important particularly in terms of creating a sense of achievement:

It's like the challenge of going to the top of Snowden(mountain). You walk to the top and you just get a little trophy, effectively.

4.6 Barriers to engagement

Across all the workshops, participants also spoke of barriers to engagement. Lack of encouragement or reward was a theme that led some to disengage from activity, particularly when participants were seeking to learn something new. Lack of confidence and the challenge of taking the first step was also a theme that emerged across workshops. When people felt coerced or that they did not have a choice but to participate this acted as a barrier to engagement and continued engagement in the activity:

And I look at that now and I think of that confinement and also my freedom to what I want to do, when I want to do it, I suppose. And that's a big thing in my life – that I've got that freedom to do what I want, really.

However by far the greatest barrier to engagement in meaningful activity was lack of time and financial resources. Within the demographic of this research a significant number of participants were of the so called 'sandwich generation' caring for children or even grandchildren and for elderly parents. Time was of a premium and the notion of engaging in any form of activity outside of work or caring roles felt to a number of participants to be impossible as reflected in the following quote:

Unfortunately, at this moment in time due to other family commitments, I don't have a lot of time for any of it. Where older people did have time resources and the cost of activities was the main prohibitive factor.

5. Attitudes to technology and barriers and enablers to engagement and adoption

5.1 Perceptions and attitudes

Perceptions of technology were broad and individuals described and identified this in a number of ways. The most common association was with digital technology: smartphone, computers, wires, cables, phones. A small number of people spoke about technology more generally including aeroplanes, cars, kettles and household objects and a couple of participants offered more philosophical definitions linked to time and place:

So technology is essentially the stuff that has just been developed or is being developed and we're just trying to get to grips with it. So everything… watches were technology at one

point, just as landlines – we don't call landlines technology now, because they're just landlines.

With the exception of 4 or 5 individuals everyone had access to a smartphone or tablet computer and this was the most common device described.

Attitudes to and responses to technology across all the workshops were polarised. On the one hand, the strengths and potential of technology to be an enabler was recognised particularly in helping individuals to overcome challenges such as dyslexia. Digital technology was also seen as a mechanism through which to access information quickly, to provide a vehicle through which it was possible to access opportunities, learn new things and to connect to interests (such as exhibitions and to book travel and accommodation). For some people advances were seen as a good thing, particularly when it had a clear function that enabled participation in meaningful activity:

Yeah I think, let's face it, you can go back 20 years and you think where are we now – it's fantastic. It is really good.

On the other hand the same technologies were seen as a threat to present way of life:

That is the really scary thing that's really come about now, where you kind of say, technology now is hugely ubiquitous in a way that it could… OK, it's already becoming dysfunctional at an interpersonal communication level, but it could be seriously… could it actually change the nature of the way that humans interact or stop interacting. Basically, technology has developed too fast for our way in which we… human development is capable of… and [the ways] which we can deal with each other.

Terms such as 'good' and 'evil', 'frustration', 'fear' were used. A number of participants described technology as being 'dull' and 'uninteresting' particularly in relation to digital technology. The following response was not uncommon:

Digital tech. Even with my running, it's very, very basic digital tech that I use. I'm really not interested. I don't download tunes onto my phone. I'm not interested in any of that sort of thing at all. I use digital technology to a minimum.

5.2 Barriers to engagement

5.2.1 Speed of change and cognitive demands

Participants described a range of barriers to engaging with technology. Speed of change was seen as a particular barrier. Individuals described their frustration in terms of constantly needing to master new types of device or operating system, leading participants to disengage completely as exemplified by the following statement:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

That's the problem – technology is running too fast to keep everybody connected to it. And we already feel slightly behind if we're talking about, you, know, however you interpret technology.

Individuals spoke of their own experiences and of the frustration that ensued when seeking to master a new device or program:

I struggled literally from half past one to half past three to get a box with a number 6 in it to go in a straight line. Two hours.

It's meant to make life simple and I think it makes life even harder.

Whilst for the most part participants described their own experiences they also offered insights into older, frailer parents when they referred to and spoke of family members and in the context of this current research these insights are useful:

I think the other thing about technology, which I think about more and more is the cognitive demand of it. Maybe it's because my parents, who actually… my mum is very technically able, was a scientist. As she's got older, she's got less and less… and now they won't do it. They won't even use telephone banking, because it's too hard.

We tried to buy my mum a mobile phone but she kept it in a box in the cupboard…

A common theme across all workshops was the increased cognitive demand that technology placed on individuals and the new learning that was required at a time when individuals were struggling to retain information and learn new things. The challenge of remembering multiple passwords was identified as a particular issue. Ironically participants described instances where the challenge was not the technology itself but access to the technology in terms of remembering a password:

She [my mother] gets confused with the passwords. So she can manage the technology, she can manage to operate the devices but when it comes to all the sign-ins and the passwords, that's the thing that throws her completely. She can no longer do that.

Participants were clear in describing the dangers of the potential for exclusion:

That whole side of life, of technology…there's a barrier that's been caused by the cognitive demand of setting up all these different accounts. You know, I just think… gosh… it's like a nuclear bomb waiting to happen in a way, if you think… how much of our lives are becoming like that, sort of behind these gated worlds, which we have to access using our cognitive faculties.

In a sense I suppose it was watching how that felt at the beginning of that whole new world of computers and phones and whatever else – just left a whole generation separate. And there is still a separation for a lot of people who find it difficult to use.

5.2.2 Costs and infrastructure

Access did not only relate to the recall of passwords but to the affordability of technology and also to network coverage. Participants used the critical artefact to talk about chance:

> *That thing about rolling the dice…. It's whether you live in an affluent area, and you've got access to all this stuff, or whether you're in Bangladesh, drowning because of global warming.*

> *In the countryside, no Wi-Fi, no super-fast broadband, so no streaming of telly. Totally different.*

Again this could lead to social exclusion:

> *Some people have got access to all these lovely things and technology, and some people haven't. And is it excluding them from the world, and everything.*

5.2.3 Security, trust and privacy

A key theme emerging across all the workshops was the importance of trust and reliability of products. Trust could take many forms and relate a number of aspects of the device. Trust could relate to reliability with concern expressed in terms of dangers of malfunction or breakdown of the technology. Trust could also relate to whether the technology is providing an accurate recording. One person articulated this by recounting the following experience:

> *On holiday there was this woman and she had a FitBit thing on her arm all the time. It's not something I've ever had, but she was looking at it at the end of the day and talking about the amount of steps that she'd done. And I said – but you've sat in a big lorry – because we were on a safari thing for most of the time – I don't think you've done that many steps! It's every time we've gone over a [bump] it's just been registering…*

For some participants trust related to dangers of user error. For instance one person described concerns relating to her frail father:

> *But then I think the security and the safety of it, as well. Even the doorbell ringing – where you can see somebody at your door. You think, ooh, because that's something. He could just press some wrong buttons and just let anybody in. You know, it's about sort of trusting the devices as well.*

Trust could also be about security of the information and how the information is used, expressed by one participant in the following way:

> *That is a really, really important issue though, with technology and health, isn't it? Health data and who is controlling it, and where it goes.*

And health, you know, it's not like it's this value-free thing. It's like… some health conditions are seen as worse than others and people feel guilty about having them, or it's their fault, or some are more socially acceptable than others. Yes.

Of particular concern was identifying who was accessing and using the data:

If it goes to your doctor, great….If it goes to your employer, it's a different meaning. … I sound paranoid. I think the government or whoever – they know a lot more about us than we… Someone is already looking at all our stuff.

I find it the most scary that, you know, you know that they're watching you! They're controlling you. As soon as you've done one thing like book a ski holiday, suddenly you get an email about ski lifts, and this and that.

Fear was also expressed regarding the permanence of the digital footprint and the consequences of making mistakes, which were difficult to erase from the digital domain. The over-riding theme within this theme was control and self-efficacy. This is a theme that is explored further in the next section.

6. Design considerations identified in the study which promote adoption

6.1 Personalisation

The ability to be able to personalise the technology was by far the most desirable design consideration expressed in this element of the research. This was seen as a way to counter the uniformity of existing technology and to project participants' personality onto the tech to make it theirs and create a sense of identity and ownership:

Because one of the things about this tech, which you've just been alluding to then, is that it's identifiable with you, isn't it. You make your decisions on what you'd like.

6.2 Consistency of instructions

If personalisation and the ability to adapt and shape the technology to reflect the owners personality then the opposite was true in relation to the operation of digital devices. Participants identified the need for consistency in design, in the symbols used and controls across products:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

You have no idea of what the symbols mean, and the lack of consistency around design, where you suddenly go – is that making it hotter or is that making it colder? I have no idea.

6.3 Portability and ergonomics

Portability was another design consideration. Older people in our study enjoyed travel and pursuits in the locality and did not want to be tied to the home or to a particular room in the house. Within this size and weight were both factors as the following quotes reflect:

My god. Fancy carrying that around! When you've got so much shopping and so much else in your life that you feel as though you must have this huge thing.

It's like my dad who's 79 now, and he had an iPad and could use an iPad, and now he can't. He can't use his iPad, he can't hold it….he can't physically hold it now.

Ergonomic factors were therefore a clear considerations. One possibility (which is worth exploring further) is whether the ergonomic features could be adapted and change as the person's needs change as they age and strength and manual dexterity deteriorates.

Participants were clear that not being dependent on others to update the device or change batteries should also be a consideration especially if the aim of the technology was to increase self-efficacy.

6.4 Features to promote control and self-efficacy

Participants appreciated the choice and option to have time to disconnect from technology. One person shared an instance of a fully automated system where they had no control and spoke about the difficulties of this experience:

And all of us, you went to their sort of reception desk toilet, and you could not get out of that room, out of the toilet, without pulling - as you do - on the handle-bar, but as you did the handle-bar would dispense your soap. It was horrible, because you had to pull it, then it dispensed into your hands and it was all a bit… that's a bit weird… But you could not get out of there without dispensing anti-bacterial sort of hand gel soap on your hand.

Other participants spoke of the importance of the stress that could arise when under constant scrutiny and not having the choice to disconnect, questioning the ethics of constant monitoring.

6.5 Single or multiple functionality?

There were mixed views in terms of whether devices should have multiple functions or whether a single piece of technology should have a single function. This extensive quote encapsulates the dilemma:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

I'm not striving to have that mobile phone that can take the best pictures. If I'm taking a photo, I want an ordinary camera. For me a phone is not something that's counting how many steps I do, it's something that when I need to make a call or text something, I do. I like its separateness. I'm not comfortable with this race to have everything on your wrist, sort of social interaction. I don't know, it just doesn't feel right to me.

6.6 Potential negative impact of technology on health

One unexpected theme that emerged during this phase of the research was discussion across three of the workshops relating to the potential negative impact technology may have on health. Concern was expressed as to whether a focus on measurement of health behaviours (pedometers, step counters) could result in the focus being on the behaviour rather than the activity itself. This is illustrated by the following quote:

Another woman a couple of weeks ago. She'd got one. And she was saying 'oh I've only done 7,000 and something, and I really need to fit in…' I thought, it's gone 8 o'clock, what the hell? Surely there's something more meaningful that you can do with your life than count up a few more steps, so you get this magic 10,000.

In this way the potential was for the original motivation and meaning of the activity to be lost and eclipsed by the focus on measurement. One person expressed this thus:

Again, I was reading something the other day about [how that] distorts memory, because actually what we're remembering is videoing the gig, and not the actual gig – the meaning of original experience is lost…..

Links were made between social media, technology and mental health:

The face that you put on when you take a photo, that's what… you know if you scroll down someone's social media, everyone's having a great time… and it's not reality. If people think that is reality, then that's not good for people's mental health at all. It really isn't. In all sorts of ways.

Technology was also seen as both being as addictive and as a gateway to web-sites that might provide dangerous to individuals vulnerable to addictive behaviours, feeding addictions such as on-line gambling and pornography. However the greatest perceived threat regarding technology in relation to mental health was in the breakdown of relationships and the ensuing isolation:

They were just stood with their heads down on their mobile phones and everything. It's that socialisation and that.

I do wonder about people these days becoming very insular, because walking around and walking to work, and I see young people and they've got these earphones in, and they're completely oblivious to people around them, to traffic. And I wonder how they will communicate with each other in the future, because they don't seem to be able to.

Like you said, you see people walking around and that's all they're doing all the time. You know, you bump into them, and they don't notice, because they're that busy – they're on the phone.

A small number of participants questioned whether long term use of technology could lead to reduced engagement in activity and result in physical changes:

Actually moving through space and interacting with physical objects – that's what's happening – people are losing the need to do that. So they don't need – we don't need to move our bodies, really, to do work, or to be entertained, or even to socialise. We need fine motor and that's about it.

I can see that's how we're going to end up - everything is going to be done automatically for us, one thing and another, and eventually we won't have to do anything, and we'll just sit there.

Finally concern was expressed regarding the wider implications of technology. This related to its impact on the environment and the consequences of this in terms of pollution, harmful materials finding their way into the food-chain with its ensuing impact on health:

And, talk about incompatibility – often designers about technology think about individuals and humans and how they interact, but the largest incompatibility is our own position within the larger environment that sustains us. And as most people know from reading the news over the last week about the particles of plastic found in deep sea fish in the Marianas Trench, this stuff is exactly what I was saying – it's about who controls what the technology does.

7. Conclusions

This report has described the findings of Task 7.1. Due to the late project start, meeting with NESTORE technologists and expert older group to co-analyse the data was slightly delayed. The meeting and co- analyses were scheduled towards the end of January and have now taken place and is reflected in this report.

This has brought the project in line with its original schedule.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

References

Attride-Stirling (2001) Thematic networks: an analytic tool for qualitative research. Qualitative Research vol 1 (3) pp385-405.

Bentley C, Powell L, Orrell A, Mountain G. (2014) Addressing design and suitability barriers to telecare use: has anything changed? Technol Disabil. 26(4):221–35.

Chamberlain and Roddis (2003) Making sense: A case study of a collaborative design-led new product development for the sensorily impaired. The Design Journal (6) Issue 1

Chamberlain, P., Yoxall, A., "Of Mice and Men. The Role of Interactive Exhibitions as Re- search Tools for Inclusive Design". Vol. 15, Issue 1. pp 57-78. Ashgate Publications (2012)

Chamberlain and Craig (2013) Engagingdesign – methods for collective creativity: HCI Human centred design approaches: methods, tools and environments pp22-31.

Design Council UK. https://www.designcouncil.org.uk

Greenhalgh T, Jackson C, Shaw S and Janamian T (2016) Achieving research impact through co-creation in community based health services: literature review and case study. The Milbank Quarterly (94) no. 2 pp.392-429.

Sligo J, Gauld R, Roberts V, Villa L. (2017) A literature review for large-scale health information system project planning, implementation and evaluation. Int J Med Inform. 97:86–97

Standing C, Standing S, McDermott M, Gururajan R, Kiani Mavi R. (2018) The paradoxes of telehealth: a review of the literature 2000-2015. Systems Research and Behavioural Science 35 90-101.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769643

Indice