Department of Informatics

Digital Remains and End of Life Traditions

- a study of modern technology, digital remains and century old habits -

"Dead people cannot speak but have a lot to say"

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Master thesis: 10p (15 ECT), 2007-06-13.

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Reviewer: blind review was used

Keywords: social computing, ubiquitous computing, interaction design, user-centered design, location-aware computing, mobile interaction, end-of-life technology, death and dying, mourning, bereavement, grief, contemporary autobiography, documentation of self, digital remains

Abstract

In this article we present a concept for a ubiquitous service that allows memories to be saved and stored during an individual's lifetime and later, after death, for those digital remains to be published and experienced at the specific geographic location where they were created. Through this concept we explore ways to combine modern technology with century old habits at the end of life. We ask: *"How do users value digital remains and how could it be used in accordance with user requirements?"* This study suggests that awareness of digital remains is very low, and few people have considered what to do with their digital remains or come in contact with other person's. People are interested both in experiencing and leaving digital remains for others to experience though few get the chance to do neither. The best caretakers of digital remains are friends, family and close relatives. Digital remains are seen as valuable source of affective and historical information. Present end of life technology are mostly augmentations of old traditions, not new phenomenons. The novel approach, as presented in the concept, lies in the fact that it will become possible to store, preserve and especially experience digital remains, from common and famous alike, in much greater depth and scale than ever before.

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1. Introduction

Despite the continual penetration of computers and Information Communication Technology (ICT) solutions into new aspects of our society, there are still areas of life largely untouched by modern technology. One such unexplored area is the culture and traditions surrounding the end of human life. For example, burial traditions and habits of mourning have remained remarkably consistent throughout the last few centuries, and modern technology has not really penetrated or added much to this aspect of the human existence. Practices of mourning and burial are to a large extent dominated by religion, and few alternative ways of managing the end of life are present. An interesting question is whether it is possible to combine modern technology with these old traditions and to create alternative ways of looking at and experiencing the end of life.

To some extent, dating back when the Internet started to expand, change began to take place in end of life traditions. However, comparing those 10-15 years of minor transformation to century-old end of life traditions makes you wonder if those phenomena we have evaluated even will be remembered in a century's time. So what changes have taken place in the past 10-15 years? First and foremost, ICT solutions have so far given the living new tools and abilities to pay tribute and mourn the dead. The first wave of ICT services that came about in the early 1990s mainly transformed the then existing end of life traditions like the obituary and the newspaper death-notice to digital and online versions. The groundbreaking service at that time was the online memorial which comparably in comparison to the obituary could hold more information about the dead person in question (i.e. information mostly compiled by relatives).

The market for ICT services dealing with end of life traditions has then grown steadily since the early 1990s when the first online memorials started to emerge. One of the earliest and still existent ICT services dealing with end of life tradition is *The Virtual Memorial Garden* (VMG) created by Lindsay F. Marshall which came about in the end of 1994 (*Lindsay, 2006*). VMG has since long been surpassed by commercial services both in number of users and to some extent features given.[1] For instance, at the time of writing memorial services like *Memory Of* (2006) has almost 48 000 memorial websites. Online obituaries have also since long migrated online to sites such as the *National Obituary Archive* (2007) in USA with more than 55 million entries. Another traditional information service that has migrated to the Internet is the newspaper death-notice. *Legacy.com* is currently hosting death-notices for over 350 newspapers in the USA (Legacy.com, 2007). Several related services have grown and flourished in relation to online memorials. For instance, forums and blogs that support grieving persons are common on the Internet (often in connection to online memorials).

While this first wave of ICT services mainly augments past end of life traditions, variations exist where other elements are introduced. For instance *LifeGem* (2006) came about in 2001 where the ashes of the dead (more precisely the carbon in the ash) are pressed into a diamond. LifeGem is an interesting example where the online memorial is combined with affective artefacts. Generally this seems to be a common theme when memorial services and memorabilia are packed together as one service. Often a few specific objects that are closely connected to the dead are kept and cherished as a memory by relatives. Coates (2006) also tells us that during life we often associate experiences with artefacts. Some artefacts are also common to give as memorabilia to relatives, such as jewellery and furniture. Sometimes it is customary to leave artefacts with the dead in for instance burial rituals. In that sense it becomes obvious that

[1] VMG practically has the same form and the same features today as when the service was launched in the end of 1994.

affective memorabilia is an old and perhaps important aspect of end of life traditions and that often the living are not given affective artefacts from the dead but rather choose memorabilia themselves. So even online interactive memorials or diamonds made from the ashes of the dead boils down to augmentation (or re-design) of old traditions, not new phenomena.

The central change considering the marriage of ICT-solutions and end of life traditions thus lies in the fact that more information (to some extent in a new format) about a person can be stored, preserved and even experienced after someone passes away. To this date, as we will show in this paper, those technological advances mainly have been utilised by the living in order to remember and honour the dead. If you on the other hand turn the perspective from the needs of the living to a perspective that considers what someone would like to happen to her/his digital remains when they die; new uses for modern technology dealing with end of life might be mandated (such that are not excluded as useful for the living as well).

We have seen (as we also will show in this paper) that some change has occurred in the last 2-3 years which could represent a second wave of end of life services. If you account for the total effect of many small changes and augmentations in end of life traditions with help of modern technology they might actually amount to substantially new and different ways of looking at and experiencing the end of life. In that sense there is a shift that transforms literally every aspect of end of life traditions (though most of those changes fall beyond the scope of this study). The most obvious change, considering the current digital storage capacity, is that more people can leave a persistent footprint in history, a minor democratisation of fame one might argue. Coates (2006) argues that there is a clear shift in who performs personal documentation today and frames it with these words:

> *"Traditionally autobiographies have always been written by those of 'lofty reputation' or 'historical importance'. This way of thinking can be traced back as far as the early 19th century. One reviewer, writing in 1982 in Blackwoods Magazine, stated quite explicitly that there was 'a legitimate autobiographical class' which should exclude the 'vulgar' who try to 'excite prurient curiosity that may command a sale'."* Coates (2006, p. 18)

1.1. Background

The background for this study derives from the work on the concept we call Blogging by the Dead (BbtD) which was presented and published at the NordiCHI conference in 2006 (Hall et al., 2006). That concept explores the marriage between modern technology and century old habits at the end of life. The method for doing so was to explore location-aware computing (since that technology matched user-requirements) in combination with a proposed service that connects social data in the form of digital remains to specific geo-spatial locations.

The concept was an attempt to achieve a modern, but still respectful, way to remember people after their death. Essentially it was a concept for a ubiquitous service that allows memories to be saved and stored during an individual's lifetime and later, after death, for those digital remains to be published and experienced at the specific geographic location where they were created (*see figure 1 for a general overview*).

We did initial background research on the area where modern technology meets old traditions (see figure 2 for methodology). In general, there were few accounts of new and novel attempts to enhance those aspects of life with modern technology. We mainly found online memorials (which were often labelled as online cemeteries), online obituaries, a novel approach to death where burial ceremonies were performed in virtual worlds and also a few other minor services.

Figure 1, overview of Blogging by the Dead

On the other hand, we have seen some indications of work emerging some time after or during the time we worked on BbtD which we will present later in this paper.[2] However, none of the proposed concepts or the implemented services that we discovered at that time dealt with the problem area from the perspective of the dead.

The first user-centred view we got of the problem area gave us a hint that people were concerned about and thought about these issues not only regarding mourning of others but also regarding their own legacy. This approach leads us to questions such as: What happens to our digital remains when we die? How does modern computer technology enhance end of life traditions today and how can it be done in the future? Why do we put so much energy and enthusiasm in capturing our lives? Is it a universal human need to want to be remembered after death?

These questions have surfaced long before our work and before any existing ICT services dealing with end of life traditions; both in the public, for instance in a interesting Slashdot (2006) discussion we found, and most likely all of them prior in the research community. Life capturing which is closely related to the study of digital remains has also long been a subject for research, spearheaded by work from, for instance, the MyLifeBits team (Gemmel, 2002) at Microsoft, and Vannevar Bush's 1945 Memex vision is within reach of fulfilment.

We also did a minor background study to determine whether location-aware technology and related interaction techniques suggested for the concept were plausible to use. We quickly came across some of the GPS and Wi-Fi specific obstacles that limit the *usage* of location-aware systems for binding social data to geo-spatial locations. For instance, the problems that exist with location-awareness indoors and the problems of tracking moving objects without altering them physically (for instance by using RFID-chips) is very limiting. There were also several existing solutions were GPS or Wi-Fi converges with mobile and fixed Internet to create location-aware systems. However, there were actually quite few implemented uses, or users, for location-aware computing where social data was connected to geo-spatial locations compared to the numerous proposed uses (or services) for such technology. The most likely reason for this is that low user numbers relate to factors like availability of GPS-enabled mobile devices and practical issues such as the amount of effort it takes to develop and program such services.[3]

[2] The Blogging by the Dead project was done in the beginning of 2006.

[3] There was a huge difference in amounts of GPS-enabled devices between for instance USA and Sweden. Partly because of US legislations from 2005 require mobile devices to be location-aware at all time.

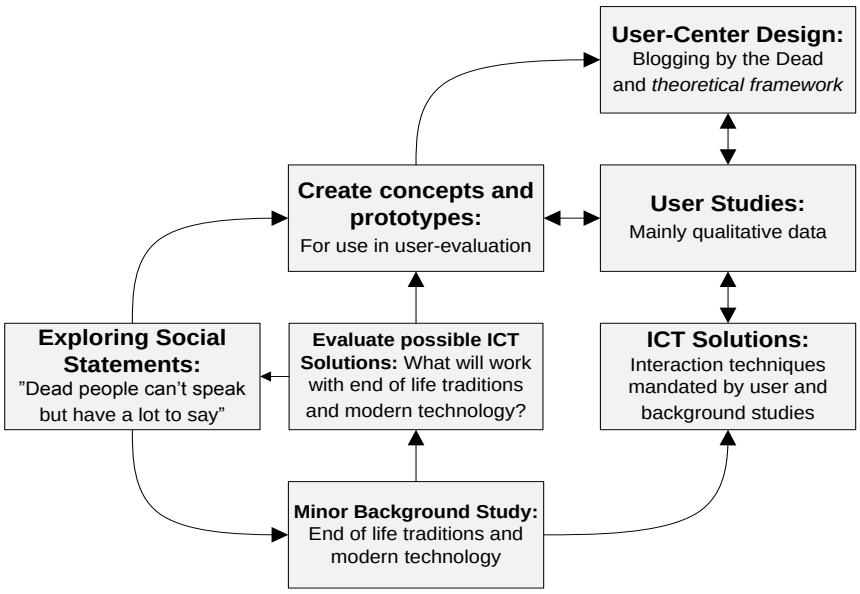


Figure 2, method for exploring end of life traditions and modern information technology in previous study.

As Miles et al. (1994, p. 298) puts it; "*We might look for a more "circular" linkage between research questions, methods, data collection, and interim analysis, as each analysis opened up new leads. And many qualitative analysts would not start with a conceptual framework, but rather aim to end up with one*". The conceptual framework that we felt emerged from the work on the BbtD concept seemed to point towards an underlying problem with location-aware computing and interaction with geo-spatial data. We received some interesting feedback that suggested that people not only want to leave digital memories for the after world but also experience digital remains of the dead during their lives.

There seemed to be a clear connection between handling of digital memories to autobiography were selected memories are identified and published. This is for instance today present in limited form on online memorials. The motivational factors behind publishing digital remains as of today should then be similar to those found in connection to autobiography. We also identified the need to handle a life's worth of unstructured digital data without encumbering the user with the task of manually tagging or annotating every piece of digital information they produce. We thus consider it important to study if a full life's worth of unstructured data, including digital traces left on the Internet, can be handled by automatic or semi-automatic technology.

Finally, we concluded that there seemed to be a great interest in alternative ways of looking at and experiencing the end of life.

1.2. Research area and limitations

In this study we move from a explorative study in, as mentioned in previous chapter, to a slightly more descriptive study (Miles et al., 1994). It thus feels meaningful to establish an overview over the problem area and do initial studies of what people feel and how they react towards these partially new and partially ancient aspects of life.

We do not simply want to continue developing our concept Blogging by the Dead (BbtD) since that would mainly lead to artefact or service design and not, to any greater extent, research. Even if it is quite interesting to just examine the specific strengths and weaknesses of the concept, we

instead propose to focus our work to the interface between end of life and modern technology and to continue to investigate that area. Since the interface between end of life traditions and modern technology is quite vast we will need to focus and limit our study to more specific areas. The idea then is, as with our prior work on the concept BbtD, to study augmentation of end of life traditions with modern ICT solutions (see figure 3 for a general overview).

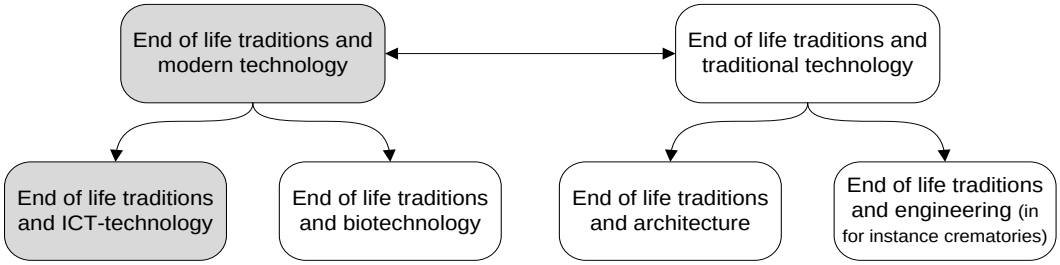


Figure 3, closely related areas of interest whereas dark grey indicate what we study.

Additionally, we also want to limit our study to services and artefacts that actually exist or can be built and researched presently, or at least can be considered feasible in the near future. We do not want to research Science-Fiction like ideas and concepts since the amount of useful empirical data we then can reasonably obtain from for instance user studies will be very small, regardless of how many new and exciting ideas we have for augmenting end of life traditions. The future is inherently very hard to investigate. This is approach is intended to focus work towards a user study and also distance the work from mere product development.[4]

1.2.1. Research question. The main research questions we propose for this study and which limits our research area even further is:

> *"How do users value digital remains and how could it be used in accordance with user requirements?"*

- With the user-centred approach this will in a sense all be about what people feel and think about end of life traditions in relation to digital remains and modern information technology.

1.2.2. Research goals and strategies. Firstly, we will gather as much existing background information as possible regarding end of life traditions where modern ICT solutions are used (*see figure 4: Background Study*). That in general involves searching for and analysing existing services and artefacts within the problem area. It also involves searching for and analysing existing literature and relevant research for instance regarding affective issues on information, ethics and IT, religion and perhaps even philosophical questions regarding end of life and death. We will also collect user data relevant to end of life traditions and modern technology by creating an online survey and perform in-depth interviews with people (*see figure 4: User Studies*).

Secondly, we will continue to explore new ways ICT solutions could be used for enhancing and experiencing end of life traditions. We will do this by continuing to motivate changes and updates to the concept with a user-centred-design approach (*see figure 4: User-Centred Design*).

[4] When adopting user-centred design methods it can be considered quite hard to find a balance between research and artefact or service development.

This concept, and corresponding user-scenario, we produce will thus showcase results from this study. The concept will then become only one of many potential concepts for presenting digital remains. Hopefully we will see phenomena and facts from background studies or from user studies and with the following analysis be able to motivate how ICT solutions could be used in new ways to enhance end of life traditions. By using the concept as a tool for user studies we also have a natural way to test and explain possible uses, interaction towards and feelings on usage of modern ICT solutions in connection to end of life traditions to potential users. The need to communicate our concept to the user without using academic jargon and abstract visions of for instance ubiquitous computing is also imperative.

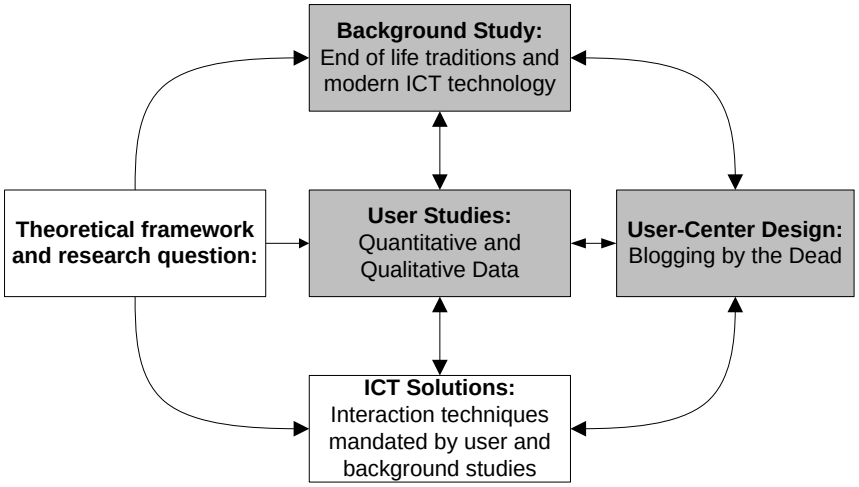


Figure 4, concurrent strategies whereas dark grey indicate the focus of this study

Thirdly we will evaluate possible social-technological problems related to the concept (*see figure 4: ICT Solutions*). In general, this will be all about how users can interact with digital remains. We already have reasonably sound indications that potential users are interested in digital remains connected to location and will try to further validate that (Hall et al., 2006). We also need to have a broad and deep understanding of location-aware computing if we intend to augment end of life traditions with it. To achieve that we need to have specific knowledge about location-aware systems, know their strengths and weaknesses and also have knowledge on user-interaction with such technologies (Patterson et al., 2003). Ackerman et al. (2001) also argue that specific areas such as privacy concerns in connection with the use of location-aware systems are especially interesting to examine from social, technological and regulatory viewpoints.

Comparing our research regarding on one hand the social aspects of end of life traditions in relation to modern technology and on the other hand the technological challenges is thus a way to seek central phenomena at a more general and broad level (*see Figure 5*).

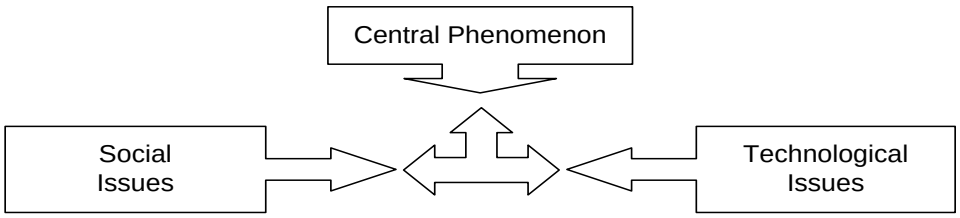


Figure 5, the relation between research area and core issues

The goals with our research are then mainly to further explore the problem area and find out what people feel and think about end of life traditions in relation to modern information technology and digital remains. Secondly, the goal is to gain better knowledge about the concept and its related context.

1.3. Methodology

Our research methods were influenced by our previous experiences as interaction designers, with user-centred design as the pre-dominant method. We chose the Scandinavian flavour of interaction design, which has a strong focus on designing with and for the user (Preece, 2002). Literature studies were mandated by prior findings and their main purpose was to further progress the study of the problem area. We tried to validate our work by reflectively going out to the user and in such way ground our development decisions. We also, to a great extent, relied on collected user-data to draw conclusion in the analysis part of the study. Using this method we tried to explore the proposed concept, for instance by evaluating; how people can, want or need to use the concept; rather than inventing something that we think is needed.

We applied both interviews and questionnaires to our study in order to bring answer to our research question. Bryman (2001) states that we can gain a lot in combining quantitative and qualitative data collection and for this study it was fitting considering we both wanted to continue to explore and also to describe the interface between end of life traditions and modern technology (as stated in chapter 1.2). An advantage of using such an approach is that we are able to double check our results from one data gathering technique by comparing it with another. For instance, we can use a qualitative method to support a quantitative approach as complement and control (i.e. triangulation). In the end this can bring greater confidence to the overall results, or to some specific questions (Bryman, 2001, Giddens, 1998).

1.3.1. Construction of the survey guide. Our main mode of data collection was a survey. We saw several benefits in using the Internet for distribution of the survey. On the positive side Internet provides a cheap, fast and easy way to distribute questionnaires and collect data from various users. According to Sveningson (2001) it is easier to collect answers trough an Internet survey if the questions are of a more sensitive nature. On the negative side a questionnaire distributed on Internet will only be answered by Internet users whom are willing to take their time to answer the survey. We wanted many answers, as quickly as possible, automatically gathered and sorted. We therefore used the open source tool Unit Command Climate Assessment and Survey System (UCCASS), for creation of the questionnaire (UCCASS, 2007). The choice of this particular tool was primarily made due to previous positive experience of using UCCASS.[5] An administrative part of the tool enabled us to create a questionnaire, fully adopted for Internet, and it also contained a data collection section which only we had access to. From the administration interface we were able to view and export data of choice for analysis.

It is of great importance how the layout of a questionnaire looks and in general how the questionnaire is presented to the respondent. If a questionnaire is unstructured, extensive or has an untidy appearance, the respondent will most likely not spend any time filling in the form. The language of the questionnaire, the questions asked and the alternative answers given must also be dealt with care (Holme et al., 1997, Trost, 2001). Holme et al. (1997) state that regarding the

[5] A few annoying bugs exist in UCCASS and it has not been an active open source project for some time. UCCASS is however easy to deploy and configure.

layout it is preferable to divide a questionnaire into several delimited sections. In the first section we can ask a few basic "warm up" questions, such as age, gender, occupation and so on. As we move towards the latter parts of the questionnaire we are able to ask more sensitive questions. The questions must also be formulated in a way so that the questions cannot be misinterpreted by the respondents, or at least this is what we must strive for. Questions formulated incorrect will in the end, most likely generate misleading or erroneously results (May, 2001).

With those factors in consideration we started to develop our questionnaire (*see Appendix 1 for the questionnaire*). We had a decent layout right from the start and only a few changes were done to the layout in order to follow some basic scientific guidelines. However, several other changes were done (over a period of 4-5 weeks) regarding the language of the questionnaire, the questions asked and the alternative answers given. Questions and answers were added, removed or/and edited and re-formulated before the survey finally was published and distributed. These changes were primarily mandated by feedback we received from experts (researchers with good knowledge of surveys and quantitative analysis) whom reviewed the questionnaire several times as it was developed (in short sessions considering their pay grade) and from information produced from the background study that we concurrently did on end of life traditions. We also launched a small pilot survey to evaluate how respondents would react to the surveys which lead to a few last minute changes before the survey went live.

We also identified online communities with assorted demographics (different age groups, interests and so on) parallel to creating the survey and matching them to user groups we were interested in. We registered us as users on identified sites, and asked the moderators for permission to distribute our questionnaire if it was necessary (*see Appendix 3 for list of sites*). The main problem we faced was getting respondents in ages above 60 to take the survey and a great deal of effort went into identifying communities with older user groups. We then published the survey at the targeted sites accordingly.

1.3.2. Construction of the interview guide. Our secondary mode of data collection was interviews. Using interviewing as an approach to gather information helps us reach deeper into the human mind. We are able to gain better insight of the interviewees experiences, opinions, dreams, attitudes, feelings and so on (May, 2001). Our study dealt with a sensitive topic which in turn directed us asking sensitive questions to our interviewees. Several questions were not only sensitive but also of subjective nature. We felt that by using an interview approach we would be able to reveal relevant facts from the interviewees that otherwise might have been overlooked.

Interviewees were located at several different locations to assure that we got user-data from as different contexts as possible (Creswell, 1997, Holme et al., 1997). The main targets for our interviews were people without explicit knowledge of our research area (different ages, interests etc) and researchers or experts within several areas of interest. We also emphasised access to interviewees who were willing to do interviews in their own home where we could talk more relaxed and without time constraints. To some extent we also searched the Internet for feedback from users connected to services within the problem area to further develop our understanding of the problem area.[6]

A few interview questions were taken from our previous study, new questions were however added and old ones reformulated, updated and so on. This was done since we wanted to reveal new and interesting answers that we may have missed earlier in the previous Blogging by the Dead study. These interviews differed somewhat from the survey since we presented the concept

[6] For instance users from online memorials or users in connection to online grieving services.

in full, in the form it had before we started this study, to the interviewees and then asked them our questions in relation to the concept. So in many ways the interviewees were talking about what they felt about the concept, and not only regarding end of life traditions and modern technology as the respondents did in the case of the online survey.

An interview guide, divided in a few blocks/themes (*see Appendix 2 for the interview guide*), was constructed in order to facilitate our interview process. The main purpose for developing an interview guide was to allow all interviewees to respond to the same questions and also to assure that relevant questions were asked. The themes can be seen as steering guidelines which enables us to stay on track and not lose focus (Jacobsen, 1993).

There are four main types of interviews from the very structured to the unstructured and group interviews (ibid.). The researcher must of course have some knowledge about the different types in order to select the one that best fits the purpose of the specific study. We thought that the most suitable interview type for our study was the "semi structured" interview. The semi-structured approach is not as strict as the structured type where all interviewees must answers the exact same questions which are asked in the exact same way. Furthermore, semi-structured interviews are not as "loose" as the unstructured one, which sometimes can flow out into just a conversation. With the semi-structured interview we were able to follow our themes in the interview guide, and still we were able make room for shorter discussions and asking sub questions when needed.

As a complement to and in conjunction with the interviews, we developed low-fidelity prototypes, mock-ups and used graphics as a help when discussing the proposed concept and interfaces with interviewees. The main purpose for building a prototype is that it can illustrate ideas and concepts, and also to create an object that can be evaluated (Löwgren, et al., 2005).

In addition, a prototype can be used to illustrate planned usage scenarios. Several studies have shown that it is very effective as well as easy to produce prototypes by simple means like using a paper and a pencil. Prototypes can be divided in to two main categories, high-fidelity (hi-fi) and low-fidelity (low-fi) prototypes (Löwgren, 1993, Preece, 2002). Hi–fi prototypes use technology close to the real thing and are of course the most realistic and most reliable way to evaluate an object, but on the other hand hi-fi prototyping requires substantial resources to build. The other alternative is low-fi prototyping which takes less time and effort to build and thus makes it possible to explore several different prototypes simultaneously and also to do several concurrent evaluations without breaking given project deadlines.

Very detailed prototypes can also prevent the interviewees from expressing spontaneous thoughts freely so the level of detail can often be kept to a more conceptual level (Preece, 2002). Often low-fi mock-ups can provide a better tool for discussion than a detailed and very descriptive prototype can. Since we partly investigate advanced computer systems, such as location-aware computing, it was of great value to be able to communicate what we were doing in order to obtain feedback from potential users.

1.3.3. Validity and reliability. Since part of our data collection was done through interviews, part of the validity of the study was dependent on interviews as well. We adopted several methods for validating the interview material. Firstly, we let the interviewees have a copy of the transcriptions to their interviews (Kvale, 1996). This gave the interviewees an opportunity to add or change information if they felt anything was lacking or was wrong in their statements.[7] We allowed this

[7] This only applies to the qualitative interviews. In the case of the online survey the users were given the option to go back and alter any given answers or quit any time during the survey without answers being collected.

to happen even if it meant that interviewees withdrew statements that could have been of importance to the study as we wished to create a trustful relationship with the interviewees.

Secondly, we tried to confirm information by asking several interviewees the same type of questions and collect a reasonable amount of answers to the same question. The reliability of our data is thus strengthened if we can see the same indications from several sources. One reason for repeating questions from our previous study, albeit with minor improvements, was that we only queried six persons and thus felt a need to strengthen the reliability of those findings. However, we also based the choice of questions, i.e., the validity of using similar questions again, on user-data collected in the previous study. For instance, the users showed a great deal of interest in digital remains in connection to location and thus we needed to investigate that area further. There seemed to be a symbiosis between location and memories. The interviewees also expressed a great deal of emotion for their digital remains leading us to repeat questions regarding how users value digital remains. We also added a few new questions that we felt were missing in the previous study.

In order to gather both qualitative and quantitative data we adopted two strategies as mentioned in previous chapter; one where we asked questions in a minor online survey and one where we did fewer but more in-depth interviews. We considered the potential for new discoveries to be greater during the qualitative interviews considering interviewees had the chance to talk beyond the interview script.

From the fieldworkers point of view it was also important that we used the same interview protocols and both collected and analysed data according to the same standards (ibid.). It was for this reason that we drafted interview manuscripts and defined methods for transcribing and analysing at an early stage. Having all the fieldworkers on the same routine is an important step in ensuring reliable data.

1.3.4. Ethical discussion. All studies that involve people will most likely raise ethical problems (Giddens, 1997) and Jacobssen (1993) even argue that if no ethical issues occur, the study was probably without content and uninteresting. According to Jacobssen you could almost say that as an interview gets better the moral problems will increase. Regardless if that is true or not there were several ethical issues surrounding the work on the concept BbtD and those aspects should be taken seriously. Miles et al. (1994) states that we cannot only focus on the value of the knowledge produced in a qualitative study and pretend that the truth is all that matter. We also have to consider how our actions affect those we investigate. And ethical considerations also require us to adopt a respectful relationship with interviewees since we might need to come back to them with additional questions (Miles et al., 1994, Creswell, 1997). The work on the BbtD concept was done with user-centred design methods and accordingly we went out to potential users and inquired about their view of related issues.

Since we did not have any clear frame of references to start with we decided to investigate if users from several age groups were interested in our proposed concept. As a consequence we ended up asking very personal questions about for instance memories of dead relatives and about the interviewees own deaths.[8] For instance, we asked 50 to 70 year old interviewees if they had prepared for death; if they thought it was hard to talk about death; if they wanted to share or leave "digital" memories for the after world; if it was important for them to be remembered after death and so on. The entire BbtD concept dealt with question of an ethical nature and the interviews, in many cases, got very personal. That, in itself, was a very clear signal to us that the area we had

[8] The project process actually lead us into such matters, the project in a way got its own momentum.

stumbled upon was important - the interviewees were in several cases very enthusiastic to talk about the issues.

We assumed that if we continued with research in connection to BbtD and end of life traditions we most likely would face the same ethical issues, perhaps more so since we this time around had some background information and logically would try to further refine our studies to gain more understanding of those quite sensitive areas. Especially considering that the findings from our prior studies indicated that even persons above 60 want to leave digital memories for the after world and also experience other persons digital remains while alive - that despite the fact that BbtD is a concept connected to a very modern technology and still has a more or less technological feel to it.

2. Background study

In chapter 2 we present both conceptual background studies dealing with death and dying, end of life traditions and concept specific background studies related to Information Communication Technology (ICT). Those two areas of interest sometimes overlap on specific subjects and thus relate to both types of background studies. In general we will first try to present concept specific areas of interest in chapter 2.1 and 2.2 and then move on to technical evaluation in chapter 2.3 and 2.4. Chapter 2.2. will be a form of user-study were we collect information on the Internet about current services within the problem area.

2.1. End of life traditions and modern technology

We have identified several areas of research that relate to this study. Firstly, we see a strong connection to research in life capturing which also deals with personal information similar to digital remains. Secondly, we need to establish some form of theory on what happens to digital remains when we die, this will mostly be a discussion since we have found no in depth study examining that subject. Thirdly, we need to some extent understand the processes people go through when someone close to them dies, for instance in connection to online memorials. Fourthly, we need to establish an overview of current phenomena within the problem area we are investigating. What types of ICT services dealing with end of life traditions exist today? This will mostly be an online study where we collect and organize data ourselves though we will relate to academic research work when possible (few studies of this specific area have been made, if any).

2.1.1. How to we capture a life's worth of digital data? The question why we as humans constantly document and store our life is very interesting. What is the motivation for capturing our own lives? Several large projects revolve around this question, for instance the Remembrance Agent (Rhodes et al., 1996), the Familiar (Clarkson et al., 2001), Memories for Life (Fitzgibbon, 2003) and the iRemember (Vemuri et al., 2004) projects all explore life capturing. One leading project is the MyLifeBits project (Gemmel et al., 2002) which we will use for discussing this topic. The MyLifeBits experiment has come a long way since it began several years ago and Vannevar Bush's 1945 Memex vision is within reach of fulfilment (Bush, 1945). That experiment mainly researches how we practically can store and capture an entire life's worth of digital data and also how we can organize and to some extent experience and use life-captured information. The Memex vision is as follows:

> *"A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility"* Bush (1945)

The technical problems in connection to the Memex vision are to a great degree solved today and even if there will be issues for many years to come the notion of digital life-capturing can be considered fulfilled. Gemmel et al. (2003) state that today the question is really more about how to use life captured information than whether it is doable to store or record a life time's worth of data.

> *"We have entered an era of virtually unlimited storage, enabling lifetime storage of most*

> *of what one sees and hears, along with many new data source such as user logs and sensor data. Now that we are able to have a lifetime store, the challenge is to make it useful."* Gemmel (2003, p. 8)

Czerwinski (2006) et al. state that the task of making sense of the abundant data that is captured in a life is much harder than building the technology to capture the life data. The technology for realizing the MyLifeBits project is affordable today for large scale use, for instance the storage capacity needed for capturing a life's worth of data is reasonably inexpensive (Gemmel, 2003). In other words, potential end-users can afford to use a solution like MyLifeBits if it was for sale. Social and regulatory requirements are however not resolved (Vemuri et al., 2004, Czerwinski, 2006), for instance is it legal to record everything and everywhere as an individual while using a life capturing device. Vemuri et al. and Czerwinski et al. acknowledge that such issues are very hard to resolve. The idea of making life capturing resource-effective, and not waste users time and attention which is a sparse resource today, by automatically doing tasks that have been around for several years. Garlan et al (2003) state;

> *"The most precious resource in a computer system is no longer its processor, memory, disk, or network, but rather human attention"* Garlan et al. (2003, p. 22)

Researchers in the MyLifeBits project use a form of automated capturing technique where all life data is captured and then the information is organized so that it can be used and experienced. Blum et al. (2006) take a slightly different approach with the InSense project and try to capture mostly interesting data and in that way circumvent the problem with sorting and defining interesting data. Blum et al. argue that it is possible to achieve a reasonably high success rate in capturing interesting data with InSense, if you consider it is a experimental study, by defining different criteria for when to automatically capture information (e.g. when performing a handshake with someone else).

Gemmel et al. (2005) further discuss the possibilities of automatically (or with authoring tools) create stories from life captured data (among many other possible uses of life captured data). This is very interesting and in our roles as interaction designers and perhaps if digital remains should be handled in similar ways. Should we use automatic life capturing techniques in some form for the concept?[9] Gemmel et al. also interestingly mention, that for instance search functions for sifting through life captured data might not be as valuable to relatives or friends (if we assume that it is permitted to search for instance your father's life information) as to the person capturing his/her life. We will discuss these issues further in chapter 4.2. The social and regulatory issues with life capturing, as done in the MyLifeBits project, have come into focus now when the Memex vision is technically achievable. Czerwinski et al. from the MyLifeBits project state:

> *"Later, Bush's envisionment of a forehead-mounted camera was implemented and extended by wearable computing researchers like Steve Mann, who have also considered the social, artistic, and legal aspects of wearable video recordings [Cyborg]."* Czerwinski et al. (2006, p. 49)

Research in Wearable Computing and cybernetics (i.e. regarding the *Cyborg*) have focused on personal choice and the right of the individual, while in ubiquitous computing the focus has been

[9] The MyLifeBits team might ask themselves what their potential users want to do with the data after they die.

on seamless social connectivity (Mann, 2003a, Mann et al., 2003b). The arguments that Mann presents against ubiquitous computing relate to life capturing research in many ways, as stated by Czerwinski et al. (2006). The current path with ubiquitous computing can perhaps only be achieved by monitoring the individual extensively and that could violate the basic human right to privacy (United Nations, 2007). Mann especially criticizes ubiquitous computing because he argues it is a corporate vision often pushed by corporate money. Mann and other researchers who share the same convictions even try to counter surveillance and level the field against ubiquitous computing by creating anti-surveillance technology used in wearable computing (Mann, 1998, Mann, 2003a, Mann et al., 2003b). On the other hand, the power that wearable computing and cybernetics put into the hands of the individual is equally unresolved.

The borderline between seeing and viewing someone and recording and remembering someone needs to be addressed, since wearable systems admit surveillance themselves. So the question of surveillance is twofold and is not completely addressed by the wearable research community or the life capturing community for that matter. The question of privacy and surveillance is of course a political issue but also a technical (for an in-depth evaluation of location and context privacy, used as metadata in many life capturing projects, see chapter 2.3.2. and 2.3.3.). A recent article by Bell et al. (i.e. the MyLifeBits architects) discusses the positive aspects of automatic life capturing. Whether we ever will see fully automated life capturing devices is beyond this paper.

> *"Although some may be frightened at the prospect of ubiquitous recording, for us the excitement far outweighs the fear. Digital memories will yield benefits in a wide spectrum of areas, providing treasure troves of information about how people think and feel. By constantly monitoring the health of their patients, future doctors may develop better treatments for heart disease, cancer and other illnesses. Scientists will be able to get a glimpse into the thought processes of their predecessors, and future historians will be able to examine the past in unprecedented detail. The opportunities are restricted only by our ability to imagine them."* Bell et al., (2007, p. 5)

2.1.2. Why do we capture our lives in digital form? It is very interesting to ask why we are motivated to capture our lives as extensively as we are today even without automatic tools. We have found sparse material on this subject and Brown et al. argue:

> *"Unfortunately, the existing literature is not particularly illuminating on this topic. As it stands, it has little to say about the range of ways in which people capture information or the reasons why they do it."* Brown et al. (2000, p. 439)

Brown et al. (2000) mainly study the office work environment and the motivations for capturing information in that setting and not the motivation for capturing our own lives to any greater extent. According to Brown et al., people capture things in the office for instance to discuss, distribute, to collect and read, to re-use, make living document (for instance for annotation purposes) and many other reasons not mentioned here. The axiological coding scheme Brown et al. use might not be applicable to life capturing and the motivational factors are most likely not the same. Coates (2006) has also, like Brown et al. (2000), noted the lack of research regarding this subject and states that with such huge investments in developing and researching of technologies that capture our lives (for instance he noted that in 2005 295.5 million cameras were sold worldwide) it should provoke curiosity about the underlying reasons for their popularity. As

Coates put it:

> *"This previously un-witnessed preoccupation with the documentation of self also should then also demand an enquiry into the psychological, social, and cultural preconditions necessary for this to take place"* Coates (2006, p. 5)

Coates (2006) further states that the motivation for capturing has nothing to do with commercial interest and is not an artificial need forced upon us by profit driven corporations. Without going in to detail Coates proves his point to some degree by showing us that documentation of self is not a new phenomenon and not one entirely driven by technological development. On the contrary, he believes that development of life capturing technology is driven by the high demand for different capturing solutions (for an in depth discussion wheatear technology drives culture or culture drives technology see work by philosophers *Ellur*, *Virille* and *Heidegger*).[10] Coates (ibid, p. 7) defines our existence as series of fleeting, temporal experiences, for which we are continually aware of their impending loss (whereas for instance nostalgia can be seen as a symptom) and argue that the secular societies many of us are living in have made us acutely aware of it.

Later in chapter 2.2.1 we will show a clear connection between Coates's reasoning and end of life traditions. More specifically, there is a clear connection between the fact that a trend towards more documentation of self has been going on for a long time in relation to end of life traditions too (for hundreds of years). Dahlgren (2003) argues that this trend cannot be explained solely with the fact that Sweden under this time has become increasingly secularized, it also points towards a more pluralistic and individualized society. In that sense the actual phenomenon of documentation of self is clearly not a new phenomenon. This further supports Coates's argumentation that documentation of self is not a phenomenon driven mainly by technological development. It is also further proof that man has used technology to its limit (at all times) to perform documentation of self. In the frame of this paper it is not possible to present Coates's excellent work in its entirety, however we can list the motivational factors he mentions (without an in-depth explanation). Cohen presents three main motivational factors which all branch down into sub-motivational factors. Below we present these headlines and motivational factors briefly. There is no room for specifics in this study and therefore we will use Coates's own summaries of them (later in chapter 4.2. we will try to relate this to digital remains):

1. "*Capturing experience through documentation* explores the concept of the ability to recall an experience as a form of possession. An anxious awareness of the unreliability of memory gives rise to the need for documentation as a cognitive stimulus." (Coates, 2006, p. 7)

Sub-motivational factors:

- *The desire to capture experience* - The desire to somehow 'capture' fleeting moments appears to be a cultural habit of our society. For instance the desire of parents to photograph a young child to in order to preserve fleeting and unmemorable perfections. This is due to the great value we place on experiences and the memory of them. Experiences become more valuable to us as time goes on. Their charm does not wear off but increases as experience is central to our identity. (Coates, 2006, p. 11)
- *Experience and Memory* - The reliability of the capacity to remember is something we are all

[10] Coates writes a very intriguing text and we recommend anyone interested in the subject to read the dissertation.

consciously aware of, and this begins to explain our reliance on documentation. The value we place on documentation is a direct reflection of the value we place on memories. This is because in contemporary Western societies, 'memories' are often conceived as *possessions*: we 'keep' and 'preserve' our memories almost as though they are objects in a personal museum. (Coates, 2006, p. 11)

- *Documentation as a stimulus* - The problem with memory as an object of possession is our limited control over the use and manipulation of it. Memory is not simply something which the self controls. We do not simply evoke memories at our whim. Therefore we require stimuli in order to initiate recall. (Coates, 2006, p. 12)
- *Documentation as "back up"* - While documentation is an important stimulus for memory recall, we also tend to think of it as a 'backup' copy of memory in its own right. Because of the value we place on memories we use documentation as a way preserving them. (Coates, 2006, p. 13)
- *The desire to re-experience* - Documentation unlocks the door to re-experience by simultaneously providing a stimulus and framework for the reconstruction of memories. The nature by which we choose to represent these experiences can be as diverse as sculpture, poetry, or video. In many instances, the intention to provide re-experience can be the primary goal for documentation. (Coates, 2006, p. 13)

2. "*Self Awareness and discovery through documentatio*n suggests how current cultural endorsements of self awareness and understanding may be generating interest in the use of digital documentation technologies. The seemingly analogous relationship between the notion of realising the self and representing the self is explored." (Coates, 2006, p. 7)

Sub-motivational factors:

- *Our cultural climate of introspection* - For instance an international awareness of dissimilar cultures and environments seems to have made us more curious about the processes involved in the construction of 'self'. (Coates, 2006, p. 16)
- *Self-realisations & representation* - The instinct to wonder about ourselves and the methods for doing so. The relationship between the notion of realizing the self and representing the self. The self understanding gained through the actual process of documenting, the very act requires a certain deconstruction of the self in order to create a meaningful representation. (Coates, 2006, p. 16)

3. "*Enhancing self identity through representation* raises the issue of the apparent fallacy of representing self. Representations are always subversive, and this chapter looks at how conscious and unconscious influences upon the production of such representations reflect upon both the represented individual and their social audience. The ability to create fluid identities is identified as an important and appealing aspect of such practice." (Coates, 2006, p. 7)

Sub-motivational factors:

- *The fallacy of representation* - The ability to mould and distort our representations clearly causes a loss of accuracy when documenting reality. These inaccuracies can be the result of unintentional misrepresentations or as conscious undertakings to shape our understanding of the past in a more or less favourable light. (Coates, 2006, p. 20)
- *Subversive representation* - The ability to influence the thoughts and actions of others as a

key motivation for documenting, both on mass media and personal scales. (Coates, 2006, p. 20)

- *Perspectives of presentism* - Using the past to justify the present self, existence is given meaning. (Coates, 2006, p. 21)
- *Supporting the self-image* – This ability is an undeniably appealing characteristic of autobiographical practice. In Western cultures a favourable self-evaluation is an important aspect of self-identity. Individuals are psychologically unable to take the liberty of concluding whatever they wish simply because they wish it so. Therefore, engaging in autobiographical activities allow them to 'conduct a motivated search for evidence that supports their preferences.'(Beike 2004:208). While self-discovery and awareness may be the initial intention, the opportunity to enhance self-image may be irresistible. (Coates, 2006, p. 21)
- *A manipulated virtual self* - We cannot consider modern personal documentation to be purely autobiographical in the traditional sense (such as MySpace pages). This does not necessarily invalidate them as forms of documentation though, as they are still partial representations of reality. The creative aspect may be appealing to many authors as it allows them to exercise their creative tendencies as human beings and sculpt a protagonist who may be more like how they would *like* themselves and others to perceive them. (Coates, 2006, p. 22)
- *Social groups & identity* - Manipulative tendencies aside, a virtual extension of self is seen by many to be an essential device for gaining access to, and acceptance from, virtually located social groups. Human groups lie at the heart of social life. In order to maintain healthy real world relationships, an active participation in virtual socialising – instant messaging, forum discussion, MySpace etc. is required. (Coates, 2006, p. 22)

Coates (2006) also identifies problems with this capturing culture (or perhaps human quality) and many of those can be related to modern technology. For instance, the problem with spending too much time capturing experiences and ending up with memories of events you never truly participated in. We will however not go into such details and encourage anyone to read Coates's paper for themselves. We believe Coates's own words nicely sum up this subject of why we capture our lives in digital form:

> *"This text suggests that the motives lie beyond the influence of technological novelty and commercial persuasion. Through an analysis of historical and contemporary autobiographical practices and cultural observations, the fundamental motives for participation in such activities are uncovered."* Coates (2006, p. 4)

2.1.3. What happens to our digital remains when we die? Today we have easy access to large storage spaces on the Internet, enabling us to retrieve and store huge amounts of data, such as pictures, e-mails etc. as mentioned in the previous chapter. One question we then may ask is: what will happen to our digital information when we are gone? The data will most likely not vanish into thin air but then again it is not obvious the data will reside on servers and DVD copies forever. The question of what happens to our digital remains when we die is very open ended and we have found no specific studies that answer this question. What we study in this paper is what we can do with digital remains and what people want us to do with digital remains, not what happens to digital remains if we ignore such information. In that context we feel a brief discussion on the subject is in place. For centuries our governments have collected material from all forms of media. Most countries have dedicated national archives which traditionally have

collected and stored for instance printed information (e.g. MINERVA, 2007 and Nationell ArkivDatabas, 2007). Today these archiving institutions spend equal amounts of time collecting digital content with web-crawlers searching the Internet for country specific digital assets which they store and organize. Since it is quite hard in many cases to collect only Internet material that is specific to one country most likely a lot of material from other countries also resides in these archives. In general, it is logical to assume there is duplicate material replicated in several national archives. On top of this, we have the Internet Archive that indiscriminately tries to store everything on the Internet (Internet Archive, 2007). Archiving institutions try to store data safely and with redundancy so that information is not lost or destroyed, a massive task considering the amount of information they deal with.

Many archives have also made their databases available on the Internet in some form, for instance Nationell ArkivDatabas (2007). Without a doubt, a lot of that material can be considered to be digital remains. However, one can perhaps differentiate between personal and affective remains to for instance newspaper articles, governmental web sites or company assets. In the previous chapter we argued that the storage capacity needed for capturing a life's worth of digital data is reasonably inexpensive. On the Internet several services offer free sharing (i.e. free bandwidth) and storage of files (e.g. Rapidshare.de), some sharing and storage services even exist without the option of deleting shared content (i.e. the data shared is automatically owned by the service provider). This is just another example of how data is replicated and stored over and over.

In connection to web pages with user-created content (MySpace.com, YouTube.com, Blogs etc.) we can for instance see how pictures and movies of the dead reappear. A famous example of this is *MyDeathSpace.com* (2007) which presents personal MySpace pages of people who recently died. This is in general a form of memorial (see chapter 2.2.2 for more information regarding memorials) since it is often the relatives that take the initiative to present the information, though they also contain digital remains which reflect the dead person's life and to some extent draw a picture of her/his last living moments. What this shows us again is that data is often replicated after death and even published at times. It is therefore logical to assume that potentially huge amounts of digital remains reside on for instance personal computers and DVDs in people's homes.

In the near we will see plenty of digital remains connected to augmented artefacts, a logical statement considering that so much digital media is built in with augmented artefacts. Much in the same way as any physical item, for instance a chair, a lamp or anything else that were there just before someone died, it will probably be there after death if it is not completely destroyed. What happens to digital remains residing in augmented artefacts is hard to say. Some storage devices might survive the test of time better than others (flash disks have for instance high durability-qualities). The same assumption could also be valid for our digital remains on the Internet; they will be there if they are not destroyed. And if they are destroyed there will most likely be a copy of some pieces of information somewhere else on the Internet (on someone else's storage space). In a way it is hard to destroy data once it has been published on the Internet.

The legal situation regarding personal mail from someone that died is less than clear. AOL has assigned a dedicated person to help with next-of-kin requests (The Mercury News, 2005). Before releasing account information, the company requires a copy of the death certificate and documentation proving the person requesting the e-mail information is the legal beneficiary or the estate representative. Yahoo has been known to terminate email accounts if a user dies and often refuses to turn over the emails without a court order. When Captain Justin Ellsworth of Michigan was killed while inspecting a bomb in Iraq, his father John Ellsworth, wanted access to his son's Yahoo email account. But Yahoo, whose policy is to terminate email accounts upon a

user's death, would not give him the material until a probate judge ordered Yahoo to do so. Microsoft's Hotmail will provide a disk with e-mails after it verifies the legitimacy of a request and that the relatives are related to the deceased. As the Hotmail staff argues:

> *"We have tried to institute a policy that is very focused on privacy, but at the same time honors the requests of bereaved family members."* The Mercury News (2005, p. 1)

This brings up the question of what rights the deceased have. Danny O'Brien of the Electronic Frontier Foundation, a San Francisco non-profit organization that often gets involved in digital-privacy issues, said it is difficult to find the right balance between personal privacy and a family's desire to get all of a loved one's possessions.

> *"We are sympathetic to the pain families go through,"* he said. *"On the other hand, there are a lot of things people want to keep private from their close relatives. You need to have some way to do that."* The Mercury News (2005, p. 1)

Potential problems are in other words already emerging regarding ownership and rights to digital remains. The Washington Post revealed an incident when a father wanted access to his deceased son's mail account but was refused (Cha, 2005). The online article states the following:

> *"Many Internet firms have found themselves facing criticism no matter what they do. If they decline to release the information, they are labelled villains by people supporting the families. If they give it up, they are chastised for violating their own privacy statements."* Cha (2005, p. 1)

Later in the article you can read:

> *"The difficulty is that there's no clear morally right or wrong,"* said Michael Froomkin, a professor of Internet law at the University of Miami. Cha (2005, p. 1)

The first clear cases also have emerged were people and companies are being held responsible for publishing slander about dead people (Urbina, 2006). There are even some cases where companies are being held economically responsible for publishing negative information about dead people on the Internet. These types of problems will probably increase as people more often will deal with and handle digital remains left by others.

2.1.4. Grief, mourning and bereavement. Grief is the normal process of reacting to the perception of loss; either a physical loss, the death of someone close, or a symbolic or psychosocial loss as experienced in a divorce or when losing a job (National Cancer Institute, 2007). Reactions can be psychological or emotional: anger, guilt, sadness. Is can also be physical, as in sleep deprivation or appetite changes, or social which manifests in the desire to see or not see family or friends. The grief process is dependent on the relationship with the person lost, the situation around the loss and one's attachment to the person. Mourning is the process by which people adapt to the loss, and the period after the loss occurs during which grief is experienced and mourning occurs is called bereavement.

In a study Elisabeth Kübler-Ross interviewed terminally ill patients in hospitals on their thoughts about dying, and found that it was possible to identify a few distinct stages of grief that everybody

went through to some degree. Patients would go from "No, not me!" through to "Why me?" and to "Yes, me, but…" and finally to the simple "Yes, me" (Kübler-Ross, 1971). The stage theory has also been generalized to describe not only the grief process of the dying but also to other areas, such as children's reactions to parent's separation, adult's reactions to martial separation and clinical staffs reaction to the death of a patient, and the stages are described as "denial-dissociation-isolation, anger, bargaining, depression, and acceptance" (Maciejewski et al., 2007).

Different steps of the grieving process can be seen when investigating memorial services on the Internet. Kylie Veale could in her study see evidence of users manifesting parts of their grieving process by posting memorial comments (Veale, 2004). Traces of denial could be seen in comments: *"It's so very hard to accept your death; and sometimes I think that you'll just walk through the door like nothing has happened."* or *"I still wait for you to call me, I think of something I want to ask you or something I can't wait to tell you about ... then I remember that you're gone."*. Some users would express anger over the situation: *"I think of you everyday. You are such a bastard to deny us. You are such a bastard. God how I miss you."*. Comments would sometimes include messages containing idioms as *"I would do anything […]"* from users on the bargaining stage, and finally traces of acceptance could be seen in messages like *"…and now I … understand that you're not coming back... ever"*.

It would seem that some users dealt with part of their grieving process by externalizing their thoughts through writing in the memorials. This can also be confirmed by Kübler-Ross, who noted during her 400 interviews with terminally ill patients that talking could help them move forward in their grief (Kubler-Ross, 1971). They would for instance move forward from denial when they started talking about the situation, with a person that could help them face the feelings that emerge when they realized the given reality. In the end, out of all the interviewed patients only three remained in denial until the very end. She also noted that she could help both patients and the next of kin to express their anger, although some moved through this phase without any external help.

2.2. Online study, on present usage of digital remains

Alternative, novel and creative ways to celebrate end of life with use of modern technology are emerging and we have noticed a heightened pace in which new phenomena are published on the Internet. The discoveries we make are at least becoming more frequent since we started exploring end of life traditions and modern technology and cover new areas of science previously untouched. It is important to note that many phenomena we have noticed have nothing or very little to do with Information Communication Technology (ICT) solutions and little to do with preserving information regarding the deceased person. Many services and artefacts mainly deal with preservation of the body, honour the dead or presents new spiritual ways to perform burial ceremonies.

The recent *Bioprecense* concept (2007) where the deceased person's DNA is encoded underneath the DNA of a plant cell and in such making the deceased DNA part of the plant during its lifespan is really more symbolic and artistic in nature than preserving. The comparisons made between the Bioprecense concept and the traditional tombstone as made by its creators falters somewhat when you consider that to the observer there is actually less information about the dead in the Bioprecense concept than on the tombstone (unless you actually recover the DNA from the plant before it too dies). Another recent biotechnological project called *Memento Mori In Vitro* actually re-grows the hair of the deceased person on artificial tissue and in such a sense proclaims to recreate the feeling of smelling, touching and seeing the colour of the dead person's

hair (2007). We question the aspect of smell in that specific case and acknowledge that it is an artistic alternative where the bio-engineers are expressing their creative sides and perhaps not directly what people want as memorabilia from the dead (though that is of course an open question since no studies we know of has been made on that subject).

We have accounted for concepts, services and artefacts in our evaluation that have elements of ICT, even if the focus is on other areas of research. However, such services can be seen as rare examples rather than common phenomena at this time. We consider it likely that for instance biotechnology and ICT technology will converge sooner or later, even in this specific research area.

2.2.1. Online Obituaries. Obituaries are an old reoccurring part of the newspaper; it can be seen as a source of information about the people that live within the area where the newspaper is published. Readers browse the family section to see who has died recently, information about the funeral and so on.

In a large study of newspaper obituaries Curt Dahlgren, Professor at the institution of Theology at Lund University, has noted some trends about the medium (Dahlgren, 2003). The first Swedish obituaries were printed in the beginning of the 19th century as very short notices. It was not until 1850 that they began to be more detailed and the first obituary containing a cross, a symbol of the deceased, was printed in 1890. The cross became popular around 1940 and dominated the obituaries as a symbol up until the end of 1970. From this date up until now the obituaries have gradually started to contain more and more individual symbols chosen to describe the deceased; in 1976 almost all Swedish obituaries had crosses while only 40% had crosses in 1995 (*see figure 6*).

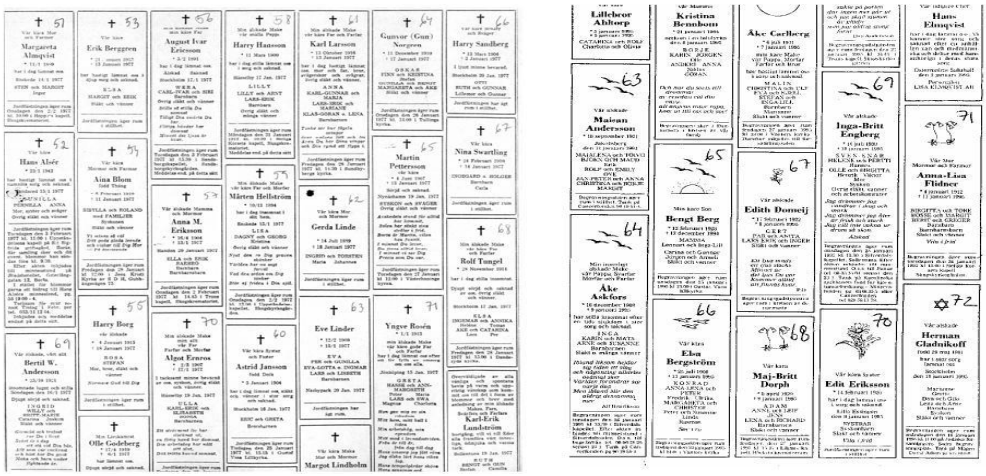


Figure 6, Swedish obituaries, 1976 to the left and 1995 to the right (Dahlgren 2003)

Dahlgren argues that this cannot be explained solely on the fact that Sweden under this time has become increasingly secularized, it also points towards a more pluralistic and individualized society. The trend thus seems to be towards more and more personalized obituaries that describe the deceased in more detail and with more personal content. Newspaper obituaries are still very strict and each newspaper has a template for fonts, line spacing, column width and so on (Wettergrund, 2005), making all printed obituaries in a newspaper look the same at a glance so none of them stand out at the cost of the others. A Swedish company called *Timecut AB* has built a system for digitalizing the whole process of creating and sending a death notice to the newspaper (Timecut, 2007). The funeral home, together with the next of kin, uses Timecuts platform to write the obituary which is then sent directly to the newspaper in digital form in a ready-to-print state.

The system has built in rules and constraints for how the death notice may look so it has not changed the actual appearance of the obituary; only the creation process (*see figure 7*).

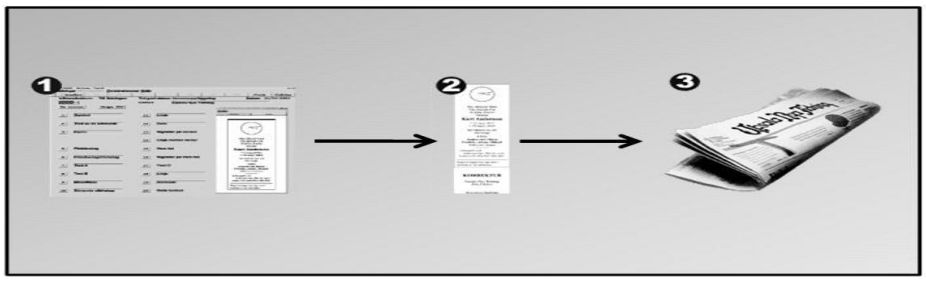


Figure 7, creating a traditional newspaper obituary with Timecuts digital tool (Timecut 2007)

Obituaries have found their way out on the Internet as more and more newspapers have started to publish part or all of their news on the web in parallel with printing them on paper. The obituaries have followed the rest of the publishing on the web, which has added some functionality to them. Online obituaries are more detailed than their traditional newspaper counterparts. They can contain more text, pictures of the deceased and guestbook's for visitors to express their sympathies. Some obituaries contain hyperlinks to the funeral home in charge of the funeral service or the church where the service will be held. The Internet has truly expanded the way traditional death notices look and function.

Legacy.com is a search engine for online obituaries that includes more than 350 US, Canadian and UK newspaper's death notices as well as the US social security death index (Legacy.com, 2007). This helps in searching for a specific obituary, since the user does not have to know where it was printed to find it, as long as it was printed in one of the affiliated newspapers. Another service for finding obituaries online is the *National Obituary Archive* (2007). This is also a search portal, but users search records added by affiliated funeral homes. National Obituary Archive (NOA) offers different functions for visitors that want to offer their condolences; each obituary has a guestbook and for a fee users can add a "tribute", a *"simple statement of affection, a eulogy delivered at the funeral, a poem, reminiscence or a favourite story"*. Users can also send physical gifts through the web site, ranging from a note of sympathy which will be delivered by the funeral director to the family to other gifts such as contributions to a charity or planting a tree in memory of the deceased. *CurrentObituary.com* (2007, CO) is another online obituaries site, sharing much of its content and functionality with NOA. Funeral directors sign up to the web site through CurrentObituary.net, which acts as the business agent for the CO web site. CO describes itself as a simple and reliable resource for both funeral directors and the public, functioning just as the newspaper and with obituaries listed geographically.

A fourth obituary search portal is *ObitsArchive.com* (2007, OA), which emphasize its services on archived obituaries. Archives are provided by affiliated newspapers, and OA claims to provide the most comprehensive collection of newspaper obituaries and death notices in the United States. Searching in the archives is free, but a small fee is required for viewing a full obituary. The search engine is expanded to not only search the title but also the body of the obituaries, so users can search using a place of residence, occupation, names of family members, or other personal information.

ObituaryRegistry.com (2007, OR) is another large database and search portal for obituaries we encountered during our research. Just like Legacy.com it offers access to the US social security death index, it acts as a search portal for current obituaries and estimates to cover about 92% of

all current US deaths, and it also archives all obituaries into a large database for future searches. OR also offers some advanced features for searching the databases, such as batch searching and list monitoring – screening large lists of individuals against their databases.

2.2.2. Online Memorials. The main type of online service we have identified is the online memorial, or web memorial, written and published by the next of kin. These range from a simple page with a brief text describing the deceased to bigger pages containing a biography, pictures, films, sounds, backgrounds, stories about the life of the deceased, blogs for the next of kin, forums for grief support and so on (*see Appendix 4 for examples*). In a study of online memorials Veale (2004) identifies some of the main motivations for creating an online memorial. The four main motivations are described as *"grief, bereavement and loss; unfinished business; living social presence; and/or historical significance"*.

Coping with "grief, bereavement and loss" is seen as the primary motivation behind creating an online memorial (ibid.). The memorial is created to provide a pleasant "memory picture" to reflect on, and can allow others to express their sympathy and consolation through active participation in the grieving process. This can go a long way in helping the users with their grieving process. The second motivation has to do with the user of the memorial feeling they have some kind of "unfinished business" with the deceased, for example as a result of a very sudden and unexpected death. In this case the memorial can acts as a place to say a final goodbye, express love, regret or making up for missing a last chance of meeting the deceased. The users can sometimes be found writing texts or comments in the memorial as they were talking to the deceased, and the deceased was still alive and able to communicate. The memorial in this case acts as a "living social presence" of the deceased, a representation of the person that has passed away, helping the users say those things they did not get a chance to say or make up for past mistakes. The online memorials can also be used as a deliberate attempt to strengthen the memory of a deceased so he or she is not forgotten in time. This historical motivation can be expressed in the publication of a memorial several years after the death took place, to help remember.

Online memorial web pages often incorporate functions for visitors to send their condolences, and offer virtual gifts to the memorial; such as sending a virtual rose or lighting a candle in memory of the deceased *(see table 1)*. This is to be compared with condolence cards and funerary wreaths as examples of this participation in the physical world, both of which can be kept for future reference (Veale, 2004).¨

Table 1, visitor contribution alternatives on different virtual memorials

Site Name \ Features	Visitor Gifts	Visitor Guestbooks
Last-Memories	Light a candle	"Shared memoirs", "Condolences", Guestbook
Memory-Of	Memorial Candles	"Tributes and Condolences"
TheEternalPortal	Links to real-world gifts	Guestbook
TillMinneAv	Light a candle	
ToLiveForEver	Virtual Flowers and Candles	"Condolences", "Ever lasting memories"
The Virtual Memorial Garden		Guestbook
Virtual-Memorials		Guestbook

The Online Memorial sites are typically tailor made towards ease of use for people that want to publish a memorial of someone that has died. They will in most cases include some kind of web content management system (CMS) that helps the user design his or her page with the aid of templates and guides. Advanced features can be opted out for less technologically adept users, making a basic memorial easy to publish. The first step is usually to fill out a form about the deceased, which will be published as a basic text on the memorial site. The user can then add different kinds of media and manage and edit all the content through the CMS, depending on which features are supported on the site. In our comparison of online memorials we found that all of the found services had some kind of Web CMS (*see table 2*).

What the user can add during the creation of the virtual memorial varies depending on the website and in some instances which price plan the user selects. Some memorial providers have divided their accounts into several different classes, each class adding more functionality and also adding the amount of media that can be posted; the cheapest level might only allow a handful pictures while the most expensive account supports the inclusion of many more pictures sorted into several albums.

Table 2, overview of basic Web Content Management System features, and price ranges

Site Name \ Features	Basic text	Pictures	Audio	Video	Edit content	Cost
Last-Memories (1 month)	X	X	X	X	X	$4.90
Last-Memories ("Forever")	X	X	X	X	X	$39.90
Memory-Of (1 month)	X	X	X	X	X	$4.95
Memory-Of ("Forever")	X	X	X	X	X	$94.95
TheEternalPortal (Basic)	X				X	Free
TheEternalPortal (Full)	X	X	X	X	X	$300
TillMinneAv (1 month)	X	X	X	X	X	149 SKR
TillMinneAv (3months)	X	X	X	X	X	398 SKR
ToLiveForEver (Basic)	X	X	X		X	$11.99
ToLiveForEver (Full)	X	X	X	X	X	$199.99
The Virtual Memorial Garden	X	X				Free
Virtual-Memorials (Basic)	X				X	Free
Virtual-Memorials (Full)	X	X	X	X	X	$50

Memorial web sites have two different price schemes as can be seen in table 2. Some include their full functionality and charge by the month, year or a one-time charge for service to continue without expiration. The other pricing scheme charge by how many functions are included in the offer but does not limit the time a memorial will stay active on the web site. One of the oldest memorial sites we found was *The Virtual Memorial Garden* (Lindsay, 2006). It was founded 1994 and appeared on the front page of the Times newspaper on the 14th of August 1995 and still remains active today. It is also interesting to note that some of the newer and more profit driven memorials in essence offer the same kind of functionality and services as *The Virtual Memorial Garden* (VMG) does. VMG is still free to use and active, although during the time that has passed since it was first created much in the ways of web design has evolved leaving it looking a bit outdated. Although there is a notable difference in layout and design on newer memorials compared to the still mostly “black text on white background”-based VMG, looking at actual

content the difference is in some instances minimal (*see table 2*).

Other examples of online memorial sites that we found by using Google's search engine with a list of predefined search queries are *Memory-Of* (2006), *Virtual-Memorials* (2006), *Last-Memories.com* (2006), *To Live 4 Ever* (2007) and *The Eternal Portal* (2006). Some of these web sites are quite large, Memory-Of.com is according to themselves currently hosting over 47 000 individual memorials (Memory-Of, 2006), although it is very difficult for us to confirm this number as the memorials that stop receiving payment remain on the site in a non-viewable form. Some memorials are on a smaller scale; Last-Memories.com has not reached the 2000 memorial mark yet (Last-Memories.com, 2006).

Many of the examples on online memorials are in English and in most cases from the USA or United Kingdom[11], but we also found examples of this phenomenon across the world. *TillMinneAv.se* (2006) is for example an example of a small Swedish online memorial site created by Mats Karlsson as a reaction to the passing of one of his close friends.

2.2.3. Specialized online memorials. There are also sub categories of online memorial sites targeted for specific groups of users. Pet memorials are one such category, where pet owners can mourn the loss of their companions. We have managed to find many examples of such sites, ranging in size and complexity. Some are even affiliated with the "regular" memorial sites, as in the case of *Critters.com* (2006) which is a part of Virtual-Memorials (2006). Pet memorial sites vary from small simple sites to bigger ones, including sites such as Critters.com (Critters 2006), *Youns.com* (2006), *Pet Remembrance* (2006) or *ImmortalPets.com* (2006) to name some. Another category of memorials are those directed towards specific careers, such as soldiers on *Fallen Heroes Memorial* (2007) or in the case of *OfficerDown* (2007) police officers.

2.2.4. Miscellaneous online services. The two main categories we have described so far, online obituaries and online memorials, are well represented online and we have thus only presented a limited selection to describe them. However, there are other services that can be seen as more unique or one of a kind, and thus are not so well represented. These services are of a smaller nature, but still contain interesting features.

One type of service we have encountered online is the Virtual Graveyard. Virtual graveyards are a unique type of digital service connected to traditions around dying, since they in essence are a virtual representation of a traditional graveyard with everything you could expect to find there. They often come in a graphical representation of a graveyard, with headstones, isles between the graves and so on (*see figure 8*). The idea is to have a virtual representation that you can visit at any time, wherever you are in the world. Relatives from far away can visit, read the headstone and place flowers on the grave. One example of a virtual graveyard is the *Virtual Graveyard* (2007) web site (with the same name as this category), published by a company in Warsaw.

[11] Since our searches for online services were limited to using English search queries, there is an obvious risk that we have overlooked some services from other parts of the globe.

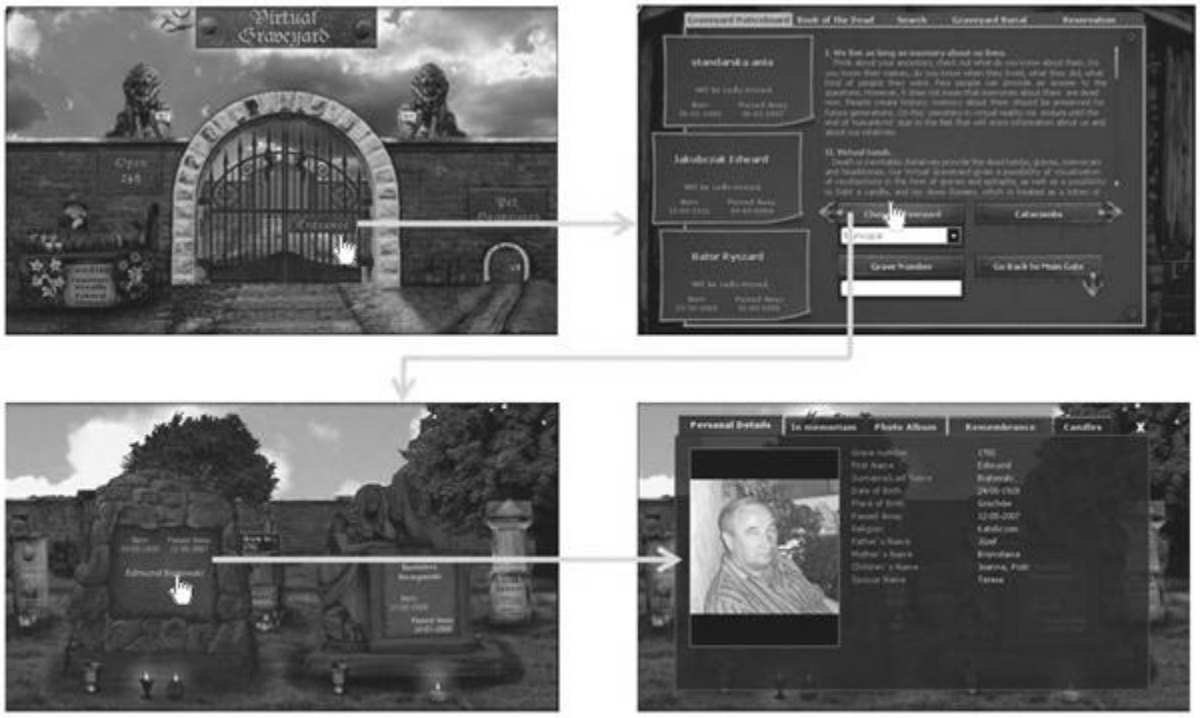


Figure 8, a brief walkthrough of a Virtual Graveyard

The virtual graveyard is unique since it uses the qualities of the real graveyard, where as memorials and obituaries have inherited their layout from web pages and news articles. Virtual graveyards can be seen as an online representation of the graveyard, which could prove useful since we are accustomed to visiting a graveyard when we want to remember or mourn someone that has passed away. Another less digital and ICT based service that looks very interesting is *Life Capsule* (2007). This service is run by a company that films lengthy interviews with a person, about every aspect of that person's life. It can probably be best described as a personal documentary, made by a professional film crew and experienced interviewer to help the client tell his or her life story. The thought is that this can be handed to the family of the interviewee to be passed on through generations, or as the people behind Life Capsule puts it: "*Who wouldn't want to watch a recording of their great-grandfather?"* While it does not approach memorialisation through novel technology, Life Capsule is a good example of how we can choose to describe ourselves to the future generations, or how some people actively record parts of their life to leave to their families.

LifeGem (2006) offers the unique service of creating diamonds from the remains of the deceased. They extract carbon from the deceased, either from the cremated remains or for example from a lock of hair, and turn it into a solid diamond (a six to eight month long process). This creates an affective artefact for the bereaved. LifeGem also have a small scale "Tributes" section on their web page, where the clients can write basic memorials about the deceased in connection to the artefact.

MyDeathSpace (MDS) is a collection of links to digital remains that is publicly available online (MyDeathSpace, 2007). Most of the links are to MySpace profiles of the deceased, but other personal profiles on other networks also occur. The deceased is presented on a personal MDS page with a picture, cause of death, date of death, hyperlink to the digital remains in question and an article about the person. It's an interesting idea since it links to actual digital remains, and that they represent one of few services who to a limited degree geographically tag their data in a map

interface. Visitors to the MDS web site can choose to see all the entries plotted on a Google Map's interface (as explained in chapter 2.4.4. this can be concluded to be a relatively new feature for this site).

2.2.5. Miscellaneous concepts. When searching the Internet for services related to old traditions around death and dying meeting new technology we found many small projects, concepts and oddities that we thought might be worth mentioning. One of these is Michele Gaulers *Digital Remains*, her graduation project in interaction design at the Royal College of Art in London (Gauler, 2006). Digital Remains is concerned with the role data plays when we remember those who have passed away, and tries to match and display the relevant data to the user that is using the service at the moment; for instance a photograph from a holiday the user spent with the deceased ten years ago. The data is stored on a central storage and accessed by beautifully crafted access keys that can display the data on Bluetooth device (*see figure 9*).

Figure 9, access key to Gauler's "Digital Remains" (Gauler, 2006).

Another related project is the *Cemetery 2.0* concept by Elliott Malkin that links the physical burial site with online memorials for the deceased (Malkin, 2006). A prototype was built for Malkin's great grandfather Hyman Victor. Hymans grave marker is linked by an Internet connection to online content such as his memorial, family tree and genealogical data. Visitors to his grave can access the online content, and visitors to his online content will get the notion that it is directly associated with the actual burial site. The project is described as a step towards the next-generation cemetery, "a networked memorial to the electronic record of a man".

The Japanese project *Mastaba: Family Digital Shrine* focus on displaying memories within a family through digital pictures (Mastaba, 2007). The project builds on a thesis that Japanese families increasingly value the memories of the dead over their actual physical burial site. The family digital shrine is their idea of a new monument of family members that have passed away. The shrine, Mastaba, is a wooden structure where digital memories are stored and where the family can gather to view the memories together (*see figure 10*). Users can select pictures of relatives, and compare them to pictures of themselves when they were the same age. Pictures are selected from a stairway of 100 steps that run around the edges of the shrine, one step for each age, and brought down to the central table for viewing and sharing.

Figure 10, the "Mastaba Digital Family Shrine" structure

The project *Mission Eternity* is also about preserving digital remains of people (Mission Eternity, 2007). Users that will have their digital remains preserved through Mission Eternity are called M∞ Pilots, and their remains will be collected in an M∞ Arcanum Capsule. The capsule is a collection of the digital fragments of the life, knowledge and soul of the users that will be stored through a network of donors, M∞

ANGELS, that each donate a part of their own disc storage capacity to store fragments of the capsule. This storage system builds on massive distribution and redundancy, so if a node should break or disappear the capsule lives on and compensates by finding a new place to store a copy of the fragment. Etoy, the company behind Mission Eternity, has recognized that this will only function in a huge community of users on different continents of different cultural backgrounds, and as a way of achieving this they display their concept as art installations; for example as the M∞ Sarcophagus. This is a converted freight container whose inside is covered in 17 000 LED lights that can display images and other content from the capsules. Etoy is a company that is completely dedicated in investing all its money and resources into art projects like Mission Eternity.

Specialised forums and blogs are sometimes ways for the bereaved to express their grief. As we have noted earlier in this chapter, some online memorials feature blogs where the bereaved can "talk" to the deceased, or express their sorrow. As was noted in chapter 2.1.4 users can find it helpful to talk or write about their loss and the Internet offers opportunities to find people to talk to that have experienced the same kind of grief. The bereaved can visit forums to talk about a suicide of a close relative, find help on how to talk to the children after the death of a spouse or ventilate thoughts on losing a loved pet. Another form of writing about one's grief is to keep a diary, or an online blog, to get an outlet for the grief and mourning that the bereaved is experiencing.

With networks of online obituaries and online databases sites specialized in genealogy arrive. These can offer tools or methods for conducting research online, or fee based access to databases that have been digitalized. Some memorial sites also offer the ability to build family trees so visitors can trace a memorial in a family for example. Web sites on genealogy range from tips on how to conduct research in physical archives, book reviews on genealogy, access to online genealogy databases, tips on using common online search engines as Google.com for research and so on.

2.3. Digital remains and location-aware computing

As mentioned in chapter 1.2 the focus of this study is not on technical aspects in relation to interaction with digital remains but instead on social interaction. Though we still need to do the background study and evaluate possible technical solutions according to social requirements in connection to Blogging by the Dead (BbtD). Secondly, we believe there is much to gain from evaluating and comparing our research question regarding on one hand the social aspects of end of life traditions and modern technology and on the other hand the social-technological challenges, as discussed in chapter 1.2.2.

Location-aware computing is becoming increasingly important. Location is stated by several researchers as key (if not the most important factor) for location-aware, context-aware and more general for ubiquitous computing to succeed (e.g. by Patterson et al., 2003, Hazas et al., 2004, Griswold et al., 2004, Minch, 2004, Chang et al., 2005). Minch (2004) and Taht et al. (2005) also argue that the ability of context-awareness and especially location-awareness greatly have enhanced the opportunities of mobile business to flourish. Many different kinds of context-aware services ranging from "finding nearby restaurants" to "sending ambulances to people in emergency" have already taken their places in the business.

The quantity of geo-spatial data mined is gradually increasing and enables us to better understand the complexity of the world and facilitate for new Information Communication Technology (ICT) solutions to be built (Patterson et al., 2003). The quality of that data is gradually getting better because of modern location-aware systems. Peterson et al. argue that four

key areas need to be addressed in research for location-aware computing or location-based services to reach their full potential. The four areas Patterson et al. mention are human interaction with geo-spatial data, high-quality geo-spatial data, location-aware computing (or location-based services) and geo-spatial databases and data mining (*see figure 11*).

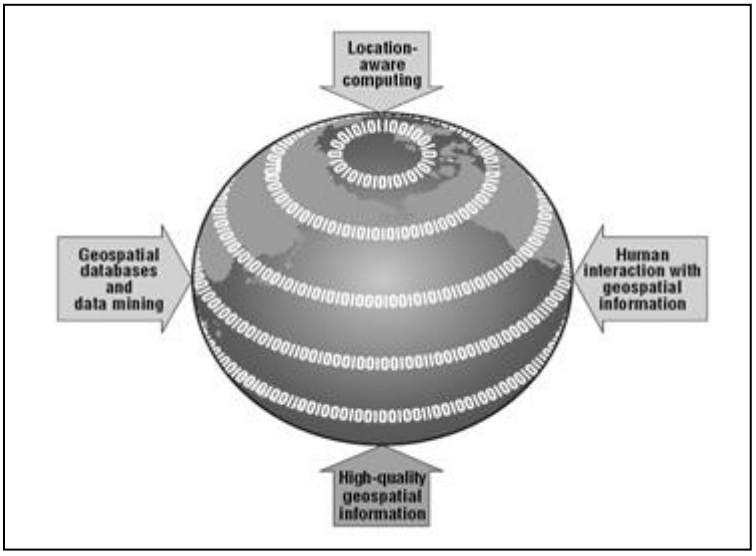


Figure 11 , overview of areas of interest; curtsey of Pattersson et al. (2003)

Since we are exploring and developing a location-based service (LB-service) with a social theme the key factor we study is human-interaction with geo-spatial data (ibid.). Later in chapter 2.4 we present our interpretation of human-interaction with geo-spatial data in connection to BbtD and show how we have moved the focus towards use-experience of geo-spatial data.

Without a doubt we also have a need to provide accurate positioning and navigation for BbtD to work properly though those factors are beyond the boundaries of this study and we will settle with an evaluation of existing base technologies (such as the use of the GPS-system in connection with LB-Services) and possible navigation scenarios in connection to BbtD in chapter 2.3.1 and 2.4.

Good database design is of course of great value if the goal was to move BbtD from concept to finished service or product but it is not. Since the BbtD concept primarily deals with user contributed data there is no real need to discuss data-mining, the users themselves define what valuable or affective data is and what is not. Secondly, BbtD mainly deals with static information that is located at one or more geographic coordinates and not information that relocates its positions constantly (i.e. information from the dead is fixed at one or more positions at all times). This actually might pose a problem in database design according to Leonhardi et al. (2002) who argue most databases developed for use with location-aware systems are optimized for complex operations and not simpler LB-services like BbtD.

BbtD is also lacking, because of the obvious reason that the dead do not communicate in real time, what Jones et al. (2005) define as people-to-people-to-geographic-places functionality (P3 systems). This is another factor that scales down the technical complexity theoretically needed to build BbtD.[12] Thus P3 systems functionality is not needed since there is no people-to-people interaction in BbtD. Furthermore, there is not any need to maintain awareness of other people in

[12] How about a new term such as “synchronous dead-to-living-to-geographic-places communication"?

the system (unless BbtD is altered according with future user-studies).

Technologies that are usable in location aware systems but require alteration of the physical structure of things have been excluded. We did not evaluate such technologies because they are unrealistic to use in a service that covers varied locations. The information owner might for instance not be the owner of the location where information is published and it is not reasonable to alter the world to fit the service BbtD (and is also impossible to manage from a service provider's point of view).

2.3.1. Present positioning technologies. What happens to location-aware techniques over time is hard to predict but most likely they have a shorter lifespan than for instance global positioning systems. One of the benefits with using a service to handle digital remains, as discovered in the previous research, is that some kind of guarantee can be given to the user that the information is kept safe and preserved over time. To preserve digital remains, in this case, also involves guaranteeing that the information can be experienced at the location it was published over longer periods of time (opposed to only keeping the data in safe storage).

Several systems exist for providing location-positioning service and those solutions are different from each other in various ways.

Varshavsky (2006) argues that the Global System for Mobile Communications (GSM) can be used for positioning services and is accurate between 5-75 meters. This is a fairly low resolution and is not optimal for social use. However, with use of triangulation techniques (3-NA) GSM might be usable in urban areas where more mobile-cells are present. In the countryside GSM is less than optimal for use as a positioning service since mobile-cells can be several miles wide.

Wi-Fi is quite accurate indoors when using 3-NA techniques but require a lot of base stations and Blue-tooth is even more accurate for the use in location-aware systems but has limited range (Hazas et al., 2004). Social networks sharing wireless access could perhaps be used in a Wi-Fi based positioning service though from a service provider's point of view this can be troublesome since there then can be no guarantee that the network would be available to the user. Then it is more likely to use commercial services, like Loki (2007), that have good coverage in densely populated cities. Public Wi-Fi networks are however starting to emerge as a common infrastructure in urban areas and those might be used in combination with for instance GPS to achieve higher service availability and precision. WIMAX also promises better positioning coverage in the long run and might be an option in the countryside (though not in remote places). A few other minor location positioning techniques exist, such as the use of ultrasound (Hazas et al 2004), though we do not see any use for them as of now.

The most important technology for providing location-based service is Global Navigation Satellite Systems (GNSS) whereas the most well known is the American Global Positioning System (GPS) and the Russian Global Navigation Satellite System (GLONASS). GPS is as of 2007 the only fully operational GNSS and cover most (if not all of) the earth's land and sea mass (GPS, 2007). The Russian GLONASS (2007) system is under repair and is expected to be fully operational by 2009. The upcoming joint EU effort GNSS system Galileo will most likely be operational towards the end of 2008 and the beginning of 2009 (Galileo Navigation, 2007). It is important to note that the Galileo system is specifically built for civil use and has a very high accuracy (both in altitude and latitude measurement). Though GPS might stand out as the given candidate at the moment for use with a LB-service like handling digital remains, where the need to provide positioning at even remote places exists, we have found several pitfalls with using the

GPS system.[13] With that said we have set the standard quite high when evaluating base-technologies and in theory it rules out any positioning system except global positioning systems. We will however present an alternative solution later in this chapter.

GPS is still less than optimal and has problems that make it ill-suited for use with localised digital remains where information might be located inside a home or inside a factory, even Assisted GPS is less than optimal indoors (Schmandt et al., 2004). In other words, there is both a need for quite precise positioning and positing service in different contexts. GPS does not work well indoors, particularly in steel-framed buildings (Patterson et al., 2003). The current version of GPS also provides relatively low resolution up to a few meters, and in some cases below a meter. GPS also has extremely varied resolution in relation to geographic context and it is not a trustworthy positioning service at many locations on the planet (Chang et al., 2005). Chang et al. have proved that location displacement in GPS with up to 500 meters exist even in democratic Asian countries. Patterson et al. (2003) also note that in mobile hardware there will be a need for specialized components that will impose weight, cost and energy consumption requirements that are problematic. However, we realise that today many mobile phones and PDAs come with integrated GPS devices. Thus, we argue that those factors are not a great problem when considering if GPS is adequate for use with localised digital remains.

Another problem with the GPS system is that it uses an absolute coordinate system which is not relative to specific objects (Patterson et al., 2003). In most cases this is not a problem for civil services and mostly affects military grade systems. We fully appreciate that no service can guarantee that the information will be available or kept forever, but the comparison with the safekeeping of literature, newspapers and writings might be valid since such material also deteriorate over time and are lost in relation to its original context (whereas historians then later seek to connect the material to their original context). An interesting question thus is whether information published at the time of a person's death at a specific geographic coordinate can be experienced at the correct place 100 years later (that is where the person meant it to be experienced)?[14]

Another interesting question is whether digital information in general published at geographic locations will relocate in relation its original location over time (and how much)? Leonhardi et al. (2002) argue that the only way to achieve good location-awareness is to use the best available option for determine location at any given time, different situations and locations require different technical base solutions. Leonhardi et al. also state that to create a location-aware system that adapts to situation and context the location-service database would need to be configured to deal with several base technologies.[15]

2.3.2. Location information and privacy: Beresford et al. (2003) show us in their article how privacy is an important aspect of our society. The *1948 Universal Declaration of Human Rights* bill declares that everyone has a right to privacy at home, with family, and in correspondence (United Nations, 2007). Ackerman (2000) argues that as long as we deal with online activity we will always face privacy issues. The problem basically can be formulated as how we manage private information in relation to different stakeholders and their needs, for instance between

[13] Since people travel and relocate during a lifespan it is likely people want to post information even at remote places on earth.

[14] We believe this question illustrates the value of evaluating technology from social standpoints and in connection to user requirements and not only according to more obvious social and technological requirements.

[15] Leonhardi et al. (2002) also state they have developed a database that does just that.

people, companies, institutions and governments. Minch (2004) and Al-Muhtadi et al. (2006) state that truly few advances for the end-users benefits have been made in the research area of location-aware computing when it comes to privacy aspects. Several questions can be asked regarding privacy problems in pervasive and ubiquitous systems to illustrate how the HCI community has failed to create privacy efficient systems.

For instance, can someone not authorized access private data, are digital footprints "secured", can information be used to track and monitor someone? In general these requirements and others are not fully satisfied in system development today, especially when you consider the end-users needs. This brings us to consider what the social-technical gap is about. We want more privacy but we actually do not know how to technically solve it. As Ackerman (ibid.) states it, we will never be able to bridge the social-technical gap completely because we do not know how to develop systems that fully support our social world and our requirements. Ackerman argues proof that the social-technical gap cannot be fully closed lies in the fact that researchers and software developers already, for a long period of time (the past 20 years or so), have tried to diminish the gap with no apparent success. Researchers, software developers and others involved are consistently building better technical devices and software solutions that better fit with our social requirements, though according to Ackerman perhaps we must admit that we cannot close the gap to the fully.

However, since the social-technical gap is important and likely to remain within the field of HCI and interaction design we might instead consider how to develop with the social-technical gap in the back of our mind and marginalise its effects (ibid.). The HCI research community then needs to ask what one might do to progress the effects of the gap and further how to better understand the gap. There are probably many different ways to tackle this problem. We believe one of the most straightforward methods to marginalize the effect of the social-technical gap is to scale down complexity in development and in technical requirements. This also relates to our discussion of map-based navigation and interfaces in the precious chapter where we argue that the complexity of map-based interfaces and navigation negates its usefulness to the disadvantage of the end-user.

That et al. (2005) argue that besides availability and quality of a service, the user-acceptance and therefore the economic success of mobile business applications fundamentally depend on a robust and easy-to-use security architecture meeting the user's needs for privacy, anonymity and confidential communication. In other words there are economic incentives for using mobile systems that are built with user-requirements like privacy in mind. Ackerman (2004) further states that privacy-needs are a key factor for ubiquitous and pervasive systems to become successful.[16] However, Ackerman also argues that if you let the user be more anonymous and for instance use de-identifying techniques the usefulness and possibilities of ubiquitous and pervasive systems suffers. Beresford et al. (2003) argue the same in relation to location-aware systems though state that we do not necessarily need to stop all access to location information, considering that the end-user potentially could benefit from applications that use location information to provide services, though there is a need to be in *control* of location and context information.

Location systems usually track users automatically and on an ongoing basis (also stated by Banerjee, 2002) which generates an enormous amount of potentially sensitive information and therefore there is a strong need for controlling mechanisms in location-aware systems. Some

[16] Ackerman and colleagues have done extensive work and published a long series of work on privacy issues in ubiquitous and pervasive systems and can be seen as some of the foremost experts on the subject.

goals are clearly mutually exclusive and cannot be simultaneously satisfied perfectly. For example, wanting to keep our location secret and yet wanting other people to be able to locate us. That specific problem is however not a problem in relation to the concept we develop, as discussed in chapter 2.3, since there is no need for P3 systems functionality. Despite conflicting problems, for instance when you *must* disclose location information for services to function and yet want to achieve a high level of privacy, there are still many useful methods to achieve better privacy. Pattersson et al. (2003) argue that end-to-end user control of location-information (and user-data) is the best solution when possible to use. Then it would be much harder for a middleman or service provider to figure out the location of the user. In general end-to-end user control of location information sounds like a good idea though we will show in the following discussion that it is easier said than done.

Beresford et al. (2003, p. 46) tries to define what location privacy is and phrase it as "*the ability to prevent other parties from learning one's current or past location".* Mockbel et al. (2006) state that recent studies about user concerns in connection to location-based services indicate that location privacy is the most important issue. Though we have found few explicit user-studies (except loose references to them as in work done by Mocbels et al.) we have found some studies that contradict the notion that people do not want to disclose location information. For instance Jones et al. (2005) conducted a survey regarding location-aware services that studied whether people would like to give up their location so that other people could become aware of them (and possibly interact). The findings are perhaps not what we expected; regarding privacy for instance 17% even told they would give up their location data to strangers. Griswold et al. (2004) made an actual field test on privacy issues specifically regarding location-aware computing. The users of a CCWS system (prototype) had in this case the choice to turn off location detection. In short, the users (mainly students) were not interested or concerned with privacy issues and only about one percent in any category turned off the location detection features. One of this CCWS systems main features was however to locate and be aware of buddies or classmates/program colleagues (that is non-buddies). It was also tested over a shorter period of time and should perhaps not be seen as hard evidence.

Ackerman (2001) and Patterson et al. (2003) pinpoint more precisely why location information needs to be protected vigorously. With enough location information one can not only mine user location but also predict where users are going and their time of arrival in relation to movement. Most likely it is possible to predict other user-aspect related behaviours if enough data is available (e.g. insurance companies can perhaps mine information on who goes to the AIDS clinic as stated by Beresford et al., 2003). This can also be illustrated by how the postal-systems work today when predicting arrival and location of objects. Humans often in general have predictable behaviour and if you add monitoring of location information over time it is quite scary how precisely someone's life can be predicted. Location information is therefore for many reasons mandated to be private. In that context it can be seen as troublesome that Iera et al. (2005) and Milic et al. (2005) state that predictive features must exist in location-aware systems for them to function properly (i.e. be efficient when large amounts of users are located in the same area), this is something that will be discussed more in-depth later in this chapter.

> Minch (2004, p.1) state "*that location is determined either internally by a device or externally by systems and networks with which the device interacts, and the resultant location information may be stored, used, and disclosed under various conditions*".

This in general is the method we have adopted for evaluating privacy issues in relation to concept

development, first we look at user-requirements and then we evaluate them at an application framework-level (internal) and at a system base-level (external).

2.5.1. How to protect localised user-data. We have argued that location privacy is important and necessary and. Ackerman et al. (2004) list three areas where you probably can tweak privacy levels; legal frameworks, technical aspects and with the use of labelling techniques. Labelling techniques are in Ackerman's terminology, the same as informing the user before disclosing location information and letting him/her decide if/not/when to use the service in question.

Minch (2004) calls for strong legislation and regulations from governments regarding location and context information, much in the same way as other privacy issues (e.g. with surveillance issues). In that context it is interesting to note, as Schmandt et al. (2004) mention, that the US government has decided that all mobile devices should be able to determine their location within 50 to 300 meters by the end of 2005 , and that wireless carriers must make this information available to emergency call responders. Whether this is mandated by emergency service improvements or other reasons is quite vague. One might ask if it is even possible to apply such a broad law in a way that only emergency call responders (and perhaps in specific circumstances law-enforcement) can benefit from location information? With the complex nature of location-aware systems, as show in this paper, it is unlikely the location information can be controlled as stated necessary to achieve any form of location privacy.

The Swedish government and the responsible authority (i.e. "Datainspektionen") have taken a few steps to regulate location privacy even before EU regulation is in place (Datainspektionen, 2006). This regulation in question is meant to clarify the situation regarding location and context information between the employee and employer. What are employers allowed to do with location information and what right do the employees have? Location and context information can easily be used to monitor a worker using company technology, for instance a PDA, in his/her daily work and perhaps even lead to ungrounded dismissal (among other possible situation when location information can be misused). The regulation also clearly defines location information during work hours as private information (in accordance with the Swedish law PUL) and state that if an external part is involved they are subject to another slightly tougher law (the EkomL law). For instance, an Internet Service Provider which often provides Internet access to the employer then also must consider that location information is private information.

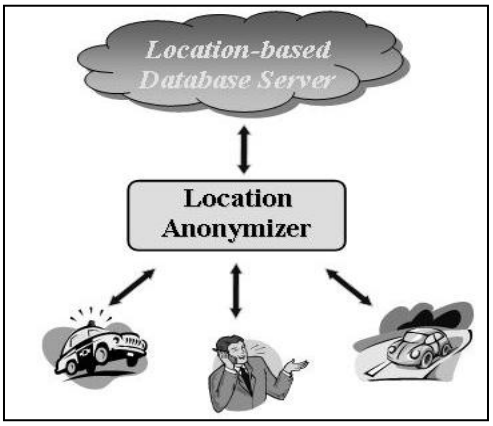
Technical mechanisms for protecting privacy can be roughly broken into four broad categories (Ackerman 2004). These categories include encryption and security mechanisms, anonymizing mechanisms, infrastructures, and labelling protocols. Ackerman (2001) argues that it will be very difficult to achieve a high level of privacy in context- and location-aware systems because of the complex nature of such technologies. It is interesting then that Iera et al. (2005) and Milic et al. (2005) state that for location-aware network protocols to be efficient the key factor is the ability to predict the users movement and to predict in what situation the user is in at the moment (Milic et al. mainly evaluate location-aware technology from a network protocol perspective).

The predictive functions in many location-aware systems (for instance mobile telecom systems) then cannot be removed from the system easily since the quality of service will degrade considerably and cause problems for providers (e.g. telecom providers or services aimed at end-users like from mobile providers and mobile navigation products). Mei-Hsuan et al. (2006) also argue that location information is necessary in wireless location-aware systems (in this case a 802.11 Wi-Fi network) were high bandwidth is required (e.g. in wireless TV). Their conclusion was that it was important for video-streaming servers to maintain up to date information of user-location in order to optimize network performance.

Al-Muhtadi et al. (2006) argue that the most pressing task in order to meet privacy-needs in location-aware systems is to separate user-identity from location. Wu (2006) also emphasizes how urgent it is to fix the privacy issues in connection to location-aware computing. Wu presents, from a practical perspective, a solution for separating user's identity and their location by using pseudonyms (i.e. using a fake identity) for user identification in combination with a non-transparent and separated storage of location-aware information. The technique presented is a type of end-to-end privacy solution and focuses on Ad-Hoc network nodes. Wu also states, as does Beresford et al. (2003), that in places with high density of nodes/users (for instance in urban areas) it is harder to identify individuals. Beresford et al. (2003) also believes that one of the most promising solutions is to de-identify information. Mokbel et al. (2006) however argues that the approach of pseudonymity may not be applicable to location-based applications where a location of a person can directly lead to his/her true identity. If a user wants to keep her location information private, she has to turn off the location-aware device and perhaps even unsubscribe from the service in question. Mockbel et al. (2006) presents an alternative solution to the problem where additional measures except the separation of identity and location are in place:

> *"The main idea is to employ a trusted third party, the Location Anonymizer, that expands the user location into a spatial region such that: (1) The exact user location can lie anywhere in the spatial region, and (2) There are k other users within the expanded spatial region so that each user is k-anonymous. The location-based database server is equipped with additional functionalities that support spatio-temporal queries based on the spatial region received from the location anonymizer rather than the exact point location received from the user."* Mockbel et al. (2006, p. 93, *also see figure 24*)

Several studies also show that it is possible to mine location information without an actual location-aware function to provide positioning service. Griswold et al. (2004) for instance show it is not necessary to use geo-location techniques to create context- or location-aware systems. The *ActiveCapus Explorer* concept was tested on 802.11b Ad-Hoc networks where location was calculated by triangulation and with node timing (e.g. how many milliseconds does it take for message A to reach node B). This tells us that there are several methods for determine location and also that it is quite easy to determine location and distance to any wireless networked device (also see chapter 2.3.1). It applies even if a user gives explicit instructions in the application framework that location-awareness is not permitted (a function present in Griswolds et al. application).



Figur 24, the location anonymizer; curtsey of (Mockbel et al. 2003)

Pramudiono et al. (2002) explores and writes specifically about the many possibilities with data mining from mobile devices that connect to the Internet and even state that it is possible to determine location when users surf web-sites from mobile phones. Their findings indicate that you can mine substantial information, including location, from mobile users just accessing web sites. In other words the use of mobile Internet in itself facilitates tracking of user movement and user location.

This is something that most users are not fully aware of when using these technologies

(labelling techniques as discussed previously are seldom, if at all, implemented in for instance mobile phones). Pramudiono et al. also state that mobile devices with location-aware technologies, for instance GPS, are easy to mine data from without the users consent.

2.4. How to use digital remains in everyday situations

We defined mobile interaction criteria in relation to digital remains using Löwgren's (2006) methodology where use-qualities are sought (we also used this method in our previous study, see Appendix 5). The reason for exploring mobile interaction is that the Blogging by the Dead (BbtD) concept is not only about the preservation and use of digital remains but also about the living experiencing affective information in the environment (e.g. family and friends of the deceased). We define use-experience of digital remains in this context as something similar to experiencing music or enjoying nice scenery. Arguably the *Sony Walkman* (2007) is the best example of a successful mobile experience to date and therefore can be used to measure how well the user is immersed in technology while on the move. One might ask if it is possible to achieve the same level of immersion as the Walkman experience if you substitute great music with digital remains (unless great music is defined as digital remains[17]).

We then essentially asked how we could make the use-experience (Löwgren, 2006) better in connection to the concept and what use-qualities we should seek in order for the user to get a good experience from digital remains. What we concluded was that mobile interaction with geo-spatial data was not to any greater extent adapted for social computing in the environment. That is if you want to create something more than a "way finder service". In chapter 2.4.4., we present a practical example which shows how most of the interaction chain between creating, geotagging, uploading and visualising information in the environment (for instance with map based interfaces) exists while mobile interaction techniques for *experiencing* affective geo-spatial data still is, to a great degree, undeveloped. The task of creating strong coupling between mind and body in mobile interaction in order to create better use-experience is not easily overcome (Biocca, 1997). Many physical and social phenomena unfold in real time and real space as a part of the world which we are situated, right alongside and around us. This also goes for mobile interaction with geo-spatial data. Our focus on, to the user, instantly accessible and usable technology in use with BbtD limits us mainly to the use of mobiles and PDAs for interaction and makes it even harder to create a better use-experience of digital remains.

In general the advance in interface research, which can be seen as an augmentation and extension of our senses and our body, moves towards creating stronger coupling and immersion towards the body and the mind (Biocca, 1997, Mann, 2001). Biocca (1997) uses the metaphors of entering a bath, pool or setting the mind free and floating in a communication system to describe the future of body coupled interfaces that are extremely good in creating immersion. This scenario would of course be optimal for experiencing digital remains though *very* unlikely to achieve with today's mobile phones and PDAs. However, we can see a few key use-qualities clearly emerging from the evaluation of use experience in relation to digital remains. What we seek is as first and foremost to create as good *immersion* as possible.

Though we find Löwgrens (2006) methodology for defining use-qualities interesting, we argue that the suggested quality *pliability* might be overworked and not needed (at least not in our case). In research areas such as game design terms for use-experiences and use-qualities have already been established which take user experiences into account (see for instance Yea 2002 and

[17] The copyright rules in connection to digital remains are unclear to us in such a case.

Bartle 2003). There is no real need for secondary terminology which would just be confusing. Another benefit from borrowing terms from game design is that they have been developed with consideration of creating a greater coupling between the player and the game (i.e. immerse the player in the game) which is in general the same as creating a deeper connection between the interface and the user. Löwgren himself argue that the term immersion is closely related to pliability though he factors in a few other qualities in the term pliability. We then prefer more use-qualities than just one term defining too many aspects of interaction design at once (which we feel will be harder to evaluate).

2.4.1. User-groups and use-qualities related to digital remains. Before we present the use-qualities we seek and put them in their right context we need to define what types of interaction scenarios we see in connection to BbtD. In general we see two broad types of use-scenarios in relation to mobile interaction experience of BbtD.[18] The first use-scenario is with the close family, friends and relatives and the second use-scenario is with what we define as the tourist group. The tourist group relates to the fact that during our first study on BbtD we came to the conclusion that people with no prior knowledge or connection to a deceased person might be interested in experiencing his/her digital remains in the environment (i.e. digital remains connected to location). These two scenarios are slightly different when it comes to mobile navigation and experience. The tourist group might have an interest at any given time to turn on the concept (which is an On/Off service) to check out if there are any interesting digital remains to experience in the close environment. Below we have provided two interaction scenarios to illustrate the situation, *see figure 12 and 13*:

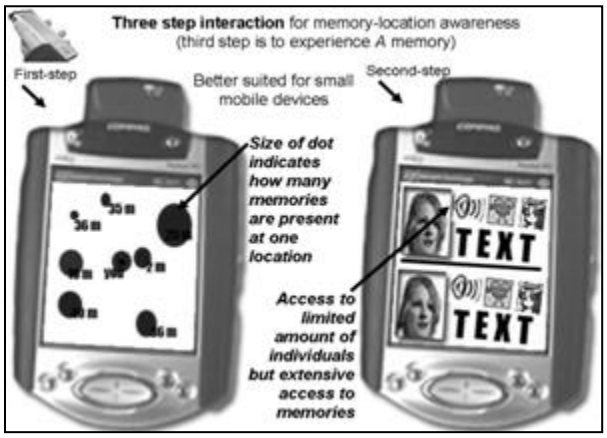


Figure 12, interaction scenario 1

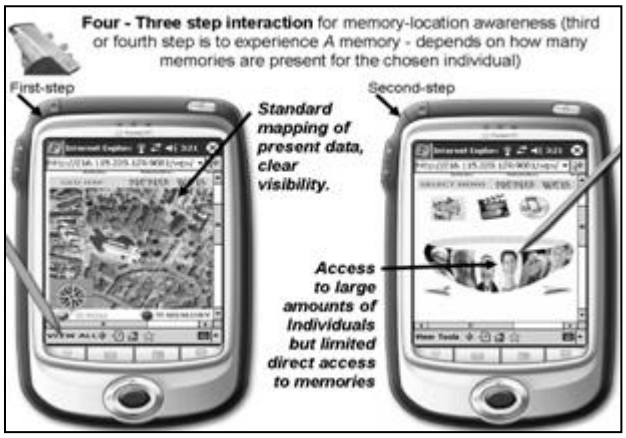


Figure 13, interaction scenario 2

Now, imaging sitting on the bus bored, and with need for something to do, then you activate Blogging by the Dead while going through a neighbourhood you have never before visited. In that scenario the interaction can be best defined as exploring, hence the use-quality *explorative*. What we are looking for in this scenario is something similar to the *Geocaching* experience (Geocaching, 2007) were you explore the world in search of treasures with the help of GPS and intriguing stories and through that, to some extent, create an immersive feeling. In the situation where a person's digital remains have been selected there might be a need for navigation from

[18] In this specific case we did not evaluate how the person leaving digital remains for instance uses geotagging features or uploads and manages digital content.

current position to location of selected digital remains (navigation aspects are discussed further later in this chapter and also in the next chapter).

The second scenario deals with close relatives and friends which have slightly different requirements. We do not see this group as in need of a less explorative interface since they too might want to explore for instance a foreign city and digital remains in that context. Though we see other additional requirements during for instance bereavement (see chapter 2.1.4 for specifics regarding grief, mourning and bereavement) and when elderly want to experience digital remains of family and friends. During bereavement it might be the case that a user wants to travel to only one person's memories or to experience digital remains from their home. We have dealt with this through considering artefacts augmented with digital remains or by giving the closest relatives a hard copy of one person's entire digital collection (also would function as an extra backup). We do not exclude the possibility that someone unfamiliar with a specific person would want to travel their life from location to location, however it is less likely. In general there are several situations when experiencing digital remains at a location that are impossible (e.g. because the user does not have enough money to travel, is injured or perhaps cannot get time off from work). However, in the scenario, when travelling a person's life or going to a specific location, you need more traditional "way finder" interaction techniques.

As explain in chapter 2.3.2. and 2.3.3. our goal is to cut down on service complexity and therefore we will skip for instance advanced "path planning" functions. Ekman et al. (2002) also argue that people often do not need much information to find his/her way in the environment (e.g. an arrow pointing in the right direction might be sufficient) and that if too much navigational aid is given it is often misinterpreted. Below we have provided an interaction scenario to illustrate the situation and where we show that the directions are minimal but are enough to guide the user to another location (we believe it could be made even simpler if needed), *see figure 14 to 17*:

Figure 14, step 1

Figure 15, step 2

Figure 16, step 3

Figure 17, step 4

The terms we have identified so far for use as qualities then are *immersion* (instead of the suggested term pliability) and to achieve a high level of immersion the experience of Blogging by the Dead (BbtD) should be *explorative* (the concept should then for instance include features that surprise the user). We also want the concept to be *entertaining* (though we argue that people leaving digital remains take care of that issue and the explorative aspects would help out) so that the living would want to experience digital remains. Another important quality is *respectful* and this relates to the fact than one user-group who potentially could benefit from BbtD is people during bereavement. In the same sense we argue that BbtD should be *helpful* to those people during bereavement and therefore we define helpful as a use-quality. However, we see no conflict

between for instance humour digital remains (think in terms of stand up comedy by the dead) and creation of a respectful service. One good example would be not to include advertisements in digital remains because it would not be respectful (unless someone specifically request advertisements in their remains).

2.4.2. Mobile interaction. Augmented reality was considered the most suitable interaction technique for use with geo-spatial information and in connection to Blogging by the Dead (BbtD), especially the part where you experience digital remains. Though we still consider augmented reality to be a somewhat futuristic solution because wearable-computing is far from main-stream to users and not accessible in the nearest future. It is not entirely clear how the aesthetics of wearing augmented reality glasses is to be deal with either. Will it be similar to the feeling people get from wearing sunglasses or will they hate it? Rheman (2004) has experimented with combining location-aware computing and augmented reality and he describes his work as ubiquitous methods for bringing computing to the real world and augmented reality methods for bringing visualisation to the real world. It is interesting to note that Rheman side steps a tradition in augmented reality and wearable computing which is to specifically not put too much power of the individual into the hands of third parties. Rheman (2004) chooses to move all sensing and computing capabilities in the augmented reality interface to the ubiquitous application framework. So in fact he is not combining the two technologies but transforming augmented reality into a ubiquitous technology

To illustrate how augmented reality really could beef up immersion we created a few test interfaces with digital remains. We feel that the experience of digital remains (opposed to just visualisation of where digital remains are) is much better with augmented reality and creates a deeper immersion. Below is our explorative interface scenario (note how we have replaced advanced path planning with sound navigation, and imagine the three last slides going in slow motion, though not frame by frame), *see figure 18 to 23*:

Figure 18, step 1

Figure 19, step 2

Figure 20, step 3

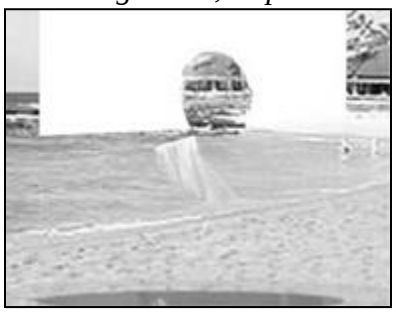


Figure 21, step 4(1)

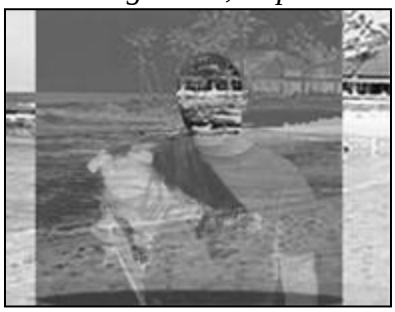


Figure 22, step 4(2)

Figure 23, step 4(3)

At the same time we saw great potential in virtual interaction with geo-spatial data though that technology has yet to become mobile in any greater sense. Virtual and semi-virtual technologies (such as Google Earth) also seem to lack mobile interaction techniques, with the exception of fast emerging techniques such as geo-tagging (e.g. with mobile phones or PDAs) and features were you can upload digital content to virtual applications or virtual worlds. In a sense we are looking for something similar to geo-spatial browsers where you could experience and interact with social data in the environment and on the move. However, we see other possible uses for virtual technology in connection with BbtD which we discuss later in chapter 2.4.4.

A few other very interesting emerging technologies are worth mentioning even if they fall beyond the limitations of this paper. Projection of geo-spatial data, which is roughly the same concept as used in movie theatres though performed in the environment, has qualities that might create immersion that small screens never could achieve (if the technology for instance could fit the format and energy requirements of a mobile phone). Holographic displays (Lucente, 1997) might also give additional methods for achieving a better use-experience. Several sensor technologies could also be usable in relation to BbtD but then again it is too futuristic to evaluate in this version. However, Krause et al. (2005) argue that sensor technology is not far from usable in large scale production for devices such as mobile phones and perhaps the question today is more about what uses sensors will have.

Patterson et al. (2003) lists a few hardware related problems with location-aware computing and mobile interaction. Below is a short list of identified hardware limitations:

- Mobile elements are resource-poor relative to static elements because of limitations on power, size and weight.
- Mobile elements must rely on limited energy sources.
- Mobile communications are inherently vulnerable to security violations because data are transmitted through open air-spaces.
- Wireless connectivity is highly variable in performance and reliability.

During the background study on mobile interaction with location-aware systems we gradually came to the conclusion that relatively few alternatives to map-based navigation and map-based interfaces exist. The overall research trusts regarding navigation in the environment seem to originate from metaphors of maps traditionally used in navigation. This actually seems quite reasonable since the map obviously is tested and very functional for tasks such as presenting geo-spatial information and also for navigational tasks. However, the apparent lack of options does not seem as reasonable since it is not that obvious that the metaphors of the map transforms equally well in all ubiquitous and digital systems, more specifically we felt map based interaction was not optimal for use with BbtD.

The question we ask is why so few options to map-based navigation and map-based interfaces exist? We have also found several problems related to map-based navigation and interfaces. Some of those problems relate to the fact that the use and development of such techniques are in its early days, time will most likely mend out most of those problems (e.g. the availability of easy to use development tools).[19] Still, we see problems that do not fit that category and we can also see a connection to the privacy discussion presented in chapter 2.3.1 and 2.3.2.

Peterson et al. (2003) argue that map-based interfaces are less that optimal for mobility purposes

[19] We have found several promising open source development tools for creating map-based navigation interfaces.

and for use in small and medium sized devices. The most apparent reason is that the map interface can easily be cluttered on small screens and has problems with large amounts of information (e.g. social information that is usually not present in regular maps). Peterson et al. also argue that map-based interfaces are poor at adapting to a changeable environment and work best with static information. BbtD deals with social data and any interface should have the quality to adapt to a changing environment.

Another factor that makes the use of map-based interfaces and navigation problematic is the cost of developing and using them. Krevl et al. (2006) argue that most software for use in location-aware systems is propriety software that cannot be reused or customized to any greater degree. Secondly, the cost increases since most location-aware services and most of the previously mentioned propriety software relies on existing geo-spatial databases that often are kept locally on mobile devices (every consumer has to pay for the same information). The upcoming EU directive INSPIRE (2007) will control the right to geospatial data produced in the EU member states. INSPIRE is ratified and will very soon be implemented in all of the individual member states and is therefore, in our theoretical role as service developers of BbtD, essential to understand.

INSPIRE amends strict intellectual property rights to geospatial data collected from all EU members, regulating who gets to use what and at what cost. This is controversial when you consider that EU tax money has paid for the collection of most geospatial data produced in the EU. Tax money has also paid for European space research, both through the EU space agency and in the individual member states (e.g. when launching satellites in orbit). In a sense European tax payers will pay for geospatial information many times before it reaches them in useful applications and services (or as job opportunities). What we in our theoretical role as developers of a civil service then face is not only a problem with customization and the cost of reusing geospatial data, as stated by Krevl et al. (2006), but also problems with the rights for using geospatial data and the extra cost for managing geospatial data.

Schmandt et al. (2004) even argue that map-based interfaces in use with location-aware systems is less than optimal if there is a need to present complicated movement patterns or predict where people are going. We question the need for such complex functions in BbtD, especially since complexity reasonably has an effect on privacy issues (less complexity leads to fewer possibilities/opportunities to misuse BbtD). For instance if the system says "Go in that direction – I will beep when you are close." might go a long way to facilitate for navigation. The human behind the screen/device has sufficient tools for navigation in the environment inherited as a human quality. The level of detail needed of course varies but in most cases, such as when strolling around an urban area, there is no need for precision guided missile-navigation interaction techniques. In our case, as interaction designers, we then argue that a too complex map-based navigation could lead to more problems than benefits for the end-user.

2.4.4 Virtual interfaces and geo-tagging: Virtual geographic visualisation has today become main-stream and service integration, with various products, which allows geo-tagging functionality (i.e. integrating geographic coordinates with digital media) literally has exploded in the last year. There are many geographic visualisation tools today and we have chosen Google Earth (2007) for discussion because it has adopted some of the features previously seen in Massive Multiplayer Online Games (MMOG) which match how the Blogging by the Dead concept deals with user-contributed content.

Google Earth (GE) is perhaps more semi-virtual than virtual and is still mainly a geographic visualisations tool, though it evolves very quickly. For instance users-contribute content can

today be uploaded and shared in GE in limited ways (a function introduced quite recently). GE has subsequently been updated with geo-tagging functions and geo-tagging-service integration. Service integration between GE and with the photo viewer Picasa (2007) is for instance present and service integration also exists with many third parties such as Flickr (2007) and RoboGEO (2007). [20] Today many mobile phones come with integrated GPS devices (as stated before, new models in USA are required to have GPS-functionality) and most of those phones can be modified to work for geo-tagging purposes. In other words there is no need for built in geo-tagging functions when third party software (plug-ins perhaps) can do the job. It is important to note that the propriety software model used in most mobile phone most likely hinders the speed of which user-created functions develop (and often the mobile service providers have custom interfaces when selling the phone that are even harder to customize).

Most of the interaction chain between creating, geo-tagging, uploading, visualising and to limited degree experiencing geo-tagged content in the environment is then realised. This is in general nothing new or remarkable from a technological standpoint and has been expected for a long time within the research community of ubiquitous computing. However, it shows that there is a real interest from people in connecting personal digital media to location (in contrast to the fact that it is possible to build the technology). The mere fact that millions of photos have been geo-tagged on Flickr (2007) tells us about the kind of success geo-tagging has experienced.[21] At current date Flickr contains almost 17 million geo-tagged images.

Another aspect of GE that attracts our attention is the management tools which are offered in some of GE's products. A recent attempt to mix open geospatial technologies and standards with GE propriety technology with the purpose of creating better disaster management has proven successful (Pezanowski et al., 2007). Pezanowski et al. argue that virtual geographic visualisation tools such as GE have the potential to assimilate heterogeneous data from distributed sources rapidly enough to support time-critical activities such as crisis response. Reasonably then the same type of solution should be possible to build with other virtual geographic visualisation tools, for instance with the open source tool NASA World Wind (2007).

Without going into technical details on how Pezanowskis et al. (2007) solution works we can argue that virtual geographic visualisation tools are one of the best available options today for managing geographical data. Löwgren (2006) also shows an interesting comparison between regular web-based interfaces and virtual interfaces were the later can be seen as easier to handle.

[20] A search in Yahoo will produce abundant of plug-ins and third party tools for Google Earth.
[21] This link provides an interesting visualisation of geo-tagged data from Flickr (in Google Earth): http://www.gearthblog.com/blog/archives/2006/09/flickr_geotagged_pho.html

3. User-studies

In this chapter we first present the data collected from the online survey, and then the result of the interviews carried out for this study. Further analysis of this data can be found in chapter 4. The interviews differed somewhat from the survey since we presented the concept in full (in the form the concept had before we started this study) to the interviewees and then asked them our questions in relation to the concept. So in many ways the interviewees were talking about what they felt about the concept, and not only about issues regarding end of life traditions and modern technology as the respondents did in the case of the online survey.

3.1. Online survey

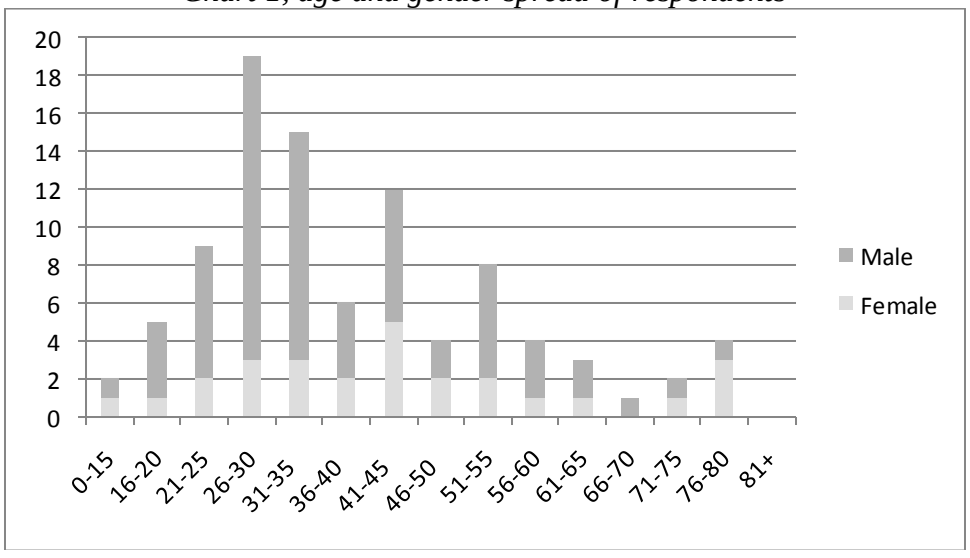
The survey was completed by a total of 95 persons and the average completion time was 4 minutes. Even though we published the survey at many different categories of Internet sites (*see Appendix 3*) with different target groups, whereas several were specifically forums for women, almost 70% of the respondents were male.

However, we do not feel that *the main point* with this survey, or the study as a hole, is to evaluate if men or women are more or less interested in modern technology and end of life traditions. End of life culture affects all people and we are more interested in if people are interested at all in modern ICT services and end of life traditions and in discovering the best way digital remains should be handled.

It is however positive that we managed to attract a reasonably large number of respondents from target groups with senior citizens and also managed to get respondents from all age groups except people over 80. In general we did not find any large forums with elder citizens so we had to publish the survey at several smaller ones, this coupled with the fact that few persons respond to survey requests meant it was plenty of work to attract just those respondents.

The following pages will show the survey with minor analysis and to a great degree in the order the respondents answered the questions (*see Appendix 1* for exact order). *Chart 9* shows the age spread of the respondents taking the survey. It is not surprising that we attracted more persons in the lower age groups when you consider the demographics of Internet as it is today.

Chart 1, age and gender spread of respondents

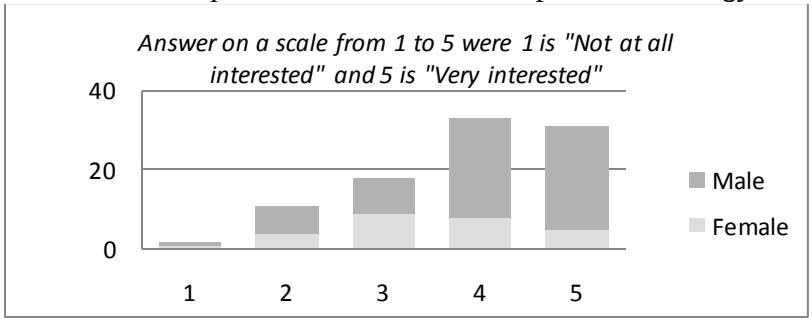


As seen in the *chart 10* we got a decent spread regarding the respondent's occupations, we feel that our efforts to attract respondents from a broad spectrum paid off.

Chart 2, occupational spread of respondents

We were interested in attracting persons both interested in technology and those who are not. This would allow us to some degree evaluate if digital remains are of interest to even less technology savvy people, *see chart 11*. We will discuss this further in chapter 4.2. In some cases we published the survey on sites with content/themes that were as far away as possible from computer technology (e.g. gardening sites, *see Appendix 3 for site list*).

Chart 3, respondent's interest in computer technology



The first theme in the survey deals with consideration to and preparation for death, in chapter 4.2. we will evaluate age differences and relate this theme (*see chart 12-13*) closer with digital remains.

Chart 4, Have the respondents given any consideration to their own death?

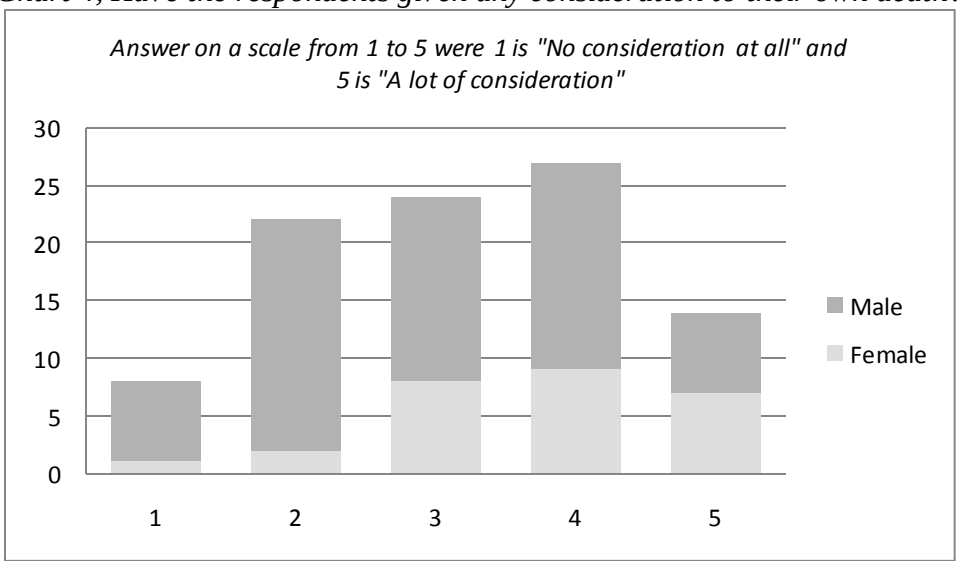
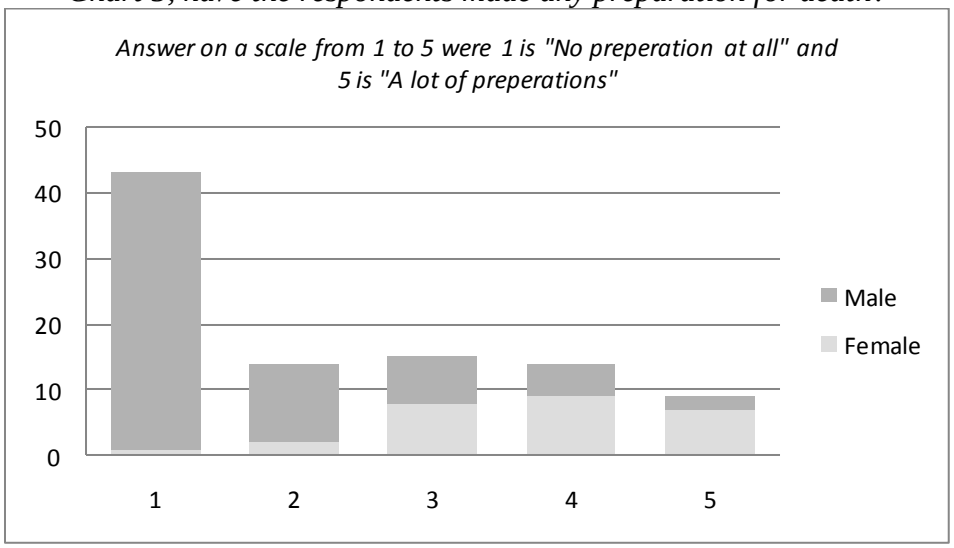


Chart 5, have the respondents made any preparation for death?



We were interested in finding out how aware the respondents were of digital remains and if they had come in contact with digital remains, the next three charts illustrate this. *Chart 14* also relates to *chart 12* and *13* as we will show with further analysis in chapter 4.2. In general, *chart 14, 15* and *16* show the lack of awareness of digital remains. They also confirm our notion that people are quite unaware of the existence and possibilities with digital remains.

Chart 6, have the respondents given any consideration to what people will do with their personal digital information after their death?

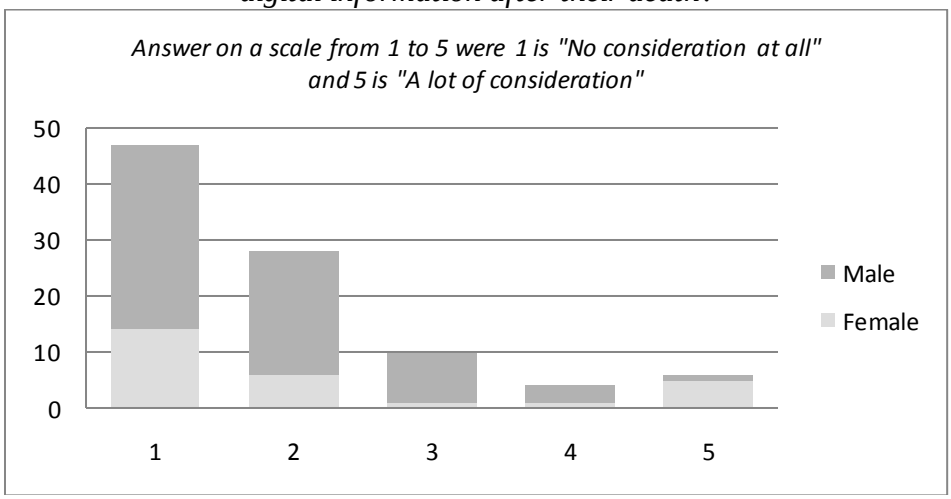


Chart 7, have the respondents ever been subjected to a situation where they had to deal with digital remains from someone that died?

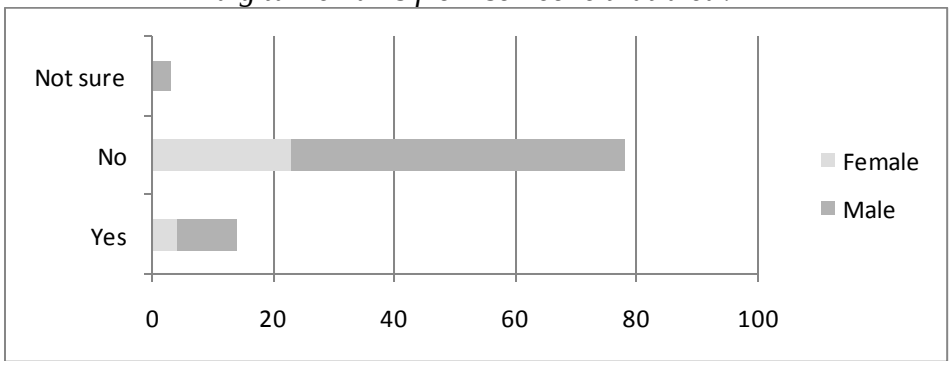
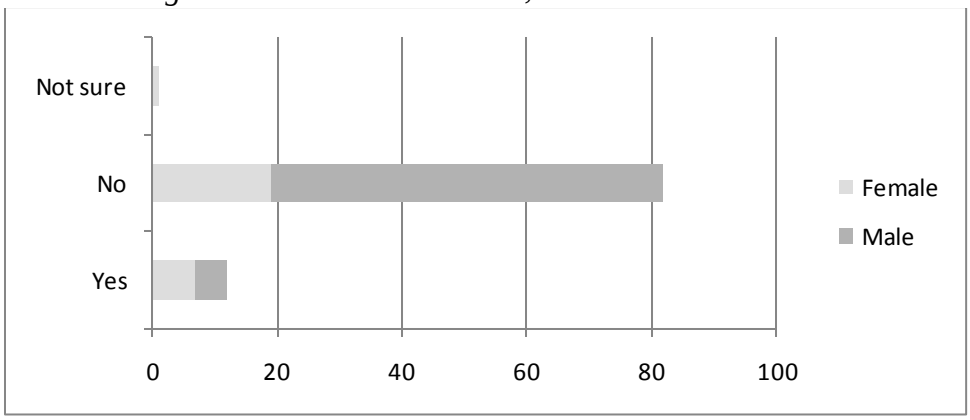


Chart 8, have the respondents ever used or considered using any service that deals with end of life traditions and digital remains? For instance; Online Memorials or Online Obituaries.



The following theme presents charts that deal with digital rights (*see charts 17 and 18*) and at this point we intended for the respondents to be aware of the fact that they will leave an abundance of digital remains when they die, on the whole we felt this was successful as shown in further analysis in the end of chapter 4.2.1.

Chart 9, are the respondents afraid that the perception of them as a person will change into something negative after their death? For instance; if someone found digital information regarding their life that changed the way they were perceived.

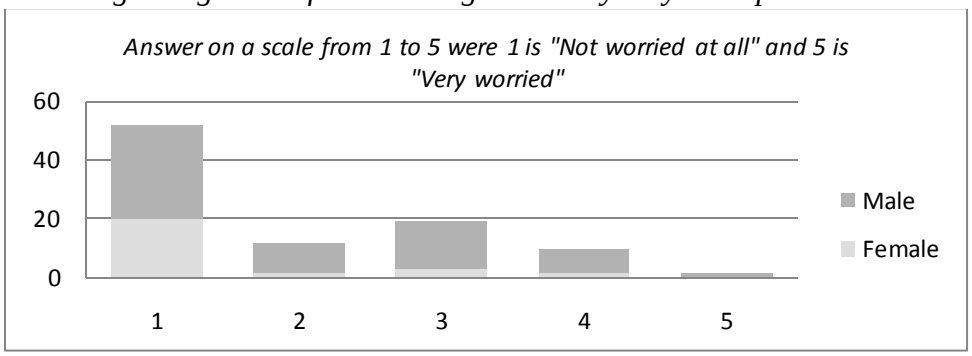
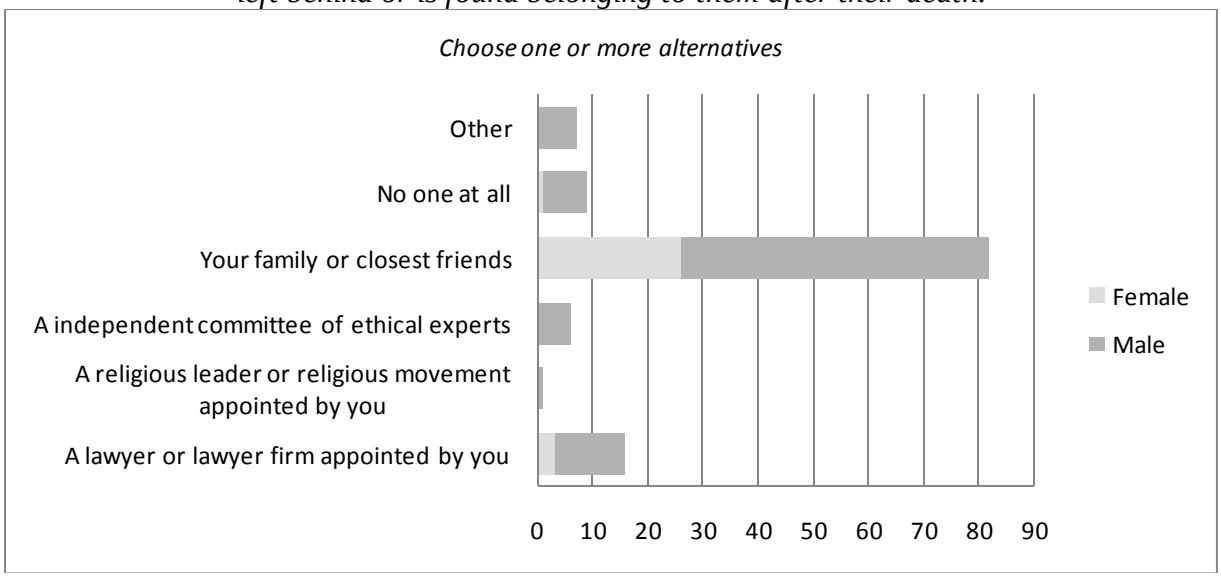


Chart 18 might seem forced upon the respondents if you consider the alternative answers presented to the respondents, this is however not the intention. The possible choices in answers relates to the previous study we did on end of life traditions and modern technology. These choices were given by those respondents when asked freely to express who they would like to access and manage their digital remains (see chapter Appendix 5 for prior results). All answers we got fell into categories that match the choices presented in *chart 18*. We were fairly certain that the respondents would choose one of these alternatives though we gave them the option to express their dislike in the "*Other*" choice.

Chart 10, who would the respondents allow to access and manage digital media that they have left behind or is found belonging to them after their death.



The following two charts probe a core issue with digital remains, if the respondents want to leave behind digital remains and experience digital remains (i.e. digital remains singled out during life). These two will be analysed in depth in chapter 4.2, though we can already affirm and validate our previous findings that state that people are in general positive towards experiencing and leaving digital remains singled out during life (*see chart 19 and 20*).

Chart 11, would it be interesting for the respondents to leave behind digital media that they have singled out as important to be experienced by future generations after their death? For instance; personal photos, text, video, voice recordings or 3D animations.

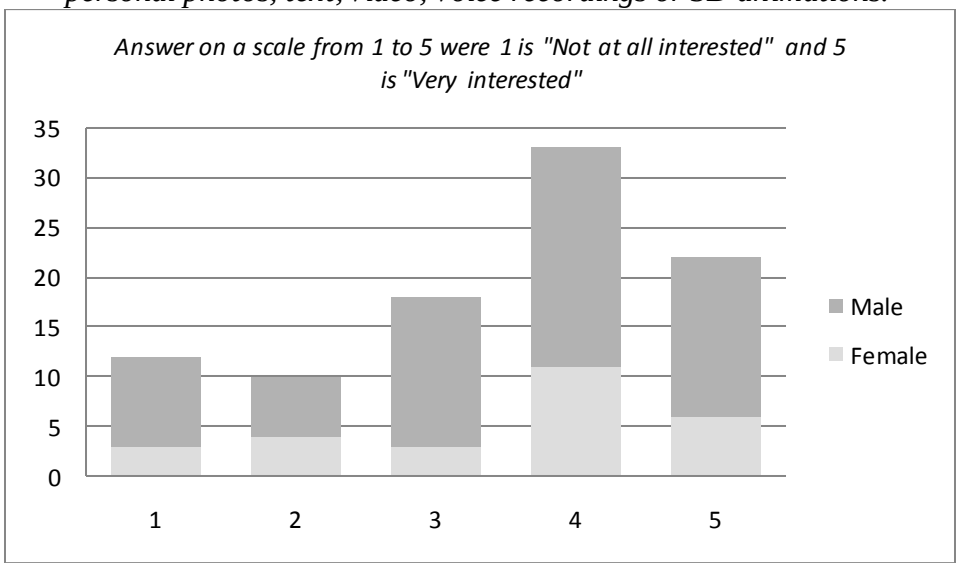
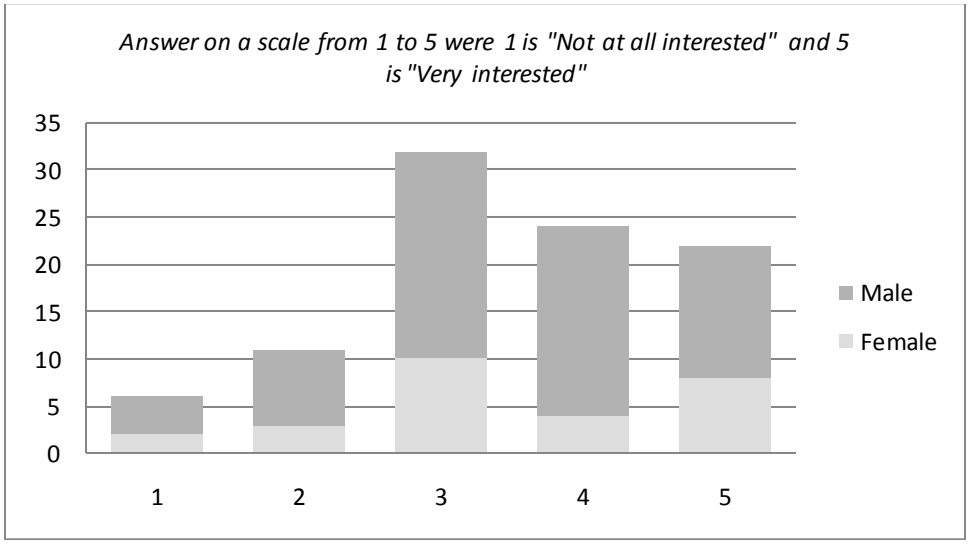


Chart 12, would it be interesting for the respondents to experience digital remains singled out and left behind by people now dead? For instance; personal photos, text, video, voice recordings or 3D animations.



The following theme show what the respondents feel about being remembered after death and also how they value digital remains (*see chart 21 and 22*).

Chart 13, do the respondents agree that it is important to be remembered after death?

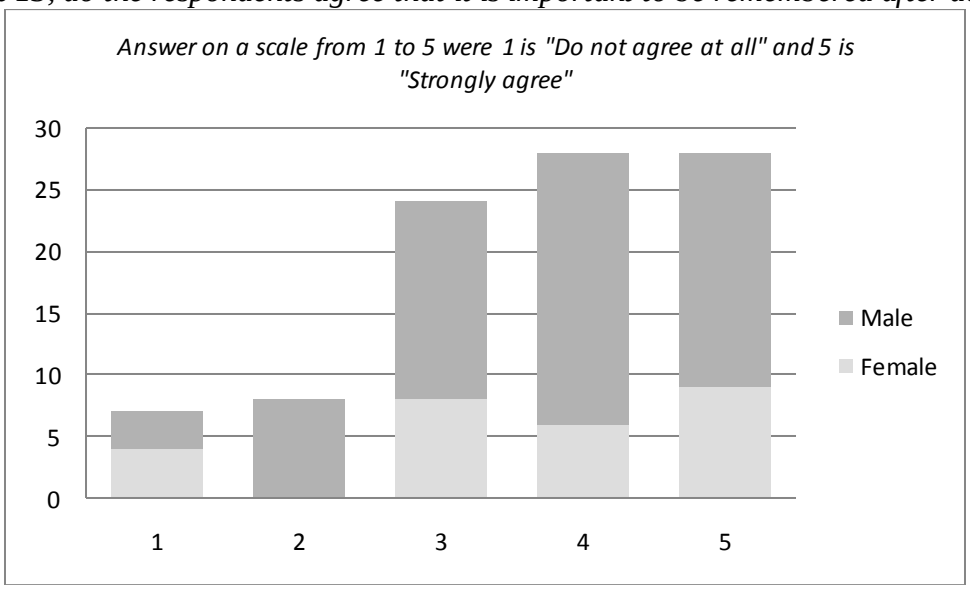


Chart 14, do the respondents agree that there is a historical value in preserving some aspects of their digital remains for future generations to experience?

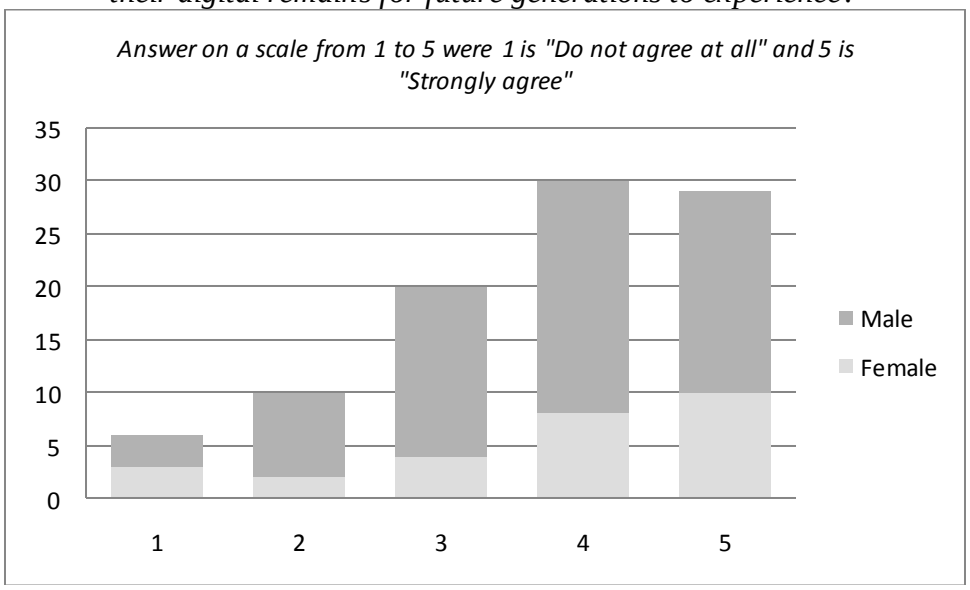
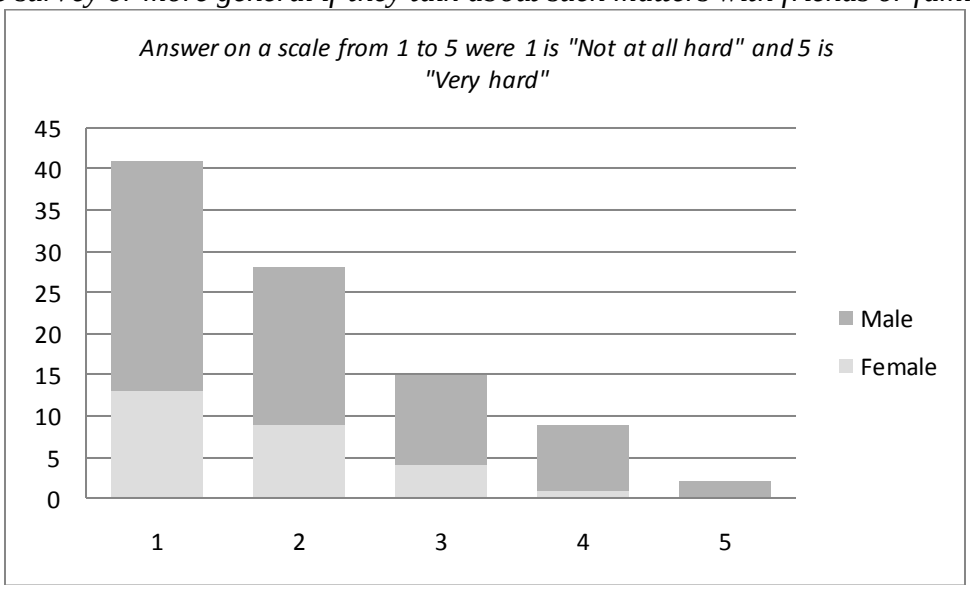


Chart 23 shows what the respondents felt about reflecting on their own death, we thought this would be interesting to ask since the interviews in our prior study indicated it was quite sensitive to talk about. However, we did not expect to see the same results as from interviews.

Chart 15, is it hard for the respondents to reflect over their own death? For instance; as done in the survey or more general if they talk about such matters with friends or family.



The last part of the survey presented the respondents with the option to freely give feedback on the survey or other matters related. In total 24 of 95 took this chance to express themselves and that in itself shows a clear interest in the problem area we investigate. The statements given show this even more clearly and we will discuss them further in chapter 4.2. Finally, the respondents were given a mail-address where they could send even more feedback if they felt inclined to do so or leave their own e-mail if they would like the resulting paper sent to them.

3.2. Semi-structured interviews

The interview guide and the survey, as stated earlier, were divided into themes (*see Appendix 2*) with graphics and mock ups to illustrate ideas and concepts. The findings from the interviews will be discussed in relation to those themes (*see chapter 1.3 for specifics regarding methodology*).

In total, four males and two females, in the age range of 25 to 65 years old, with various professions were interviewed individually. Half of the interviewees had moderate or a great interest in technology and the other half had little or no interest at all in high-tech gadgets and technology.

The first theme deals with consideration and preparation for death, and also issues related to awareness of digital remains. In general all interviewees, except for the youngest one, had contemplated on their own death and the reasons why they did so varied. Three of our interviewees thought about their own death on a daily basis, or at least from time to time. Sub questions asked revealed the reasons why they did so. It showed that one of them previously had worked in a hospital, and this is what she said:

> "*Yes, on daily basis. Of course I see too much shit that happens around me all the time. Probably due to that I previously worked at the hospital, working with dying people. And I read the death notices often."* (student. 38, female)

One other person who also said that she had frequent thoughts about death did so because her father recently died from cancer. A third interviewee mentioned that he thought about it from time to time, especially during moments when he saw and realized his parents were getting older, and as his children grew up. Reflections on our own death might thus be trigged when we get reminded about it in our daily life. This is at least what we could read out from our interviews. The other two interviewees on the other hand announced that they rarely, or almost never, considered their own death.

Almost homogenous answers were delivered on the question of if they had had made any preparations for their own death, except from the youngest one again, that had not made any preparation at all. He said;

> "*I would not say so, no. It would feel a bit depressing to start thinking about that now when I'm young*". (industrial worker. 25, male)

All other interviewees gave us similar feedback that emphasised practical preparation of various issues which they felt must be handled and dealt with before death. Issues' involving insurance papers, wills and so on. One interviewee stated;

> "*Regardless if you want it or not some preparation must be done. I mean, it is almost forced on you by external companies, such as insurance companies*". (janitor. 65, male)

> "*Yes, since I have two children and husband I think it's important to do some preparation. In my father's case it went so fast - you never know.*" (medical engineer. 38, female)

In other words, we can conclude that readiness for death increases with age, something we expected to see. The last question on this theme, which probed whether the interviewees had considered what to do with their digital remains, revealed that no one had considered it at all. Neither had they considered what they could do with digital remains or what other people will do with their digital remains after they were gone. The majority said that they had a lot of digital media stored on the private PC, but that they never given it any further consideration. They were actually surprised when we formulated the question to them. For instance these two answers were given;

> "*Interesting question never thought about it. I have private data in my PC, though I haven't given it any thought. At work they own the data.*" (medical engineer. 38, female)

> "*No. I do have plenty of digital information, but I really haven't thought about it!*" (production manager. 31, male)

> "*No, haven really not given it any thought - actually!*" (janitor. 65, male)

When asked how they would like to remember people they cared about we got answers that were of no surprise to us. They stated that they wanted to remember good things about their nearest and dearest. What they did not want to experience was of course the opposite, such as bad things, sickness and so forth. However, in our previous study several interviewees said they did not mind bad memories (to some degree) since they were a part of life and this might thus be more of a personal preference than a common theme.

The second theme deals with more concept specific questions, though it naturally also relates to

end of life traditions in a broader meaning. The interviewees were very positive towards experiencing digital remains from deceased persons, and even so from unknown persons. All six interviewees also thought it would be interesting to experience location tagged remains. However, one interviewee said that this should be optional, and the reason was that in some cases they maybe wanted to experience the memory from home or elsewhere. Below are a few remarks:

> "*Yes, my father was in Mexico once with his work, if he had taken pictures there then, we could travel there and see what places he visited and so on. Both of my children had never met him, if this* (concept) *was possible then, they could get to know him.*" (medical engineer. 38, female)

> "*Yes, I think it's better to see things in its context. It would add more to the experience. Sometimes when things are pulled out of its context they don't mean as much, or they could mean something entirely different. It's like sentences pulled out of their context.*" (production manager. 31, male)

> "*That would be nice, to visit old friends that had passed away, and be at the same place as they were.*" (janitor. 65, male)

> "*I´m not so sure in the case of unknown people. But if I could get in and out of the memories with little effort I guess that curiosity would get the best of me.*" (film producer. 41, male)

> "*It depends, when someone dies you also want a balance between what has been and what is now. Maybe you want to live your life here and now and don't want to be reminded all the time. I'm overall positive towards the idea - though perhaps with some modification."* (production manager. 31, male)

Five of the interviewees stated that it would be interesting to leave digital remains behind and also to have them location tagged for the after world to experience. These are a few remarks:

> *"Yes, I would like that. But if it could be accessible to my relatives and friends only."* (film producer. 41, male)

> *"Yes, that would be interesting. My children could visit me."* (medical engineer. 38, female)

> *"Yes, that sounds kind of fun. Especially if was possible to save pictures and things for the future, for your kids, grandchildren and so on. As I said, from a historical perspective it could be fun for my grandkids to see how their grandpa lived, how I grew up and such."* (industrial worker. 25, male)

> *"Sure, it would. I could show people where I lived and such."* (production manager. 31, male)

On the question on how the interviewees in such case wanted to be remembered they emphasised that they most likely would like to leave happy memories, though they didn't exclude other types of digital remains. One interviewee said:

"*My experiences, so people can learn from them. I have lived a very good life, and then there came a war when I was 16; literally over one night everything changed. I lived in an occupied city, hunted like big game during hunting season. I lived under occupation for three years and survived genocide, and then I came here and started all over. I was 19 and had experienced more than some people experience in a lifetime. I had learned a lot about people, and some things don't bite on me today. I've come to some insights and I'm not really politically correct about some things to say the least. So if I was to leave anything, it would be personal experiences.*" (production manager. 31, male)

Those two interviewees that announced they had poor or no interest at all in technical gadgets were still positive towards the concept. What we noticed was curiosity for the concept, regardless the levels of technical interest or age, even though the concepts still has a more or less technological feel to it (*see table 5 for an overview of answers given on this theme*). A reflection on these results brings us to the conclusion that it is probably the social interaction in the concept that is of any interests to the interviewees and not the technical aspect of it.

Table 5, Attitude towards the concept

	leave selected digital remains	experience digital remains	leave geo-tagged digital remains	experience geo-tagged digital remains
concept positive	6	6	5	5
concept negative	0	0	0	0
uncertain or interested in limited way	0	0	1	1

When we felt the interviewees were up to speed on this subject of digital remains we moved on to ask how they would value their pending digital remains and if they saw any historical value in such information (this also in a way relate to digital rights presented in the next theme). When asked if they thought it was important to be remembered after death we got close to identical answers as in our previous Blogging by the Dead study. The interviewees answered that it perhaps was important to their family and close friends but not to other people. The reason why they felt it was not important was exactly the same reason given in our previous study, no one would be interested in their remains unless they were famous or successful (which is contradicted by the fact that they themselves truly want to experience other person's remains).

"Sure, for my next of kin. But looking 100 years into the future… If I have done something great, sure! But other than that you have to realize that people have died before." (janitor. 65, male)

"Maybe, if you made something important in your life worth being remembered for. I mean, for other people that your own family it is not that important to be remembered." (production manager. 31, male)

What is more confusing is that the interviewees consider their digital remains to be valuable from a historical point of view. On the question if they agree that there is a historical value in

preserving some aspects of their digital remains for future generations to experience all but one interview agreed. One interviewee considers it important only if he did something great in his life. These are a few remarks given:

> *"Absolutely, until now the history has been written by those governing us. This would probably be a good addition to the official documentation of history."* (film producer. 41, male)

> *"Of course, it could be important* (somewhat hesitant answer). *Coming generation can see how we lived, and so on..."* (janitor. 65, male)

> *"Yes, for relatives and close family. Perhaps not from a larger historical point of view. I find it hard to imagine some random dude on the net browsing my life and looking at old pictures. Though, the remains could almost function as some kind of automatic genealogy service."* (industrial worker. 25, male)

The next theme in the interview guide deals specifically with the subject of digital rights. When we asked the interviewees what they would do if they had to deal with their best friend's digital remains they all said that they would make safety copies and store the media somehow. Some interviewees stated that they did not want to be responsible for another person's digital remains even if it was a close friend, they would however in such case make a copy and deliver them to the deceased person's family. Two interviewees said they would go through the content for valuable information and two stated they consider it wrong to access his/her friend's data without permission. One interviewee said this;

> "*I do not know, maybe I would try to save the digital remains in a safe way. But I would not like to be responsible for it. There should be a place where one can hand in things like that, so that the digital remains were taken care of.*" (janitor. 65, male)

Similar on the question on who was allowed to access their own digital remains four interviewees stated that the closes family (preferably their mate) should sort through the data. One interviewee was reluctant to have any go through it but preferred his closest family if necessary. One interviewee stated he did not want anyone to go through his information at al:

> *"Nobody! Cremate my computer when I die - haha. No it depends on what information they go through. Most things aren't anything dangerous for anyone to know about but you still have some personal things, from different phases of your life that you don't want anyone to see."* (production manager. 31, male)

Sub question asked: Would you worry that the perception of you as a person would change?

> *"Yes, if certain things were pulled out of their context. What I did when I was 17 isn't for anyone to see."* (production manager. 31, male)

In connection to the end of the interview were the interviewees could speak freely one interviewee said:

> *"Generally, as I said before I haven't considered what will happen to my media after I'm gone. But as long as nothing happened to it would be OK. What I want to say is, if someone changed (in a negative way) my media and put it public "out there" it wouldn't be fun. Basically, in the middle of the whole we have great security issues that must be considered, at least if we care about our legacy. Who is responsible for the media when we die, who can we trust to preserve it??"* (janitor. 65, male)

Nearest family members were in all cases the most trusted ones to take care of and be responsible for digital remains left behind. No religious leaders, ethical experts, lawyers or other formal body were mentioned as interesting in the role as primary caretakers of their digital remains. In the later part of the interviews we asked the interviewees who they trusted to monitor and review their digital remains for censuring purposes and such (in connection to the proposed concept). All mentioned their nearest friends or family to be the reviewer, but all of them also stated that they did not like the idea at having their digital remains reviewed and/or changed at all. Different reasons were discovered in relations to the question. Following is what one interviewee said:

> *"No one! It's a difficult issue to answer; because how can anyone make sure that the controller makes the right decisions? Who decides the frame of what is ethical or not*." (student. 38, female)

This answer made us think of difficulties regarding legal issues. For instance, what is officially allowed in one country or culture is probably banned somewhere else, and vice versa. One interesting answer gave us the idea to label the media with some kind of warnings signs, depending on what content digital remains were composed of, maybe similar to when we rent a movie or a game. The interviewee said resolutely:

> "*There could be a warning sign of some kind but no censorship!*" (film producer. 41, male)

This solution on the other hand would mean that content must be reviewed by someone that decides what the right level for a warning is and what type of warning labels to use. As we stated earlier we must have in mind that ethics, laws and cultures in different countries around the world differ quite a bit and will affectively make such a solution hard to use. The same problem exists with explicit content on the Internet and in our daily lives and we argue that it is unreasonable for us to solve such a major issue. Since none of the interviewees wanted their digital remains altered or censured in any way we could detect tendencies that the interviewees possibly could consider having a lawyer (or comparable person) guarantee that their digital remains, just like paper wills and other important document are handled and guaranteed today. This is what one interviewee said:

> *"I would like them to be protected in some way, yes."* (film producer. 41, male)

One interviewee argued that selected digital media from her PC should be of equal importance for her to safe keep as her important paper based documentation. She said;

> "*Yes, I think digital stuff shall be as valid as stuff written on real paper, it should be equally worthy.*" (medical engineer. 38, female)

Further she said;

> "*This made me think of when you rent a safe deposit box at the bank to put important papers, and other things. Could a similar box exist, for some very important and/or precious digital memories? Not the memories that we make public, those could be on ordinary servers, accessible for anyone.*" (medical engineer. 38, female)

In connection to the end of the interview were the interviewees could speak freely one interviewee touch the subject of sudden death. This subject we also noticed in our previous study on end of life traditions, it seems to trouble a few interviewees (especially when young people die):

> *"Maybe you should think about it, what's left behind when you die is left behind. You always die suddenly. In 99.9% of the cases you don't know when you get up in the morning – it could be the day I die. But when you're having fun your having fun, you don't think about storing it. It might occur to you after a while, but then it's already happened. Sure, you can reconstruct my life after death, but then it's not my view of my life."* (production manager. 31, male)

4. Analysis and Interaction Design

In chapter 4.1 we will analyse findings from the online study, presented in chapter 2.2. We will then weigh all aspects of this study against each other in chapter 4.2 and discuss findings in relation to the research question. That includes a deeper analysis of the survey and of interviews. We will thus weigh prior results, the background study and collected data. We will do this in our role as interaction designers with a user-centred approach. Finally, in chapter 4.3, we will present an updated concept in full, with updates mandated by our analysis.

4.1. Analysis of online study, on present usage of digital remains

The memorial web site TillMinneAv.se was started as a reaction to the death of a close friend of the creator, memory-of.com is a part of the Library of Life network which also hosts a Red Cross community, and uses some of its revenues to fund charities for the Red Cross and Red Crescent (Memory-of, 2007). Both these services are fee-based, but different service providers use different pricing schemes to fund their operations. In general this seems to be a theme, were someone in grief creates a service to honour a close relative or friend and then continue maintaining it as a commercial service. One of the oldest still active services, The Virtual Memorial Garden, is free of charge and also free of any banners or any kind of advertising. Some memorials charge a onetime fee for their services based on the kind of content the user wants to display, while others offer their full functionality for a recurring fee. If the user in that case stops payments or does not renew the subscription at some point, the service is terminated. With that said, one of the bigger online memorial sites seems to have a somewhat inflated number of users. Memory-of.com claim to host over 47 000 memorials, but it is very difficult to judge how many of these are active at this point. Since Memory-of has a subscription fee for their services, their memorials go "offline" as soon as payments cease but remain searchable – only not viewable – on the web page.

It is also interesting to take note of what some services claim to offer to their customers. One of the most indecent claims is that of the "To Live For Ever" memorial site, which for a substantial onetime fee offers to publish a memorial in their pages so it can be viewed for all eternity, and the memory of the deceased will live on forever. For a large sum the user can buy the company's most luxurious service, granting their memorial a place amongst the memorials of famous historical persons such as "Einstein, Napoleon, Newton and others that left a deep shining mark in World History" (ToLive4Ever, 2007). The most expensive memorials will also be displayed first when searching for memorials, and memorials are clearly labelled with their respective category, for example "Bronze" or "Diamond" memorial. While this hierarchal thinking is not only possibly offending, it also goes against traditions rooted in newspaper obituaries as described by Dahlgren (2003), where obituaries are intentionally made so they do not compete for attention. Claiming that some memorials are more worth than others does not seem like a good business strategy for this reason.

In general, experiencing digital remains on online services connected to the problem area is relatively rare. Finding digital remains scattered in databases can be quite hard, maybe even a luxury that comes with some kind of celebrity status. Often the content provided on memorial and obituary services are not what we would call actual digital remains, but will in most cases consist of pictures of the deceased added by the family. While this is a good representation of the deceased and a good way to give a living description, the experience of viewing actual digital

remains is lost. Looking at more conceptual projects, as compared in *table 4*, we can see that digital remains are a more central part and are viewed in some instances as the core of the concept. Memorials and obituaries are often profit driven, so they need to attract many users to produce revenue. With this in mind, it might be easier from a company's point of view to keep it simple for users that want to create an online celebration of a deceased, and it is arguably easier to upload a few pictures through a standard template than including customized digital remains from various different sources.

One thing that many services dealing with end of life tradition and ICT technology have in common is that they are with very few exceptions targeted as a way for the deceased family, relatives or friends to gather and pay their respects to and remember the deceased (see chapter 2.2 – 2.2.5 for background information). This means that any information or story posted about the person in question is likely someone else's memories or views of events in the life of the deceased. One possible exception we have found is the site MyLastEmail.com, where the user signs up for an account to create a personal memorial consisting of smaller text based messages, letters, a life story, will, financial information, photographs and videos. All information will be published after the user's death, to anyone specified by the user beforehand (MyLastEmail 2006). However, either this service is completely internal and only accessible to those chosen by the user, or the site does not have any real user base, because we have so far been unable to see any example of any of MyLastEmail's services. We have thus only included it here to show the possibility of services that focus on the deceased instead of the family or friends of deceased as the primary memory contributor.

4.1.1. Comparison of services and products within the problem area. The multitude of services available online each focus on different parts of traditions around death and dying. We have therefore compiled a comparison of the different services so their respective likenesses and differences can be seen. As is evident from this comparison, the use of geographic tagging is very rare today. By geographic tagging for services such as memorials or obituaries, we mean linking specific parts, digital content, or even the memorial or obituary itself to a geographic location using some kind of interface for displaying such information; this in contrast to stories containing information about where the person grew up, worked, lived or died. Almost no services contain functions for sending death notices, in the case of The Eternal portal the death notice is a graphical template that can be filled with text and then e-mailed or printed and mailed to friends and relatives. The newer, more experimental or conceptual services take more usage of affective artifacts and digital remains.

We figured that grieving blogs would be an integral part of many memorial services, but few memorials have this feature. As we have shown previously, externalizing one's emotions can be an important tool to cope with grief and mourning. A way of doing this could naturally be through a blog connected to the memorial of the deceased.

We can also note that some online services are of a crossover nature, in that they offer both obituaries and memorials for example. It is very hard to sort out exactly what kind of service, so we have categorized according to what the main service is of the web site: memorials can offer obituary searching and obituaries can have basic memorial functions. In the case of arrangeonline.com for example, the memorial section is a collection of obituaries connected to the coordinated terrorist attacks on September 11, 2001 and the Oklahoma bombings. Since this comparison is quite large we have split the spreadsheet in two, see the next two pages with *table 3 and 4* for the comparison of services and products within the problem area.

Table 3, overview of ICT services and artefacts (part 1 of 2)

Name \ Features 1	Online Obituary	Online Memorial	Online CMS	Genealogy	Geographic Tagging	Affective Artefacts
1. Online Obituaries						
Legacy.com	X	X	-	-	-	-
CurrentObituary	X	-	-	-	-	-
ObituaryRegistry	X	-	-	X	-	-
Obitsarchive	X	-	-	-	?	-
NationalObituaryArchive	X	-	-	-	-	-
2. Memorials						
TillMinneAv	-	X	X	-	-	-
Last-Memories	-	X	X	-	-	-
Virtual-Memorials	-	X	X	-	-	-
Memory-Of	-	X	X	X	-	-
TheEternalPortal	X	X	X	-	-	-
VirtualMemorialGarden	-	X	-	-	-	-
2.1 Pet memorials						
Critters	-	X	X	-	-	-
Youns	-	X	X	-	-	-
PetsRemembrance	-	X	X	-	-	-
ImmortalPets	-	X	X	-	-	-
3. Misc. Services						
VirtualGrave	-	X	X	-	-	-
Life Capsule	-	-	-	-	-	X
Life Gem	-	X	-	-	-	X
MyDeathSpace	-	X	-	-	X	-
4. Misc. Concepts						
Digital Remains	-	-	-	-	-	X
Cemetery 2.0	X	X	-	X	X	X
Mastaba	-	-	-	X	-	-
Mission Eternity	-	-	-	-	-	-

Table 4, overview of ICT services and artefacts (part 2 of 2)

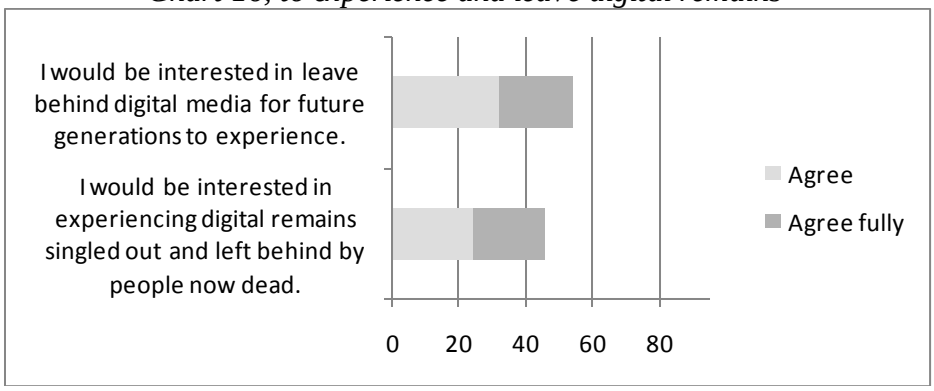
Name \ Features 2	Digital Remains	Death Notice	Obituary Search	Grieving Blogs	Grieving Forums	Virtual Content	Constructions / Buildings
1. Online Obituaries							
Legacy.com	-	X	X	-	-	-	-
CurrentObituary	-	-	X	-	-	-	-
ObituaryRegistry	-	X	X	-	-	-	-
Obitsarchive	-	-	X	-	-	-	-
NationalObituaryArchive	-	-	X	-	-	-	-
2. Memorials							
TillMinneAv	-	-	-	X	-	-	-
Last-Memories	-	X	-	-	X	-	-
Virtual-Memorials	-	-	-	-	X	-	-
Memory-Of	-	-	-	-	X	-	-
TheEternalPortal	X	-	-	-	X	-	-
VirtualMemorialGarden	-	-	-	-	-	-	-
2.1 Specialized memorials							
ta	-	-	-	-	X	-	-
Youns	-	-	-	-	-	-	-
PetsRemembrance	-	-	-	-	-	-	-
ImmortalPets	-	-	-	-	X	-	-
3. Misc. Services							
VirtualGrave	-	-	-	-	-	X	-
Life Capsule	X	-	-	-	-	-	-
Life Gem	-	-	-	-	-	-	-
MyDeathSpace	X	-	-	-	-	-	-
4. Misc. Concepts							-
Digital Remains	X	-	-	-	-	-	-
Cemetery 2.0	X	-	-	-	-	-	X
Mastaba	X	-	-	-	-	-	X
Mission Eternity	X	-	-	-	-	-	X

4.2. Analysis of user-data and interaction design issues

In this chapter we present the main body of analysis which includes triangulation between interviews, the online questionnaire, prior results and background study. This analysis mainly relates to interaction towards end of life traditions augmented with modern ICT technology and to user-centred design in connection to Blogging by the Dead. The main theme in this analysis revolves around digital remains since that material is such a recurring and central aspect of this study.

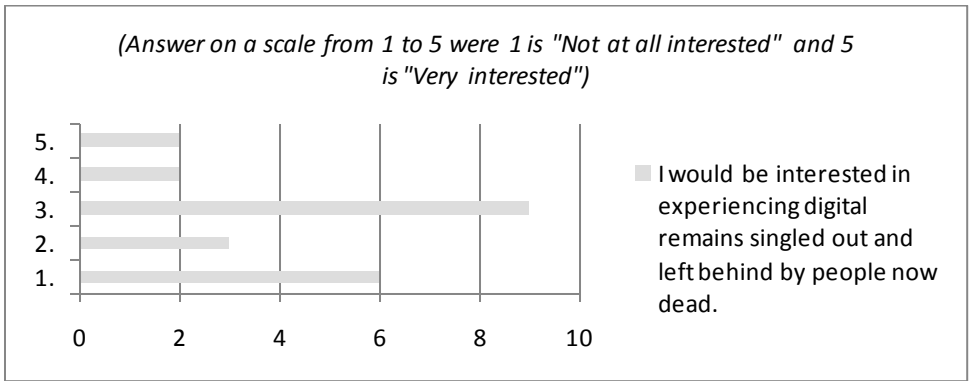
4.2.1. Digital remains. Throughout our studies we found many examples of how digital remains could be, or already are, used to remember the dead. People memorialize their dead loved ones online by writing about them, showing their pictures and sharing memories about them. In general, the attitude towards taking active measures to leaving behind digital remains for the world seems somewhat positive. A little less than two thirds (55 of 95) of the respondents to the web survey would be interested to some degree or very interested in leaving behind digital media of their choosing such as photos, video, texts etc to be experienced by future generations and half of the respondents (46 of 95) would like to experience digital remains singled out and left behind by people now dead (*see chart 24*).

Chart 16, to experience and leave digital remains



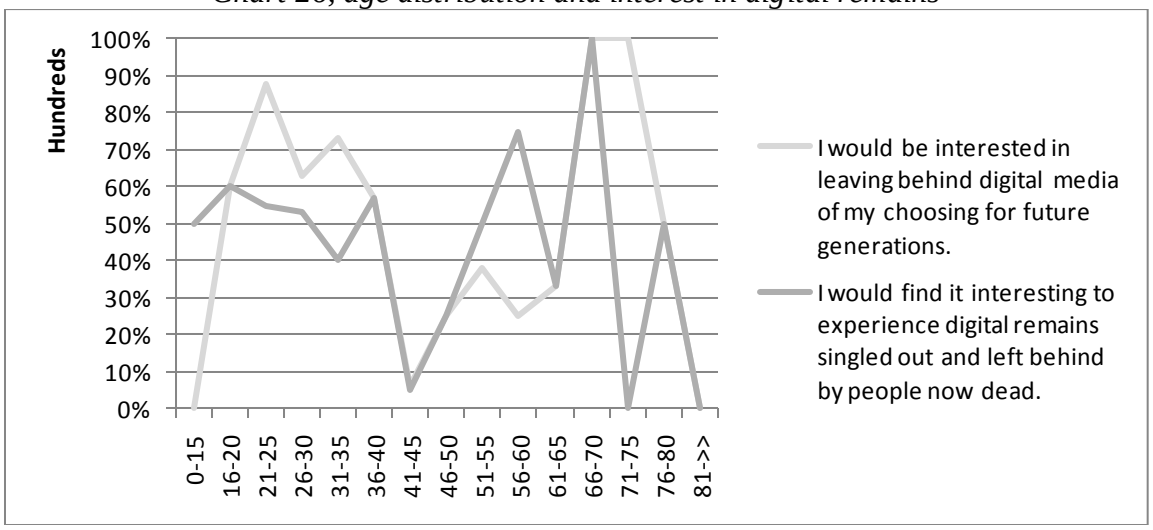
22 respondents answered that they were uninterested in leaving behind digital media for future generations. This group also does not seem as interested in viewing digital remains left by others as the general respondent, as can be *seen in Chart 25*. Only 4 out of the 22 answered that they would be interested or very interested. However, the most common answer is the middle alternative, which can be interpreted as a small level of interest from the respondent.

Chart 25, are respondents not interested in leaving digital remains interested in viewing digital remains?



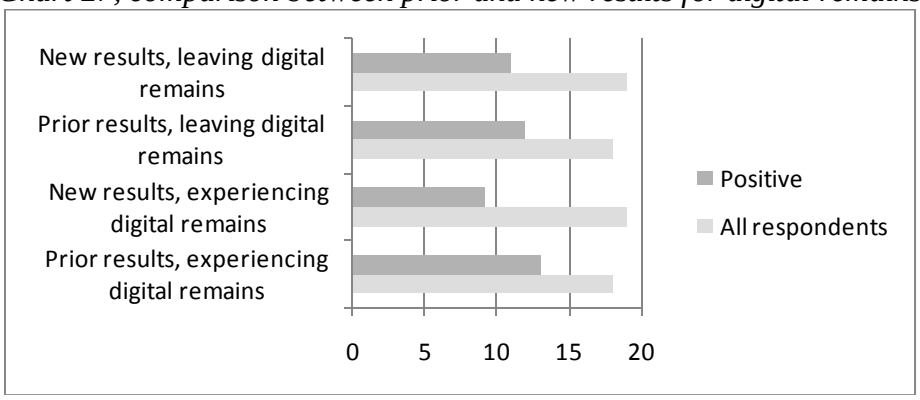
The age distribution among our respondents that were clearly interested in leaving and viewing digital remains seems to more or less follow the age distribution of the survey as a whole. We could not see any clear trends that certain age groups would be interested in these questions to any greater or lesser degree, *see chart 26*.

Chart 26, age distribution and interest in digital remains



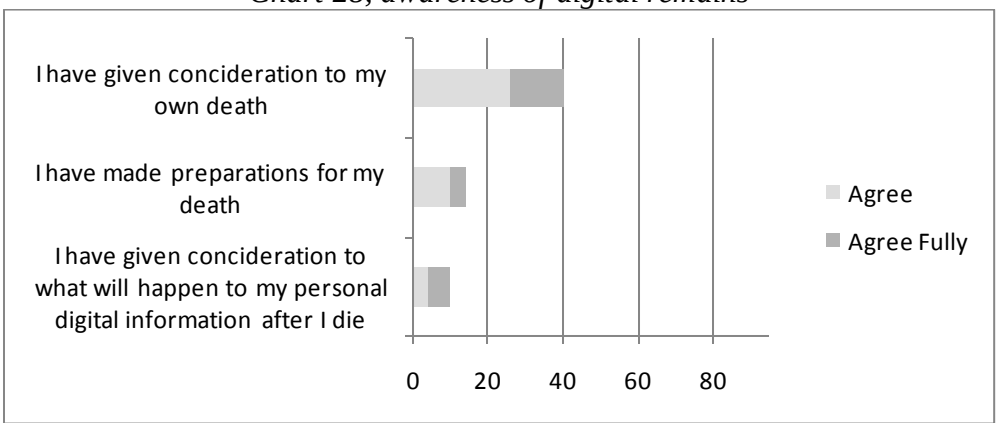
Comparing our results for these questions asked in our online survey to our results from the old BbtD interviews, we see similarities. Referring to chart 1 and chart 2, we can see from our prior findings that 13 out of our 18 interviewees were positive towards experiencing digital remains and 12 out of 18 were positive towards leaving digital remains for future generations. For easier comparison we have divided our new survey results by five, to bring them down to a comparable level (making them a total of 19). The comparison, as *seen in chart 27*, shows clear similarities between our old and new results. It looks like our new results points towards users being slightly less interested compared to our previous results, but we have only used the top two answer alternatives to get the strongest data; the two alternatives closest to "Very interested". The middle alternative still holds answers from respondents who might be interested, but it is hard to interpret and present in a chart. As a whole, we can still point towards very strong evidence that users would be interested both in viewing and sharing digital remains.

Chart 27, comparison between prior and new results for digital remains



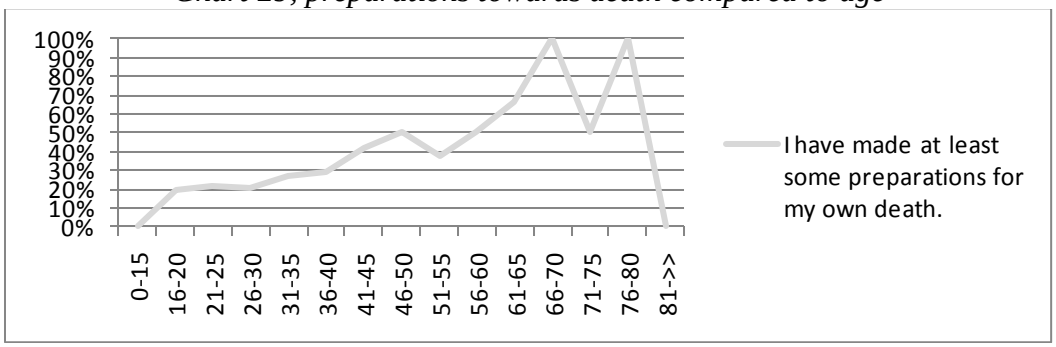
The theme so far seems to be that a vast majority of digital remains is, in the cases something is done with it, handled by the next of kin. Four out of nine of all respondents in our survey have given any real consideration to their own death; yet only about one out of nine have made preparations in general and even fewer have considered what will be done with their personal digital information after they die (*see chart 28*).

Chart 28, awareness of digital remains



A conflict in being positive towards being remembered through digital media on one hand but not considering how or which types of personal digital remains should be used on the other hand is thus noted. Preparing for death also seems to come with age.

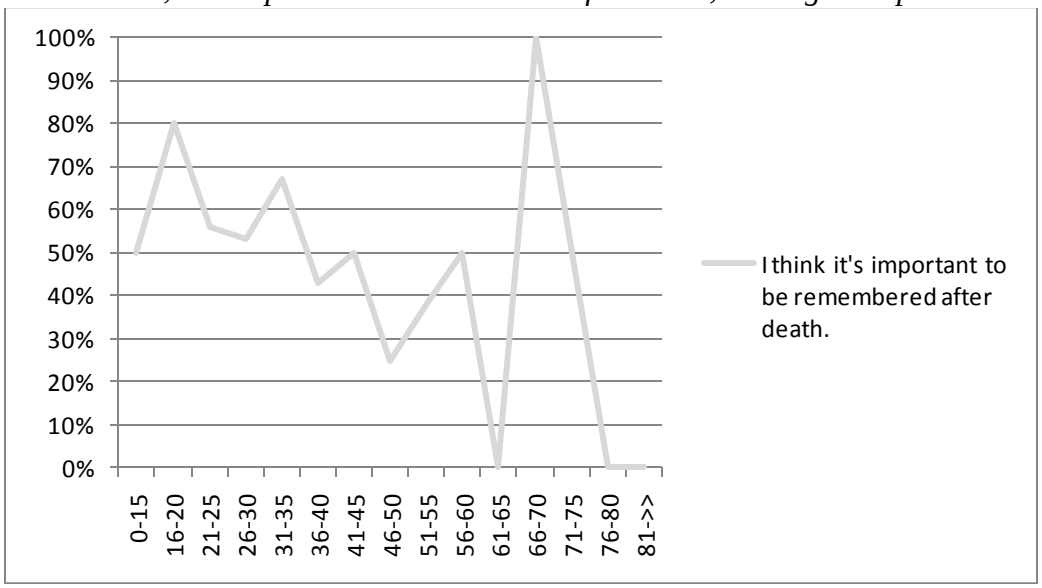
Chart 29, preparations towards death compared to age



As can be *seen in Chart 29*, relatively few of our younger respondents have made some kind of preparation towards their own death, and as could be expected a relatively large amount of respondents in the higher age groups have. Since a majority of all of the respondents answered that they have not made any preparations at all, we have included the top three alternatives for this analysis to be able to see any kind of trend. A majority of the interviewees from our interviews said they have made some kind of preparations for their death, and focused their answers on practical preparations such as legal issues. Both the results from the survey and from the interviews are similar when it comes to the low amount of consideration given to the possible usage of one's digital remains. Comparing these results to our prior results, we can almost see a comparable trend. Referring to *chart 4*, five out of 18 (or 2.5 out of 9 compared to 2.9 out of 9 in our new study), said they had prepared for death. It seems that in general, people focus on living their life and do not start preparing for death until they get older.

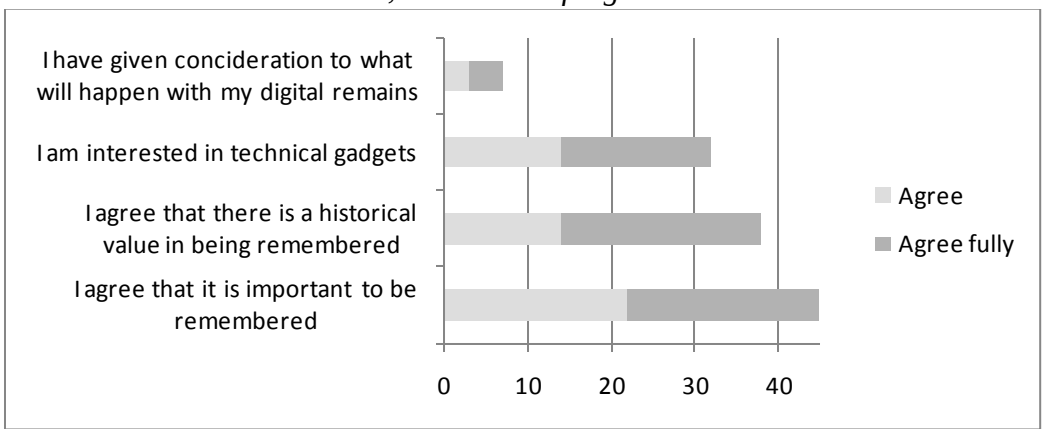
On this topic, it is also important to notice that many of our respondents considered being remembered after their death important; half of the respondents, 47 out of the 95, answered that they agree that it is important to be remembered after their death. It is hard to see any age factor in this question; the answers seem to be spread out evenly over all age groups (*see chart 30*). We do not have a concrete question about this in our old results, so it is hard to see if there is a connection. Referring to chapter Appendix 5 we can see that in general there is a positive attitude to the concept of being remembered through digital remains. This is also strengthened in our interviews presented in chapter 3.2.

Chart 30, is it important to remembered after death, with age comparison



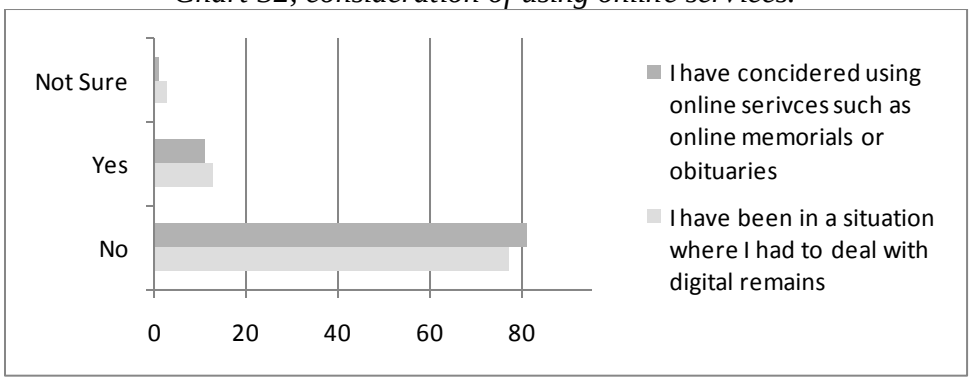
Out of these 47, 40 answered that they agreed that there is a historical value to preserving their digital remains for their future generations to experience. This group seems quite technology friendly, with 70 per cent stating that they are interested in technical gadgets. Still only seven respondents in total, or about 15 per cent, of this group have given some consideration to what people will do with their digital remains after their death. For an overview of this group, *see chart 31*. The historical perspective is also new for this survey, so it is hard to compare with our prior results.

Chart 31, awareness of digital remains



From our research of online services that focus on traditions around death and dying augmented by new technology, we found that digital remains are used in some services. As noted much of the services are used by family or friends of the deceased, so usage of actual digital remains from the deceased is in many cases limited. This is in spite of a general positive attitude towards leaving digital remains to the after world to be experienced by the family, friends and future generations. In our survey, we found that very few people have actually considered using an online service, like an online memorial (*see chart 32*). It also seems evident that not many people so far have been in a situation where they had to deal with the digital remains of someone that passed away.

Chart 32, consideration of using online services.



It would seem that there is a bit of confusion when it comes to where to find digital remains and how to use them. In our interviews, we noted that our interviewees were unsure what to do if they would be asked to handle digital remains of a close friend. Many said they would somehow see to it that it was saved and delivered to the family of the deceased, but other than that they did not really want to be in charge of going through it. A better way to represent one-self would thus be to specify what could be displayed and used for memorials or other remembrance services.

During our previous study we received indications that people want to experience digital remains at a location (i.e. a location in connection to the digital remains). This question is however today quite well grounded in the fact that geo-tagging has become a huge success (for specifics see chapter 2.6). In the last year or so millions of people have take up geo-tagging and the amount of digital data containing geographic meta-data is increasing exponentially. In general

imprinting geographic meta data in digital information could lead to several new ICT solutions. The MyLifeBits team (see chapter 2.1.1 for specifics) has researched the possibilities with geographic metadata imprinted in digital content and also the visualisation and experience of such information. Context and location metadata in digital content can even be used for memory retrieval, and we can conclude that digital remains could be used for the same purpose and possibly then create a stronger use-experience of such information (i.e. when relatives experience digital remains). Our interviews also show that the interviewees are interested in such features in connection to Blogging by the Dead (see chapter 3.2). This statement given by the MyLifeBits team illustrate the possibilities quite clearly:

"Location and time are powerful keys to unlocking Memories" (Aris 2004, p. 2)

When looking at how we record our lives, the sources of possible digital remains look rich. One source could be personal web spaces such as a MySpace profile or a personal blog. We have shown that web pages like these can be saved either intentionally, as on MyDeathSpace, or unintentionally as in a blog remaining, backed up or stored somehow on the server it was originally published (see chapter 2.1.3 for specifics). Web pages can also be stored by the family of the deceased, which is interesting since they often contain a rich selection of content provided by the deceased in person. In general there seems to be a strong support for almost any imaginable form of digital media (as seen in chapter 2.2). We can see that a few more novel digital media formats are emerging as optional digital remains. For instance, digital body scans as suggested in the Mission Eternity project might be something a digital artist could elaborate on and something that perhaps also could strengthen the immersion of experiencing digital remains.

We have shown how affective artefacts are a common phenomenon in end of life traditions and since we are required (for many reasons as stated throughout this paper) to give the user's close relatives a hard copy of her/his digital remains it might be appropriate to suggest something like what Gauler presents in her "Digital Remains" project (see chapter 2.2.4 for specifics). It is also possible that people would like to augment affective artefacts with digital remains (i.e. artefacts inherited or given by the dead to the living). We at least argue that Gauler's version, which packages digital remains very nicely in a artistically crafted box, is a better option than what we suggested in our previous work which was a "nice version of a USB-memory" (even though it was supposed to be delivered in a hand carved box). Gauler's version also has Bluetooth functionality which might facilitate for easier experience of digital remains while at home.

When studying digital remains it is interesting to consider the historical value of such information. There is a historical value in all information even though it does not mean that all digital remains are equally valuable. We argue that all people can contribute with interesting information and that digital remains can be interesting even for coming generations to experience. Previously we have shown how people want to share and experience digital remains which we further validate in this study and that tell us that there is value in preserving and sharing personal information for the after world to experience. This is what one of the respondents of the survey said:

> *"My digital writings may not be of much value but I think there are other people who have information of great value to leave behind. Some individual's memories/stories might not be very helpful in themselves but put together with other people's memories on a theme or for a particular period in history, the collected stories could be very powerful."* (teaching and lecturing, 76-80, male)

This is a very good comment and we argue that even if personal digital remains might have a larger affective value than a historical value the sum of many individuals digital remains may amount to something entirely new. First of all, digital remains are easy to store, search and evaluate and secondly the common woman and man are described and documented less throughout history than the famous and rich which makes it hard to imagine how past times really were experienced. Most likely more and more digital media (which eventually turn to digital remains) will have metadata such as geographic coordinates and date imprinted which will pinpoint its place in history even more accurately. We argue very strongly that personal affective information is very valuable when viewed from a historical perspective.[22] This is what another one of the survey respondents said:

> *"I have actually thought of this quite a bit. My greatest fear is that my digital remains will be perceived as "nothing but a junky old computer" rather than that people will laugh about me. I think that what I choose to save and cherish says a lot about me and the times I lived in. One of my most cherished possessions is a notebook filled with letters from my late sister. Although my daughter never met her aunt, who died when she was less than three years old, they were able to "meet" through the printed word when my daughter became an adult."* (healthcare, 41-45, female)

One aspect of the survey, not actually connected to the results struck us as interesting on this topic was that in the last question the respondents were allowed to express their opinion freely and several of the respondents answered very similarly to one another (in total 23 out of 93 respondents took this chance). This is what some of the respondents wrote:

> *"Provocative questions. They made me think about my opinion in areas I had previously not considered."* (teaching and lecturing, 66-70, male)

> *"This survey has inspired me to think of a much more cohesive record of my life, not limited to a 2D, romanticized journal of text and scribbles. Thank you."* (sales, retail and buying, 42-35, male)

> *"Good topic. Very thought provoking and original. Well designed survey."* (art, design and crafts, 26-30, male)

> *"Interesting to reflect over an unavoidable subject...."* (sales, retail and buying, 41-45, female)

> *"Very interesting survey - something whose time has come."* (publishing, media and performing arts, 41-45, male)

In general we got more of these types of answers, and also a few very insightful answers. As previously argued the awareness of digital remains is low. These answers also illustrate this fact very well. The respondents thus seemed pleased to become aware of the fact that they will leave an abundance of digital remains when they die and that they might use such information in previously unknown ways. This might actually mean there is a need to inform people of these

[22] It might also be appropriate for archiving institutes and governments to collect machines that enable us to read digital remains in the future even if they are "outdated" formats.

issues so that they can decide for themselves what to do with their digital remains.

Regarding why people want to capture their lives and what motivates them to do so is, as mentioned, a quite unexplored question (see chapter 2.1.2 for specifics). Coates (2006) presents the best evaluation on this subject but states that it is a subject that needs more attention if it is to be resolved. We, in our limited role as interaction designers, might even question if one driving factor behind capturing our lives is a motivation to leave a legacy and be remembered after death (for instance when we grow old). Coates category *Enhancing self identity through representation* might possibly cover that aspect though it is hard to tell, we argue that there at least might be a need for a sub-category of its own dealing with the motivation behind digital remains.

4.2.2. Regulatory and ethical issues regarding digital remains. The big question surrounding digital remains is how to access and use it and who is suited to or should be permitted to access it. In our survey, 68 per cent answered that they were not at all or only to some degree worried that the perception of them would change to something negative after their death, depending on the kind of digital remains they leave behind. As was also noted in the previous section the majority of our respondents would let their family or closest friends access their digital remains after they passed away.

Chart 33, access right to someone's digital remains

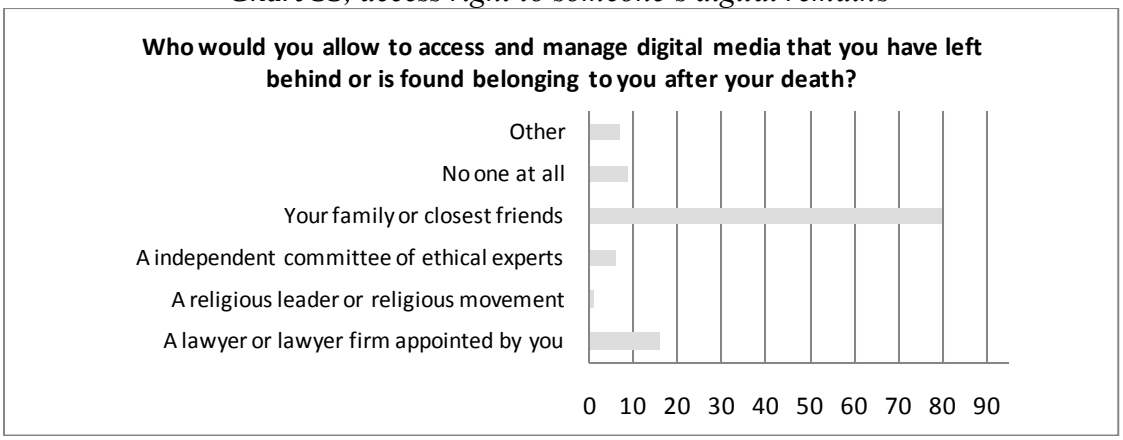
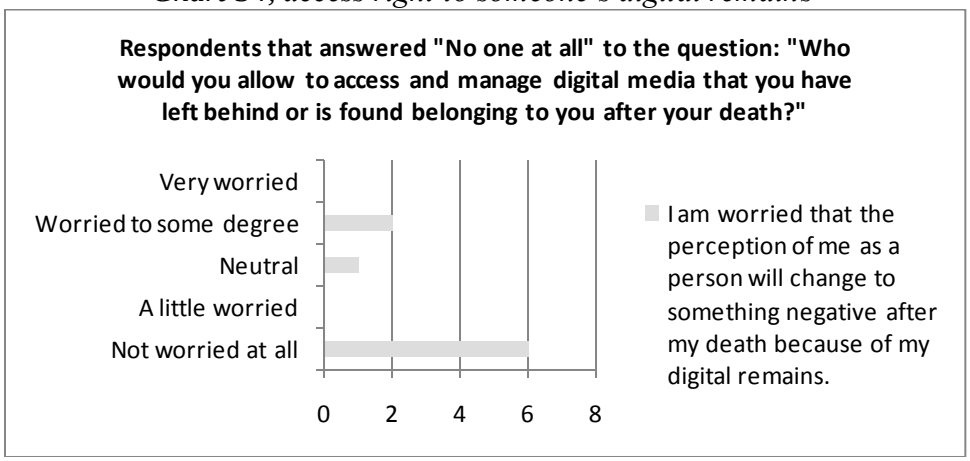


Chart 33 shows the full answers to the question, and what is notable is the low frequency of other choices; this was a multiple answer question where the respondents could pick as many alternatives as they would like. Other than family or close friends the respondents were not too keen giving access to their digital remains. As previously mentioned less than ten per cent, nine of the respondents, said they would not want anyone to access their digital remains at all.

Chart 34, access right to someone's digital remains



As seen in *chart 34* the reason that some of our respondents do not want anyone to review their digital remains does not seem to be that they think the information contained within would damage the image people have of them. When questioned if they would be interested in leaving behind digital media of their choosing, two thirds of these respondents expressed some or much interest and only one third was completely uninterested in such a service. It might be fair to assume that if they want to be remembered, they would like to handle it themselves and for different reasons not relying on or expecting someone else to go through their digital remains. Since a majority of all of the respondents would let their family have access, and about two thirds were interested in leaving digital media for future generations to see, maybe it should often be up to family or close friends to try to sort through and somehow manage the information, to make it into something comprehensible. If you do not want anyone at all to touch it, this could easily be written into a will. Having some sort of "digital mortician", be it a lawyer or some kind of expert at handling ethical issues, take care of it does not seem to be any real alternative at this point. In our eyes, the best possible solution would be to either make up very strict guidelines for what you want your family to do with such information, or go through it yourself. Since so few of our respondents have given it any consideration, it is not likely that there will be a common solution, at least not as long as digital remains are overlooked as a valuable source of information about the deceased. This statement made in the survey frames our opinion on the affective value of digital remains well (as opposed to previously discussed historical value of digital remains):

> *"My Mom (the last of our surviving parents for my husband and me), died less than 1 month ago, of cancer. She was 80 years old, and requested home hospice. We honored her wishes, and I treasure her handwritten notes. I hope my child; future grandchildren, and loved ones will take comfort in my digital writings, as well as handwritten notes."* (health care, 51-55, female)

Gaining access to password protected content such as web based email can be hard in some instances, AOL required a death certificate to hand out login information to the next of kin while Yahoo reportedly would not give any such information up without a court order since it is their policy to terminate email accounts upon a person's death. Depending on what the email account was used for, it could contain plenty of digital remains. An account used strictly for business or

professional purposes might not be as valuable to the family as an account containing more personal email conversations. There are of course issues with privacy, but when asked who would be allowed to gain access to such content after their death a majority, about 70 per cent, answered family of closes friends; less than ten per cent answered that no one at all should be able to gain access.

In Blogging by the Dead we have to this point avoided the problem of ownership by only, to a certain degree, allowing the deceased person to publish his or her version of their memories and not their relatives' versions. In any case, the complications and responsibilities of having the living posting about the dead (see chapter 2.1.3 for specifics) should make us think twice before implementing such functionality in any concept. It is reasonably safe to assume that the living will publish memories about the deceased anyway and one might argue that it is best to stick to the part of the concept BbtD that is different and which is not possible to perform after someone has died.

During our qualitative interviews (see chapter 3.2) we also got some insightful feedback from interviewees arguing that we should in no circumstances censor content (i.e. digital remains) so that they would not be offensive or abusive as we suggested when explaining our concept (in our theoretical role as service providers we could be held responsible otherwise). Then it would be better if we label the media with some kind of warning signs as the film producer quoted in chapter 3.2 suggested, dependent on the content therein, maybe similar to when we rent a movie or a game. Though this means that the content has to be reviewed and classified anyhow by someone to decide if the content is a candidate for a warning label or not, and further do we always follow the warning labels?

From an ethical point of view it might be interesting consider if publishing of digital remains might have negative effects on the living. The study we made on grief, mourning and bereavement (see chapter 2.1.4.) indicate that even those mourning their dead children could benefit from experiencing digital remains. That is, if you compare such a severe case to a normal situation without digital remains, then users would still process their loved ones in relation to remains even if no digital remains existed (for instance photos, clothes or similar artefacts). In both cases the user always have the choice to stop experiencing old "memories" and it falls natural that they do so after a certain period of time (perhaps not completely, but in normal cases they leave the grief phase eventually). We conclude, considering that no one really owns published digital remains, and that it is not possible to censure or delete all digital traces on the Internet, that users are more worried about the after-world loosing access to their hard earned life experiences than they are of having their reputation questioned. We also conclude that users actually are forced to handle digital remains left by relatives, unless they are in the public domain whereas they would have little power to censor them. As of today, people are already forced to deal with remains left by their loved ones and it is thus a common situation during the span of a life time.

4.2.3. Administration and management of digital remains. In the previous version of Blogging by the Dead (BbtD) we used web based interfaces for managing user-contributed content (i.e. digital remains). With a deeper technical background study behind us we realize this was wrong for many reasons (see chapter 2.6 and also chapter 2.3 – 2.4). First and foremost, we argue that virtual or semi-virtual interfaces are positioned to become standard when administrating geographic information. Web-based interfaces are cumbersome to use and Löwgrens (2006) comparison between the web-base interface at Eniro and semi-virtual interface in Google Earth illustrate this quite well. Arguably with new web-functionality (e.g. what is referred to as web

2.0) semi-virtual and virtual interfaces could be used on the Internet too. If virtual geographic visualisation can meet very high demands, from experts like Pezanowskis et al. (2007), we feel that this technology is more than adequate for management of geographic data in connection to BbtD (which handles geographic metadata). The requirements and complexity of BbtD is also nowhere near the complexity and does not have the same requirements as a disaster management system.

We argue that semi-virtual or virtual interfaces are the best option for the end-user when managing digital remains. To the end-user a web-based interface would be awkward to handle, especially when managing geographic coordinates in connection to their user-contributed content (e.g. moving picture A to location X). It would for us (in the theoretical role as service developers for BbtD) be interesting to get our hands on a service provider that delivered an easy to use semi-virtual management system (for instance with web-based login). Google offers industrial and enterprise services for managing and visualising geographic data in their Google Earth (GE) product, however it is in our case a slight overkill and we are looking for something less complicated. GE's personal edition is also not usable from a practical perspective since we cannot sign over the ownership of digital remains to Google (their retention policy of storing everything in lesser services/products would not work with BbtD). In Google Earth's personal edition, where it is possible to publish user-contributed content, the question arises who actually owns the material published. In for instance Second Life (2007) all material published by users are owned by the users. Hopefully we will see administration functions appear in open-source geographic visualisation tools that perhaps fit simpler civil services like BbtD better and that also will be easier to customize. *Figure 26* and *27* show a mock-up to illustrate the idea.

Figure 24, administration of digital remains (login to the left)

Figure 25, close up handling remains (drag and drop techniques)

The general idea with BbtD is to connect digital remains with location and context and the interaction is also supposed to encourage exploration of digital remains. However, in specific use-cases, as mentioned in chapter 2.4.1, the option of experiencing digital remains at location is not possible. We consider semi-virtual techniques mainly good for administration of digital remains however for instance elderly, who most likely will experience digital remains in their home, could benefit from semi-virtual visualization of digital remains (e.g. on the TV). The system we have in place where the closest relatives, stipulated by the deceased, receive a hard copy of her/his digital remains facilitate in abundant ways in which friends and relatives can

experience digital remains in their home or in private, they can even make up their own end of life tradition by combining digital remains with new technology. Though we argue even in that scenario there is a certain value to present digital remains in their right context. In that case a semi-virtual application for visualizing the digital remains in its right context would be interesting. We even argue that a complete virtual environment would be usable and valuable to the end-user (i.e. a virtual world which represent the real world in full detail), though such scenario is too futuristic to be reasonable in connection to BbtD.

4.2.4. Base-system and application-framework functionality. The task of trying to figure out what location positioning system to use is tricky. Our background study clearly shows that no single solution can solve all problems (see specifically chapter 2.3). The best option for use with BbtD is then a mixed service where the application framework adapts to changes to the best available service at any given time (much like mobile roaming service). However, we have found no such solution present at the market today where the change of location-aware systems is transparent to the user. This is despite, as we have shown in the background study, researchers arguing that such solutions are possible. From a service developer's point of view it would be a nightmare to build such a solution. Arguably if service providers manage to build roaming services for use of mobile Internet coverage they should be able to provide similar solutions for location-awareness. Then perhaps even location-awareness indoors would work on a global scale since many city wide (probably nationwide in years) Wi-Fi networks are emerging (e.g. as in San Francisco).

We have argued that in user-centred design, and more specifically in the concept Blogging by the Dead, the need for high privacy is mandated by the overwhelming of evidence showing us that not only is privacy a requirement but also a human right. We state, after extensive *reading* (see specifically chapter 2.3.2. and also chapter 2.3.3.), that there are more problems with privacy in context and location-aware systems at a base-level than with privacy at an application framework-level. We can do something as developers about problems at an application-level however at the level of an external system we run into patrol and must rely on laws and regulations (we will discuss regulations below).

The engineering precision of, for instance, network protocols such as for instance the TCP/IP stack simply facilitate for an abundance of methods for measuring location regardless of what happen at an application framework-level. An interesting question is if the actual precision of the engineering work done in network protocol development negates the possibility to create ICT-solutions with good end-user privacy. Is it possible to implement some form of scrambling technique in relation to the TCP/IP stack that makes it harder to pinpoint location without breaking the usefulness of TCP/IP? Such questions lie beyond the boundaries of this paper. We however believe that since BbtD is less complex than many location-aware services and that we should be able to create a higher measure of location and context privacy.

We argue that the issue of regulation of location-aware systems is troublesome and unresolved. As previously mentioned we have no or little control over the infrastructure and location-aware systems are prone to misuse because of their complexity. If we look at the Swedish location privacy legislation, aimed at an employee/employer-scenario, which might a step in the right direction, the question arises whether it makes any impact at all. For instance, consider an international company using location services from Country C and using location-positioning in country D and monitor the worker in country E. The ICT infrastructure of many countries (for instance fibre-optic infrastructure) might also be owed by companies in another country which makes this issue even harder to solve. Then the conclusion we make is that this question of context and location-privacy needs to be regulated in international treaties. The treaties we have

evaluated in this paper seem to be vague and not very specific, that means less possibility for control over location and context information. Our final word on this subject is that we do not believe we can build a location-aware service that upholds privacy requirements and human rights to any greater degree because it most likely is very hard to achieve as of today. In that context, labelling techniques sound like a good idea. The warning label would however be about location-aware and mobile equipment in general, not about BbtD.

4.2.5. Interfaces, navigation and social interaction. Regarding mobile interaction we argue that most of the interaction chain between creating, geo-tagging, uploading, visualising and to limited degree experience geo-tagged content in the environment is fulfilled. Most of the solutions needed exist today in the real world and not merely on paper (see chapter 2.6 for more specifics). Navigation needed in certain scenarios is tested and working, we even present a dumbed-down version of map-based navigation to strengthen usability and combat privacy issues. The last step of the interaction chain, which is to experience digital remains, was not fully present on the market as of today.

Creating a better immersive feeling while experiencing Blogging by the Dead (BbtD) is hard. A picture viewed on a small mobile screen is not a great option. However, according to the limitations of this study this is how BbtD will present that information. A few methods can perhaps strengthen the experience of digital remains, for instance by combining sound with pictures and we believe to experience digital media at their right context might deepen the immersion somewhat (though that is not the primary reason why digital remains are connected to location as stated later in chapter 4.2.).

The technological part of this study dealing with interaction, interfaces and navigation ends with those use-qualities we have identified in chapter 2.4 and the discussion surrounding them. There is no further room in this study to elaborate on technical issues as stated in chapter 1.2 the focus is on end of life traditions and modern technology. Though there are a few additional *social interaction* issues we would like to discuss in connection to BbtD. During the development of Blogging by the Dead (BbtD) we have pondered on what is the best way to capture and share digital remains (for related background study see chapter 2.1.1, 2.1.2 and 2.1.3). In many research studies, such as *MyLifeBits* (Gemmel, 2002), everything from a person's life is captured and all data get type-specific attributes, for instance, a photo has date and location imprinted (latitude/longitude coordinates where the picture was taken). Recent life capturing project *InSense* (Blum et al., 2006) takes a different path and tries to automatically capture only interesting data. These are very interesting concepts to us and in our roles as interaction designers we can ask if digital remains could and perhaps even should be handled in similar ways. Should BbtD use automatic life capturing?

The concept Blogging by the Dead handles digital remains stored and left behind by people dead and therefore is closely related to the life capturing research. Digital remains stored during life and published after death could arguably be used while the users are alive too. The question is if we increase the technical complexity of BbtD by automating some capturing tasks or we simple make it a "*do it yourself service*". Is automatic capturing a feature the users would like to see in connection with storing and sharing their digital remains (i.e. before they die)? We argue that at this point there is no need for automatic capturing techniques. If we argue for the sake of the discussion that regulatory issues with automatic life capturing techniques were resolved in the near future (however unlikely) we still do not consider it usable with BbtD. The primary reason is that the point of sharing digital remains with the after world is that the user selects what she/he thinks is valuable or affective information.

We then believe that shared digital remains will have a higher affective value and also be more interesting for others to experience after death. The previously mentioned InSense project might be on to something and we argue that that idea is a huge step in the right direction in contrast to the MyLifeBits project (the movie *Final Cut* with Robby Williams and Mira Sorvino has some interesting feedback on this specific matter). Though there is no conclusive evidence that show that an automatic life capturing device ever will succeed in capturing only (or primarily) interesting information. We also question if such information ever will have as affective value as information specifically selected by the user which is emphasized as something he/she would want to leave behind.

There is however a few scenarios, which we became aware of during our previous study, when the user cannot collect and publish digital remains by own free will. We met with two undertakers at *Fonus* (a Swedish undertaker and funeral arrangement company) in our previous study for an interview and only one of them wanted to participate in the study, the other person listened in on the interview (Hall et al., 2006). After the interview was over the person not participating wanted to add and emphasize how important it was that people, and especially children's parents, realized how many people die without any preparation what so ever and whom hardly leave any legacy at all. To a great degree we then believe the role falls on family and friends to in the best way possible attempt to present someone's life. We argue that in such scenarios the value of automatic capturing and authoring tools rise somewhat, that is before they die.

We also consider that the use of open source application actually might be a considerable advantage if used with BbtD since they are better supported over time. For instance, if an ICT service dealing with digital remains was shut down, users could themselves easier make use of abandoned digital remains (e.g. when a company providing ICT end of life services goes bankrupt). We argue that any service dealing with digital remains should have safe storage and also promise not to sell out such data if a company went bankrupt or was sold off (at least not discard the data and pass on legal papers like wills). Preferably there should be an option where you could leave digital remains for free and also were limited ICT services which were provided for free with legal protection (as discussed prior in this paper). The concept Blogging by the Dead could then be one way of many to present digital remains in connection to such a service. This might sound like an odd proposal though since bandwidth and storage space is so cheap this could actually be a service provided by open and free organisations or institutions, we see no real reason why for instance the preservation and presentation of books and movies, which represent a small fraction of a society and also is made by a small fraction of society, should go before the preservation of digital remains. This free service could also be fitted to help during bereavement, in a way a part of the a health care system. We envision such a service as a museum built by and populated with content from persons of all sorts, with no discrimination and censorship. *A democratic museum of affective memories from past and current time*. Lindsay F. Marshall which was one of the first persons to work with ICT service and end of life traditions writes these words on his free of charge memorial site:

> *"This is a place where anyone can be remembered. The VMG is growing rapidly, but please be assured that as far as I am able these memorials will always be available somewhere and that there will never be any charge for including information on this page."* Lindsay (2006)

We have evaluated many services dealing with end of life traditions and modern technology but

one of the most respectful of those we argue is The Virtual Memorial Garden which is free of charge. Another respectful service is MemoryOf who both donate profits to the Red Cross and offer substantial help during mourning. One of the best with regards to describing the dead in a digital format is in our opinion the LifeCapture service that does biographic video recordings of someone for preservation (which can be regarded as digital remains in time). It is as simple as genial, a concept that truly captures the person for the after world. It sets out from our concept in many ways and we do not see it as contradicting the usefulness of BbtD but rather we see it as a complement, it would also be hard to offer a service like LifeCapture for free since it involves a team of skilled video biographers.

4.3. Resulting concept: *"Blogging by the Dead"*

The basic idea behind this concept is to connect location-aware systems with information in the form of digital remains that can be accessed and experienced by people at the location these memories were created. Chosen digital media are left behind by a person and published after death at the geographical location where her/his memories occurred, or in general at the location/context were the "owner" of these digital remains feels they belong. The rightful owner of these digital remains publishes the information, not the relatives of the deceased person. This assures that the deceased person gets to express and leave behind her/his view of the world and leave a legacy that better reflects the person in question. Since these digital remains have meta-information imprinted they can be experienced in their right context with the help of the service Blogging by the Dead. These digital remains will also be a contribution to the ongoing and continual historical documentation and even include information about social interaction between regular people and not only social interaction between the famous, rich and successful as common in the written history.

When it is not possible for a person to collect and publish his/her own digital remains Blogging by the Dead gives the family of the deceased person several tools to assist them in the task of representing their loved one. This is hopefully helpful during mourning and possible, to some extent, limits the mourning period and eases the burden of grief family and friends experience. Even if the deceased person in question has not published digital remains on his own, close family and friends can gain access to social networks with other mourning people and tools to help them express their grief and honour the dead (for instance grieving blog or grieving forums). Blogging by the Dead is free of charge, free to use and without advertising (the total charge for using this Blogging by the Dead amounts to less than a dime per person for storing and presenting one person's entire life's worth of data and is paid as a onetime fee upon birth or collected from charity). Family and friends are also allowed to, in a respectful way, annotate their loved ones digital remains. This is allowed both for the sake of the mourning and for the sake of the dead who might want to have her/his memories signed with their loved ones thoughts and feelings (this feature is optional and the user has chosen if he/she wants this feature enabled or not before death). With annotation digital remains also can possibly obtain an even higher affective value and a better contextual meaning, though we in the Blogging by the Dead management team cannot say for certain.

As a complement to the traditional gravestone and affective memorabilia from the dead, people can revisit their grandfather's, friends' or mother's memories through personal stories, pictures, thoughts, videos, or digital media of any form by connecting digital remains to real-world artefacts, buildings and other objects (even nature/the environment itself). If you so choose you could "travel" through someone's specific life using their memories or access different digital

remains from different persons for the same "meta-space" (object, place and so on). The concept even assures that it is possible to navigate to, from and between digital remains if needed during mourning. Bringing forth the dead wherever you go in the environment in an explorative way is also possible (if preferred since Blogging by the Dead is an ON/OFF service).

> *Imaging sitting on the bus, bored and with need for something to do, then you activate Blogging by the Dead while going through a neighbourhood you never before have visited. The screen lights up with stashes of digital remains, organised in memory banks which you can access and extract digital remains from which you have selected as interesting.*

Blogging by the Dead represents the dead and therefore presents the dead in a democratic manor with no regard to status, much in the same respectful way newspapers have presented their death notices for many years. However, the service gives space to individuals in need of expressing who they are and what they feel and think. The concept service ensures that valuable and affective information are preserved and accessible in its correct context, not destroyed or lost after death. Digital remains are kept in a highly fault tolerant manor (both logical and physical). Blogging by the Dead also assures that you can experience and interact with digital remains in the environment to assure that someone's digital remains will not disappear in a dusty basement or in an anonymous Internet database. Sensitive digital remains have metadata that specifically state the will of the dead.

A clever fail safe exists where the closest family of the deceased receives an artistically crafted box, augmented with high technology and digital remains, at the funeral in connection to the end of the ceremony (for instance when and if a urn with the ashes of the dead is handed over to the family). This box comes in many forms and Michele Gauler's top of the line *Digital Remains* boxes can be used if the standard storage is unsatisfying. A *emerging* market where merchants and artist can present and sell alternative artefacts exist for those users who choose so, a few digital artists even have created short documentaries with digital remains that close family can experienced on the TV directly broadcasted from digital artefacts (these are often favoured by the oldest members of families and some people in mourning since they do not have the hassle of travelling and still get a good experience of digital remains at home). A specific craft trade has also has started to *emerge* where artists are augmenting real world remains with digital ones, combining the best of both worlds carefully not damaging memorabilia such as jewels and old chairs inherited from fathers and grandmothers. In the Blogging by the Dead archive you will share space with many other people (much in the same way as in graveyards, though without the physical constraints).

Blogging by the Dead consists of five essential technologies:

- A mixed mode location-aware service which roams between GPS and assorted location-positioning services available while anonymizing user location into spatial regions (and use location-databases too which separate user-identity from location).
- Mobile internet connectivity and mobile interfaces for explorative navigation and interaction with digital remains.
- A virtual interface for managing digital remains.
- Assorted Internet websites such as blogs and forums.

- Storage of digital remains and bandwidth for delivering digital remains.

No modified hardware is necessary for using the service since Blogging by the Dead is functional on a broad range of off the shelf consumer products such as mobiles and personal digital assistants. Blogging by the Dead developers also do everything possible to achieve the best form of end-to-end privacy solutions in connection to location-aware system. Though regulations are troublesome and the complexity of location-aware technology makes it very hard.

Digital remains can be uploaded from home or from mobile equipment (for instance just by taking a picture with the mobile camera and then uploading it to memory storage). Each memory contributed by a person gets a time stamp, geographic coordinates and file rights incorporated (which include for instance whether a memory should be private to be accessed by family only or could be public), and is added to that person's personal memory-storage. Memory editing services and access to memory-storage is present online in a virtual interface where users can drag and drop digital content from location to location and also get an overview of their collected digital content.

4.3.1. Memory-share & experience scenario. Adam sees an advertisement for a service that allows him to record his memories and share them after he has passed away. The main aspect of the service involves location-based memories where a memory can be recorded and tied to a specific address or location. In this way, even though the physical landscape of, for instance, a city changes – the memory can still be tied to the original location. Adam decides it is a good idea to store his memories in case something happens to him so he can still share his memories, advice, and stories with his daughter Lisa. He contacts the organisation that provides the service and creates an account. The account connects his information (including memories, stories in audio and video, pictures, etc.) to his name and allows for easy storage, editing, and retrieval of the data he collects. He decides to save pictures, video messages (including stories), audio messages, and location-based memory messages.

Adam collects relevant pictures which are transferred into digital media by the service and stored on their server with Adam's special identity tag. He adds some location-based memory of their home (and Lisa's first home) where he tells some stories about Lisa playing in the yard and her swinging on a tree-swing in the back yard. He uses his mobile phone to record this memory, sitting on the tree-swing, and saves the memory with a location tag (including longitude and latitude for a precise location trace – data formatted to be able to be found using a GPS) to the tree. The saved data also includes timestamps. This data is transferred to the memory service from the location where he records it via his mobile phone, and it is saved to the server and account connected to his profile. He can continue to add data to this storage site as long as and wherever he chooses to until he passes away. Upon his passing this data becomes available to the people he has stipulated in his will, including his daughter Lisa. After a certain time period the memories will become public since he stated so in his will otherwise they would only have been accessible to his ancestors (who themselves then manage who gets access to the memories).

After Adam's death, Lisa receives a notification that her father has left her some "living memories" to experience and to keep a part of him alive. The notification is delivered to her in a nice wooden box with a handwritten note from her father along with a hard copy of the memories. Lisa knew of her father's memory account and was favourable towards the idea of keeping and viewing memories her father saved and made. Some memories were made especially for her. There is one memory in particular which also has a location-tracer on it about her childhood home. Lisa follows her GPS and discovers that the place at which she used to live as a

child is now replaced by a tall apartment building. Lisa uses her mobile phone and plays back the message her father recorded while sitting on their tree-swing. She walks around until she finds the precise place where the tree-swing was and looks around. The neighbourhood certainly has changed, she is unsure if she would even have recognized it without the GPS locator. Lisa can experience these types of memories as well as pictures etc. whenever she chooses to, and she finds it comforting to be able to feel her father's presence even after his death. What Lisa finds most positive about her father's memory storage is that she can show his memories to her son who was only two years old when her father died. Now her son can get to know his grandfather in a way that never would have been possible if Adam had not chosen to save memories, stories and other information to be shown after his death.

5. Conclusions and summary

In this paper we have studied how digital remains are used today and how it could be used in the future. We have focused on what people feel, think and need in connection to digital remains. In the background study we have examined Information Communication Technology (ICT) within the domain of end-of life traditions that have a broad and substantial user-base to get an overview of user-demands. We have concluded that people in general are in favour of using every imaginable digital media format for documenting their lives and more important also for publishing digital remains in connection to death and dying.

This we also have shown to be a historical trend, where technology has been used to its historical limits for documentation of self and in connection to end of life traditions. That is, documenting of self when possible considering that autobiography historically has been an occupation for the upper class and that documentation technology has not been accessible to the mass population at all times. This finding to a great degree relies on correlation between Dahlgrens (2003) research in Theology regarding documentation in connection to death and dying and Coates (2006) research in Psychology regarding documentation of self. We in some sense affirm Dahlgrens and Coates theories further with user-data collected on our own. In relation to Coates work on the motivations for documenting self we also question why documentation in connection to death and dying does not appear in his work and argue that this might be a motivational factor to consider in his axiological categorisation.

We also presented emerging services and artefacts intended to augment end of life traditions. This we did in order to detect possible features or trends that could match user-requirements identified in this study. Some features identified as useful in connection to end of life traditions and digital remains are Gauler's artefact *Digital Remains*, specialised forums and grieving blogs. While evaluating social-technological issues we identified several problems with privacy and most of those exist because of the complexity in location-aware systems. We concluded that we could do little to remedy those fault since they exist beyond the application framework layer. In this paper we also have discussed interaction with geo-spatial data in many ways. We have argued that virtual interfaces not only should be used for managing geo-spatial data in complex system, such as in disaster recovery management systems, and that they also are suitable for managing personal data (in this case digital remains). We have also argued that automatic life capturing and authoring techniques are interesting for use with digital remains in only some use-cases. Such techniques are still in their early days and in use-cases when they are useful, such as when people cannot collect their own digital media, automatic capturing and documenting of only interesting data is preferred (when it is possible to build such a system).

We also conclude that present technology dealing with death and dying are mostly augmentations of old traditions, not new phenomenons. The novel approach to death and dying, as presented in the concept, lies in the fact that it will become possible to store, preserve and *especially experience digital remains*, from common and famous alike, in much greater depth and scale than ever before.

In connection to the background study on end of life traditions we have also showed proof of how ICT technology can help users while mourning and ease the effects of grief. We argue that this is a hidden quality that the research community could develop much further and which could be more beneficial to people (think health care).

We have collected user-data from several sources (i.e. a quantitative survey, qualitative interviews, background studies and user data collected in prior studies) and from analysis of that

data made several conclusions and observations, most of these further validate our previous research. Our data collection and analysis show that awareness of digital remains is very low and that very few people have come into contact with digital remains. We also have shown considerable proof that people are interested in experiencing and leaving digital remains for the after world and that most likely this is true for all ages. Still, very few people have considered what to do with their digital remains or considered using online services, such as online memorials.

Several problems with regards to digital remains have been identified and those problems most likely will become more severe over time since more people will deal with considerably larger amounts of digital remains. For instance slander of the dead and problems with access rights to digital remains have been discussed (digital remains might also in some case have a high monetary value like other digital data). We have effectively established the family, close relatives and close friends as the best caretakers of digital remains. Some people are worried that too much information might give a distorted picture of their self. A possible solution would be to state any preferences regarding digital remains before death, so that the family knows the boundaries and can handle digital remains accordingly.

We have also clearly shown in this paper that digital remains are considered to be a valuable affective source of information which people cherish. We have further shown that people regard their pending digital remains to be valuable from a historical point of view, something we agree with - especially when digital remains from one person is put in a larger context with others remains. Social networks can often be traced in digital remains (e.g. from metadata) and we have argued that this aspect is both new and of great value to the continual historical documentation considering that traditionally such information is missing from the written history, where mostly the famous, rich and successful have been described in great detail.

6. References

Ackerman, S. M. (2000). The Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility. Human-Computer Interaction, 15(2&3), 179-203. http://doi.ieeecomputersociety.org/10.1207/S15327051HCI1523_5

Ackerman, M., Darrell T., Weitzner J. D. (2001). Privacy In Context. *Human-Computer Interactions*, 16(2, 3&4), 167-176. http://doi.ieeecomputersociety.org/10.1207/S15327051HCI16234_03

Ackerman, S. M. (2004). Privacy in pervasive environments: next generation labeling protocols. *Personal and Ubiquitous Computing*, 8(6), 430-439. Springer-Verlag, London, UK. http://dx.doi.org/10.1007/s00779-004-0305-8

Al-Muhtadi, J., Hill, R., Campell, R., Mickunas, D. M. (2006). Context and Location-Aware Encryption for Pervasive Computing Environments. In, *Proceedings of the Fourth Annual IEEE International Conference on Pervasive Computing and Communications Workshops*. http://doi.ieeecomputersociety.org/10.1109/PERCOMW.2006.33

Aris, A., Gemmel, J., Lueder, R. (2004). Exploiting Location and Time for Photo Search and Storytelling in MyLifeBits.

Banerjee, S., Agarwal, S., Kamel, K., Kochut, A., Kommareddy, C., Nadeem, T., Thakkar, P., Trinh, B., Youssef, A., Youssef, M., Larsen, L. R., Shankar, U. A., Agrawala, A. (2002). Rover: Scalable Location-Aware Computing. *Computer*, 35(10), 46-53. http://doi.ieeecomputersociety.org/10.1109/MC.2002.1039517

Bartle, R. A. (2003). *Designing Virtual Worlds*. New Riders Publishing.

Beresford, Rr A., Stajano, F. (2003). Location privacy in pervasive computing. *Pervasive Computing*, 2(1), 46-55. http://doi.ieeecomputersociety.org/10.1109/MPRV.2003.1186725

Brown, A. T. B., Sellen, J. A., O'Hara, P. K. (2000). A diary study of information capture in working life. In, *Conference on Human Factors in Computing Systems archive: Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 438-445). ACM Press, New York, NY, USA. http://doi.acm.org/10.1145/332040.332472

Bush, V. (1945). As We May Think. *The Atlantic Monthly*, 176(1), 101-108.

Carroll, M. J. (2002). *Human Computer interaction in the new millennium*. ACM Press.

Cha, E. A. (2005, February 3). After Death, a Struggle for Their Digital Memories. *Washington Post*. Retrieved November 8, 2006, from: http://www.washingtonpost.com/wp-dyn/articles/A58836-2005Feb2.html

Chang, S-J., Hsu, G-Y., Huang, S-J. (2005). Location-Aware Mobile Transportation Information

Service. In, *Mobile Technology, Applications and Systems, 2005, 2nd International Conference on*.

Coates, A. (2006). *Discovering the Motives for Documenting Experience*. University of Plymouth School of Computing, Communications & Electronics. www.acoates.co.uk/dissertation/

Creswell, J. (1997). *Qualitative Inquiry and Research Design: Choosing among Five Traditions*. SAGE Publications, London.

Czerwinski, M., Gage, W. D., Gemmell, J., Marshall, C. C., Pérez-Quiñonesis, A. M., Skeels, M. M., Catarci, T. (2006). Digital memories in an era of ubiquitous computing and abundant storage. Communications of the ACM, vol. 49, Issue 1 (Jan 2006), pp. 44-50.

Dahlgren, C. (2000). *När döden skiljer oss åt ... Anonymitet och individualisering i dödsannonser: 1945-1999*. Databokförlaget, Stockholm

Datainspektionen. (2006). *Positioneringsteknik i arbetslivet*. Retrieved Dec 11, 2006, from the Datainspektionen web site: http://www.datainspektionen.se/nyhetsarkiv/nyheter/2006/november/2006-11-06.shtml and http://www.datainspektionen.se/temasidor/positionering.shtml

Ekman, I., Lankoski, P. (2002). What should it do? Key issues in navigation interface design for small screen devices. In, *Conference on Human Factors in Computing Systems: CHI '02 extended abstracts on Human factors in computing systems* (pp. 622-623). ACM Press, New York, USA. http://doi.acm.org/10.1145/506443.506514

Garlan, D., Siewiorek, D. P., Smailagic, A., Steenkiste, P. (2002). Project Aura: toward distraction-free pervasive computing. *Pervasive Computing*, 1(2), 22-31. http://doi.acm.org/10.1109/MPRV.2002.1012334

Gemmell, J., Bell, G., Lueder, R., Drucker, S., Wong, C. (2002). MyLifeBits: Fulfilling the Memex Vision. In, ACM Multimedia '02, December 1-6, 2002, Juan-les-Pins, France, pp. 235-238.

Gemmell, J., Lueder, R., Bell, G. (2003). Living with a Lifetime Store. ATR Workshop on Ubiquitous Experience Media, Sept. 9-10, 2003, Keihanna Science City, Kyoto, Japan

Gemmell, J., Aris, A., Lueder, R. (2005). Telling Stories With MyLifeBits. In, ICME 2005, Amsterdam, July 6-8, 2005.

Giddens, A. (1997). *Sociologi*. Polity Press, Cambridge, England.

Griswold, G. W., Shanahan, P., Ratto, M., Shapiro, R. B., Truong, T. M., (2004). ActiveCampus: Experiments in Community-Oriented Ubiquitous Computing. *Computer*, 37(10), 73-81. http://doi.ieeecomputersociety.org/10.1109/MC.2004.149

Hall, A., Bosevski, D., & Reinell, L. (2006). Blogging by the Dead. In, *ACM International*

Conference Proceeding Series: Vol. 189, Proceedings of the 4th Nordic conference on Human-computer interaction: changing roles (pp.425-428). Oslo, Norway: ACM Press. http://doi.acm.org/10.1145/1182475.1182528

Hazas, M., Scott, J., Krumm, J. (2004). Location-aware computing comes of age. *Computer*, 37(2), 95-97. http://doi.ieeecomputersociety.org/10.1109/MC.2004.1266301

Holme, M. I., Solvang, K. B. (1997). *Forskningsmetodik, Om kvalitativa och kvantitativa metoder*. Oslo. Studentlitteratur Lund, second edition. ISBN 91-44-00211-4

Iera, A., Molinaro, A. (2005). Quality of Service Concept Evolution for Future Telecommunication Scenarios. In, *Personal, Indoor and Mobile Radio Communications: IEEE 16th International Symposium on: Vol 4.* (pp. 2787-2793). http://doi.ieeecomputersociety.org/10.1109/PIMRC.2005.1651949

INSPIRE. (2007). *INSPIRE – European GEO Portal*. Retrieved May 15, 2007 from the European GEO Portal web site: http://eu-geoportal.jrc.i

Jacobsen, K. J. (1993). *Intervju: Konsten att lyssna och fråga*. Studentlitteratur Lund. Lund

Jones, Q., Grandhi, A. S. (2005). P3 Systems: Putting the Place Back into Social Networks. *Internet Computing*, 9(5), 38-46. http://doi.ieeecomputersociety.org/10.1109/MIC.2005.105

Krevl, A., Ciglari, M. (2006). A Framework for Developing Distributed Location Based Applications. In, *Parallel and Distributed Processing Symposium, 2006: 20th International*. http://doi.ieeecomputersociety.org/10.1109/IPDPS.2006.1639551

Krause, A., Siewiorek, D. P., Smailagic, A., Farringdon, J. (2005). Unsupervised, dynamic identification of physiological and activity context in wearable computing. In, Wearable Computers, 2003: Proceedings of the Seventh IEEE International Symposium on (pp. 88-97). http://doi.ieeecomputersociety.org/10.1109/ISWC.2003.1241398

Kvale, S. (1996). *InterViews: An Introduction to Qualitative Research Interviewing*. SAGE Publications, London.

Kübler-Ross, E. (1971). What Is It like to Be Dying? *The American Journal of Nursing*, Vol. 71, No. 1., pp. 54-62.

Leonhardi, A., Rothermel, K. (2002). Architecture of a large-scale location service. In, *Distributed Computing Systems, 2002; Proceedings of the 22nd International Conference on* (pp. 465-466). http://doi.ieeecomputersociety.org/10.1109/ICDCS.2002.1022292
Löwgren, J. (1993). *Human Computer Interaction*. Studentlitteratur, Lund.

Löwgren, J., & Stolterman, E. (2005). *Thoughtful interaction design*. MIT Press.

Maciejewski, K. P., Zhang, B., Block, D. S., Prigerson, G. (2007): An Empirical Examination of the Stage Theory of Grief. *JAMA*, Vol. 297, No. 7 (Reprinted).

May, Tim. (2001). *Samhällsvetenskaplig forskning*. Buckingham. Studentlitteratur Lund. 2:a upplagan. ISBN 91-44-01143-1

Maxwell, J. (2004). *Qualitative Research Design: An Interactive Approach*. SAGE publications, London.

Miles, M. B., & Huberman, A. M. (1994). *Qualititative Data Analysis*. SAGE Publications, London.

Milic, B., Milanovic, N., Malek M. (2005). Prediction of Partitioning in Location-aware Mobile Ad Hoc Networks. In, *System Sciences, 2005: Proceedings of the 38th Annual Hawaii International Conference on* (pp. 306c - 306c). http://doi.ieeecomputersociety.org/10.1109/HICSS.2005.501

Minch, P. R. (2004). Privacy Issues in Location-Aware Mobile Devices. In, *System Sciences, 2004: Proceedings of the 37th Annual Hawaii International Conference on*: *Track 5, 2004*. http://doi.ieeecomputersociety.org/10.1109/HICSS.2004.1265320

Mokbel, M. F. (2006). Towards Privacy-Aware Location-Based Database Servers. In, *Data Engineering Workshops, 2006: Proceedings of the 22nd International Conference on* (pp. 93-93). http://doi.ieeecomputersociety.org/10.1109/ICDEW.2006.152

National Cancer Institute. (2007). "National Cancer Institute: Loss, Grief and Bereavement" Retrieved on the 21 of May 2007 from the National Cancer Institute web site: http://www.cancer.gov/cancertopics/pdq/supportivecare/bereavement/HealthProfessiona

Networks. *Vehicular Technology, IEEE Transactions on*, 55(3), 1062-1073. http://doi.ieeecomputersociety.org/10.1109/TVT.2006.873840

Patterson, C. A. Muntz, R. R. Pancake, C. M. (2003). Challenges in location-aware computing. *Pervasive Computing*, 2(2), 80-89. http://doi.ieeecomputersociety.org/10.1109/MPRV.2003.1203757

Pezanowski, S., Tomaszewski, B., MacEachren,. M. A. (2007). An Open GeoSpatial Standards-Enabled Google Earth Application to Support Crisis Management. *Proceedings of the the 3rd International Symposium on Geo-information for Disaster Management ,Toronto, Ontario*

Pramudiono, I., Shintani, T., Takahashi, K., Kitsuregawa, M. (2002). User Behaviour Analysis of Location Aware Search Engine. In, *Mobile Data Management, 2002: Proceedings of the Third International Conference on* (pp. 139-145). http://doi.ieeecomputersociety.org/10.1109/MDM.2002.994398

Preece, J. (2002). *Interaction Design: beyond human-computer interaction*. John Wiley & Sons, Inc.

Quigley, A., Ward, B., Ottrey, C., Cutting, D., Kummerfeld, R. (2004). Bluestar, a privacy

centric location aware system. In, *Position Location and Navigation Symposium 2004* (pp. 684-689). Monterey, CA. http://doi.ieeecomputersociety.org/10.1109/ITCC.2005.233

Rehman, K. (2004). Augmented Reality in support of interaction for location-aware applications. In, *Mixed and Augmented Reality, 2004: Third IEEE and ACM International Symposium on* (pp. 286-287). http://doi.ieeecomputersociety.org/10.1109/ISMAR.2004.16

Schmandt, C., Marmasse, N. (2004). User-Centered Location Awareness. *Computer*, 37(10), http://doi.ieeecomputersociety.org/10.1109/MC.2004.182

Sveningsson, M., Lövheim, M., Bergquist, M. (3003). *Att fånga nätet. Kvalitativa metoder för Internet forskning*. Lund. Studentlitteratur Lund 1:a upplagan.

Tath, E. I., Stegemann, D., Lucks, S. (2005). Security Challenges of Location-Aware Mobile Business. In, *Mobile Commerce and Services, 2005: The Second IEEE International Workshop on* (pp. 84-95). http://doi.ieeecomputersociety.org/10.1109/WMCS.2005.23

Trost, J. (2001). Enkätboken. Lund. Studentlitteratur Lund. 2:a upplagan. ISBN 91-44-01816-9

Varshavsky, A. (2006). Are GSM Phones THE Solution for Localization ? In, *Mobile Computing Systems and Applications, 2006: Proceedings of the 7th IEEE Workshop on* (pp. 20-28). http://doi.ieeecomputersociety.org/10.1109/WMCSA.

UCCASS. (2007). *Unit Command Climate Assessment and Survey System*. Retrieved January 7, 2007, from the Dziga web site: http://www.bigredspark.com/survey.html

Urbina I. (2006, November 5). In Online Mourning, Don't Speak Ill of the Dead. *The New York Times*. Retrieved November 8, 2006, from: http://www.nytimes.com

United Nations (2007). *United Nations, Universal Declaration of Human Rights, General Assembly Resolution 217 A (III),1948*. Retrieved February 10, 2007, from the United Nations web site: *www.un.org*.

Veale, K. (2004). Online Memorialisation: The Web As A Collective Memorial Landscape For Remembering the Dead. *Fiberculture*, Issue 3.

Wettergrund, S. (2005, June 7). It-företag växer med dödsannonser. *Dagens Industri*. Retrieved December 14, 2006, from: http://www.di.se/Index/Nyheter/2005/06/07/146582.htm

Wu, X. (2006). Applying Pseudonimity for Anonymous Data Delivery in Location-Aware Mobile Ad Hoc Networks. *Vehicular Technology, IEEE Transactions on*, 55(3), 1062-1073. http://doi.ieeecomputersociety.org/10.1109/TVT.2006.873840

Yee, N. (2002). *Facets: 5 Motivation Factors for Why People Play MMORPG's*. Retrieved from the Nick Yee web site: http://www.nickyee.com/facets/home.html

References: Online content:

Bioprecense. (2007). *Bioprecense – human DNA Trees as Living Memorials*. Retrieved December 12, 2006, from the Bioprecense web site: http://biopresence.com

Critters.com. (2006). *Critters.com*. Retrieved December 12, 2006, from the Critters web site: http://www.critters.com

Currentobituary.net. (2007). *Currentobituary.net - Nationwide Online Obituary Service*. Retrieved January 17, 2007 from the Currentobituary web site: http://www.currentobituary.net

Fallen Heroes Memorial. (2007). *Fallen Heroes Memorial*. Retrieved May 17, 2007, from the Fallen Heroes Memorial web site: http://www.fallenheroesmemorial.com/

Flickr. (2007). *Flickr: Explore everyone's geotagged photos on a Map*. Retrieved May 7, 2007, from the Flickr Map web site: http://www.flickr.com/map/

Picasa. (2007). *Picasa – Picture Simplicity*. Retrieved May 7, 2007, from the Picasa web site: http://picasa.google.com

Galileo Navigation. (2007). *ESA – Galileo Navigation*. Retrieved May 7, 2007, from the ESA web site: http://www.esa.int/esaNA/galileo.html

Gauler, M. (2006). *Digital Remains*. Retrieved May 30, 2007, from the Michele Gauler web site: http://www.michelegauler.net/projects/digitalremains

Geocaching. (2007). *Geocaching.com*. Retrieved May 7, 2007, from the Geocaching web site: http://www.geocaching.com

GLONASS. (2007). *GLONASS*. Retrieved May 7, 2007, from the Russian Space Agency web site: http://www.glonass-ianc.rsa.ru/pls/htmldb/f?p=202:1:7379628375507121285

Google Earth (2007). *Google Earth - Explore, Search and Discover*. Retrieved May 7, 2007, from the Google Earth web site: http://earth.google.com

GPS. (2007). *GPS*. Retrieved May 7, 2007, from the GPS.gov web site: http://www.gps.gov/

ImmortalPets.com. (2006). *Immortal Pets - Online memorials for our pets*. Retrieved December 14, 2006, from the ImmortalPets web site: http://www.immortalpets.com/

Internet Archive. (2007). *Internet Archive*. Retrieved May 7, 2007 from the Internet Archive web site: http://www.archive.org

Last-Memories.com. (2006). *Last-Memories.com*. Retrieved December 6, 2006, from the Last-Memories web site: http://www.last-memories.com

Legacy.com. (2007). *Legacy.com*. Retrieved January 5, 2007 from the Legacy web site: http://www.legacy.com

LifeGem. (2006). *LifeGem created diamonds*. Retrieved December 10, 2006, from the LifeGem web site: http://www. lifegem.com

Lindsay, F. M. (2006). *The Virtual Memorial Garden*. Retrieved December 5, 2006, from The Virtual Memorial Garden web site: http://catless.ncl.ac.uk/vmg

Loki. (2007). Skyhook Wireless Inc. Retrieved May 7, 2007, from the Skyhook Wireless Inc. web site: http://loki.com

Mastaba. (2007). *Mastaba: Family Digital Shrine*. Retrieved May 30, 2007, from the Mastaba web site: http://mastaba.digital-shrine.com/

Memory-Of. (2006). *Memory-Of*. Retrieved December 5, 2006, from the Memory-Of web site: http://www.memory-of.com

MyDeathSpace.com. (2007). *MyDeathSpace.com*. Retrieved May 12, 2007, from the MyDeathSpace.com web site: http://www.mydeathspace.com

Malkin, E. (2006). *Cemetary 2.0*. Retrieved May 7, 2007, from the Bigredspark web site: http://www.bigredspark.com/survey.html

Memento Mori In Vitro. (2007). *Memento Mori In Vi*. Retrieved May 8, 2007, from the DESIGN INTERACTIONS AT THE RCA web site: http://www.interaction.rca.ac.uk/people/alumni/05-07/michael-burton/projects/project1.html

MINERVA. (2007). *MINERVA Knowledge base*. Retrieved May 13, 2007, from the MINERVA web site: http://www.minervaeurope.org

Mission Eternity. (2007). *Crossing the Deadline*. Retrieved May 30, 2007, from the Mission Eternity web site: http://missioneternity.org/

MyLastEmail.com. (2006). *MyLastEmail.com*. Retrieved December 4, 2006, from the MyLastEmail web site: http://www.mylastemail.com

NASA World Wind. (2007). *NASA World Wind*. Retrieved May 7, 2007, from the NASA web site: http://worldwind.arc.nasa.gov

National Obituary Archive. (2007). *National Obituary Archive*. Retrieved on the 20 of May 2007 from the National Obituary Archive web site: http://www.arrangeonline.com or http://www.nationalobituaryarchive.com

Nationell ArkivDatabas. (2007). *Nationell ArkivDatabas*. Retrieved April 6, 2007, from the Nationell ArkivDatabas web site: http://nad.ra.se/

Pet Remembrance. (2006). *Pet Remembrance - Online Pet Memorials*. Retrieved December 12, 2006, from the Petsremembrance web site: http://www.petsremembrance.com

Obituaryregistry.com. (2007). *Obituaryregistry.com*. Retrieved December 10, 2007, from the Youns web site: http://www. obituaryregistry.com

Obits.com. (2007). *The Internet Obituary Network*. Retrieved January 17, 2007, from the The Internet Obituary Network web site: http://obits.com
ObitsArchive.com. (2007). *ObitsArchive.com*. Retrieved on the 20 of May 2007 from the ObitsArchive web site: http://www.obitsarchive.com
OfficerDown. (2007). *OfficerDown.com*. Retrieved February 13, 2007, from the OfficerDown web site: http://www. officerdown.com

RoboGEO. (2007). *RoboGEO – georeference photos*. Retrieved May 7, 2007, from the RoboGEO web site: http://www.robogeo.com

Second Life. (2007). *Second Life*. Retrieved May 7, 2007 from the Second Life web site: http://secondlife.com

Sony Walkman (2007). *Sony Walkman*. Retrieved April 6, 2007, from the sony web site: http://www.sony.se/walkman

The Eternal Portal. (2006). *The Eternal Portal*. Retrieved December 5, 2006, from the The Eternal Portal web site: http://www.theeternalportal.com

Timecut. (2007). *Timecut*. Retrieved May 20, 2007 from the Timecut web site: http://www.timecut.se

TillMinneAv.se. (2006). TillMinneAv.se. Retrieved December 5, 2006, from the *TillMinneAv.se* web site: http://www.tillminneav.se

To Live 4 Ever. (2007). *To Live 4 Ever – Memorial*. Retrieved May 12, 2007, from the To Live 4 Ever web site: http://www.toliveforever.com

Virtual Graveyard. (2007). *Virtual Graveyard*. Retrieved May 12, 2007, from the VirtualGrave web site: http://www.virtualgrave.eu

Virtual Memorials. (2006). *Virtual Memorials*. Retrieved December 5, 2006, from the Virtual-Memorial web site: http://www.virtual-memorials.com

Youns.com. (2006). *Youns.com*. Retrieved December 12, 2006, from the Youns web site: http://www.youns.com

Appendix 1. Questionnaire

Internet Survey: Blogging by the Dead http//:www.datorpunkten.com/Survay)

Lund University

Department of Informatics

Hi,

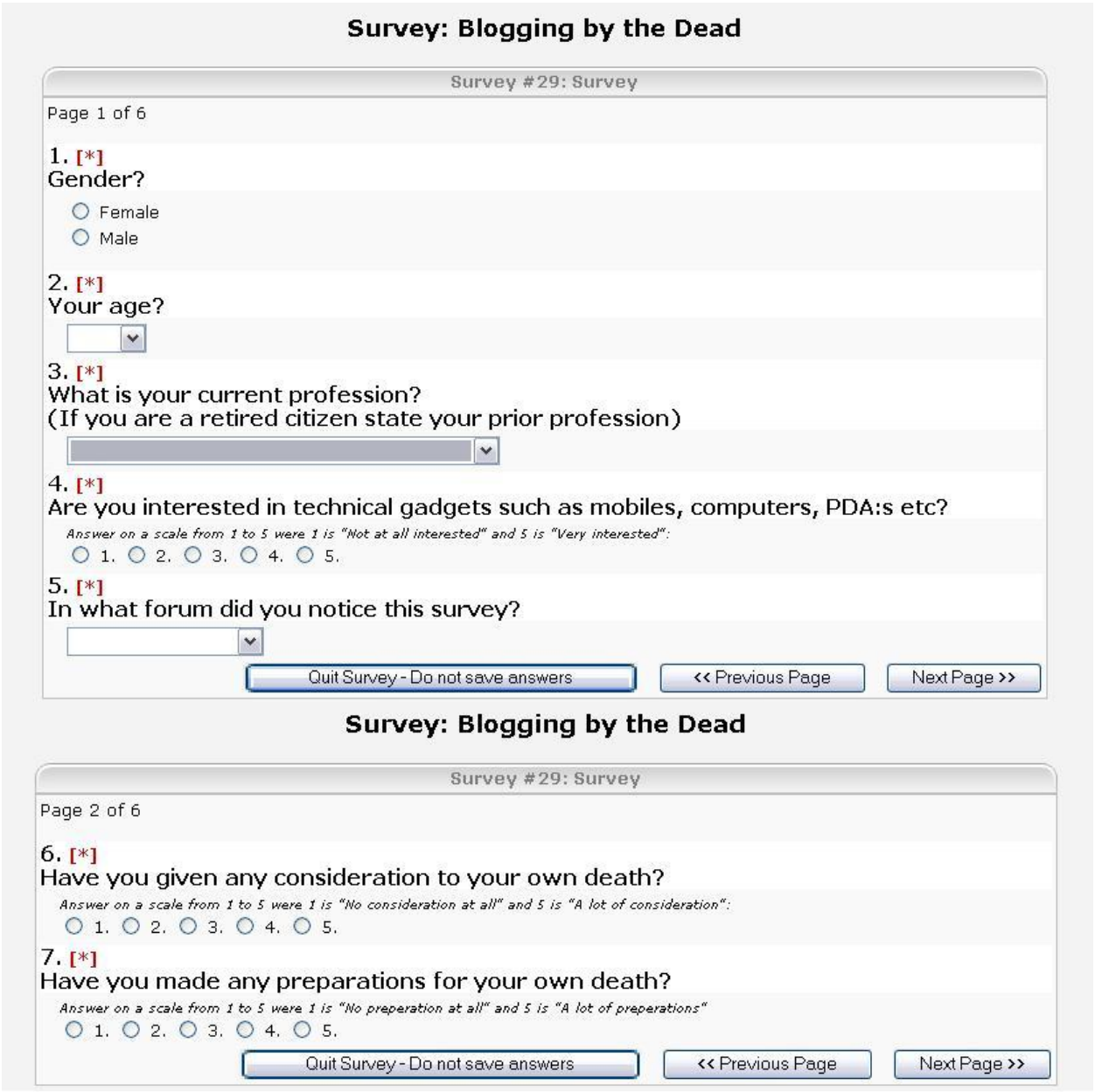
We represent Lund University in Sweden and research how modern information technology affects end of life traditions and what happens to digital information once someone has passed away.

For instance; How is personal digital information left behind after death (ie digital remains) used today and in what new ways could such information be used in the future? We are very interested in knowing how you feel and think about related issues and ask you kindly to participate in this survey that take about five minutes to complete.

To start the survey, click on the following link:

Start survey

Thank you in advance /
Anders, Dragan and Kristofer



Survey: Blogging by the Dead

Survey #29: Survey

Page 1 of 6

1. [*]
Gender?

- Female
- Male

2. [*]
Your age?

3. [*]
What is your current profession?
(If you are a retired citizen state your prior profession)

4. [*]
Are you interested in technical gadgets such as mobiles, computers, PDA:s etc?

Answer on a scale from 1 to 5 were 1 is "Not at all interested" and 5 is "Very interested":

1. 2. 3. 4. 5.

5. [*]
In what forum did you notice this survey?

Quit Survey - Do not save answers | << Previous Page | Next Page >>

Survey: Blogging by the Dead

Survey #29: Survey

Page 2 of 6

6. [*]
Have you given any consideration to your own death?

Answer on a scale from 1 to 5 were 1 is "No consideration at all" and 5 is "A lot of consideration":

1. 2. 3. 4. 5.

7. [*]
Have you made any preparations for your own death?

Answer on a scale from 1 to 5 were 1 is "No preperation at all" and 5 is "A lot of preperations"

1. 2. 3. 4. 5.

Quit Survey - Do not save answers | << Previous Page | Next Page >>

Survey: Blogging by the Dead

Survey #29: Survey

Page 3 of 6

8. [*]
Have you given any consideration to what people will do with your personal digital information after your death?

Answer on a scale from 1 to 5 were 1 is "No consideration at all" and 5 is "A lot of consideration":

○ 1. ○ 2. ○ 3. ○ 4. ○ 5.

9. [*]
Have you ever been subjected to a situation where you had to deal with digital remains from someone that died?

- ○ Yes
- ○ No
- ○ Not sure

10. [*]
Are you afraid that the perception of you as a person will change to something negative after your death? For instance; if someone found digital information regarding your life that changed the way they perceived you as a person.

Answer on a scale from 1 to 5 were 1 is "Not worried at all" and 5 is "Very worried":

○ 1. ○ 2. ○ 3. ○ 4. ○ 5.

Quit Survey - Do not save answers | << Previous Page | Next Page >>

Survey #29: Survey

Page 4 of 6

11. [*]
Who would you allow to access and manage digital media that you have left behind or is found belonging to you after your death (for instance your private mail, your pictures, your writings and so on).

Choose one or more alternatives

- ☐ A lawyer or lawyer firm appointed by you
- ☐ A religious leader or religious movement appointed by you
- ☐ A independent committee of ethical experts
- ☐ Your family or closest friends
- ☐ No one at all
- ☐ Other

12. [*]
Would it be interesting to leave behind digital media that you have singled out as important to be experienced by future generations after your death? For instance; personal photos, text, video, voice recordings or 3D animations.

Answer on a scale from 1 to 5 were 1 is "Not at all interested" and 5 is "Very interested":

○ 1. ○ 2. ○ 3. ○ 4. ○ 5.

13. [*]
Have you ever used or considered using any service that deal with end of life traditions or digital remains? For instance Online Memorials or Online Obituaries.

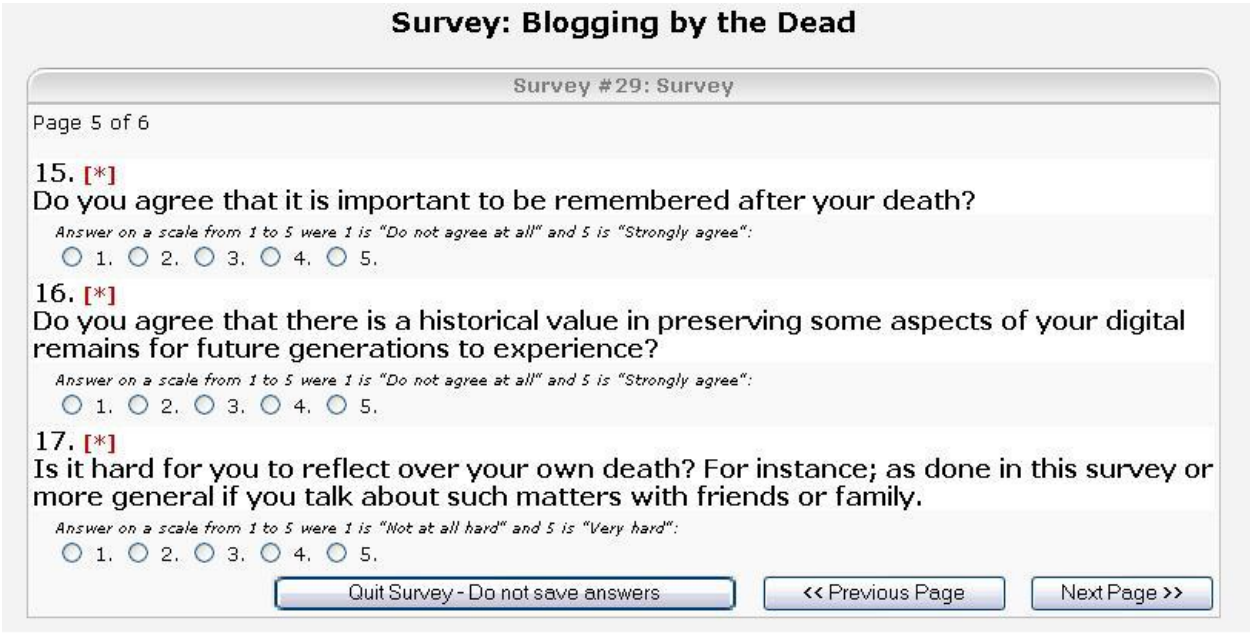
- ○ Yes
- ○ No
- ○ Not sure

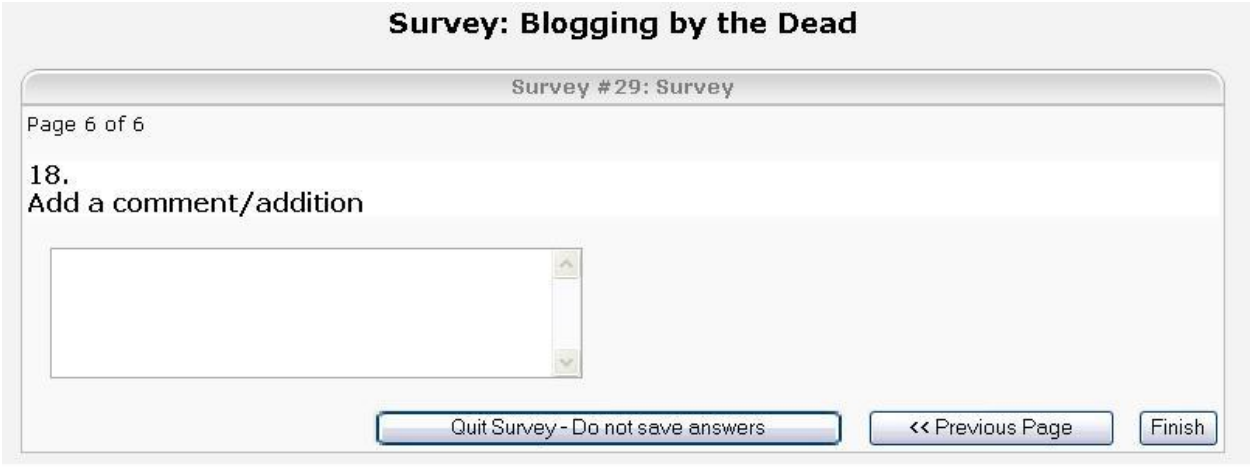
14. [*]
Would it be interesting to experience digital remains singled out and left behind by people now dead? For instance; personal photos, text, video, voice recordings or 3D animations.

Answer on a scale from 1 to 5 were 1 is "Not at all interested" and 5 is "Very interested":

○ 1. ○ 2. ○ 3. ○ 4. ○ 5.

Quit Survey - Do not save answers | << Previous Page | Next Page >>


Survey: Blogging by the Dead
Survey #29: Survey
Page 5 of 6
15. [*]
Do you agree that it is important to be remembered after your death?
Answer on a scale from 1 to 5 were 1 is "Do not agree at all" and 5 is "Strongly agree":
1. 2. 3. 4. 5.
16. [*]
Do you agree that there is a historical value in preserving some aspects of your digital remains for future generations to experience?
Answer on a scale from 1 to 5 were 1 is "Do not agree at all" and 5 is "Strongly agree":
1. 2. 3. 4. 5.
17. [*]
Is it hard for you to reflect over your own death? For instance; as done in this survey or more general if you talk about such matters with friends or family.
Answer on a scale from 1 to 5 were 1 is "Not at all hard" and 5 is "Very hard":
1. 2. 3. 4. 5.
Quit Survey - Do not save answers
<< Previous Page
Next Page >>


Survey: Blogging by the Dead
Survey #29: Survey
Page 6 of 6
18.
Add a comment/addition
Quit Survey - Do not save answers
<< Previous Page
Finish

Appendix 2. Interview guide

Demographic:

1. **How old are you?**
2. **What sex (don't ask)?**
3. **What is your current profession?**
4. **Are you interested in technical gadgets such as mobiles, computers, PDA:s etc?**

Quick Questions I:

1. **Have you given any consideration to your own death?**

2. **Have you made any preparations for your own death?**

3. **Have you given any consideration to what people will do with your personal digital information after your death?**

Part I: About someone else

1. **Think of someone you care a lot about and then think of them not being there anymore. How would you like to remember them?**

2. **Would it be interesting to experience "memories" singled out and left behind by people now dead? Even from dead people you don't know.**

3. **If you could re-experience parts of a loved one's life through digital media, what parts would you like to experience again?**

a. **What would you Not want to experience again?**

4. **What would you do if you had to deal with your with best friends digital remain after his/her death?**

5. **Would it be interesting to experience "memories" singled out and left behind by people now dead at the geographic places they occurred? Imaging you could walk up to your since long passed away friend Bobs old house and experience his digital memories at that location and experience his memories about that location – would that be interesting?**

6. **Imaging you could experience digital memories testament, from dead friends or even unknown persons, at geographic location (cities, buildings, in the nature) all over the world – would that be interesting?**

Part II: About you

1. **Would you like to leave a digital footprint on the world "I was here" and let the world know more about yourself after you're gone?**

a. **In case of yes or maybe, what events and/or messages from your life would you like to convey to others. In essence, "How do you want to be remembered"?**

b. In case of yes or maybe, if you could testament some digital memories and attach them to geographic locations such as your family house and we would make those memories accessible after your death for your relatives to experience at that location – would that be interesting.

c. In case of yes or maybe, do you agree that it is important to be remembered after your death?

d. In case of yes or maybe, do you agree that there is a historical value in preserving some aspects of "memories" for future generations to experience?

Access:

e. In case of yes or maybe, who would you allow to access and manage digital media that you have left behind or is found belonging to you after your death (for instance your private mail, your pictures, your writings and so on).

f. In case of yes or maybe, if your memories left behind for use with Blogging by the Dead were by law forced to be checked for things such as hateful or angry statements against other people and explicit content (to some extent), who would you trust to perform this task? We have considered religious people a priest or holy official much like before a funeral in church (an example) and for atheists only close family and lawyers as censors.

g. In case of yes or maybe, would you like the idea that your digital memories were regulated and guaranteed by lawyers much in the same way a testimony is today?

h. Are you afraid that the perception of you as a person will change to something negative after your death? For instance; if someone found digital information regarding your life that changed the way they perceived you as a person.

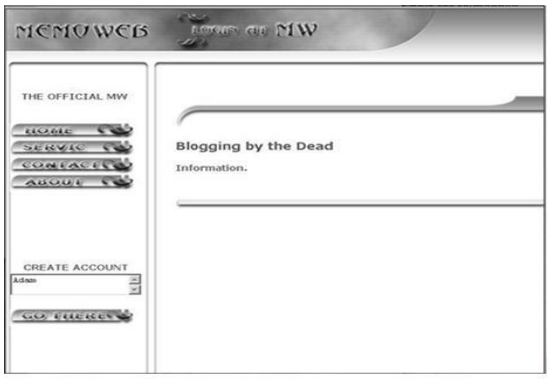
Quick questions II:

1. Do you find it hard to think/speak about your own death and your legacy after death?

Reflections and comments (anything beyond the question above – summaries -):

(See next page for graphics used in connection to the interview presentation)

Concept graphics shown to interviewees in connection to presentation of the concept Blogging by the Dead.


MEMOWEB
THE OFFICIAL MW
Blogging by the Dead
Information.
CREATE ACCOUNT
GO THERE!


TEXT MESSAGE

Appendix 3. Websites where the survey was published

In total 20 unique forums were used.

Thread-names that were used:

> Modern technology and ancient end of life traditions? or How does modern technology affect end of life traditions?

Presentation used in forums:

> "Hi,
>
> We represent Lund University in Sweden and research how modern information technology affects end of life traditions and what happens to digital information once someone has passed away. We are very interested in knowing how you feel and think about related issues and ask you kindly to participate in this anonymous survey that take about five minutes to complete.
>
> If you leave your email at the end of the survey the final paper will be sent to you for your convenience. To start the survey, click on the following link (with more details about our work):
> http://www.datorpunkten.com/Survey/intro/
>
> Thank you in advance /
> Anders, Dragan and Kristofer"

Age mixed, mixed theme

* Forum login; username: Lund University password: trafikBuller
(Philosophy & Debate) Name to list in survey = Able2Know
http://www.able2know.com/forums/ask-about43.html
Total Topics: 2446 | Total Posts: 95338

* Forum login; username: Lund University password: trafikBuller
(Second life name "Draganb Allen")
(Virtual world with a plethora of different people) Name to list in survey = Second Life
http://forums.secondlife.com/
Total Topics: potentially huge | Total Posts: potentially huge

* Forum login; username: Lunds Univ password: trafikBull
(Travel) Name to list in survey = Travellerspoint
http://www.travellerspoint.com/forum.cfm?ForumID=1
Total Topics: 3338 | Total Posts: 820,050

* Forum login; username: Lund University password: trafikBuller

(Genealogy) Name to list in survey = British Genealogy
http://www.british-genealogy.com/forums/forumdisplay.php?f=46
Total Topics: 725 | Total Posts: 6,743

* Forum login; username: LundUniver password: trafikBuller
(Blog forum) Name to list in survey = Blogger Forum
http://www.bloggerforum.com/modules/newbb/viewforum.php?forum=1
Total Topics: 4445 | Total Posts: 18391

* Forum login; username: lund_university password: trafikBuller
(Gardening) Name to list in survey = iVillage GardenWeb
http://forums2.gardenweb.com/forums/party/
Total Topics: potentially very large | Total Posts: potentially very large

* Forum login; username: LundsUniversity password: trafikBuller
(Teen / young adult forum) Name to list in survey = Nexopia
http://www.nexopia.com/forums.php
Total Topics: 1230395 | Total Posts: 20608114

* Forum login; username: LundUniversity password: trafikBuller
(Teen / young adult forum) Name to list in survey = Gaia Online
http://www.gaiaonline.com/forum/viewforum.php?f=2
Total Topics: potentially huge | Total Posts: 1003521820 (includes all forums)

* Forum login; username: draganb password: pN6efJ2x
(Music forum) Name to list in survey = Pure Volume
http://www.purevolume.com/forums/viewforum.php?f=10&sid=721e702b2135bd5c3b83bd84a9a258e8
Total Topics: 245,255 | Total Posts: 5,841,57

* Forum login; username: Lund University password: trafikBuller
(Disney forum) Name to list in survey = DISboards
http://www.disboards.com/forumdisplay.php?s=2d8ec9af51806a7795b3652e7e9b8074&f=33
Total Topics: 23609 | Total Posts: 849026

* Forum login; username: Lund University password: trafikBuller
(Disney forum) Name to list in survey = DiscussAnything
http://www.discussanything.com/forums/forumdisplay.php?s=b694b788210b2d8c243d19c044164a9d&f=26
Total Topics: 15,103 | Total Posts: 287,575

Age mixed, religious theme

* Forum login; username: LundUniversity password: trafikBuller
(Christian forum, very active writers!) Name to list in survey = Christian Forums
http://www.christianforums.com/showthread.php?p=33965876#post33965876
Total Topics: 85,885 | Total Posts: 2,015,743

* Forum login; username: LundUniversity password: trafikBuller
(Christian forum, very active writers!) Name to list in survey = Christian Forums
http://www.christianforums.com/f80-general-theology.html
Total Topics: 29,778 | Total Posts: 979,673

* Forum login; username: 397965643 password: trafikBu
(ICQ forums, regarding Theology etc.) Name to list in survey = ICQ Forums
http://boards.icq.com/boards/browse_folder.php?tid=295
Total Topics: 1833 | Total Posts:

* Forum login; username: Lund University password: trafikBuller
(Christian forum, very active writers) Name to list in survey = Internet Infidels
http://www.christianforums.com/f80-general-theology.html
Total Topics: 9,957 | Total Posts: 231,041

Age mixed, service-related theme

* Forum login; username: Lund University password: trafikBu
(regarding loss of a child) Name to list in survey = Memory-Of
http://www.memory-of.com/Forums/ShowForum.aspx?ForumID=18
Total Topics: 4996 | Total Posts: 34581

* Forum login; username: Lund University password: trafikBuller
(Grief) Name to list in survey = MotheringDotCommune
http://www.mothering.com/discussions/forumdisplay.php?s=a1f530f7f9604bdc5ae3e0713808ff33&f=64
Total Topics: 838 | Total Posts: 10,300

* Forum login; username: Lund University password: trafikBuller
(Grief) Name to list in survey = Psych Forums
http://www.psychforums.com/viewforum.php?f=130
Total Topics: 109 | Total Posts: 816

* Forum login; username: Lund University password: trafikBuller
(Grief) Name to list in survey = Parenthood
http://forums.parenthood.com/viewforum.php?f=108&sid=95ab8bb5c5b0809a0afee7ce2d42d808
Total Topics: 109 | Total Posts: 816

Age seniors

* Forum login; username: LundUniversity password: trafikBuller
(Senior citizens) Name to list in survey = SeniorNet
http://discussions.seniornet.org/webx?13@501.QFnfag9ljtD.0@.4a84ec0b
Total Topics: below 500 | Total Posts: below 10000 (in total)

* Forum login; username: LUNDUNIVERSITY password: trafikBuller

(Senior citizens) Name to list in survey = ThirdAge
http://www.thirdage.com/WebX?14@94.sa1odGMa08j^0@.eed47e1/
Total Topics: below 500 | Total Posts: below 10000 (in total)

* Forum login; username: LUNDUNIVERSITY password: trafikBuller
(Senior citizens) Name to list in survey = ThirdAge
http://www.thirdage.com/WebX?14@94.sa1odGMa08j^0@.ef74d3e/
Total Topics: below 500 | Total Posts: below 10000 (in total)

Age mixed, technology oriented theme

* Forum login; username: Lund University password: trafikBuller
(Industrial Design, general discussion) Name to list in survey = Core77
http://boards.core77.com/viewforum.php?f=5&sid=faebf1eebbec80b467cc77717ce3d5ea
Total Topics: 2895 | Total Posts: 22501

* Forum login; username: LundUniversity password: trafikBuller
(GPS-forum) Name to list in survey = Pocket GPS World
http://www.pocketgpsworld.com/modules.php?name=Forums&file=viewforum&f=29
Total Topics: 7465 Total Posts: 31325

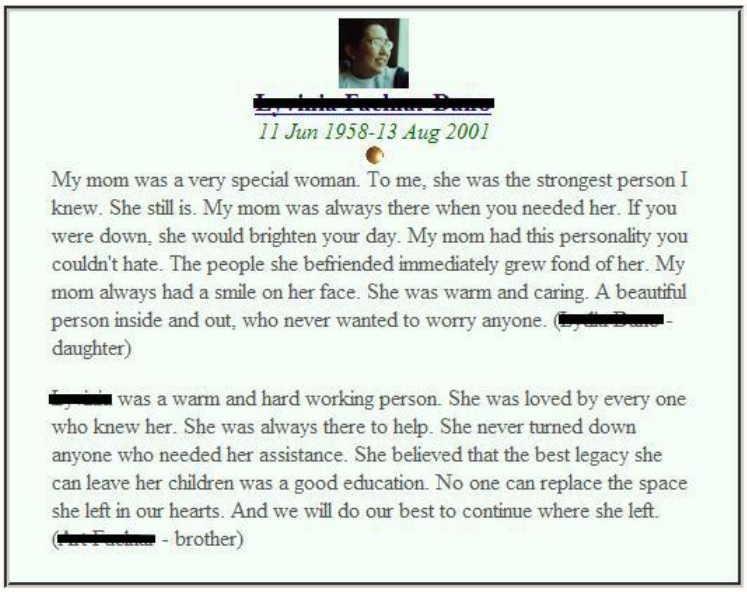
* Forum login; username: Lund University password: trafikBuller
(Mobile phones, motorola) Name to list in survey = Howard Forums
http://www.howardforums.com/forumdisplay.php?s=45cde3e0db87042c39b2533d0e9bdf65&f=38
Total Topics: 89,402 | Total Posts: 609,510

* Forum login; username: Lund University password: trafikBuller
(Computer hardware forums) Name to list in survey = Howard Forums
http://www.howardforums.com/forumdisplay.php?s=45cde3e0db87042c39b2533d0e9bdf65&f=57
Total Topics: 43,163 | Total Posts: 912,089

* Forum login; username: LundUniversity password: trafikbuller
(Computer hardware forums) Name to list in survey = Toms Hardware
http://forumz.tomshardware.com/community/Other-forum-4.html
Total Topics: 13268 | Total Posts: 388929

APPENDIX 4. Additional memorials.

The first memorial is from the Virtual Memorial Garden, featuring a photo and some text. The visitor can send in comments to the memorial which is displayed on a separate page.



[redacted]

11 Jun 1958-13 Aug 2001

My mom was a very special woman. To me, she was the strongest person I knew. She still is. My mom was always there when you needed her. If you were down, she would brighten your day. My mom had this personality you couldn't hate. The people she befriended immediately grew fond of her. My mom always had a smile on her face. She was warm and caring. A beautiful person inside and out, who never wanted to worry anyone. ([redacted] - daughter)

[redacted] was a warm and hard working person. She was loved by every one who knew her. She was always there to help. She never turned down anyone who needed her assistance. She believed that the best legacy she can leave her children was a good education. No one can replace the space she left in our hearts. And we will do our best to continue where she left. ([redacted] - brother)

The second example is from Memory-Of.com. It contains links to different parts of the memorial, background music, photos, tributes, memorial candles and so on.

Memory Of

Library of Life

Memory-Of.com
Create Memorial Site
Sympathy Gifts
Search for Memorial
First Name:
Last Name:
Search
Advanced Search
Forums
FAQ
Features
Testimonials

[redacted]

(1935-2007)

About Her | Tributes & Condolences | Photo Album | Memorial Candles | Audio & Video | Her Legacy | Her Timeline | Edit Site

This memorial website was created in the memory of our loved one [redacted] who was born in Pennsylvania on June 05,1935 and passed away at her home in Philadelphia on April 22, 2007 at the age of 71.

[redacted] leaves to cherish her memories her husband [redacted] Sr, daughter [redacted], Son [redacted], Sister [redacted], brother [redacted] Sr, Neice [redacted], Nephew [redacted], several grandchildren, great-grandchildren,cousins, sisters-in-laws, brother-in-laws and host of friends.

We will remember her forever.

Please use this site to "light a candle" or post any memories of loved one [redacted] affectionately known as [redacted] MOM.

We offer our sincerest thanks to all those shared her joyous days and those who sent cards,flowers,meals and

This memorial website was created by [redacted] on 04/24/2007.
click here to contact Stephanie

Stop music

Sponsorship

The hosting of this website is sponsored by [redacted]

Memorial Candles

Friends &. Family lit a candle on 05/13/2007: "Happy Mother Day [redacted] MomMom remembering our

The third example is from Last-memories.com. We can see the same kind of features as in the previous memorial.

The fourth example is from TheEternalPortal.com. Features are roughly the same.

APPENDIX 5. PIOR RESULTS

We received some interesting feedback from people that suggested that people not only want to leave digital memories for the after world but also experience digital remains of the dead during their lives, and perhaps even experience and publish those memories at the geo-spatial location were the memories occurred.

Several other areas were also probed and explored in connection with Blogging by the Dead (BbtD). In general, we got a glimpse into an unexplored area were ethical and existential question rose to the top of our list of things we needed to inquire potential users about.

The findings from the BbtD study were mainly of a qualitative nature and gave us hints and direction in our concept development. We did a few extensive interviews with random interviewees in the age range of 14 to 70 (18 to be more specific, plus a few targeted interviews). Though we mostly found value in personal statements given by people on end of life traditions we feel that the quantitative data that we extracted from the interviews better illustrates the BbtD study and what questions we investigated at that time.[23] This notion is also supported by Miles et al. (1994). It is important to note that these charts do not show how much interest the interviewees have in leaving digital remains, only that they think it sounds like a good idea. In other words, these charts mostly show indications and hints we can build upon in this paper.

Chart 17, do the interviewees want to experience digital remains?

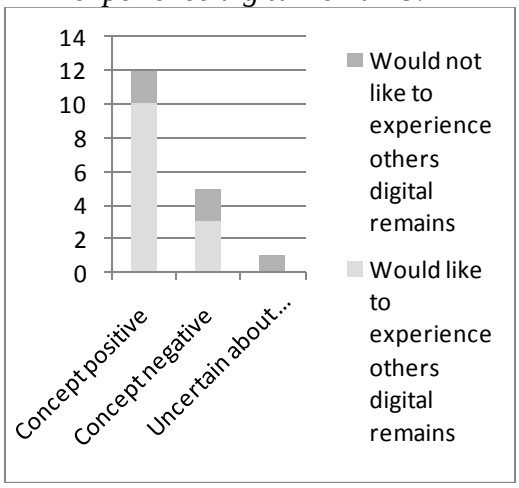


Chart 18, do the interviewees want to leave digital remains for others to experience?

[23] The resulting concept from the Blogging by the Dead study is presented in full, *with updates*, in chapter 4.3.

Chart 19, what the interviewees think of talking about death?

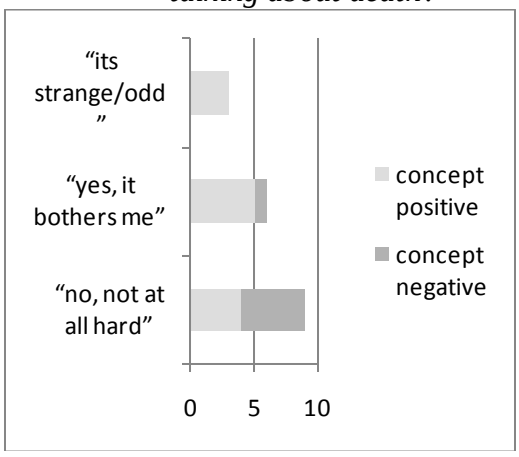


Chart 20 how the interviewees think about and whether they prepare for death

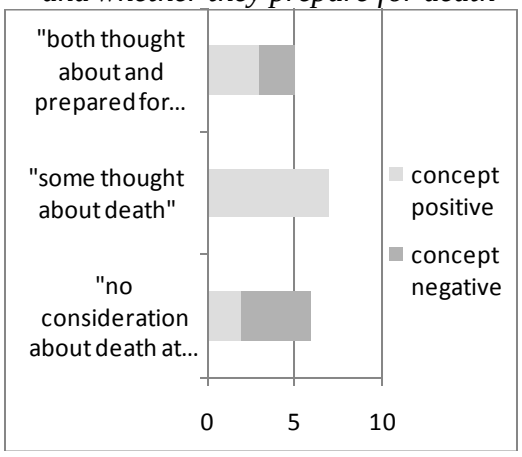


Chart 5 below to the left shows who is allowed to access and manage the interviewees digital remains (suggestions given by interviewees if it was required that someone had to deal with their digital remains after death). *Chart 6* to the right shows locations where the interviewees would like to experience digital remains of relatives.

Chart 21, who is allowed to manage the interviewees digital remains?

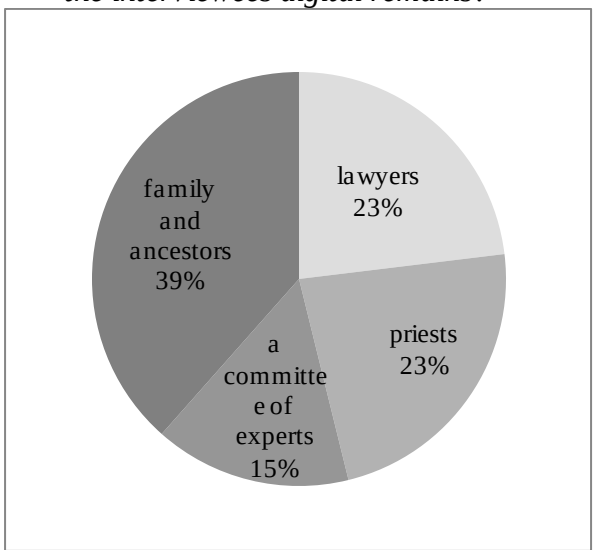


Chart 22, locations where the interviewees would like to experience digital remains (of relatives)

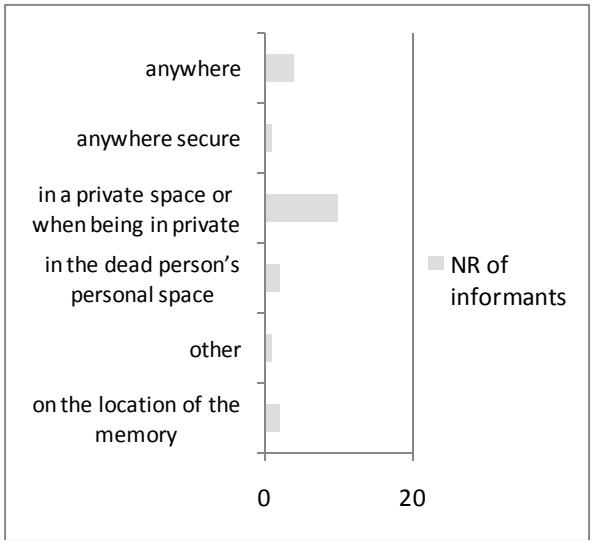


Chart 7 to the left shows if the interviewees, to some extent, fear being remembered in a negative way after death. *Chart 8* to the right shows who is allowed to access their digital remains (in connection to Blogging by the Dead).

Chart 23, are the interviewees afraid of being remembered in a negative way after death?

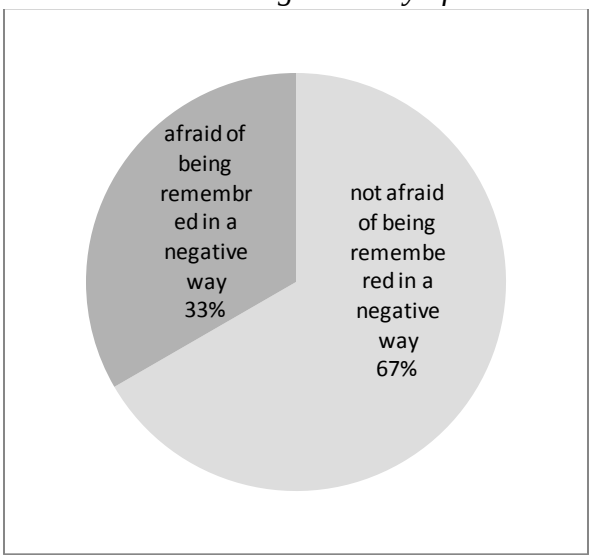
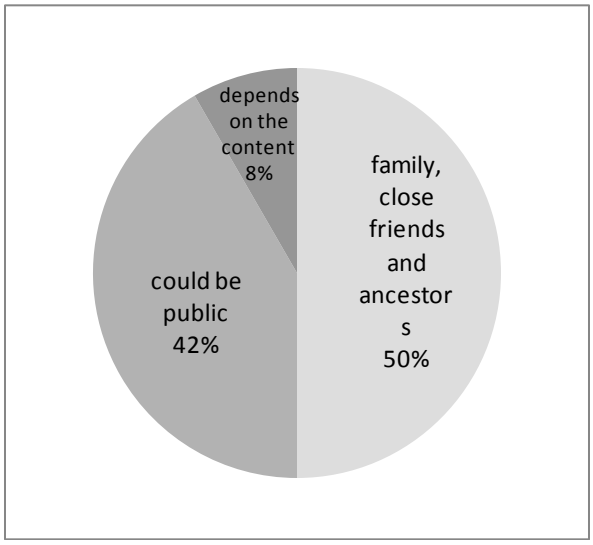


Chart 24, who is allowed to access the interviewees digital remains



Facing the task of explaining for instance location-aware computing to the user we also created interaction use-scenarios and interfaces for mobile-interaction in relation to the concept. This was first and foremost helpful when explaining to the user how information could be retrieved and accessed in the environment and secondly useful for exploring different interaction solutions in connection to the concept.

We later defined several use-qualities (Löwgren, 2006) of interest in mobile interaction with BbtD and those qualities set out somewhat in comparison to regular map-based mobile interaction. In short, we had a hard time finding interfaces and interaction techniques that fit the use-qualities we sought. As a consequence we started exploring and creating our own interfaces.

APPENDIX 6. INTERVIEW TRANSCRIPTS

Interviewees

1. Janitor. 65, male.
2. Student. 38, female.
3. Industry. 25, male.
4. Engineer. 38, female.
5. Production manager. 31, male.
6. Film producer. 41, male.

Demographic

1. Question: How old are you?

65 (Janitor, male).
38 (Student, female).
25 (Industry, male).
38 (Engineer, female).
31 (Production manager, male).
41 (Film producer, male).

2. Question: What sex (don't ask)?

Male (Janitor, 65).
Female (Student, 38).
Male (Industry, 25).
Female (Engineer, 38).
Male (Production manager, 31).
Male (Film producer, 41).

3. Question: What is your current profession?

Janitor. (65, male)
Student. (38, female)
Industry worker, I build machines. (25, male)
Engineer. (38, female)
Production manager (31, male)
Film producer, (41, male)

4. **Question: Are you interested in technical gadgets such as mobiles, computers, PDA:s etc?**

"Yes, in a way. Taking pictures is actually my hobby. I never thought I'll change my ordinary camera (analoga vanilga kamera), into a digital camera, but I did. Amazing how god the quality actually is.
Due to this I have been working with my computer even more, since I'm editing (e.g. read eyes) my digital picture and saving them on CDs as well." *(Janitor. 65, male)*

"No, no interest at all actually. But I'm learning fast." *(Student. 38, female)*

"Well, not really. I'm interested in technology but I don't exactly keep up to date on every new gadget." *(Industry worker. 25, male)*

"No, not rely. It's a must in my work but I have no deeper interest in technical stuff." *(Engineer. 38, female)*

"Yes! I'm very interested in all kinds of gadgets, especially mobile phones and such. I love PDA:s!" *(Production manager. 31, male)*

"Yes, I'm not late on buying a new phone model for instance. I have both a PC and a Mac, I don't know how the work, I mean inside and so, I just want them to function for surfing, mailing, picture editing, writing and so on." *(Film producer. 41, male)*

Quick Questions

1. **Question: Have you given any consideration to your own death?**

"Sometime, not in a way that I go around and thinking about it all the time. I mean, I think everyone has thought about it sometime." *(Janitor. 65, male)*

"Yes, on daily basis. Cause I see to much shit that happens around me. Probably due to, since I previously was working at the hospital, working with dying people. And I read the death adds (döds annonser) often." *(Student. 38, female)*

"No, not at all." *(Industry worker. 25, male)*

"Yes, since my father died in cancer some years ago (not that old)." *(Engineer. 38, female)*

"Sure, to some degree. Everybody dies." *(Production manager. 31, male)*

"Well, it happens from time to time, my parent is not getting any younger, and neither I'm. I see my kids grow up. I remember when my first kid began I kindergarten, the first day, and

now he's beginning in third grade (tredje klass), and my daughter in first grade. Suddenly they are just grown up, and we just never reflect of it, how fast the time goes by." *(Film producer. 41, male)*

2. Question: Have you made any preparations for your own death?

"In a way, since one always have to deal with insurance paper from time to time, and since I'm just retired (gick I pension) there is papers as well to be filled in regarding this question. For instance who will get the insurance money or similar must be dealt with and filled in the papers. If I'll get injured or die, I mean, my grown up children and my partner will inherit me. Regardless you want it or not, some preparation must be done, I mean it is almost forced on you, by external companies such as insurance companies, AMF and other pensions companies, where you must state who will inherit you or similar." *(Janitor. 65, male)*

"Yes. Insurance papers, home insurance and personal letter."
(Student. 38, female)

"I wouldn't say so, no. It would feel a bit depressing to start thinking about that now." *(Industry worker. 25, male)*

"Yes, since I have two children, husband I think it's important to do some preparation. I mean, for my father it went so fast, you never know." *(Engineer. 38, female)*

"No, none at all. Like practical stuff, wills and such? No, not at all. Besides I don't have anything to will really so I haven't felt the need." *(Production manager. 31, male)*

"No, not really, but I´m thinking about it from time to time." *(Film producer. 41, male)*

3. Question: Have you given any consideration to what people will do with your personal digital information after your death?

"No, haven really not given it any thought actually." *(Janitor. 65, male)*

"No." *(Student. 38, female)*

"Well I don't think I have that much in terms of digital information. *** Sub Question: Mail conversations, forums, pictures, stuff like that? I don't think mails and forums and such contain that much.. Maybe pictures and things like that on my disks. Things I save myself. Somehow I would like to keep it, question is if my parents and such would think about going through my computer for things like that. My father is pretty technologically adept; he would probably sit down and have a look at it. In general I think people would just put the computer somewhere or sell it or throw it away." *(Industry worker. 25, male)*

"Interesting question, never thought about it. At work, they own the data there. But my private data in my home PC, no." *(Engineer. 38, female)*

"No. I do have plenty of digital information but I haven't really thought about it." *(Production manager. 31, male)*

"Yes, I have. I have written quite a lot and filmed, so there is lots of material that I would like my children to keep and to show their children." *(Film producer. 41, male)*

Part I: About someone else.

1. **Question: Think of someone you care a lot about and then think of them not being there anymore. How would you like to remember them?**

"By thinking of them, looking at pictures, maybe now with your concept visit the same places they where at. Maybe not me, but my children could do this." *(Janitor. 65, male)*

"With joy, of course." *(Student. 38, female)*

"How I would like to remember that person? I would like to remember that person in how we would hang out. Things we had done together." *(Industry worker. 25, male)*

"In the best moments they had." *(Engineer. 38, female)*

"Mostly things we have done together, things based on common experiences." *(Production manager. 31, male)*

"I would like to have the memories of my loved ones close to me. So that I could easily access it." *(Film producer. 41, male)*

2. **Question: Would it be interesting to experience "memories" singled out and left behind by people now dead? Even from dead people you don't know.**

"Yes, why not. Could be interesting, maybe you can get to know a person cutie well even if they are now dead.
If the person have left behind memories of his or her life, (like in the scenario), you could easy find a interesting character and see where they went and did, or hear what they had to say. " *(Janitor. 65, male)*

"Yes, it would be interesting, yes." *(Student. 38, female)*

"Sure, absolutely. Maybe. **Sub Question: Even from dead people you don't know?
That depends, if it's very personal memories that he has documented I don't think that would be so interesting. But if it would be someone that was famous for something it might be more interesting. But just accessing some random person's personal stuff wouldn't feel that interesting." *(Industry worker. 25, male)*

"Yes, why not. Isn't it a human load, take a sneak peek at other peoples maybe secret stuff, and if it was available then why not. But then of course if it was available to all it would not be that secret." *(Engineer. 38, female)*

"It could be interesting, it could also be hard, and it depends. But sure, it would. **Sub Question: Even from dead people you don't know? If they are interesting somehow, they don't have to be someone I know. They can be interesting for other reasons. Company managers, or people that have done things I haven't and I want to learn more about that. So sure, but not everybody. It should have to do with things I'm interested in." *(Production manager. 31, male)*

"Yes. It would be kind of interesting to learn to know somebody after they are gone." *(Film producer. 41, male)*

3. Question: (a). If you could re-experience parts of a loved one's life through digital media, what parts would you like to experience again?
(b). What would you Not want to experience again?

(a) "All the nice things of course."
(b) "The opposite, times of illness, and/or bad things that maybe happened during life. Fortunately I had not experience any greater negative things."
(Janitor. 65, male)

(a) "I'll would remember, don't know, depends on my daily mood, how a feel just that day. "
(b) "Don't want to see bad stuff, but I really don't know."
(Student. 38, female)

(a) "That's a really strange question. Fun things we did together I guess."
(b) "I'd say anything depressing or sad."
(Industry worker. 25, male)

(a) "All the happy moments."
(b) "For instance when my father was sick, before he died. Bad stuff in general."
(Engineer. 38, female)

(a) "Hard to say because it's very individual. But… things that made them happy. But also if people hurt them somehow, so I can find them and claim payback! If it's my wife of children, I'd also like to know who's been bad against them."
(b) "Their intimate things. Things they think would be embarrassing if others found out. **Sub Question: You would respect their personal sphere? Yes, definitely."
(Production manager. 31, male)

(a) "The moments when we laughed together."
(b) "The bad things."
(Film producer. 41, male)

4. Question: What would you do if you had to deal with you're with best friends digital remain after his/her death?

"I don't know, maybe tried to save the digital remains in a safe way. But I'll would not like to be responsible for it. There should be a place; one can hand in things like that, so that the digital remains were taken care of. " *(Janitor. 65, male)*

"First of all made a safety copy and then I'll watch the memories as well." *(Student. 38, female)*

"I'd naturally try to secure it somehow. Question is how, burning it to DVD:s might not be that good. I wouldn't just put it out on the net that would be like exposing that person. Just somehow secure it and save it. ***Sub Question: Would you sort it and pick out bits, maybe to make an album or something like that? Maybe, but that would probably have to be some time after he or she died. It would be too sensitive to do it just after a person passed away, that would be a bit too depressing." *(Industry worker. 25, male)*

"I'll check it, and see if there was any material important to save." *(Engineer. 38, female)*

"Would he give me any instructions? **Sub Question: Assuming he passed away and you were asked to take care of his digital belongings.
I would probably just burn everything (on DVDs) and give it to his family. I wouldn't look at it… then I would format the drive." *(Production manager. 31, male)*

"I would find somebody that could store it for me. I wouldn't like to have it in my home computer. I would like to access it from home though." *(Film producer. 41, male)*

5. Question: Would it be interesting to experience "memories" singled out and left behind by people now dead at the geographic places they occurred? Imaging you could walk up to your since long passed away friend Bobs old house and experience his digital memories at that location and experience his memories about that location – would that be interesting?

"That would be nice, to visit old friends that had passed away, and be at the same place as they were." *(Janitor. 65, male)*

"No, think it is not necessary to be at the place. I would like to be somewhere else maybe, especially if the memories is from the nearest." *(Student. 38, female)*

"Sure, that sounds interesting. In a way." *(Industry worker. 25, male)*

"Yes, my father was in Mexico ones with his work, if he had taken pictures there then, we could travel there and see what places he visited and so on. Both of my children had never met him, if this (concept) was possible then, they could get to know him." *(Engineer. 38, female)*

"Yes, I think it's better to see things in its context. It would add more. Sometimes when things are pulled out of its context they don't mean as much, or they could mean something entirely different. It's like sentences pulled out of their context." *(Production manager. 31, male)*

"Yes, I think I would like that." *(Film producer. 41, male)*

6. Question: Imaging you could experience digital memories testament, from dead friends or even unknown persons, at geographic location (cities, buildings, in the nature) all over the world – would that be interesting?

"Yes, if you find an interesting person (even that you don't know), it would be interesting to see what this person did and went. If the person is boring you could just find a new one to follow instead (the respondent laughs)." *(Janitor. 65, male)*

"Yes, from unknown persons it would be interesting." *(Student. 38, female)*

"It would be more interesting from a parent's perspective for example, to show ones childhood home… It would be more interesting to experience that after they passed away than it would be for a friend. It's more likely you had a similar upbringing as friends than you and your parents so it would be more interesting to see your parents. So maybe more from a historical point of view." *(Industry worker. 25, male)*

"Yes, very interesting." *(Engineer. 38, female)*

"It depends, when someone dies you also want a balance between what has been and what is now. Maybe you want to live your life here and now and don't want to be reminded all the time. Overall yes but with some modification." *(Production manager. 31, male)*

"I'm not sure about unknown persons. But if I could get in and out of the memories with little effort I guess that curiosity would get the best of me." *(Film producer. 41, male)*

Part II: About you.

1. Question: Would you like to leave a digital footprint on the world "I was here" and let the world know more about yourself after you're gone?
(a). In case of yes or maybe, what events and/or messages from your life would you like to convey to others. In essence, "How do you want to be remembered"?

"In a nice way, of course. Maybe when I have fun on holidays or vacations." *(Janitor. 65, male)*

"I'll would leave happy memory." *(Student. 38, female)*

"Yes. But for who? If you knew that someone would look at it after you passed away you could go for it, document more and such. Maybe it's a bit early to document things when you're young? But in the same time it's too late to do it when you're 85 and stuck in the elderly home. But it's so unrealistic for me to think of now, that someone will go through my digital stuff when I'm gone. But when I'm old I'll still have things stored, probably a lot of things stored. I would naturally try to describe myself and what I did. Like my hobbies for examples, maybe my parents would understand more about me if I described them." *(Industry worker. 25, male)*

"In a nice way, of course. Maybe when I have fun on holidays or vacations." *(Engineer. 38, female)*

"Well sure, that's like leaving it on paper or any other media. Sure it would be interesting. When I think of people remembering someone, it's because they did something big. Like Alexander the great. And thinking of myself compared to that I wonder what I have done in the world. I don't think of the every day stuff, but I would like to have something to leave for the world. ***Sub Question: So you think there's a historical value in leaving things for the world? Not for any man, no. It might be interesting for scholars that want to see how you lived in a certain era, but that would be about it. I don't think we today in general is interested about how they lived in the middle ages in their every day life, how many hours they plowed their field ant that their plow broke because they hit a stone with it and such. But were all interested in knowing why wars started and big important events like that. But there can be an emotional value for their families and such, but not for people in general.
My experiences, so people can learn from them. I have lived a very good life, and then there was a war when I was 16; literally over one night everything changed. I lived in an occupied city like big game (storvilt) during hunting season. I lived under occupation for three years and survived genocide, and then I came here and started all over. I was 19 and had experienced more than some people experience in a lifetime. I had learned a lot about people, and some things don't bite on me. I've come to some insights and I'm not really politically correct about some things to say the least. So if I was to leave anything, it would be personal experiences." *(Production manager. 31, male)*

"In a good way. I would like to be of comfort to my friends and family even when I´m gone." *(Film producer. 41, male)*

(b). In case of yes or maybe, if you could testament some digital memories and attach them to geographic locations such as your family house and we would make those memories accessible after your death for your relatives to experience at that location – would that be interesting.

"Yes, it will probably give the viewer a greater experience watching media at the right location, if you mean as in the scenario." *(Janitor. 65, male)*

"No, since I think that we should be able to reach memories from where we want, and not be limited. It should be optional, so you could be at the location, but also access the memories from your nearest family from anywhere." *(Student. 38, female)*

"Yes, that sounds kind of fun. Especially if you could save pictures and things for the future, for your kids and such. And for grandchildren and so on. As I said, from a historical perspective it could be fun for my grandkids to see how their grandpa lived, how I grew up and such." *(Industry worker. 25, male)*

"Yes, that would be interesting. My children could visit me." *(Engineer. 38, female)*

"Sure, it would. Like showing where I lived and such." *(Production manager. 31, male)*

"Yes, I would like that. But if it could be accessible to my relatives and friends only." *(Film producer. 41, male)*

(c). In case of yes or maybe, do you agree that it is important to be remembered after your death?

"Maybe, if you made something important in your life worth be remembered for. I mean, for other people that your own family, maybe is not that important to be remembered." *(Janitor. 65, male)*

"Yes, since death is a part of life." *(Student. 38, female)*

"Sure, for your family and so on." *(Industry worker. 25, male)*

"I don't know, important for somebody, your family maybe, but not for all other out there." *(Engineer. 38, female)*

"Sure, for my next of kin. But looking 100 years into the future… If I have done something

great, sure. But other than that you have to realize that people have died before." *(Production manager.31, male)*

"It's important to me. I would like my children and grandchildren to remember me. And I would like my grandchildren's children to know about me." *(Film producer. 41, male)*

(d). In case of yes or maybe, do you agree that there is a historical value in preserving some aspects of "memories" for future generations to experience?

"Could be, of course. Coming generation can see how we lived, and so on." *(Janitor. 65, male)*

"Yes." *(Student. 38, female)*

"Yes, for relatives and such. But not from a bigger historical point of view. I find it hard to imagine some random dude on the net browsing my life and looking at old pictures. But almost as some kind of automatic genealogy." *(Industry worker. 25, male)*

"Yes, but the same here, for the family mainly." *(Engineer. 38, female)*

(See previous answer. Production manager. 31, male)

"Absolutely, until now the history has been written by those governing us. This would probably be a good addition to the official history writing." *(Film producer. 41, male)*

(e). In case of yes or maybe, who would you allow to access and manage digital media that you have left behind or is found belonging to you after your death (for instance your private mail, your pictures, your writings and so on).

"The family maybe." *(Janitor. 65, male)*

"My children and grandchildren. Not mainly the family, because if I die before my husband and he find an other wife, maybe she will destroy sensitive data." *(Student. 38, female)*

"I'd probably say family of friends. You could leave it to a company that has it as their job to compile a person's digital remains and give it to your next of kin. Else it would just be a mish mash of information. The question is if anyone would really bother to sort through it all, at least not directly after you passed away. You would probably have to wait before taking care of it." *(Industry worker. 25, male)*

"My nearest." *(Engineer. 38, female)*

"Nobody! Cremate my computer when I die ha-ha. No it depends on what it is, the most things aren't anything dangerous for anyone to know but you still has some personal things,

from different phases of your life, that you don't want anyone to see. **Sub Question: Would you worry that the perception of you as a person would change?
Yes, if certain things were pulled out of their context. What I did when I was 17 isn't for anyone to see." *(Production manager. 31, male)*

"To my family. Stuff that I have made like films and so on I could leave to anyone to access." *(Film producer. 41, male)*

(f). In case of yes or maybe, if your memories left behind for use with Blogging by the Dead were by law forced to be checked for things such as hateful or angry statements against other people and explicit content (to some extent), who would you trust to perform this task? We have considered religious people a priest or holy official much like before a funeral in church (an example) and for atheists only close family and lawyers as censors.

"I wouldn't like my media to be checked or changed in any way. Some parts missing here or there, wouldn't not make any sense. If you wanted to be angry at someone in your media, so be it. We must be able to have a last wish that no one can change or manipulate. If we censure some, media and not other, where will the line be at." *(Janitor. 65, male)*

"No body. It's a difficult issue to answer; cause how will make sure that the controller makes the right decisions. How decides the frame in what is ethical or not." *(Student. 38, female)*

"I don't really see any need for a lawyer to censor my thoughts like that, but if they had to I'd say a lawyer." *(Industry worker. 25, male)*

"The family." *(Engineer. 38, female)*

"I wouldn't want it to be reviewed like that, only by my family in that case." *(Production manager. 31, male)*

"There could be a warning sign of some kind but no censorship." *(Film producer. 41, male)*

(g). In case of yes or maybe, would you like the idea that your digital memories were regulated and guaranteed by lawyers much in the same way a testimony is today?

"Yes, but here I should say that only some media was handed to lawyers, such as sensitive digital media, insurance stuff or similar that has been saved on disks. My other stuff (not sensitive) e.g. pictures and so on would be best handled by my family. There is no need for others (lawyers) to have and store these not sensitive media." *(Janitor. 65, male)*

"That could be ok." *(Student. 38, female)*

"Not really, my digital remains would probably just be stored on some hard drive. I wouldn't see the need to have it regulated like that." *(Industry worker. 25, male)*

"Yes, I think digital stuff shall be as valid as stuff written on real paper, it should be equally worthy. If you state a thing on a paper or on a word document it should be the same." *(Engineer. 38, female)*

(No answer from Production manager. 31, male)

"I would like them to be protected in some way, yes." *(Film producer. 41, male)*

(Only if NO is given on question 1)
1. In case of no, why wouldn't you like to leave memories behind as we explained in our design concept?

Not Available

(Only if NO is given on question 1)

2. Are you afraid that the perception of you as a person will change to something negative after your death? For instance; if someone found digital information regarding your life that changed the way they perceived you as a person.

Not Available

Quick questions II

1. Question: Do you find it hard to think/speak about your own death and your legacy after death?

"No not really, it's actually harder for me to talk about the death of my other family members than my own." *(Janitor. 65, male)*

"Yes, it is." *(Student. 38, female)*

"No, not really. It just feels kind of irrelevant to talk about at this point. I haven't really planned that far ahead. It's probably different if you talk to someone in their fifties or sixties, approaching retirement." *(Industry worker. 25, male)*

"No." *(Engineer. 38, female)*

"No, not at all." *(Production manager. 31, male)*

"No." *(Film producer. 41, male)*

Reflections and comments (anything beyond the question above – summaries):

"Generally, as I said before I haven't considered what will happen to my media after I'm gone. But as long as nothing happened to it would be OK. What I want to say is, if someone changed (in a negative) my media and put it public "out there" it wouldn't be as fun. Basically, in the middle of the whole we have great security issues that must be considered, at least if we care about it. How is responsible of the media when we die, how do we trust?" *(Janitor. 65, male)*

No further reflection. *(Student. 38, female)*

No further reflection. (Industry worker. 25, male)

No further reflection. *(Engineer. 38, female)*

"Maybe you should think about it, what's left behind when you die is left behind. You always die suddenly. In 99.9% of the cases you don't know when you get up in the morning that this is the day I die. But when you're having fun your having fun, you don't think about storing it. It might occur to you after a while, but then it's already happened. Sure, you can reconstruct, but then it's reconstructed by me at least." *(Production manager. 31, male)*

(No further reflection. Film producer. 41, male)

APPENDIX 7. OVERVIEW OF FIGURES, CHARTS AND TABLES

These posts are sorted accordingly to when they were used.

- **Chart 16:** Have the respondents ever used or considered using any service that deals with end of life traditions and digital remains?
- **Chart 17:** Are the respondents afraid that the perception of them as a person will change into something negative after their death? For instance, if someone found digital information regarding their life that changed the way they were perceived.
- **Chart 18:** Who would the respondents allow to access and manage digital media that they have left behind or is found belonging to them after their death.
- **Chart 19:** Would it be interesting for the respondents to leave behind digital media that they have singled out as important to be experienced by future generations after their death? For instance personal photos, text, video, voice recordings or 3D animations.
- **Chart 20:** Would it be interesting for the respondents to experience digital remains singled out and left behind by people now dead? For instance personal photos, text, video, voice recordings or 3D animations.
- **Chart 21:** Do the respondents agree that it is important to be remembered after death?
- **Chart 22:** Do the respondents agree that there is a historical value in preserving some aspects of their digital remains for future generations to experience?
- **Chart 23:** Is it hard for the respondents to reflect over their own death? For instance; as done in the survey or more general if they talk about such matters with friends of family.
- **Table 5:** Attitude towards the concept
- **Chart 24:** To experience and leave digital remains
- **Chart 25:** Are the respondents not interested in leaving digital remains in viewing digital remains?
- **Chart 26:** Age distribution and interest in digital remains
- **Chart 27:** Comparison between prior and new results for digital remains
- **Chart 28:** Awareness of digital remains
- **Chart 29:** Preparations towards death compared to age
- **Chart 30:** "It is important to be remembered after death", with age comparison
- **Chart 31:** Awareness of digital remains (of the respondents own remains)
- **Chart 32:** Consideration of using inline services (such as online memorials or obituaries etc)
- **Chart 33:** Access right to someone's digital remains
- **Chart 34:** Access right to someone's digital remains, reasons respondents answered "No one at all"
- **Figure 24:** Administration of digital remains
- **Figure 25:** Close up handling of digital remains