Technology for Supporting Care Staff in Residential Homes

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Care staff, those who attend to the day-to-day needs of people in residential facilities, represent an important segment of the health care provision of those entrusted to their care. The potential use of technology for this population has not been a focus of researcher attention. The work reported here provides initial steps in addressing that gap, considering both the design requirements for this population and presentation of early work on a software system for use by care staff. We describe the development of a software tool for use by care staff, called Portrait, and report two studies related to factors affecting technology use by this population. The results of this research are promising, with Portrait being very positively received by care managers and care staff. Use of this software in a care home for over a month indicated continued use, with care staff returning to the system throughout the test period. The contributions of this research are the identification of factors important in working with a care staff population, the introduction and evaluation of a novel software tool for care staff in residential homes, and the highlighting of potential benefits of technology in assisting care staff.

1. INTRODUCTION

As demands for residential care continue to rise, care providers have increasingly turned to technology to help with tasks of management and patient care (Chaudhry et al., 2006). There is the obvious desire to consider how technology can help reduce the soaring costs of care, but beyond that is often the desire to consider how technology can help improve the quality of care (Chaudhry et al., 2006; Claßen, Schmidt, & Wahl, 2013). Our work focuses on an aspect of care that has been largely neglected. Specifically, we ask the question of whether technology can be used to

support care staff in residential homes. While a great deal of technology has been directed at supporting health care administrators and health providers, care staff – those who take care of the day to day needs of residents – have been largely ignored by software developers.

For this initial introduction of technology into the environment, we consider an important aspect of care staff's daily routines involving communication with residents. It can be difficult for care staff to get to know residents due to limitations of both the care staff and residents (Armstrong-Esther, Browne, and McMcafee, 1994; Caris-Verhallen, Kerstra, and Bensing, 1997; Clark, Baddeley, Moniz-Cook, and Woods, 2003; Damianakis, Crete-Nishihata, Smith, Baecker, and Marzaili, 2009). Care staff have little time in their day to engage in activities not directly related to care. Our long-term goal is to help facilitate communications between care staff and residents. We suspect technology can be very useful in that respect. Toward that goal, the current research seeks to understand technology use by care staff. At this stage, we did not investigate impact on resident outcome measures. The first step was to determine if we could develop a software tool that could be used by care staff and would fit into their work routines. This research is distinguished by the fact that the focus is not on the 'patient' but rather on the use of technology with care staff. This paper reports on work with care staff as a user group and provides key information about this group and the application of technology in their working environment. Described is the development of a software tool, Portrait, which provides care staff with digital portraits of the individuals in their care. Two studies are reported on the use of Portrait by care staff, including an evaluation of the tool in use at a residential care facility.

2. BACKGROUND

A person with dementia can present multiple and varied intellectual impairments in areas such as attention, orientation, memory judgment, language, motor and spatial skills. These impairments are progressive and typically affect older members of the population. Despite common desires of the person and family to have the person remain at home, it is often the case that the dementia progresses to a state in which it is necessary to seek care in residential homes. In such care homes, there are a number of professionals including doctors, nurses, administrators, and care staff to address the needs of residents. For most of these professionals, a wealth of data management and medical software applications has been developed to address aspects of diagnosis, management, and underlying business needs.

There also have been a number of tools developed that focus on memory aids for the person with dementia. These range from life story books, memory boxes for reminiscence, and various cognitive prostheses (Alm, Dyce, Gowans, Campbell, Astell and Ellis, 2007; Alm, Ellis, Astell, Dye, Gowans and Campbell, 2004; Baecker, Marziali, Chatland, Easley, Crete, and Yeung, 2006; Damianakis et al, 2009; Müller, Neufeldt, Randall, and Wulf, 2012; Smith, Crete-Nishihata, Damianakis, Baecker, and Marziali, 2009; Wallace, Thieme, Wood, Schofield, and Olivier, 2012; Crete-nishihata et al., 2012; Lindley, 2012). For example, the Computer Interactive and Conversation Aid (CIRCA) is software that allows people with short-term memory loss associated with dementia to draw on reminiscences about common experiences and general information to converse with relatives and carers (Alm et al. 2004, 2007). The Multimedia Biographies has a similar goal for reminiscence support, but rather than making use of general information provides those with memory loss access to

multimedia information about their own lives (Baecker et al, 1006; Damianakis et al. 2009;Smith et al. 2009; Crete-Nishihata et al., 2012).

Biography Theatre is an in-home ambient display that can be placed in the home of a person with Alzheimer's. It displays the person's digital life history in the form of music, photographs, movies, and narratives (Massimi, Berry, Browne, Smyth, Watson, and Baecker, 2008). In a research study, this software was placed in a participant's kitchen in a similar role to that of a picture frame. The intent was to become part of the background environment of the person's home, focusing on engaging in the activity of reminiscence and social interaction rather than operating the display. This software was found to provide rehabilitative benefits to its participant with improved positive self-identity and less apathy (Massimi et al., 2008).

Overall, these systems have a variety of benefits for the person with dementia including a focus on communication or reminiscence support and are designed for use in a variety of different environments. However, none are designed specifically for use by care staff, even though care staff may have used them in some cases (Muller et al., 2012; Wallace et al., 2012). Portrait, to be described here, differs from these projects as it is designed specifically for the care staff. It is not a reminiscence tool or life storybook but is uniquely designed to fit into the work routines of care staff and care environments.

Care staff are not trained nurses or doctors, but rather the individuals who attend to the day-to-day care and comfort needs of residents. These tasks traditionally have not been supported by the use of information and communication technologies (ICT). Of interest in the work reported here is whether such technology can be used by this population to facilitate aspects of their work life. It is important to note that care staff are often low skilled workers who are provided with the required basic training of moving and handling etc. when they start at a care home. They are not trained medical staff. Care homes can have very high turnover rates due to the fact that being a carer is a physically and emotionally demanding job often for minimum wage. Also, the first language of the carers is not always the same as the language of the residents, adding not only another language barrier to the social interactions but a lack of knowledge to the social context of the residents' lives. The research reported here, therefore, plays a critical role in terms of helping to understand the ICT needs of this population.

A pamphlet from the Alzheimer's Society states that "Dementia becomes a label behind which other needs were lost" (Alzheimer's Society, 2007, p.8). In this respect, it is often the case that the tasks of care staff become limited to dealing only with the clinical care or daily living needs such as eating, bathing, toileting and sleeping (Armstrong-Esther et al., 1994; Caris-Verhallen et al., 1997; Ward, Vass, Aggarwal, Garfield, and Cybyk,2005; Ward, Vass, Aggarwal, Garfield, and Cybyk, 2008). In a 6-hour time period a typical resident can spend as little as two minutes socially interacting with staff and other residents. This problem is particularly acute for those care home residents who have dementia, with relatives reporting residents left alone in their room with no social interactions for hours at a time (Alzheimer's Society, 2007; Ward et al. 2008).

Given the job demands for care staff, it is perhaps easy to understand how this can become the case. This situation is clearly not desirable, however, and healthcare professionals have increasingly been encouraged to move away from traditional task-oriented models of care to person-centred care (Kitwood, 1997; Timothy, 2003). Although the concepts involved in person-centred care are not easy to articulate, the

basic philosophy is that such care seeks to bring together ways of working with residents with dementia to emphasise communication and relationships. The most tangible implication of person-centred care is taking an individualised approach to the care of each unique person with dementia, tailoring help and support to match individual's needs and social context (Clare et al, 2003; Brooker, 2004). Person-centred care and personhood have been embraced by some (see Brooker 2007; McCarthy 2006) although others argue it has limited relevance or impact on practice and that only the language of care, not the actual delivery, has changed (Dewing 2008; Nolan, Davies, Brown, Keady, and Nolan, 2004; Packer, 2000). This attitude is illustrated by a quote from a senior care worker:

> *There's plenty of information and training that tells us what we should be doing;*
> *I really need something or somebody to show me how to achieve all these things*
> *in my current working environment* (Packer, 2000, p. 21)

These points were confirmed through the first author's observations when volunteering in care homes over the three-year period. Through weekly observations at a specialist dementia unit it became apparent that care staff's personal relationship and abilities varied greatly. Some knew every resident and visiting relative in great depth. Others seemed to know nothing outside of the required care knowledge. Although no staff were ever observed to be negligent or cruel with a resident, the difference in the two extremes of care was very apparent. The care staff worked 12-hour shifts and had many tasks to accomplish during that time. Each day the care staff had to ensure that every resident was awake and appropriately dressed, tidy the care home as required, assist with all meals, and complete toileting and hygiene needs.

During the observations, some care staff stood out because of their exceptional attitudes and presence. One care staff member summed up her attitude to the residents in that she treats each as she would treat her own grandparent and how she would want to be treated. Staff similar to this person manage not only to complete all the required care tasks but also form and maintain positive relationships with the residents. At the opposite end of the scale, when the author asked to be introduced to residents she had never met before, another care staff member gave the residents' name, then provided her opinion on whether or not it was worth trying to talk to the residents. For one woman, the care staff member pronounced in front of the resident that she could not communicate and never made sense. This resident in fact, enjoyed company and would often talk to visitors. For instance, during one visit this resident saw a baby on TV and then continued to talk about babies for some time after.

To our knowledge, there has been no research previous to Portrait that has specifically targeted technology needs of care staff in terms of software design. Our work sought to address the needs of this new population, both in terms of their work environment and their usability requirements. We sought additional input as to whether the software did, indeed, seem fit for purpose. Towards that goal, we conducted early interviews with three care managers about an early design iteration of Portrait (Webster, Fels, Gowans, and Hanson,2011). In these interviews, the managers tried the Portrait software and were asked questions about the pros and cons of the system and considerations of how the software might be integrated into the work environment. The usability was high and these care home managers thought it was well suited for care staff (Webster et al., 2011). It was positively

received with these care managers suggesting potential benefits related to communication ("will trigger a conversation with the individual"), humanizing ("make the person a person"), informational (such as for "other health professionals who visit the unit"), quickly getting details about a resident, and support of care management. Based on these positive reactions from managers, our next step, reported here, was to test the software with care staff themselves to see of the they were able to use it and, specifically, if they were able to use it in the their everyday care home environment.

We put forward the work reported here to underscore the potential of technology for this new community of care workers and to help better understand how technology can be used to support care in a residential environment. The specific technology introduced, Portrait, is digital biography software. We begin with a description of Portrait, followed by two experimental studies with care staff. The first evaluates the extent to which care staff get to know residents through traditional care home paper-based booklets and through Portrait; the second is an in situ evaluation examining relatively long-term usage. We conclude with a discussion not only of the current experimental findings, but also situate this research within a larger discussion about the considerations of software development for use by the population of care workers.

3. THE PORTRAIT SOFTWARE

The Portrait software was designed and developed through extensive requirements gathering from care homes, investigation of critical content with people who might need such software, and incorporation of good UI design.

3.1 Requirements gathering

With respect to requirements gathering, the first author volunteered at a local Alzheimer day centre for one afternoon a week over a three-year period. She also visited a specialist dementia unit of a local care home for a day a week for approximately three months. These first-hand experiences with dementia care provided an understanding of the culture of dementia care and the nature of care staff jobs. These experiences underscored the diversity in backgrounds of care staff and indicated a great variation in computer experience, age, literacy levels, and time available for training. For example, the main duty of a direct carer is to carry out the daily care tasks required for a person with dementia. These may include dressing, toileting, feeding and bathing activities but does not include computing tasks. The direct carer, therefore, does not typically use a computer as part of his or her job. Of direct relevance for the development of the Portrait software, care staff's computer experience varied with computer use ranging from never to daily (Webster, Fels, Gowans, and Alm, 2010). These observations informed requirements that the system be intuitive, simple and easy to use, and require little or no training.

In considering a potential application that would be useful to care staff, the Portrait project itself was suggested by a nurse who asked if there could be a way to help care staff better get to know about the lives of the residents before they entered the care facility. While the ultimate goal of Portrait, therefore, is to provide a technology-enhanced means of facilitating person-centred care, we first needed more information as to whether care staff could use such an application with little or no instruction and information as to how such software might fit into their work lives.

The design objective of Portrait was to provide care staff with important but limited personal and social information about residents. Portrait provides a snapshot of a person to help care staff see the person behind the disease and quickly help them get to know that person.

3.2   Content selection

To inform decisions about software content, a questionnaire was designed and administered to healthy adults focussing on things that (if needed) they would like care staff to know about them. This questionnaire presented participants with the following scenario:

> Imagine that you are unable to communicate and that you will be moving to a place where you will be looked after, as far as the staff are able, but on your arrival they will not know you as a person.

This 'Five Things about Me' questionnaire was sent out to a local Bank and business employees, as well as to relatives of residents in a participating care home. Twenty-three participants, 7 male and 16 female, responded to the questionnaire. Participants varied in age between under 30 and 60 years old, with 9 of the participants between 40-50 years old.

Filling out the questionnaire was approached in different ways. Some people simply listed what kind of person they are: Independent, Private, Friendly, Sociable and Active. Some gave general answers that covered a range of topics: What I did for a living, Who my family are, What hobbies/activities I enjoy, What my daily routine is and What I like and dislike to eat/drink. Finally, some answers were very detailed and personal. There was one that particularly stood out, with very interesting and vivid answers:

1. *That I have been a carer myself and understand the difficulties and stresses involved and that my preference would be to be cared for by a mature, family oriented person.*
2. *I am a widower and have written a short story about my wife and our relationship. I would like staff to read this story to gain an insight into my personality.*
3. *I would like staff to have knowledge of my musical tastes, viewing habits and literature likes and dislikes.*
4. *My personal "Time-Line" which would depict events in my life, such as where I was born, my parentage, siblings, children, schools, colleges, university, military, jobs and marriage etc.*
5. *Family photographs and familiar items would be important to me e.g. I have a small 3" plastic tiger which my son and I used in our version of "hide and seek". We played this game throughout his childhood years. Some games lasted for weeks before the tiger was found. Memories are important to me.*

Responses from this questionnaire suggested each portrait contains information about the person's key life events, family, important things to know, preferences, and hobbies and interests. Specifically, the following six categories of information were included in the initial Portrait development:' Timeline,' 'Family Tree,' 'Things to Know,' 'Hobbies and Interests,' 'Family Stories,' and 'Photo Album.'

3.3   User Interface

The UI of Portrait was designed for display on a 19" touch screen device, an integrated PC and display used in previous work with care homes (Alm et al., 2007).

The overall user interface ordered the six different categories of information from the above questionnaire along a linear main menu system located in the lower portion of the screen, as shown in Figures 1 - 8. This main menu bar is consistently available in this position making it easy to locate at any time during system use. The name of the person whose portrait is currently being reviewed is always displayed in the top portion of the screen and a current picture is available through the 'see me now' button.

Fig. 1. Main menu showing the six topics. The colour of the options matches the background colours.

Fig. 2. Selected event from Timeline topic with photograph and text description.

Above the main menu on each screen is the content area where information related to each menu item is displayed. The headings for each category in the menu are represented by icons and text labels to provide redundancy and to reduce literacy level requirements. To select a menu item the user would touch that item of interest on the screen. A new screen would appear containing additional information about the personal or social preferences of the person with dementia. This information is presented in high-contrast text and image formats. The text format is organised in short sentences that are precise and concise to ensure the information can be read easily and quickly. Where non-photo graphics or icons are used to represent a concept, a brief text description is also provided. In addition, text is used for instructions to users.

Fig. 3. Family Stories topic showing the 'See Me Now' button which allows the user to see a current picture of the person

Fig. 4. Selected story from Family Stories topic with photograph and text description.

A second content screen is available in three categories, 'Timeline,' 'Family Stories' and 'Photo Album'. A "Go Back" button has been added to these second screens so that the user can easily return to the first content screen. The other three categories contain only one screen of information (see Figures 6, 7, and 8).

Fig. 5. Photo Album topic showing label indicating access to second level.

Fig. 6. Family Tree topic showing the immediate family.

Each main category and content area is represented by a unique primary colour (e.g., purple is the colour associated with the 'Photo Album' category), and a high-contrast text label. This was done so that the different topics are easily differentiated, as well as to help users keep track of their location within the system. Colours were selected to be noticeably different from each other and to have good contrast with the images and text so that they were legible. To ensure people who were colour blind could successfully use the system, colours with a high degree of contrast and saturation were used and no 'colour cueing' or instructions relied on the identification of a colour.

We have previously reported on the iterative development and usability testing of Portrait (Webster et al., 2010; 2011).   The software description here is the end result of that previous testing.

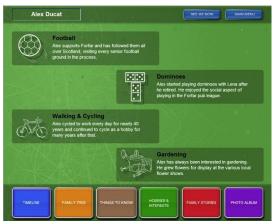Fig. 7. Things To Know topic with bullet point text description.

Fig. 8. Hobbies & Interests topic with short, to the point text description and meaningful icons.

4.   STUDY 1: PORTRAIT SOFTWARE AND PAPER BOOKLETS

Paper booklets are one of the commonly used tools within the care environment to introduce care staff to a person's life history and preferences. These are distinct from the residents' medical records and details of treatment.   Rather, these booklets, like Portrait, are designed to give staff a snapshot of the residents' lives and interests. Booklets vary from care home to care home as there is no legal requirement directing the use of content in such booklets.   It should also be noted that the amount of information contained in these booklets varies, depending both on the information requested in the booklet and the degree to which the requested information was filled in.

This study was carried out to test the Portrait system with the target users — care staff — from residential homes. The goal of the study was to evaluate the usefulness of the Portrait computer system in this care environment. We asked care staff to use both Portrait and these paper booklets and then asked them questions about knowing the resident, engagement with the material, and information retention.

The experimental method consisted of a background questionnaire, familiarisation with Portrait and the appropriate booklet, testing with Portrait and the booklet, and finally an experimental questionnaire. The data comprised care staff responses on this experimental questionnaire.

4.1   Experimental Portraits

For testing purposes, three portraits were created by the experimenters.   These portraits were of real people, older adults known to the researchers who gave permission for their biographical materials to be used for this experimental work and in publications. Thus, the information contained in the biographies was not fictional. None of these three people, however, were in residential care.   This point is

important. While the portraits depicted the lives of real people, these people would not be known to care staff.

The names of the individuals depicted in both the Portrait and booklet biographies were "Margaret," "Alex," and "Vic". The information provided in Portrait and the corresponding experimental Booklet was identical wherever possible. Most of the information required for the booklets was available from the equivalent Portrait. However, where the information differed the families of the three individuals added more of the requested information to the booklets. The booklets information was fully completed, meaning there were no sections or questions left unanswered, even if this information was not present in Portrait. Due to the nature of the information contained in the different presentations, however, some differences were unavoidable. The key differences related to the use of media the manner and type of information presented. Table I highlights the key differences between the systems. Compared with *This is me*, for example, there were more photographs in Portrait; *This is me* contained some care information (about personal care, mobility, hearing, eyesight and medication) that the Portrait system did not cover. The initial needs analysis did not identify medical details as important personal information to know. This clinical/medical information is already currently available to care staff in the legally required care plan.

Table I. Highlighted are key differences between the Portrait system and the two Booklets.

		Portrait
This is me	• Only one photograph of the person • Contains care information (about personal care, mobility, hearing, eyesight and medication) • Handwritten • Limited to two A4 pages	• Multiple photographs • No care information. • Digital media • Multiple screens of information
My Memories	• Printed Booklet	• Digital media

4.2 Procedure

Testing, approved through the University of Dundee ethical procedures, was conducted in individual sessions in a private office onsite at the respective care home where each participant worked. Sessions lasted approximately 25 minutes.

After signing the Informed Consent, participants were asked to complete the background questionnaire. This questionnaire consisted of paper-based questions and collected demographic data such as age and computer experience.

Following the background questionnaires, the Booklets and Portrait software were introduced to the participants. Participants were provided with a brief introduction to the booklet format using Vic's biography (approximately 2 minutes). Each was then provided with a brief introduction to the Portrait system also using Vic's biography (approximately 2 minutes). Vic's biography was used to provide an introduction to both the Booklet and Portrait system. The procedure alternated between introducing the Booklet and the Portrait system first.

Participants were then directed to Margaret's biography and asked to complete three simple training tasks to become familiar with using the system, either the Booklet or Portrait. They were then asked to complete five representative tasks that involved finding specific information about the person in the system (e.g., the names of her children and where she preferred to sit). Upon completion, they were then asked to find this information about Alex's biography, this time using the other system (either Booklet or Portrait). Margaret and Alex's biographies were counterbalanced so that an even number of participants experienced the Booklet or Portrait system with the two profiles.

During the use of each system, participants were asked to think aloud their thoughts and opinions. Audio and screen capture software (Camtasia™ version 7) were used to capture on-screen actions and commentary. This data were used to analyse positive and negative user experiences.

After completing both the Portrait and Booklet tasks, the participants were asked to complete the experimental questionnaire. This questionnaire consisted of 14 questions addressing issues of *knowing the person, engagement,* and *information retention.* As usability had not been previously tested with this population, the questionnaire also included some questions about Portrait usability.

Knowing the person

Of these 14 questions, three were concerned with knowing the person in the biography:

- Q3: How well do you feel you know Margaret / Alex (the person in the booklet biography)?
- Q12: How well do you know Margaret / Alex (the person in the Portrait biography)?
- Q14: Who do feel you know better – Margaret or Alex?

Answers to each of these questions were responses on a 5-point Likert scale. For each the scale ranged from 1 = "Very Well" to 5 = "Not Very Well." Answers for Q14 were responses of either Margaret or Vic.

Engagement

Two of the questions (Q1 and Q8) focused on participant engagement with the two methods of presentation, asking participants to rate how fun / interesting each was to use. Answers were responses on a 5-point Likert scale, with 1 being "Very Engaging" and 5 being "Very Boring." A further two questions asked what people thought of the amount of information contained in the Booklet (Q2) and Portrait (Q11) on a 5-point Likert scale with 1 being "Too Much Information" and 5 being "Too Little Information".

Retaining the information

Two of the questions considered information retention.   These questions asked about the job of the person depicted in the biography, what they liked to do in their spare time, and whether they had any children. Q4 asked these questions with respect to the booklet, while Q13 asked with respect to Portrait. Answers for each of the three details were scored as correct or incorrect, with a 1 given to correct responses and 0 to incorrect responses.

Usability

The remaining five post-test questionnaires examined usability through 5-point Likert scale questions. One question asked about the amount of training they thought it would take to learn Portrait, with 1 = "no training", 2 = "less than 30 min" and 5 = "one day." The remaining questions focussed on specific aspects of the user interface and functionality, such as font clarity, colour and ease of navigation. These results were used by the research to verify Portrait's usability by the target audience.

To anticipate, Portrait was very positively received by care staff with no usability issues being raised in response to the items on the questionnaire. Thus, the earlier research on the usability or Portrait (Webster et al., 2010; 2011) had resulted in software that was able to be used by the target population. The majority of participants thought that Portrait would require 'less than 30 minutes' training (the lowest training option available) with some stating that it would require 'no training' to learn to use. One participant during the study stated *"I like the Portrait more 'cos it's easy and fast…it might need those people who's not very computer literate to have a short training."*

4.3 Research Participants

The research participants were care staff from three different care homes in Scotland. None of these participants had previous experience with Portrait.

Two of the participating care homes were from the same large care group (Care Group A); one was from a smaller care group (Care Group B). Care Group A consists of a number of care homes throughout Scotland. The homes varied in terms of size and, thus, some operational details. All, however, used the Alzheimer's Society's *This is Me* Booklet that is designed for people with dementia who are going into the hospital. It consists of two A4 sheets of paper.

Care Group B was a large care home (65 beds) from a different smaller care group. The Booklet used within the Care Group B was a self-made Booklet called *My Memories*. *My Memories* was kept in each individual resident's room and could be used by both the resident and staff. It consisted of up to twelve A4 sheets of paper that contained information on that individual in the form of text and photographs about the resident.

Participants from both care homes were recruited though the management at the home. All employees (day and night) in a care staff position at these homes were invited to participate. Due to scheduling conflicts, night shift and annual holidays, not all were able to take part in the study. For Care Home A, the final group consisted of 31 participants, which was 47% of the total care staff (day and night staff) working at these two locations. Experimental testing took place during days, and this number represents 70.5% of the day staff. For Care Home B, there were13 care staff participants in the experiment. This was 26% of the total care staff and was 39.4% of the day staff.

A summary of participant information from the background questionnaires is given in Table II. This Table includes information about the gender breakdown, the number who had English as a first language, and their range of ages, care experience, and computer experience. For both groups, the most common response regarding computer experience was that they used computers "a few days a week." The gender breakdown reflects the gender balance in this occupation.

Table II. Summary of participant care staff characteristics.

	Care Group A	Care Group B	Care Groups A and B
N	31	13	44
Female	26 (83.9 %)	10 (76.9%)	36 (81.8%)
N having English as first language	24 (77.4%)	10 (76.9%)	34 (77.2%)
Ages	18 – 60+	18 - 49	18 – 60+
Care experience	< 6 mon - > 5 years	< 6 mon - > 5 years	< 6 mon - > 5 years
Computer experience	Never - daily	Once every few months - daily	Never - daily

4.4   Results

The study was conducted using the same method in both care groups but the results with respect to *knowing the person, engagement,* and *retaining information* will be discussed separately due to the difference in the Booklet used by the two. The aim of this study was not to compare different care home environments but rather to evaluate computer vs paper presentation of biographical information in different use-case scenarios.

4.4.1   *This is Me* booklets (Care Group A)

Comparing response to Q3 and Q2, the responses of participants at Care Group A who used the *This is Me* booklet indicated that they thought they better knew a resident with Portrait (mean = 2.81, SD=1.078) than with the booklet (mean = 3.42, SD=.958), t(30)= 2.56, p<0.05, d=0.60. Reponses to Q14 indicated that 70% of the participants believed they better knew the person present in Portrait, $\chi 2$ (1, N= 30) = 4.80, p<0.05.

In terms of engagement, a comparison of Q1 and Q8 revealed that participants felt more engaged with Portrait (mean=1.37, SD=.49) than with the Booklet (mean=2.23, SD=1.01), t(29) = 4.18, p<0.01, d=1.09.

The questions about retention of information (Q4 vs. Q13) showed no statistically significant different in the two forms of presentation (Portrait mean = 1.39, SD=.48 and Booklet mean = 1.39, SD=.50), p>.05.

4.4.2   *My Memories* booklets (Care Group B)

For Care Group B the results were similar in most cases to those of Care Group A. There was a significant difference between Portrait (mean=2.23, SD=.60) and Booklets (mean=2.92 SD=1.12) with respect to how well participants felt they knew the people described (Q3 and Q12), t(12)=2.25, p<0.05, d=0.77. As with Care Group A, this indicated that participants felt they better knew the residents with Portrait. The one difference with respect to the other care group occurred on Q14 about "Who do you feel you know better?" For the Care Group B participants, the chi-square test showed no significant result (p>.05), with 53.9% of participants selecting that they believed they knew the person in Portrait better than they knew the person with the *My Memories* Booklet. As will be discussed later, this difference may well be due to the specific exemplar chosen for the *My Memories* Booklet.

Similar to the Care Group A results, participants in Care Group B rated Portrait (mean = 1.23, SD=.44) as the more engaging method to view the information (mean=2.38, SD=1.19), t(12)=3.43, p<0.01, d=1.28.

Also consistent with Care Group A, there was no significant difference in how well participants retained information (Q4 and Q13) (Portrait mean = 1.23, SD=.44 and Booklet mean = 1.46, SD=.519), p>.05.

4.5   Discussion

Portrait was overall rated more favourably by care staff from both care groups than existing paper *This is Me* and *My Memories* Booklets. Participants generally felt that they better knew the person with Portrait and rated Portrait as more engaging. Common comments were that Portrait is *"easy to understand and quicker to get answers."*

Ratings by participants from both care groups indicated that they felt that they knew the person better via Portrait than the booklet. In a direct question about which method allowed them to better know the person, a majority of participants from Care Group A responded that they thought they better knew the person presented with Portrait. For Care Group B, however, no significant difference was detected on this direct question.

A possible reason for this latter finding is the level of detail and amount of photographs in the two Booklets. *This is Me* (Care Group A) was only 2 pages of information. The *My Memories* Booklet used by Care Group B was up to 16 pages of information. As indicated in the methods, the information for *My Memories* was fully complete in the experimental booklets, with our profile providers adding more information for the *My Memories* booklets than was contained in Portrait. A number of staff from Care Group B commented that the detail in these experimental booklets was more complete in that all the questions and topics were answered where as the actual *My Memories* Booklets in place within the home often had unanswered sections. For this research, the booklets provided the 'best example' rather than an 'average' Booklet.

More concerning, however, is that no significant difference was found in the amount of information retained in the two scenarios. In hindsight, there are a number of likely contributors to this result. First, we can't discount the possibility that this biographical information actually is equally well retrained via the two means of presentation. However, accepting such a null hypothesis must always be done with caution and it is worth considering experimental factors that may have resulted in a Type II error of not having enough power to detect a significant difference. First, it is very possible that these particular questions and the fact that there were only three of them created a situation in which the test was not a very sensitive measure of short-term recall of the information. To adequately address this question, more questions probing different aspects of the content might well be needed. Alternatively, no significant difference in retention may well have been due to care staff's relatively short time using the booklets and Portrait. Care staff were only involved in the study for approximately 25 minutes. This time frame was selected due to the busy schedule of care staff. We did not want to prevent them from completing their duties but this also limited their use of the two systems. Given this time frame, however, there were only a few minutes between presentation of the material and testing. A longer time gap, one more representative of a care situation, should be used in future work.

For both care homes, there was a large effect size related to engagement (d=1.09 and 1.28 in the two care groups) indicating an important difference in the extent to which participants rated their engagement with Portrait and with the existing paper *This is me* and *My Memories* Booklets. Participants rated Portrait as more engaging.

While there was undoubtedly some novelty effect when using the software, we highlight the fact that learning about residents through booklets was also a bit of a novel experience for our participants. Most participants indicated that they had never previously seen any booklets.

The fact that they had not seen the booklets raises an important issue and interesting questions for future research. It is significant that while care homes may have information about residents available to staff, if the information is not noticeably and easily available it is likely not to be used. For whatever reason, the means by which these booklets were stored (in cabinets in locked nurses' office or in residents' rooms) appears not to have facilitated staff access.   The phrase "out of sight, out of mind" may be appropriate here.   In contrast, computer-based information about residents may be more noticeable to care staff. In the discussion, we talk about situations of envisioned use for a computer-based system.

Finally, while these results suggest support for the utility of technology applications for care staff, there are many ways to investigate utility. In this study, our goal was to compare Portrait to the booklet system currently in use in care home. Thus, the booklet biographies, while based on the same people as the Portrait biographies, mirrored the depth and style of the booklets currently in use.   To directly evaluate potential advantages of computer presentation, it would have been useful to provide participants with printouts of the Portrait screens, rather than booklet versions of the biographies. This latter is a different research question and one possibly suited for future work.

5.   STUDY 2: LONG TERM RESIDENT CARE HOME USE

While Study 1 was promising, it was a study of one-time use of Portrait out of the context of care home use. It doesn't answer the question of whether ICT would be accepted by care staff in the context of their work routines. For Study 2, portraits of care home residents were developed and placed in a care home to evaluate whether care staff use the Portrait software as part of their daily routines. In terms of Portrait itself, this field study examined the frequency and length of use of the Portrait software and the use of each topic.

We describe, first, the biography creation process given its potential to inform work by other researchers interested in creating such life stories. We were interested in questions of how time-consuming and difficult it might be to create these biographies.   Given previous reporting on such a task (Baecker et al. 2006; Damianakis et al. 2009; Massimi, et al., 2008; Smith et al. 2009), we anticipated that families or residents would be able to successfully created these portraits and would find the process an enjoyable experience.

5.1   Creating digital portraits

In a full deployment of Portrait, the ideal would be portraits of all residents in a care facility. As this was a research project that could not promise long-term support for the software, only four volunteers were recruited to create test biographies. The resident featured in one of these four was moved to a different care home before experimental testing began, resulting in only three portraits included in the study. More will be said later about these considerations of long-term support in the discussion about 'Research in a Care Environment' (Section 6.1).

A summary of the characteristics of the volunteers creating the portraits is shown in Table III. All were recruited through care homes at Relatives meetings where the Portrait system was demonstrated. These meetings included both family members

and residents. For each of the four volunteers, a meeting was arranged either at the care home or their own home. At this meeting the Portrait system was again demonstrated and volunteers were allowed to use the system for as long as they wished. Once all questions were answered by the researcher, the volunteers were given a verbal explanation of the study along with an information sheet and were asked for informed consent in compliance with the University of Dundee's ethical guidelines. In this paper we will report one case study from the first care home (participant 3) to describe the portrait creation process. The further three portrait case studies is reported in Webster and Fels (in press).

Table III. Overview of the three biography creators for Study 2.

Portrait	Relationship to resident	Characteristics	Format	Time taken
1	Son	Male, ages 50 – 59	Electronic	~ 1 month
2	Granddaughter	Female, age 30 – 39	Electronic	2 weeks
3	Self	Male, age 83	Oral	3 weeks (3 separate hour sessions)

During the process of gathering the information for the portraits, the researcher kept in contact with the volunteers, having regular meetings to answer any questions and assist the volunteers when needed. As one of the aims of this study was to see what type of information would be selected for inclusion in Portrait, the researcher did not help with identifying the content to include, only answering questions related to content length. Once the volunteers had gathered all the content for the biographies, the researcher manually entered the information into the Portrait system. When completed, the final digital biography, displayed in Portrait, was to shown to the families. If the families requested any changes these were addressed.

To understand the portrait creation process, we provide here one case study for the creation of this study's Portrait 3.

5.2 Portrait Creation Case Study

At the time of the study, Mr P was an 83-year-old Scottish male and had been living in the care home for 2 years. This was Mr P's only care environment. He had regular visits from his wife and two sons. Prior to entry he was living at home with his wife. Mr P did not have dementia, having entered residential care due to physical health needs resulting from Parkinson's disease. After the Relatives Meeting the care manager approached the researcher stating that Mr P would like to participate. The care manager stated that Mr P would be capable of participating in the project and that she would assist him if necessary.

It was Mr P that consented to participate and he was the researcher's only contact during the study as he did not require his family's assistance. At the time of the study, Mr P was not able to write very easily due to his Parkinson's disease. He stated that he would much prefer to answer questions orally.

The researcher visited Mr P three times during the Portrait creation process: when the Portrait system was demonstrated to him, to gather photographs and finally at the demonstration of the completed Portrait. All meetings took place in Mr P's room within the care home, where he was the most comfortable.

During the initial demonstration of the example portraits, the researcher took detailed notes as Mr P stated what he could have in each section. During this

meeting, Mr P spent some time showing the researcher his personal photographs and explaining them. The initial meeting lasted approximately one hour. After the meeting the researcher gathered the information provided by Mr P into the appropriate topics. The researcher formed a list of questions to complete missing or gather more detailed information. The care home manager asked Mr P the questions and completed the answers on his behalf. With this additional information the researcher was able to identify which of Mr P's photographs would be required for the Portrait. The researcher asked Mr P for photographs he would like to show care staff that was relevant to each topic, once the photographs were identified they were copied at the home to ensure Mr P was not missing them for any length of time.

Mr P had spent time in the Royal Observer Corps, but did not have any photos of this time. As this time was very important to him, the researcher gathered some generic photographs of the ensign and badge. At the final demonstration of the completed Portrait Mr P was delighted at seeing the generic photographs enquiring how the researcher managed to find them. Mr P was very happy with the final Portrait but was concerned that it stated his wife's name in the system and worried that she might not like being named in the system. The researcher reassured Mr P that it could be removed immediately and that the Portrait could be shown to his wife before any care staff used the system to ensure she was also happy with the content. Mr P decided to leave his wife's name in the system as he felt it could be easily removed later if she wanted.

5.3   Situating Portrait at Care Homes

The hardware used for testing in this study was an integrated all-in-one 19" touch screen monitor and computer. This was a Vand A-Series A190 system. As the care homes where we tested did not have Internet connectivity in the resident care areas, no features of Portrait, as tested, relied on such access. Sound was not included in the Portrait system because care homes are often noisy environments and the system may be located in a variety of spaces where that sound may distract people not using the system.

Our objective was that this desktop version be located in an easily accessible area by care staff not locked within an office. In the studies conducted with care homes during this research the Portrait touchscreen was placed on pedestals in areas such as a large hallway between the public/communal areas of the care home and the resident bedrooms or outside the nurses' station/ staff room. These were areas the care staff frequently passed. In all these cases, it was easy to access the Portrait system without being away from the residents.

The Portrait system was left permanently switched on. Thus, the care staff required no setup to use the system.

5.4   Research Participants

The study was conducted in one of the care homes used in the previous study. This care home was a 32-bed facility on two levels with a total of 22 staff, of which 15 were care staff. Eleven of the care staff had participated in the previous study. Table IV summarizes information about these care staff.

All staff, not just care staff, were given access to the system as the care home manager thought more than just the care staff could be interested in and benefit from using the system. All staff who worked at the home, therefore, were able to use Portrait. As the other staff did not directly interact with the residents as part of their job (e.g., cooks), only data for the 15 care staff were analysed.

Table IV. Participant profile for Study 2.

	Total Staff N=15
Number Females	12 (80%)
Number with English as First Language	12 (80%)
Age Range	18 – 60+
Self-Reported Computer Use - Range	Never - daily
Self-Reported Computer Use – Most Common	daily
Number of Years of Care Environment Experience	< 6 months - > 5 years
Number Having Personal Experience with Dementia	6

5.5 Procedure

No staff members were given training to use the Portrait system. Eleven of the fifteen care staff had previously been given a brief (approximately two minutes) introduction and subsequently used the Portrait system during the previous study. In all cases, this previous experiment was at least two months before this final study. A paper help guide was left at the care home that described the basic functionality of the Portrait system.

For the purposes of this study, a login password was created for each of the workers at the care home. This password guaranteed that unauthorized visitors would not have access. For experimental purposes, it also allowed researchers to uniquely identify individual users. The Portrait system logged the following data:

- user login by password;
- user login time, as measured from time of successful password entry to logout (by clicking the logout button);
- auto logout, if the user had not touched the screen in 3 minutes the system automatically logged out;
- which portraits were viewed and length of time for each;
- which topics were viewed and length of time for each.

We asked the care manager to inform all staff of their password and to encourage them to access the Portrait system. The experimenters did not interact with care staff during this field trial. After the Portrait system was removed from the care environment care staff completed a brief questionnaire to gather their opinion and comments on the system.

5.6 Results

The Portrait system was in the care home for four weeks (28 days). It should be noted that no data was available to us about the numbers of days or hours worked by care staff during this time. Their holidays and working hours could have affected their study participation.A total of 12 out of 15 care staff used the Portrait system at least once. Eight care staff repeatedly accessed the system.

There were 62 logins during the four weeks. Of these, 14 (22.58% of total logins) were cases in which a user logged in then logged back out having not selected a portrait to view or accessed any content. It is presumed these short uses where care staff quickly logged out having not viewed any information were due to another task

arising as all care staff used the system on other occasions. Data from these logins is not included in further analyses about times or tasks selected.

There were 48 care staff uses of Portrait, defined as times they logged in and viewed content. In 29% of these uses care staff looked at multiple portraits, suggesting that they may not have accessed the Portrait system with the aim to find a specific fact or piece of information. Rather, they may be accessing to gain a fuller understanding of the people contained in the Portrait system. As a new technology, they may also have been exploring its capabilities. This repeated access in the absence of experimenter intervention does, however, suggest an interest by the staff in learning about the technology and what it can be used to do.

It was originally expected that there would be longer initial use by care staff as they investigated and became familiar with the residents in the Portrait system, then the use would decrease as care staff became familiar with the technology and accessed the limited number of portraits available. This pattern was indicated in the data in terms of number of uses, but not with respect to the length of participant sessions. A one-way ANOVA on the total number of uses showed a significant difference in the number of logins per week, $F(3,69)=33.23$, $p=.001$. Tukey post-hoc comparisons indicated that this effect was due to the larger number of users in the first week than on other weeks. The line in Figure 9 shows the total number of logins per week. Although there were fewer uses after the first week, the total number of viewings in weeks $2 - 4$ was very similar. This result needs further investigation to evaluate if Portrait's use by care staff may eventually plateau, or whether this seeming plateau was caused simply by the limited number of portraits available.
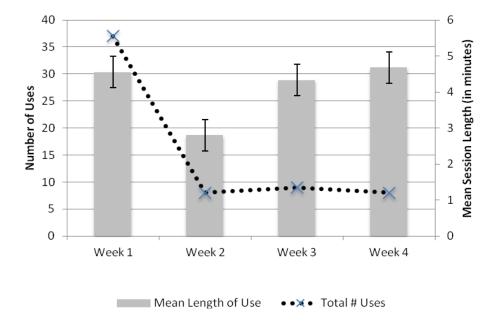

Fig. 9. Number and length of Portrait sessions over the four weeks of the Study 2.The line graph shows the total number of uses per week. The bar graph shows the mean session length per week (in minutes), along with the error bars.

In contrast to the decreased uses after the first week, time per user session did not decrease throughout the four weeks, $F(3,41)=0.36$ $(p<.05)$. The bars in Figure 9

show the mean length and standard error of each user session of Portrait over the weeks. We note that participants spent, on average, somewhat less than five minutes per session. This is consistent with our initial design goal of software that could be rapidly accessed to accommodate the busy schedules of care staff.

One participant indicated that s/he used Portrait 'infrequently', stating that s/he "*already know(s) the resident well*". This comment was mirrored in comments made during the follow up visit to the care home. Care staff commented that "*it would have been nice to have more people*". It was anticipated that care staff would comment on only having three portraits, as with only three portraits to view using the Portrait system could become repetitive.

One of the participants stated that they found Portrait "*Quite helpful as I am a new member of staff here. I think this is a good idea knowing and seeing a client as a person, an individual who used to have a good job, a good life not a person with an illness.*" This comment is a very positive result as the aim of Portrait was to assist care staff to get to know residents as people and to help them focus on more than the physical care of a person.

Table V shows the frequency of access and time used for the six different topics of information. In examining the raw data, we determined great variability in the use of the software. Typically, participants quickly browsed through topics and in a particular session would stop to use one topic in more depth. The percentages of use on Table V, therefore, can only be used as rough indicators. Overall, it was encouraging to see that all topics were used. The care staff seemed particularly drawn to topics with high visual appeal (Timeline and Photo Album), although, interesting, spent a large proportion of time on the Family Tree topic.

Table V. Participants' use of the six Portrait topics. Shown are the percentage of times each topic was accessed, as well as the percentage of total time (of Portrait use) per topic.

Topic	% Accessed	% time
My Life Events (Timeline)	22%	15%
Photo Album	20%	19%
Family Stories	17%	19%
Hobbies and Interests	15%	10%
My Family (Family Tree)	15%	26%
Please Note (Things to Know)	12%	11%

5.7   Discussion

This study investigated the use of the Portrait system by care staff within their care environment. Most importantly, the results showed that the Portrait system could be integrated into a care environment and successfully used by care staff. 8 of the total 15 (with 12 of 15 using the software at least once) participants used the software multiple times. This was interesting, particularly in light of the fact that in our interviews in Study 1 many indicated that they had never looked at the booklet at their care homes. The presence of an easily accessible electronic version of this information thus holds great promise. As one participant commented, "*In the short time that I have used the system I have found it to be very useful and would ask other clients to participate, which would help staff with vital information.*"

We proposed that the Portrait system could be used by care staff with a limited introduction to the system's content and no long-term training. This is supported by the findings that care staff successfully used Portrait during this study and no care

staff had any lengthy training or had even seen Portrait for approximately two months.

Important limitations of study 2 was the study's relatively short time frame for the care home use, the limited number of portraits available for care staff to use, and the length of time care staff were available to participate in discussions regarding this study. Future research is needed to fully investigate the long-term use of the Portrait system in a care environment, specifically with more residents in the Portrait system. The limited number in this study will have affected care staff's use of the system due to repetitiveness.

6. CONCLUSIONS AND FUTURE RESEARCH

The present research is important in a number of respects. Specifically, it addresses a user population not previously considered in efforts on residential care. The contributions will be considered here both with respect to knowledge about conducting research in care environments and with this user population, as well as specific findings with respect to the Portrait software system.

6.1 Research in Care Environments

Care environments pose a number of different issues when integrating technology within them. The first issue is a physical consideration when designing technology that is to be placed in a care environment, mainly health and safety. A care environment's principle function is to provide a safe environment for its residents. Therefore, any technology used must not affect this requirement. There must be careful consideration when identifying any physical hardware for use within such an environment focusing on the questions: Where is the technology going to be located? Who are going to be the principal users? Who will have access to the technology? Any hardware placed in a public or communal area of a care environment must be durable as more than the intended users may investigate the device. There cannot be wires or leads which pose a risk to health and safety. The inclusion of sound requires careful consideration as care environments can be noisy and if the technology is to be placed in a communal area it could disturb the residents or be inaccessible to care staff. Will the technology require any set-up to use or maintenance to continue use and, if so, how will this be done and by whom? Care staff have very busy routines with little free time to set-up or maintain technology every time they wish to use it. The availability of technology considered commonplace must also be considered as older care environments may not have such technologies readily available (i.e., Internet outside the office), but more modern care environments may have more advanced technology than expected (i.e., integrated networks throughout with monitors outside every bedroom). Thorough initial requirements gathering must be conducted to fully understand the technology's target environment.

These studies, involving care staff, were easily conducted. The length of time each care staff member could be involved in both studies, however, was limited by the strict schedule of care environments. Time is a major issue within a care environment. Care staff have very strict routines and there was only a short window of time in mid-morning and again mid-afternoon when care staff had time to work with the researchers. This strict schedule meant there was approximately 3-4 hours spread out over a day when care staff could be involved in the studies. This available time is also often when care staff breaks are taken due to it being the quiet time in

the care environment. This limited time was only available if there were no problems such as care staff or resident illness. Each care staff member was also only able to be away from their set of duties for a restricted length of time. All this meant that the study designs used when working with care staff has to be carefully considered to not affect their routine. This, therefore, limited how long each participant could be involved. A possible solution to this problem would be to fund additional care staff during the studies to ensure there is always cover for study participants.

Ethically, it is not possible to completely monitor or shadow care staff's daily routine or working environment due to the sensitive nature of their jobs. This can pose a problem to conducting investigations or evaluations in care staff's full care environment.   Thus, our procedures did not include observations of how staff interacted with residents after viewing portraits.

6.2   Care Staff as a User Group

As the use of technology spreads into more aspects of everyday life, new and novel uses of technology are constantly being identified. This paper considered the application of technology in the new situation of assisting care staff. Care staff do not typically use a computer as part of their job. The results illustrate care staff's ability to use technology within their work routine and the care environment. An important finding from this work was that care staff are open and accepting of new technology and its possible benefits to them, the care environments, and importantly the residents themselves.

We found a wide variation in age, literacy levels, first language and experience in care staff. Although it was presumed that care staff would not have any physical disabilities due to the physical nature of their jobs, care staff often required reading glasses but did not carry them when conducting the physical care tasks. It was also observed that care staff may have hearing impairments. The use of any technology with this user group must take into consideration these different user requirements.

The high usability of the Portrait system, the successful use of Portrait during studies with care staff and care managers, and acceptance of the tool showed that the Portrait system could be integrated into a care environment and successfully used. Care environments' openness to adopting the Portrait tool demonstrates the possibility for effectively and efficiently integrating technology into the working environment of care staff and care environments.

The studies reported in this paper found that many care staff are experienced computer users and all seemed to be open to the use of technology within their working environment. However we recommend that any technology for use by care staff is designed for novice users to ensure all care staff can easily use the technology. Technology for care staff should require little or no training, so that it does not add any barriers to acceptance. Technology that is intuitive, simple and easy to use is required to suit the varied ability of the large range of users.

6.3 Creating digital portraits of family

Through this work it has become apparent that it is possible for families to create Portrait's of their relatives. An unexpected result from the study that will require more research in the future is the possibility of expanding the Portrait system to be used for all people who live in a care environment not just people with late-stage dementia. That the family of a person who did not have dementia and a resident

themselves wanted to participate in the study demonstrates that the information contained within the Portraits is not just relevant to people with late-stage dementia and could possibly have benefits to all residents within a care environment.

The information required for populating Portrait was gathered in different ways by each family with some selecting photographs and matching information and others identifying topics and matching photographs. A more structured process with immediate feedback as to how the Portrait will look could be of benefit to families in helping with motivation and identifying what still needs to be collected. It was noticed by the researcher when creating the Portraits that every family had provided additional or 'spare' photographs or information. If the family was creating the Portrait while gathering the information this would not happen as the instant feedback would allow them to see what topics of information were completed.

Previous studies such as Multimedia Biographies and Biography Theatre involving the families of people with dementia in the process of gathering information about their relatives life found similar results in that families found the process enjoyable, a good opportunity to reminisce about past memories and that it is feasible for families to develop a portrait of their relatives life (Baecker et al. 2006; Damianakis et al. 2009, Massimi et al, 2008, Smith et al. 2009). The process of gathering information for the Portrait system did not take as long as in the previous studies conducted.

6.4   The Portrait System

In terms of usefulness, both the care staff in Study 1 and care mangers in previous research (Webster et al., 2010) rated the Portrait system and its content positively. For both of these separate groups, acceptance of the possible benefits of the Portrait system was essential. The system was found to be engaging, with care staff finding the system easy to understand and quick to get answers. These findings are reflected in the use of Portrait in a care home, through the voluntary use of the system by the majority of care staff. Critically for usefulness, care staff generally felt they got to know the person in the Portrait system better than through conventional previously used paper booklets. The engaging presentation of the information in Portrait may have helped care staff to get to know the person better.

While the results discussed in this paper are very promising, further research is required to fully explore the use of the Portrait system in care environments. It is also important to note that the technology is a rapidly changing landscape and its use in healthcare environments evolving at unprecedented rates. When development of Portrait began, the tablet technologies had not, yet, made impact into care homes. Currently, however, interest in such devices is high and we are in the process of creating a tablet version of the software for testing in these environments. Our recent discussions with care homes have found them extremely eager to investigate how technology might be used to transform their care of residents.

In this respect, it is useful to consider the question of how the use of a system such as Portrait relates to the evolving work on electronic health records. The development of Portrait was not tied to electronic health records. This was done for a number of reasons related to updating and access, but also in consideration of the roles of care staff. The question of a standalone system, however, is one that needs to be considered going forward as to whether the information needed for care staff to learn about the lives of their wards can be usefully and useably presented through larger, multi-purpose electronic health records. Such systems provide not only for

detailed information about residents, but also provide excellent security and privacy – an area not addressed in the current Portrait work. We note only that the issue of privacy is one that may have different responses among individual residents and their families. In many cases enthusiasm was expressed by family members for having the information in Portrait openly available to those who wished to know about a loved one.

The use of biographical material raises issues of who should create them, the process for creating them, and the cost-benefits of such individualised materials. In many (if not most) cases, such biographies would not be created by the resident, but rather by a caring family member. If such collection of materials were to become standard, however, it can be imagined that individuals newly diagnosed with dementia would participate in the creation of these biographies.

Finally, we return to the long-term project goal of helping care staff see residents as individuals, not simply as people with service needs – a question not addressed in the present study. To this end, future research with long-term use will aim to determine whether access to a person's information, such as through the use of Portrait, will affect care staffs' views of individual residents. This future work will need to include in-depth interviews and quantifiable measures related to the effect of Portrait on resident care. The ultimate goal is the delivery of the highest possible personal care as part of the welcomed trend of care-giving that seeks to move away from task-based care to person-centred care.

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