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Reflections on creative methodologies for health technology research, and the iterative process between research and design

Nikki Holliday, Paul Magee and Aimée Walker-Clarke

Centre for Technology Enabled Health Research, Coventry University, UK

Abstract

This paper presents reflective case studies, based upon experience of creative methodologies for health technology research to develop assistive technology (AT) products and services. AT is often abandoned due to poor aesthetics, disregarding any pleasing functionality of the product. The development of a consumer market for AT means the requirement for the design of products which meets the needs of older and disabled consumers and users is critical, as consumers of AT are presented with ever increasing choice. As such, consideration of creative methodologies that involve users in the design process is vital. Following this, the paper reflects on creative methods involving older and disabled people in AT development. The journey taken by researchers, designers and the research participants themselves across numerous projects at Coventry University is explored, from the use of 'traditional' data collection methods to innovative, creative methodologies such as cocreation, alongside use of 2D-illustration, 3D-modelling and rapid-prototyping to help participants' ideas come to life. The paper critically considers benefits of creative design and research methodologies when engaging with disabled and older people, and reflections and learning from researchers and designers who engage directly with participants, to develop AT which is less likely to be abandoned.

Keywords: cocreation, assistive technology, older people, disabled people, research, design

Introduction

The UK population is ageing – by 2030 the number of people aged 65+ will rise by 39% (ONS, 2014). With increasing age comes increasing chance of illness and disability, with 41% of over 65s and 69% of over 85s in England currently having a long-term health condition or disability which limits participation in everyday life (DWP, 2009; ONS, 2013). Such people have needs which require solutions to enable them to maximise independence. Assistive Technology (AT) has the potential to support challenges presented by an ageing society, and is defined as:

> "…Any product or service-designed to enable independence for disabled and older people" (FAST, 2015)

AT includes products and services under the umbrella terms of telecare and telehealth (definitions of which can be found online – see Department of Health, 2009, p.5-6). Successful use of AT is not straightforward. Research has found a lack of awareness amongst the public, lack of available information, and concerns about cost (COMODAL, 2014). Even when people are aware of AT, high abandonment rates are reported (Shinohara & Wobbrock, 2011). Reasons for AT abandonment include: poor usability, poor aesthetics, poor functionality, low digital literacy, and concerns that AT is stigmatising (Phillips and Zhao, 1993). Such barriers to use lead to abandonment regardless of functional benefit (Ravneberg, 2012). It is argued that use of creative methodologies benefits AT development by reducing barriers and increasing enablers, leading to development of AT which matches user need. The Innovation Design & Technology Unit (IDTU) at the Centre for Technology Enabled Health Research (CTEHR), Coventry University aims to conduct research into development of AT by placing the user at the heart of their work via creative methods. This paper considers literature surrounding use of creative methods, and then considers how development of AT can be supported, using reflections from CTEHR designers and researchers.

Creative methodologies: benefits

Traditional data collection methods view participants as passive sources of data – not active partners. They have been criticised by the creative community for placing too much focus on metrics, and lacking consideration of how to enact improvements based on feedback generated (Robert *et al*, 2015). There are numerous benefits to using creative methodologies as an alternative, including: ability to meaningfully involve people at an earlier stage in the design process (Xie *et al*, 2012), inclusion of a range of perspectives (Steen *et al*, 2011), development of original, innovative ideas (Steen *et al*, 2011), lowering risk when introducing products to market (Xie *et al*, 2012), improved match between user needs and product capabilities, and improved satisfaction (Steen *et al*, 2011).

Criticisms of creative methodologies include: difficulties in encouraging creativity, the view that not everyone is creative (Morales *et al*, 2012; Xie *et al*, 2012), inclusion of designers leading to

'overdesign' (Raijmakers *et al*, 2012), and increased costs (money, time – Morales *et al*, 2012; Culén and van der Velden, 2013). Creative approaches are critiqued for leading to the development of solutions which are not cost effective, feasible, or only relevant to the small group involved in the design process (Culén and van der Velden, 2013). However, others argue feasible solutions are *more likely* to be developed *if a variety of stakeholders are included in the design process*, e.g., whilst users have innovative ideas, developers can make these ideas technologically feasible (Steen *et al*, 2011; Culén and van der Velden, 2013). The utilisation of health-professionals in the process is also useful where clinical applications are important (Roberts *et al*, 2015). Thus by collaborating, stakeholders can develop innovative yet feasible and scalable solutions.

Creative methodologies: AT research

Creative methodologies have significant relevance for AT development. In particular, they allow inclusion of "absent but relevant groups" (Xie *et al*, 2012). The very people often excluded from the development process are those most likely to benefit, as they rely on suitable products to support health, wellbeing and independence (Culén and van der Velden, 2013). If older and disabled people are included at all, it is at concept testing or final usability stage, and they are not always included as inherent to the design process as advocated by creative methods (Sustar *et al*, 2013). Creative methodologies have potential to reduce AT abandonment rates by enabling development of accurate user requirements. Creative methods can be utilised to encourage higher rates of technology adoption, as users themselves have been included in the design process, thus increasing relevance of the resulting solution to target groups (Mangyoku *et al*, 2014).

Although attempts to add to the limited evidence base regarding creative methodologies are increasing, there is a lack of evidence regarding how they have a particular role to play in expediting the development of acceptable and desirable AT. This paper will add to the evidence base by reflecting upon the use of creative methods by CTHER. Case studies will demonstrate the journey from the use of 'traditional' research methods to the increasing use of creative methods, and the benefits of such methods to AT development.

Case studies

This section describes three case studies which chart the use of creative methodologies utilised at CTEHR. The first case study describes a linear approach, with research and design stages 'taking their turns'. Case Study 2 describes the first use of a creative method by the authors and considers the reflections of the authors and the participants who experienced the move into the use of creative methodology. Case 3 presents a recent project which highlights benefits of adopting a multi-stakeholder cocreative approach to AT development.

Case study 1 – linear iterative process between research and design

The authors were involved in a project which initially sought to develop a new style of walking-stick handle using a comfortable gel material (Holliday and Prothero, 2011). The research was conducted in a linear but iterative manner, with separate phases of design and research. The project began with an initial design phase, where a designer produced a 3D-model of the new walking-stick handle (which aimed to be more comfortable to use for people with arthritis). This model was presented to health professionals (physiotherapists, occupational therapists) to ascertain their thoughts on the design. Their feedback concluded that although it was an interesting concept, they were concerned the shape of the handle was not universal and would need to be produced in a range of sizes to account for individual-differences. Participants argued that the material used for the walking-stick handle would have more utility as a crutch handle, where users are more likely to bear weight on the handle, thus requiring additional comfort. Participants also expressed concerns that a greater issue was walking-stick users experiencing shoulder problems, caused by shockwaves created through the stick as the ferrule impacts the floor. This feedback was considered by the designers and the inventor, who changed the direction of the project to develop a shock-absorbing ferrule, and to consider applying the comfortable gel material to crutch handles. New prototypes of the crutch handle and ferrule were developed and presented to potential end-users (see Figure 1), who viewed the new developments favourably. The ferrule is now available commercially. Further work regarding the crutch handle is ongoing.

Figure 1: Development of the walking-stick ferrule

Case study 2 – the move into creative methods

The Consumer MODels for Assisted Living project (www.comodal.co.uk) aims to support development of a consumer market for electronic AT (eAT) by gaining in-depth understanding of barriers to market development, and creating consumer-led business-models developed through collaboration with consumers (younger older people – YOP), industry, and third-sector stakeholders. The first phase of research utilised 'traditional' data collection methods including

focus groups to explore YOP perceptions to eAT. The focus groups collected rich, saturated data which enabled the researchers to plan the second phase of research – exploring ideal consumer journeys when purchasing eAT. As this was considered service-design, it was felt that creative methodologies would be appropriate to explore the consumer journey - therefore a co-creative approach was utilised. The same participants took part in both phases of the research, which allowed the authors to gain a useful insight into participant perceptions of traditional versus creative methodologies. Although participants enjoyed taking part in the focus groups, despite the facilitator's skills there were some who felt unconfident about contributing, particularly in the presence of dominant group members. However, feedback from the cocreation sessions, suggested that *all* participants felt able to contribute, as the nature of the sessions relied on writing down thoughts or taking part in activities to produce data. Cocreation was particularly welcomed by participants whose first language was not English, and a participant who was hearing-impaired, as the asynchronous nature of the activities allowed people to take time to express their thoughts, rather than relying on verbal communication alone. The project results have been used to develop a range of consumer focused business-models, and advice for businesses regarding wants and needs of YOP (see Figure 2 for an example cocreation output).

Figure 2: how YOP wish eAT were advertised

Case study 3 – a multistakeholder cocreative approach

The researchers led a project which aimed to design a new consumer-focused technology service to support older or vulnerable people to live independently by using sensor and mobile technology to connect family, friends and informal neighbourhoods and enable them to support their loved ones more easily (Holliday *et al*, 2014; Ward *et al*, 2014). Two cocreation sessions were

held with potential users (older people, people with long-term health conditions, carers), commercial stakeholders (those working in the care industry), and technologists. 2D-illustrations were used to summarise service concepts in between the two cocreation sessions (see Figure 3 for example outputs), and existing sensor technology was used to rapidly prototype a working service which was implemented as a test pilot with 12 families. The inclusion of users in the process produced original and innovative ideas, e.g. commercial stakeholders had not considered environmental impact of the service, however users felt strongly that technology provided should be returnable and reused should a customer leave the service. Including commercial and technology stakeholders in the process allowed the development of a service which was acceptable to users, but also feasible. The service is now out for commercialisation (Holliday *et al*, 2014).
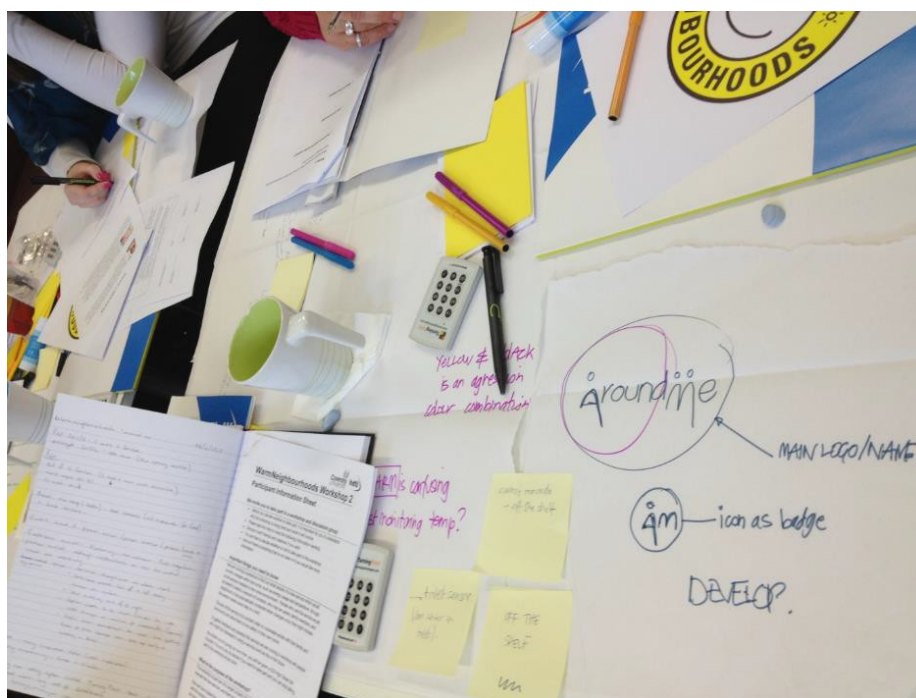

Figure 3: Simultaneous research and design stages, with users and stakeholders

Reflections

Why the move to creative methods?

Following reflections from their work, methodologies utilised by the authors are becoming increasingly creative, as a more efficient way of realising AT solutions. For example, although the end result from Case Study 1 was acceptable, the linear process and lack of interaction between research and design meant that designers were required to wait until the research process was completed to consider views of the users (Figure 4). The authors have reflected that if Case Study 1

had adopted a creative methodology, the resulting solution of the ferrule development could have been realised sooner, with investment in the walking-stick handle being suspended earlier, thus saving time and money. Rather than creative methods increasing the timescale and costs of a project, the authors have found that by placing the iterative process between research and design in situ with users, a feasible solution can be realised sooner (Figure 5).
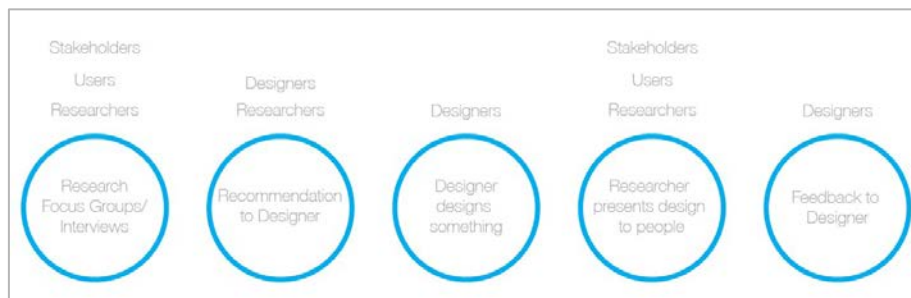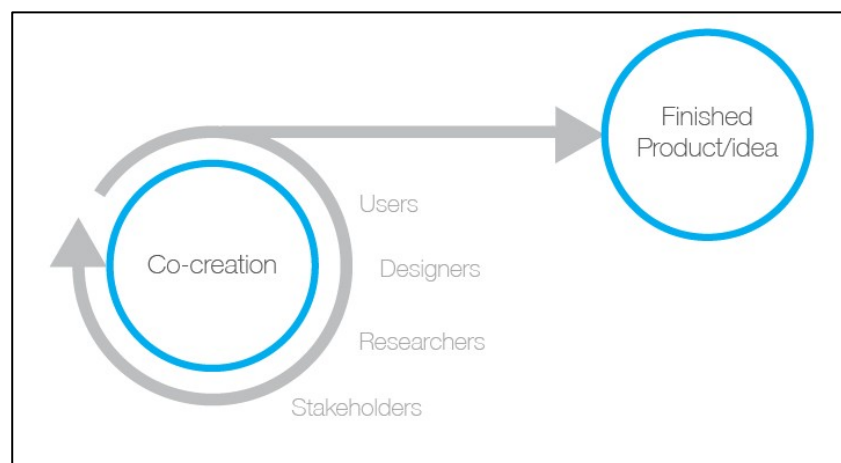

Figure 4: linear iterative process

Figure 5: The creative process

Can everyone be creative?

In the experience of the authors, it is possible to stimulate latent creativity and encourage users to seek novel solutions to everyday problems (Sanders, 2001; Sustar *et al*, 2013) however, there may be an element of self-selection. Following good ethical practice, the nature of any cocreation session is made explicit in the process of recruiting – it is therefore feasible that those who volunteer are naturally more creative. This could introduce bias into a project. However, the authors would argue that as long as the participants are relevant to the project in hand, then they should be given the opportunity to unleash their creativity. Anecdotal reports from the authors' participants would dispute the notion of bias – participants have expressed concerns about *not* being able to contribute creatively, however all have been able to provide meaningful

contributions, particularly with the use of 2D-illustrations and 3D-modelling to help visualise their ideas.

Are creative methods inclusive?

It has been the authors' experience that creative methods are more inclusive than traditional methods. There is no 'turn-taking' in cocreation – participants can shout out ideas, jot down thoughts on post-it notes, and work with visual tools at the same time as other participants. It is this aspect that allowed the participant with hearing impairments, and participants for whom English is not their first language to fully participate in the Case Study 2 cocreative sessions. Lack of turn-taking also provides opportunity to collect data from all participants simultaneously as they engage in individual or group tasks – thus increasing depth of data and saturation of themes. Further, the use of a variety of activities gives cocreation an inherent ability to utilise a range of different learning and communication styles, allowing those who may not prefer verbal activities to fully engage. This is beneficial when working with those who may benefit from AT, who have a greater likelihood of having communication or learning disabilities.

Does cocreation overdesign?

In the examples described, there has been a concerted effort to keep the provided designs during the cocreation phase (2D-illustrations/3D-models) as simple as possible. For example, in Case Study 2, the designers developed a storyboard to illustrate initial service concept ideas to participants, which described a potential caring scenario whilst keeping use of technology within the story as generic as possible. This allowed participants to engage with the concept whilst allowing them freedom to redesign and repurpose existing technologies according to their requirements. This reflects the findings of Raijmakers *et al* (2012), who argue the importance of "preliminary, unfinished thoughts and visuals as tools for cocreation" (p.6), enabling utilisation of design expertise alongside allowing creativity and innovation from participants.

Can creative methods help preserve anonymity?

It has been considered by the authors that creative methodologies have the opportunity to offer a further level of anonymity to participants than traditional methods, and reduce chances of group influence. Participants have a high level of anonymity afforded to them in any project dissemination; however they may feel inhibited from disclosing *all* their thoughts and experiences to other participants, stakeholders, researchers or designers. The variety of tools used in cocreation means that participants can write down thoughts and ideas rather than verbalise them to a group, e.g. by adding a surreptitious post-it note on the wall. The ability of participants to interact away from the gaze of facilitators may also reduce the chances of interviewer bias. This of course is anecdotal, and warrants further investigation into group and facilitator dynamics involved in creative methods.

Conclusion

This paper has described a series of case studies from the authors' experience, which depict the journey from traditional social science research methods (where the end user is disassociated with the design process), to the use of creative and participatory methods, with embedded user involvement, research, and design all occurring in a simultaneous manner. The use of a variety of tools within the cocreative mindset allows for inclusion of a variety of people, including older and disabled people. The authors have benefitted from using creative methodologies which allow for the development of innovative and feasible AT solutions in a timely and efficient manner. Furthermore, the solutions developed are likely to better meet the needs (both functional and aesthetic) of those they are intended to aid, thus reducing the likelihood of AT abandonment. This paper hopes to inspire other AT researchers and designers to consider use of collaborative and creative methodology, embedding users and important stakeholders at the heart of the iterative process of research and design.

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