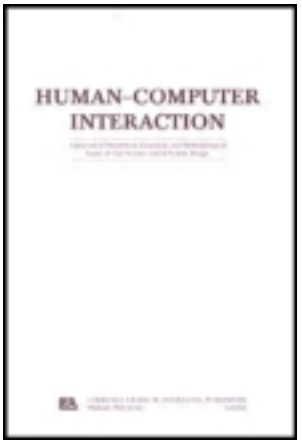


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# A Design Perspective on Three Technology Heirlooms

Richard Banks [a], David Kirk [b] & Abigail Sellen [a]
[a] Microsoft Research Cambridge, United Kingdom
[b] Newcastle University, United Kingdom

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# A Design Perspective on Three Technology Heirlooms

**Richard Banks,[1] David Kirk,[2] and Abigail Sellen[1]**
*[1]Microsoft Research Cambridge, United Kingdom*
*[2]Newcastle University, United Kingdom*



Artifacts play an important role as triggers for personal memory. They help in the recollection of past experience and in reminiscing about people, places, and times gone by. Of particular interest to us is one type of artifact, the heirloom, which may also have rich connections with memory, but often through the lens of the life of a deceased member of a family, or a friend. Issues of personal memory and heirlooms are complex, diverse, and subtle. In this article we describe a design case study investigating the role technology will play as part of the process of inheritance. We describe the process of translating fieldwork related to artifacts and heirlooms into a design space from which a broad set of themes, concepts and prototypes emerged. We describe the development of this space, its thematic arrangement, and finally a number of resultant artifact designs.

## 1. INTRODUCTION

Artifacts play an important role as triggers for personal memory. They help in the recollection of past experience and in reminiscing about people, places, and times gone by (e.g., Petrelli, Whittaker, & Brockmeier, 2008). They also act as aids to reflection and analysis, not only helping us look back on the past in new ways but enriching our experiences in the moment (Sellen & Whittaker, 2010). In this article we

**Richard Banks** is a designer with an interest in the long-term impact of technology in our lives; he is Principal Interaction Designer in the Socio-Digital Systems group at Microsoft Research Cambridge. **David Kirk** is a social scientist with interests in material culture and the design of digital artifacts; he is a member of the Digital Interaction Group and a Senior Lecturer of Experience-Centered Design in the School of Computing Science at Newcastle University. **Abigail Sellen** is a social scientist with an interest in how we can design technologies to support a wide spectrum of human values; she is a Principal Researcher in the Socio-Digital Systems group at Microsoft Research Cambridge.

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are particularly interested in one type of artifact, the heirloom, which may also have rich connections with memory, but often through the lens of the life of a deceased member of a family, or a friend. Heirlooms offer us connections to the past that extend both before and beyond our own lifetime.

Heirlooms are material artifacts, passed down through generations of family members, which provide a shared sense of history, heritage, and values. It has also been argued that as artifacts they provoke reflection on the nature of relationships and our own temporality (Hallam & Hockey, 2001). Traditionally they are physical objects, such as furniture, paintings, or jewelry. Digital technologies are now such a pervasive aspect of our lives that they too have begun to play a role in the process of inheritance. It is not uncommon for a family to inherit the technological belongings of someone who has passed away, for example, along with all the other artifacts of his or her life. These digital items might include old computers, still containing digital files and folders, or old mobile phones, with a variety of highly personal digital content contained within (Odom, Harper, Sellen, Kirk, & Banks, 2010).

In previous research, we have explored some of the issues that surround the bequest of digital artifacts (Odom et al., 2010) and examined the sentimental relationships that people have with material and digital artifacts more generally (Kirk & Sellen, 2010). In parallel, we have undertaken a series of design investigations focused on trying to understand what it might mean to intentionally create digital objects of inheritance. We call these objects "technology heirlooms" (Kirk & Banks, 2008).

A few of the questions we have explored in this work include

- What does it mean for a digital artifact to persist over generations in the way more conventional heirlooms do? Our attitudes toward technology tend to be quite short term, with longevity rarely an aspect for exploration.
- How might the affordances of the digital aspects of an artifact provide richer ways to reflect on our past and on the lives of others?
- How might the way we reminisce in the future about our own and others' pasts be different than it is today because of the emergence of new digital artifacts and systems?

Our work explores notions of personal memory, but examines it in a way that is very much couched within a social context. We are interested, for example, in notions of shared history and memory amongst family members, explored through devices like the "Family Archive" (Kirk et al., 2010). The objects, artifacts, and items of material culture with which we interact invoke the relationships and experiences we have had with others (Hoskins, 1998; Radley, 1990; Turkle, 2007). Objects are polysemous; they have multiple identities; and the same object can carry with it different meanings for different people, and these meanings can change over time and in accordance with the changing nature of the relationships we have with other people (Ekerdt & Sergeant, 2006; Kirk & Sellen, 2010). Put simply, objects can become more or less significant as our relationships to others change over time. This is true even through bereavement, where artifacts can take on new meaning as they shift to become objects of historical legacy, for example (Odom et al., 2010). As such, our work has implications for digital experiences before, during, and after the process of bereavement, as the content we create survives us. This gives us a broad area of research and a large design space within which to work as we examine relationships to objects, memories, and the design of new digital technologies.

In this article, to illustrate our concerns and our multidisciplinary approach to this topic, we present a case study that combines a strong design orientation with a program of social-science-led field research. Our fieldwork is positioned within this approach as a sensitizing resource rather than a means for gathering hard requirements. We are interested here in exploring issues of memory, reflection, and legacy more generally, using them as material for design rather than looking for very specific requirements for technological solutions. The goal of our work is the development of artifacts that "help users be reflective about the role of technology in their lives" (Sengers et al., 2005). From the position of design practice, we draw particularly on speculative (Beaver, Kerridge, & Pennington, 2009; Gaver & Martin, 2000) and critical design (Dunne & Raby, 2001).

Much as Anderson (2003) called for the use of ethnography to be used to open "the play of possibilities," we have used our social-science-led inquiries to address our agenda of understanding material culture (Miller, 2008). This, as we describe, can make available a set of understandings, which can then be used as a resource for the design of technology heirlooms. This allows us to engage in design practice

as both a creative process and a research tool in its own right. In particular, we describe the set of design-led activities we undertook as a means of both ideation and concept generation as well as exploring the parameters of the design space through thematic analyses of "technology trends." As a natural part of the design process we also produced some interactive devices, examples of technology heirlooms, which we describe. These pieces were developed as technology probes (Hutchinson et al., 2003), and as artifacts for reflection. However, we have developed these as working instantiations of the ideas we are exploring mainly so we can further evaluate them in-the-wild. It is the totality of this case study, rather than any specific part of our methodology and approach, which we believe leads to a set of insights, which can inspire new technological concepts. The artifacts we describe are evidence of that process, and illustrative of a new design space that we believe this field opens up.

The case study is structured as follows: First, we cover some of the related literature in the area of heirlooms, sentimental objects, and archiving in home life. Second, we outline the design process we followed during the technology heirlooms project. Next, we broadly describe the space of technology heirlooms as we see it, mainly through the presentation of a thematic map that was developed to provide a structure for navigating the different issues related to this project (and which was developed from insight gained from both the fieldwork and the design activities in which we engaged). We hope it provides some food for thought in the development of other research work in the area of reminiscing and personal memory. Last, we describe a number of new artifacts that were developed as an output from our theme generation work. We describe the origins and some development work for each artifact, as well as draw conclusions from each.



## 2. RELATED WORK

Although issues around the value of physical and digital artifacts to people and households are broad, we have found two specific corpora of work, which are most influential in underpinning our field and design practice. One body, concerning itself mostly with digital content and the relationship between memory and technology, can be found within the human–computer interaction (HCI) literature; the other stems from extensive anthropological work, which has considered the role of material cultures in domestic lives. Somewhat surprisingly, the two have remained for the most part largely disconnected: The deeper anthropological research has had little impact on the technology development work, and vice versa.

For example, much of the work on family archiving from the HCI community stems from research on the home use of media such as photos and videos (e.g., Chalfen, 1987). Studies have explicitly explored how photos are stored in the home (Rodden & Wood, 2003), and of importance how they are oriented to and talked around (Balabanović, Chu, & Wolff, 2000; Crabtree, Rodden, & Mariani, 2004; Drazin & Frohlich, 2007; Durrant, 2007; Frohlich, Kuchinsky, Pering, Don, & Ariss, 2002).

Such studies have directly sought to design better tools for photo storage and for the sharing of photos (photoware). Similar work has explored the storage and annotation for subsequent replay of video (Abowd, Gauger, & Lachenmann, 2003). Much of this work, however, although often using the study of physical (or analogue, if you will) forms of photo and video as a research vehicle, has sought to inform the design of technology to support digital media with digital interactions.

However, moving beyond this is a developing interest by the HCI community in exploring the interrelationship of the physical and digital, using one to enrich the experience of the other. This can especially be seen in recent work on the concept of the "Internet of Things" (Gershenfeld, Krikorian, & Cohen, 2004), which is supporting explicit attempts to give physical objects an online digital presence. Where such considerations have intersected specifically with technologies of memory, we see concepts such as the "Memory box" (Frohlich & Murphy, 2000), and later, by a different set of researchers, the "Living Memory Box" (Stevens, Abowd, Truong, & Vollmer, 2003). Both of these are essentially physical boxes into which RFID tagged items are either placed or stored, which trigger the replay of associated audio commentaries about the objects. More recently there have been similar concepts developed such as the MEMENTO (West, Quigley, & Kay, 2007) and the Ubiquitous Memories (Kawamura, Fukuhara, Takeda, Kono, & Kidode, 2007) systems, which allowed users to combine elements of the physical and digital using, respectively, Anoto Pens and RFID tags. In addition, recent work in this space (Frohlich & Fennell, 2007) has offered intriguing designs for a variety of specific memory-supporting artifacts. None of these projects has ever been fully developed to the point where it could be evaluated in ecologically valid deployments. And it is also fair to say that, for the most part, most concepts have not been built on the basis of extensive research into home archiving practices, or issues surrounding the bequeathing or inheritance of digital material. One exception to this is the "Family Archive" (Kirk et al., 2010) in which a centralised archiving system for the home was built using a bespoke multitouch surface. This system was built on the assumption that families would want to keep and store both digital objects (such as photos) as well as to scan in sentimental physical objects (such as documents, toys, souvenirs, etc.). The system was deployed in three family homes and examines the values that families hope to achieve through archiving, as well as how new technologies can disrupt existing archiving practices and otherwise subvert the moral order of family practices.

If we move now to consider existing anthropological studies, we find a long tradition of studying material cultures. This includes the processes of exchange economies, and the importance of structured practices such as gift giving (Appadurai, 1986; Douglas & Isherwood, 1979; Mauss, 1954). In many respects, this forms the precursor for our understanding of the importance of objects and why we value them. However, this work, although often culturally bound, tends to speak to broader issues. Of more specific relevance here in terms of archiving practices are the various treatments of domestic objects which have sought to explore the role of artifacts in the construction of memory (Gonzalez, 1995; Middleton & Brown, 2005; Petrelli et al., 2008), identity (Csikszentmihalyi & Rochberg-Halton, 1981; Hoskins, 1998) and the

work of making a home a home (Gregson, 2007; Miller, 2001, 2008). These studies make a key contribution in exploring how we come to populate spaces in which we live with objects of significance and, perhaps more important, how we relate to and through those objects. A study of our own, to which we refer later (Kirk & Sellen, 2010), attempts to map out the range of values of sentimental objects in the home, and the reasons we keep them.

Although research on archiving and sentimental objects shed important light on the value of such objects in the present, they do not tackle head on the issues of inheritance and the bequeathing of objects. It follows that, although such studies often hint at or imply the importance of keeping objects for future generations, they do not focus on the challenges for digital technologies for the longer term. When we look to the literature, it is perhaps no surprise that, again, there is a large and diverse set of literature on death and bereavement in other disciplines, notably sociology, psychology, and anthropology. The main themes of the literature are many and diverse. For example, psychologists and psychiatrists tend to focus on how individuals come to terms with loss, mapping out such things as the stages of grief (Kubler-Ross, 2005). By contrast, sociologists have often focused on death as a social act, such as Sudnow's (1967) classic study of the social institutionalization of death and dying. Even more broadly, social anthropologists have tended to concern themselves with kinship structures and the cultural context of death. The work of Geertz (1973) and Danforth (1982) map out some of the arguments here. As we might expect, however, these literatures are quite removed from issues to do with our relationship to technology when we are bereaved, when we inherit objects, or when we think about what we leave behind to future generations and the ways in which technology might intersect with these practices. Here, within HCI, there is now a growing interest in such issues such as the work of Massimi and Charise (2009) and Massimi et al. (in press). Our own fieldwork, which we describe in more detail (Kirk & Banks, 2008; Kirk & Sellen, 2010; Odom et al., 2010), is part of this trend, highlighting as it does many of the compelling and challenging issues that we face in the digital age for passing on digital information to future generations.



## 3. OUR APPROACH: DESIGNING TECHNOLOGY HEIRLOOMS

We begin with a brief overview of the key fieldwork that helped inform this case study. We then describe how we incorporated research into trends and new technologies to act as a secondary source of inspiration. From both these sources we developed a thematic map, which allowed us to see and discuss different possible subproject areas within which we might generate artifacts and further work. In addition, we maintained a continuously evolving document of references and ideas that we added to throughout the lifetime of the project to act as a stimulus for us as well as a record of our thoughts and ideas. We describe these processes, too,

before documenting how we selected specific areas within our theme map for further exploration, developing a number of artifacts within each.

### 3.1. The Field Work

Our research group has focused on the domain of the home for a number of years. As part of this work we have looked at many issues that connect to memory and artifacts. Focus areas have included the ways and motives with which families fill their homes with images of themselves (Swan & Taylor, 2008), the reasons why sentimental artifacts in the home are kept or discarded (Kirk & Sellen, 2010), and what families do with all the records they create of their life (Kirk, Sellen, Harper, & Wood, 2007; Kirk, Sellen, Rother, & Wood, 2007). Although we describe next the specific field work that relates to this case study, this earlier work also provided us with material for reflection, and the technology heirlooms work is a continuation of the natural trajectory of this research. In addition to these publications, and work by other teams, this project is grounded, primarily, in three pieces of work undertaken by us:

In a study of home archiving practices (Kirk & Sellen, 2010) we deal directly with sentimental artifacts, which is the subject of much of the technology heirlooms work discussed later in this document. This study involved an in-depth set of interviews and "home tours" of 11 diverse family homes in the United Kingdom. In these, we focused on what objects, both physical and digital, these households treasured, the reasons they were kept, and the ways in which they were kept. Whereas the document goes into depth on *what* people keep in their homes, a key area of insight is around the *why*, around the motivations for keeping things. For example, many sentimental items are kept so as to protect them; others are for the purpose of facilitating memories or evoking feelings. Essentially any sentimental object becomes sentimental because it has moved beyond being a mere object in isolation to being an object that embodies an association with some other. This research highlights the fact that there are three primary "others" that sentimental items in the home are kept for—the owner themselves, a "known" other for whom items are kept to bolster a shared connection with the past, and an "unknown" other for whom items are preserved as a form of legacy.

In Kirk and Banks (2008) we describe how we might consider it a goal to explicitly attempt to design digital artifacts that have some aspect of heirlooms-like qualities, in the way that physical things do. We state that technology heirlooms might represent new devices, but they also suggest a means by which existing mundane technologies such as digital files and data might come to be considered heirlooms, and then require new forms of treatment and be associated with new forms of practice. In this article we describe a Technology Heirloom as "a technological/digital artifact that is designed with the intent that it might outlive its owner and come to be passed on, and that in some way either materially or conceptually it might carry with it an imprint or impression of the previous owner. It will in effect become a memorial for that person

passing it on and a means by which others might reflect on the life of or relate to the original owner."

Finally in Odom et al. (2010) we look more specifically at the role of artifacts in the process of bereavement. In this study, we interviewed six men and five women who were recently bereaved, focusing on their retrospective reflections on their own experiences of bereavement, including objects they may have been bequeathed or otherwise inherited, as well as looking ahead and thinking about their own mortality. Here, we discuss issues of how they envisioned their own legacy would live on, including through both physical and digital objects. We observe that objects can help or hinder the ways in which people come to terms with death, and play a part in the change of state, rather than simply ending, of the relationship between the deceased and bereaved.



### 3.2. Secondary Research

In addition to our primary research, we also sought out references to new ideas and trends as a deliberate contrast to our field research. The goal here was a conscious merging of the social science resources we had at hand with information about technological changes and trends being published on a continuous basis online—an attempt to generate new ideas for this space by mixing what we knew about it socially with where we might anticipate we were going in terms of science and technology.

The Internet gives us access to a constant output of these kinds of references. Web sites like Gizmodo (http://gizmodo.com) and PSFK (http://www.psfk.com) provide a daily stream of articles that show new ideas, technologies, and services emerging around the world. These secondary references were pulled from a "trends" blog maintained by a member of the team (http://www.richardbanks.com/trends). This blog has been used to capture and share links to interesting new technologies since 2003, and thus it provides a decent-sized corpus of about 10,000 entries from which to draw items to include in our mapping exercise. We went through a process of filtering this body of entries, looking for items that seemed even tenuously related to the topic of technology heirlooms. We treated these items not unlike the random elements commonly introduced during brainstorms to encourage the unexpected, or provoke juxtapositions of ideas that seem incongruous at the outset but from which new ideas can emerge that the team would not have developed otherwise.

Some entries drawn from these secondary sources were more obviously connected to our project, such as an item describing "My Wonderful Life," an online tool to help an individual plan for his or her own funeral (http://www.mywonderfullife.com). This is clearly directly relevant to issues around the process of bereavement. Others were more tenuously connected to our topic, for example, an item describing "The Sound Advice Project," which offers a physical manifestation of the sound wave of a sentence of advice given from a parent to a child (http://thesoundadviceproject.com). This project was developed as a way of allowing families to discuss complex

issues such as drug use. We imagined from a purely speculative position that an object like this might make an interesting form of digital heirloom and therefore included it as a piece of reference material. There were many other examples pulled from the blog that were similarly only slightly relevant to our project but that we felt might be provocative for idea generation.

### 3.3. Generating a Theme Map

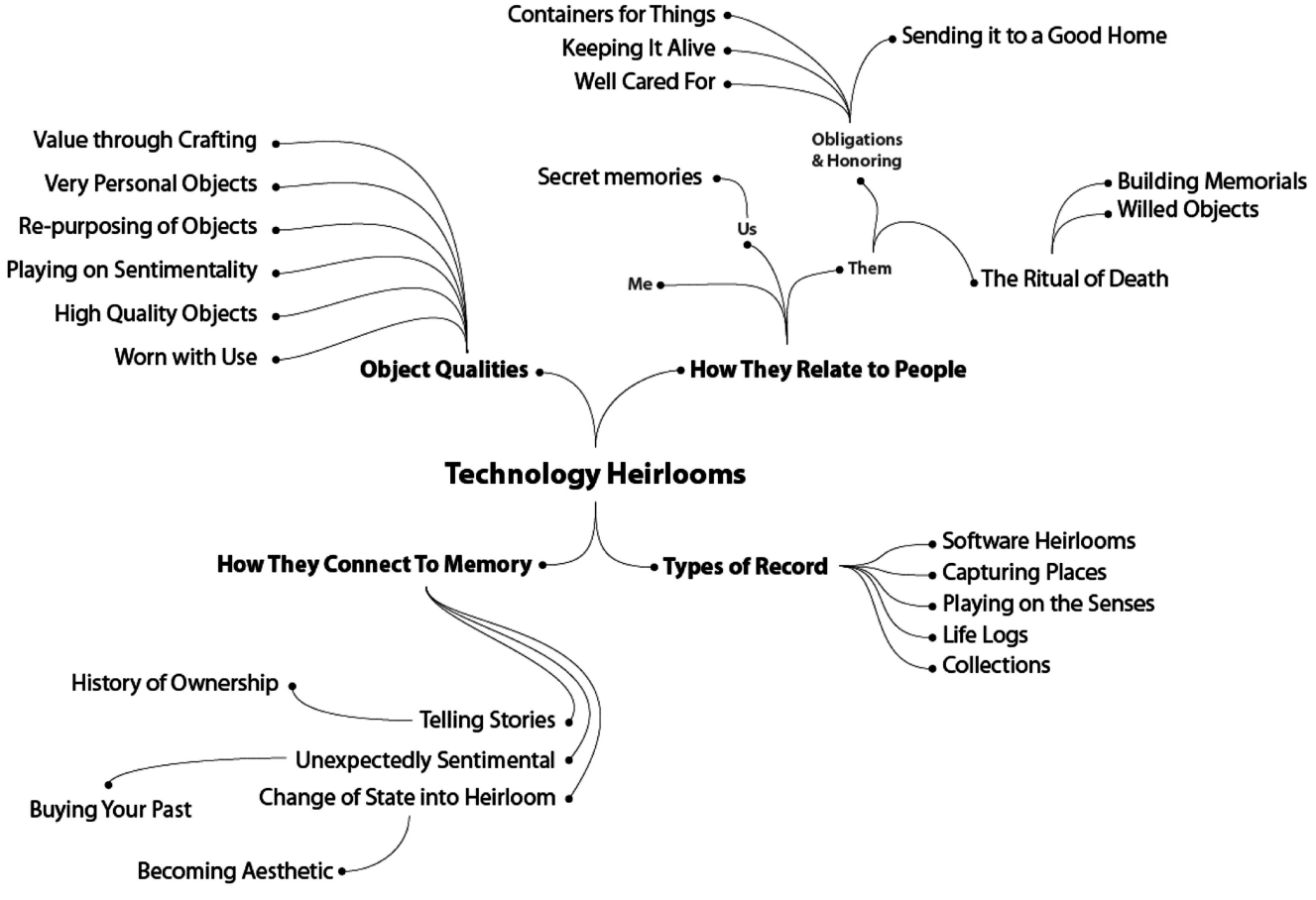
Based on the fieldwork we had undertaken, and more broadly on the related literature, it is clear that the domains of memory, legacy, heredity, and bereavement are extremely multifaceted and broad. The reasons why a person might keep one object and discard another are very complex, for example, as are the questions of how a person reflects on their past through the things they own. Naturally, the first step in tackling the design work for this case study was, therefore, to attempt to break down the topic into subcomponents that might be more constrained and approachable from a design perspective. We therefore created a map within which we started to tease apart the project into individual thematic areas.

In addition to breaking up the project into reasonably sized themes, we deliberately wanted to avoid developing any design objects in detail too prematurely. Instead we wanted to get a sense of the whole space first, in a way that might invite new ideas through the cross-pollination from one topic to another.

We created the thematic map using two deliberately contrasting sources for topic areas, rather than one. First we took the academic research that we had undertaken, breaking it down into constituent observations that we could use in developing the map. These were the more grounded elements, taken from firsthand experience, which could provide insight and inform new design ideas from a basis of reality. For example, in Kirk and Sellen (2010) we observed that many of the things that people hoarded in their homes were part of a collection and that there was value and sentimentality in the collection as a whole as well as in the individual constituent parts. In the article we observed that humans have a natural inclination to horde items to which they have attached sentimental value. This level of insight felt useful as the basis for idea generation and was typical of the observations we used from the field in this process. There were many similar items drawn from across our own research and the related research of others.

We combined these primary sources with the trends and technologies, previously described, and met as a team over a number of weeks, discussing and organizing them into thematic groupings around which there seemed to be some consensus. Figure 1 shows the output of this process. Four large collections of themes emerged from our discussions, focused on people ("How They Relate to People"), memory ("How They Connect to Memory"), the material form of artifacts ("Object Qualities"), and new forms of heirlooms ("Types of Record"). In total, we developed 26 different themes, each of which had the potential for the generation of new design ideas and research directions.

FIGURE 1. A theme map for technology heirlooms.



Although there were specific meetings in which this map was generated, the output was also seen as a work in progress. As we continued on the project we used this map as a source for thinking about ideas but also reconfigured it, creating new branches if sources were found that we felt did not have a clear home, or merging elements if it no longer made sense for them to be separate. In this sense, the map acted as an aid in providing a frame of reference for the team to understand and discuss what they are focused on while working on this topic, as well as an engine for the emergence of new ideas. We include it here, and describe some of its structure next, to give a sense of how our team approached the space of personal memory and technological longevity within the context of this case study. We hope it may be useful to other groups working in this domain, too, as a resource for reflection.

Twenty-six themes emerged through the process of evolving the map. Our expectation, though, once we had developed this map was not that we would create 26 artifacts. In a project of this scope there are inevitably far more themes that a team *cannot* expect to address as there are themes that they *can*. We feel it is almost as important, though, to have some sense of what is *not* going to be addressed in a project as it is to understand what *will* be an area of focus. It is useful to be able to show the breadth of our thinking and understanding of the space, for example. It allows us to express to others what we have chosen to prioritize, and why. Themes also cross boundaries, so concepts from those that are a lower priority can end up recurring as important elements in other areas. The theme map, therefore, provides a home for both the immediately addressable, and for those areas that are being set aside for the time being.

On other projects in which we have developed maps like this one we have found that they need to be given time to stabilize. They are not necessarily fixed at the conclusion of the last session in which the team met to develop them. Instead, they are iterated on for a number of months after their original generation, as the team continues to do further research, to talk internally and externally, to read more on the subject area, and generally think more deeply about the space. The map itself is therefore a work in progress, and new items are added to it and removed from it as needed, or existing items are subdivided, renamed, and so on.



## 3.4. Making a Record

In parallel to the theme generation exercise it was an important part of the process that we capture and record what we were learning and thinking. We created a single document within which we could record our sources of inspiration (from research or trends). This document acted as a place to start to record the emergence of new ideas, too, in the form of tentative one-line descriptions and thumbnail sketches, which might eventually grow into more fully fledged artifacts.

The working document within which all relevant content was recorded has a number of roles. First it acts as a container for the sources used in generating each theme. Second, it acts as a place within which new ideas can be documented and

emerge. Finally, once the project comes to an end this document continues to serve a purpose as a raw historical record that we can refer to as we do other work in areas that are related or overlap. It serves as a reminder of what we've done before and a continuing source of inspiration as we develop new ideas elsewhere.

## 4. EXPLORING THE THEMES

Although it is beyond the scope of this document to describe all 26 themes in detail, we do wish to give some sense of the content of the theme map. In the following section we discuss more generally the four major clusters of themes and pull out some examples within each that give an impression of how the smaller topics emerged. We hope this will give some sense of the breadth of topics that materialized from our work.

At a high level, then, the themes concern the connection between technology heirlooms and people ("How They Relate to People"), their relationship to memory ("How They Connect to Memory"), the material properties of an object that make it feel precious and sentimental ("Object Qualities"), and novel forms of technology that might form the basis for new types of heirlooms in the future ("Types of Record").

The source material for generating the theme map comes from both field research and technology trends, so it was perhaps inevitable that different themes would sometimes place more emphasis on the social sciences and sometimes on technology. The themes on "How They Relate to People" and "How They Connect to Memory" are clearly weighted toward the field research, as they are conceptually driven by sociological and psychological topics. The "Object Qualities" theme is more biased toward design as a discipline, with its emphasis on materiality and form. The "Types of Record" collection of themes emerged more from a technological perspective, with an emphasis on looking at new technologies and imagining what it might be like to inherit them in the future, for example.



### 4.1. "How They Relate to People"

The relationship between technology and people is a cluster containing eight themes that encompass a range of issues. This is partially based on areas of our fieldwork that relate to an individual's motivations when it comes to the preservation of artifacts (particularly in how items are kept for the individual themselves, for "known others" [as heirlooms] and for "unknown others" [as legacy]; Kirk & Sellen, 2010). This cluster also encompasses some of the issues uncovered in Odom et al. (2010) that are concerned with the subtleties and intentions inherent in a bequest—whether, for example, an item was intended as a bequest and the positive and negative ways that heirlooms can communicate intention as they change hands. Because our interest with this topic is primarily in legacy, this collection of themes also deals in more detail with the nature and process of bereavement, the rituals that form part

of that process, as well as the sense of obligation and the necessity of honoring the deceased that often compels the bereaved.

Consider the "Containers for Things" theme, for example. From a research perspective, this theme comes from the observation in Kirk and Sellen (2010) that "people hoard and collect, they accumulate and they curate, and over the course of their lives, most will gather a collection of objects for which they feel sentimental attachment" (p. 2). It puts a focus on the boxes within which our subjects stored their sentimental items. The research emphasized the tension between keeping and throwing away of sentimental objects, and these containers created a halfway house within which things could be kept, without them being overtly part of the environment. Sometimes the contents of the containers we found were random and eclectic. Sometimes the boxes contained highly related items, and they were kept in these containers for very specific reasons. Sometimes these containers were highly personal, with content related very much to the self, and sometimes they were simply kept through a sense of obligation to the person from whom the item came, with the objects themselves being of little individual sentimental.

So the "Containers for Things" theme is about the role of containers as places where we can put away things. Although our fieldwork is primarily about physical containers, this theme extends to cover digital containment. Digital files and other similar objects need to be kept somewhere, just as physical things do, and often their container, their hard drive, PC, memory card, and so on, is the only physical manifestation of them. These manifestations can feel quite conceptual to individuals. People are often not quite sure how to get to the digital things on their PCs, for example. We have dealt with this issue to some extent in the past through projects like Shoebox (Banks & Sellen, 2009) (Figure 2) and the Family Archive (Kirk et al., 2010).

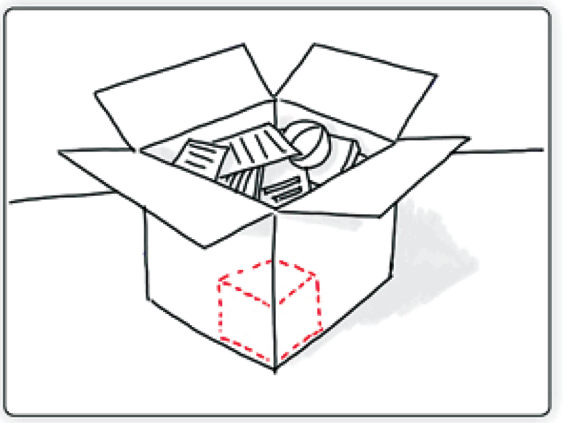
In addition to drawing on our field research, we also drew on items from the trends blog described earlier (http://www.richardbanks.com/trends). Some examples of items from this source that drove the emergence of this theme during our discussion include "Here and There" (Son, 2009), a pair of digital boxes that store personal videos and photos, and also act as walkie-talkies to allow the content to be shared with a loved one over a distance, and "Digital Reliquaries" (Tate, 2009), which encase modern technology in glass, creating "video memorials." These, and the other examples of trends in this theme, help us think about containment in ways we may not have done before.

Because the creation of our theme map is primarily an exercise for inspiring design, so each individual theme is also a conceptual structure for inspiration. By creating a theme such as "Containers for Things," for example, that conceptualizes boxes and folders in the way previously described, we hope to inspire new ideas. Some directions for design that lead directly out of this assembly of field research and trends have included the creation of new ways of manifesting the containers for digital things in richer, more sentimental ways; the creation of physical objects that have a digital relationship, somehow, to the boxes that they are contained within; the idea of boxes of digital content that might be put on display in a home, rather than stored away under a desk or in a basement.

**FIGURE 2. Shoebox. (Color figure available online.)**


For each of our themes we generated a series of small "one-line" design ideas. These are simple sketches that are deliberately shallow in terms of detail. They are used primarily to suggest an idea and to provide a visual cue to discussion within the team. Sometimes these are practical, and sometimes conceptual, but they help set the Ftone for ideas generated within the theme. Figure 3, for example, shows

**FIGURE 3. A sketch for the "one-line" idea "An object that likes being at the bottom of a box." (Color figure available online.)**



a thumbnail sketch for the idea of "an object that likes being at the bottom of a box." Although conceptual, this sketch helps us orient toward the research we had found around archiving practices, in order to consider the design of artifacts that are sentimental but deliberately kept out of sight.

## 4.2. "How They Connect to Memory"

In the bottom-left region in the map (Figure 1) is a cluster of themes entitled "How They Connect to Memory." Themes in this area deal with the changing nature of artifacts over time and how they draw upon human memory in different ways because of time's passage. They question the role of objects in the telling of stories, the change of state of an object as it simply ages, and the idea that objects become imbued with the histories of their owners as they change hands.

An example theme from this area, entitled, appropriately enough, "Telling Stories," deals with the role of artifacts for triggering memory to tell tales of the past. It draws on our research in Kirk and Sellen (2010), and the work of van Dijck (2007), who argued that "the performative nature of memory is, I believe, much underexposed in current research on memory machines. Memories are narratives as well as artifacts, performances as well as objects—things that work in everyday lives and cultures of people" (p. 169). Our assertion in Kirk and Sellen (2010) is that "sentimental artifacts can invoke and symbolize important places, times, things, people, and experiences" (p. 10) in a way that perhaps enables new forms of narrative.

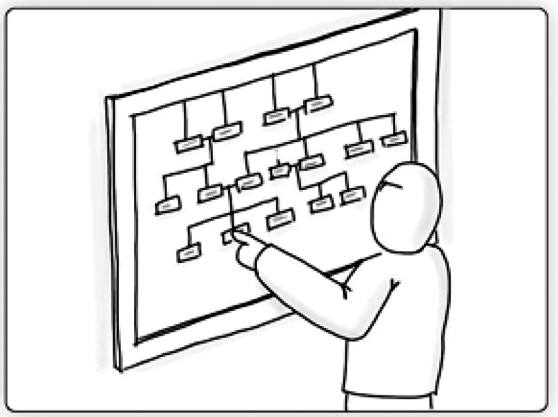
In terms of trends there is a tremendous amount to pull from for this theme. Notions of storytelling through digital artifacts have entered the public domain quite visibly. The *New York Times*, for example, touches on the idea of connecting artifacts to memory in Walker (2010).

> Ask anybody about the most meaningful object he owns, and you're sure to get a story that this old trunk belonged to Grandpa, we bought that tacky coffee mug on our honeymoon, and so on. The relationship between the possessions we value, and the narratives behind them, is unmistakable. Current technologies of connection, and enterprises that take advantage of them, surface this idea in new ways — but they also suggest the many different kinds of stories, information and data that objects can, or will, tell us. (p. MM18)

They describe a number of projects, for example (Tales of Things; http://talesofthings.com), which enable the creation of associations between narrative and artifacts through the use of bar codes and readers.

Additional inspirational source material came about through our engagements with interaction design and product design student groups at Dundee University. Through a project entitled Networked Objects for Grandpeople (Pullin, 2011) students designed bespoke artifacts exploring family relationships. The winning student group produced a system entitled (StoryTeller/StoryMaker; http://www.mrleemurray.co.uk/index.php?/projects/storymakerstoryteller/), which allows a grandparent to

**FIGURE 4. A sketch for the "one-line" idea "a visible, digital family tree for telling stories about family history."**



share their memories with their grandchildren. There are two artifacts in the system, one for the grandparent and one for the grandchild. Each is designed to be sensitive to the needs of their specific user—the grandparent's story recording object is based on a slide viewer, a technology that is familiar to them, and the grandchild's object, for projecting and hearing the stories, is a more technological digital projector. This sensitivity to need and experience for different users seems particularly important in this theme.

An example "one-line" idea, developed among a number of others by us for this theme, is shown in Figure 4. This is for an interactive family tree that might be on display in a home, used for showing and encouraging the recording and telling of stories of family history.

## 4.3. "Object Qualities"

The top-left region in the map (Figure 1), entitled "Object Qualities," deals with the form and substance of an item. There are certain kinds of materials, for example, that age well and seem more precious with time. These might include leather and wood. They can feel historic or sentimental simply because of their material form. There's an aspect of a family heirloom that can make it seem more precious simply because of the way it has sustained itself materially. The way it has aged well, adding to our perception of its value or desirability rather than detracting from it, for example. Or the way it has been materially abused, with knocks and scratches on its surface that can serve as a reminder of its history. This group of themes, therefore, deals with issues of materiality, setting aside any specific personal meaning or memory imbued in an object. What makes an item feel precious, for example, from a purely material perspective? How do notions of craft or personal creation, the way in which

a material form has emerged or evolved through personal intervention, change the way we feel about an item?

An example theme in this collection is "Playing on Sentimentality." This draws less on our field research and more on what we collected from other sources (http://www.richardbanks.com/trends). We found a large number of projects and ideas that played on the perception of an object as historical by borrowing aspects of design languages that have been used in the past. In effect, these items play on sentimentality by drawing on visual connections to older times.

An example of an item from our secondary sources that applies to this theme is the design of a stand for an Apple iPad by Damon (2010). The stand plays on the visual connection to a cathode-ray television, in a way that draws sentimentally on the past. Similarly, Skelly (2010) designed a digital music player that uses the form and metaphor of an LP and turntable to present content with no moving parts. "Martin says that nowadays, people tend to rush and skip through their digital music; his Playlist Player brings back the old charm of listening to the whole music album without having the distraction to skip tracks." So not only is the designer drawing on the aesthetic of a record player as a way of referencing the past, he is also attempting to draw on the behaviour of past times through its form. A final example, this time entirely in software, is Hipstamatic (http://hipstamaticapp.com). This is an extremely popular photography tool for the iPhone that provides an experience that mimics the handling and output of analogue cameras, film, and even flashes from history, all through the user interface of a contemporary phone.

This theme, therefore, is less about the nature of heirlooms in providing connections to individuals, places, and events of the past than it is about the co-opting of different aesthetics of history, from earlier in our lives, and from the lives of those we have known. There is a question about the difference between these technological objects versus the experience of the "originals" that may be an interesting area for further research.

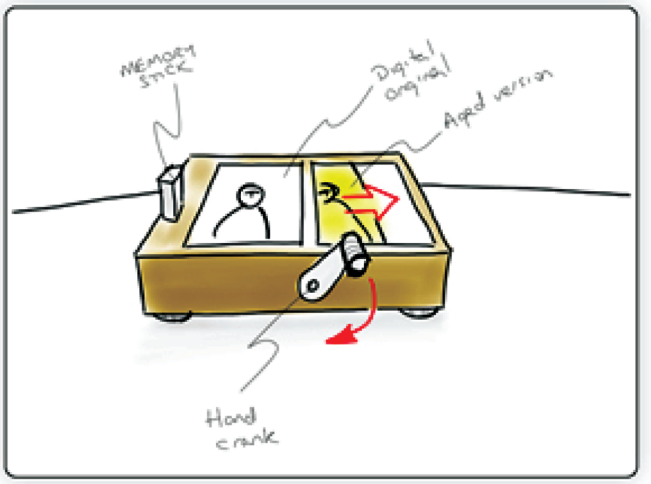
Figure 5 shows one of our "one-line" ideas for this theme. It is a hand-cranked box into which you can slot a memory stick full of photos at one end. As you crank, the photos are printed and emerge from the other end of the box, each with a unique faded and aged look.



## 4.4. "Types of Record"

The bottom-right region of the map (Figure 1), entitled "Types of Record," deals with the potential for new kinds of artifacts of inheritance that are enabled by digital technologies. Although most of the heirlooms we have inherited in the past have been analogue, what kinds of new digital forms will our heirlooms take in the future? These might be forms we cannot yet predict, or may be things we are creating today that we simply haven't lived with long enough to understand them in the context of inheritance. So, for example, what might it mean to inherit the output from a lifetime of blogging, or a lifetime of GPS traces?

**FIGURE 5. An object that "ages" your media. (Color figure available online.)**



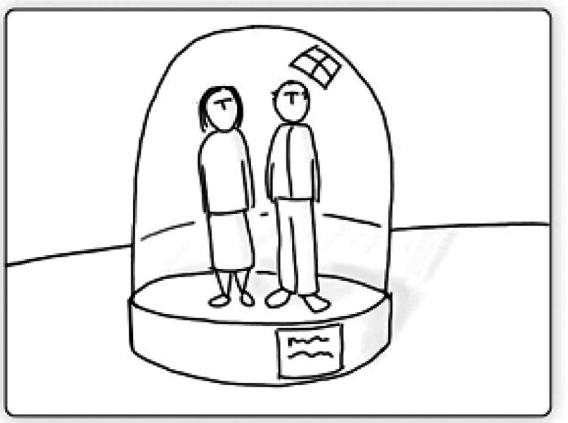

An example theme from this region is "Software Heirlooms." During our field work we found many examples of digital files, kept for sentimental reasons. These included e-mails, Microsoft Word documents, and text messages. In Kirk and Banks (2008) we made the observation that

> a Word document is just a Word document. It's copyable, it's deletable, it can be stored in many profane ways and places. But what if the Word document is the last thing written by a deceased loved one? Would that then give it the status of technology heirloom? If so, would we need to find new ways of treating that object – does it matter that it can be instantly copied and if it is copied does that then feel the same? Is it still the original object? (p. 3)

This theme concerns itself both with the nature of these digital items as sentimental objects, particularly in terms of their attributes which are quite different from physical objects, and with the potential for reminiscing with new forms of digital object that emerge.

Examples from our secondary sources include a project by Serrano (2009) entitled Backup Objects. In this project Serrano took a number of items of sentimental value from different people, used a 3D scanner to digitally capture their shape and reprinted them using a 3D printer. He used this project to speculate on the notion of the "original" artifact, commenting that "although the copy will never reach the same emotional value as the original, at least it can be a way to preserve it in case is lost, broken or stolen." A "virtual memento" released by the Tate Museum (2010) is a digital copy of Picasso's *Monument to the Spaniards who Died for France*, released to promote an exhibition of the artist's work. Again, this plays on the notion of the original, although some value is also attributed to this object through its digital

**FIGURE 6. A sketch for a 3D model of your grandparents as a form of heirloom.**



properties. Owners can scale the image, viewing it from very close up and in a way never possible with the original.

One of a number of "one-line" ideas for this theme is shown in Figure 6. This shows a 3D model of grandparent, which might be printed and put on display as a form of heirloom object.

## 5. BUILDING THREE TECHNOLOGY HEIRLOOMS

The theme map gave us a broad sense of the myriad of issues connected to our original notion of Technology Heirlooms. From this, many different "one-line" ideas, some of which were previously described, were developed as a form of output from each theme. Naturally, an important aspect of our process was to select and refine some of these ideas, with the goal of building artifacts that might allow us to explore the space further.

A first step in identifying ideas to refine was to decide if there were groups of themes that we were more or less interested in exploring in the short term. As a team we decided to set aside two of our collections of themes—those dealing more specifically with the materiality of technology heirlooms (described on the map as themes connected to "Object Qualities") and those dealing specifically to memory and storytelling (described on the map as "How They Connect To Memory"). We set aside the first group because we felt that a purely material exploration was less interesting to us across the disciplines represented in the team. We set aside the second group because as a team we had explored issues of storytelling and memory in other work.

The two groups we were left with were "How They Relate to People," which deals more specifically with the process of bereavement, and "Types of Record," which focuses on new technology areas and the kinds of legacy they might create.

We were interested in the former theme because bereavement is an area that hasn't been explored hugely within the HCI and design fields. The latter area interested us because it placed an emphasis on the potential impact of still emerging technologies on our future forms of reminiscing.

We then prioritized the set of ideas represented by the remaining 13 themes in these two groups and selected three to start developing in more depth. These are "Timecard," the "Backup Box," and the "Digital Slide Viewer." These ideas were selected for a number of reasons, outlined in the description of each artifact next.

## 5.1. Timecard

Timecard is a personal timeline object and system (see Figure 7). Family members can add items to the system using a PC. These items can include text and images and are associated with specific dates by the user. They are then sent to a wooden digital photo frame, which, like an ordinary photo frame, lives on display in the home. Photos are shown randomly on it by default, in a slideshow view. Clicking on a photo, though, brings up a timeline view that shows all the images of that person chronologically. It displays the structure of a life and encourages the telling of stories about the represented by presenting rich material for reminiscing.

We decided to build the Timecard device because it allowed us to explore a number of issues, many of which emerged from the collection of themes entitled "How Technology Heirlooms Relate to People." We were interested particularly in ways in which family members honored the deceased and reflected on their life,

**FIGURE 7. The Timecard device. (Color figure available online.) (*continued*)**

**FIGURE 7. (*Continued*).**


through the creation of artifacts such as photo albums. We wanted to build a digital equivalent in order to better understand the role of these items of honoring, as well as how a technological replacement might differ from the physical original. We also wanted to understand the process of reflection that takes place during the act of creation of an item such as this—what new insights might be found about the deceased's life, for example, as the jigsaw pieces of their lifespan are assembled.

Timecard was built as a fully working and deployable system. As such it is an artifact with an end goal of testing ideas in the field, with individuals and families. It is currently in deployment with four diverse groups in the United Kingdom. Over the next few months we hope to draw some conclusions from our deployment of the

Timecard device, which we will publish elsewhere. We are already seeing a diversity of use of the device; as a representation of the life and activity of a young family; as a potential bridge between the experiences of a grandparent and the interests of their grandchildren; and as it was originally conceived, as a device to construct a history of a deceased relative in order to better understand them, and as a way of honoring them.

It is important to note that not every item designed and developed as an output to processes like the one we have to go through needs to have end-user testing as its goal. More speculative objects that are more highly resolved than our simple one-line ideas also provide an important focus for discussion. What follows are two examples of this, both of which are working systems but neither of which is intended for deployment per se.



## 5.2. Backup Box

Backup Box (Figure 8) was built in response to a specific observation seen in the field in Odom et al. (2010). In that publication we talked to a woman who had inherited a large number of diaries from her late grandmother and late mother. She observed that "so many of the diaries just say things like 'Cleaned kitchen. Joy went to rehearsal all day. I did some gardening. Took a nap. ' . . . just really dull, ordinary, everyday things [that] seem so boring, but now they're really important . . . there's a whole social history of our lives in there." In contemporary terms, these mundane diary entries look to us much like the content posted as status updates to sites such as Facebook and Twitter. We wondered how these new entries might look in decades to come, and how they might change in nature like the diary entries.

The Backup Box is a concept device built to explore this idea. We imagine that it lives in the corner of a person's living room, with the lid in place, continually backing up the content of their Twitter feed. As this content accrues, its value as a source of reminiscing might change. This device has allowed us to speculate, for example, on the value that the status updates of 2010 might hold in 30 or 40 years. What use might the box hold if its owner passes on and it is inherited by another family member? Unlike Timecard, which has a fairly practical element to it, the Backup Box was created as a more conceptual piece that we might be able to use in interviews to elicit responses from our subjects, to help them imagine the role their contemporary communications might play in the future.

## 5.3. A Digital Slide Viewer

We decided to build the Digital Slide Viewer, like the Backup Box, to explore the potential for contemporary digital content as a source of reminiscing in the future. With this artifact we were also interested in the process of inheritance. It allows us to explore issues surrounding the memorialization and persistence of content belonging to someone who has passed away. The Digital Slide Viewer (Figure 9) is a device that

**FIGURE 8. Left: Backup Box with and without lid. Right: The interface displays a timeline of Tweets from Twitter. (Color figure available online.)**



can be used to back up the content of an online photo sharing website in a form that can be put on display and used for storytelling in a home. Inside its wooden display case is a handheld viewer, which stores the images and can display them on a small digital screen, and a series of white plastic slides, which can be used to recall sets of photos. Each slide corresponds to an online collection or set of photos.

Like Backup Box, the Digital Slide Viewer is another artifact that explores our relationship to online services and the role that the content we place online may play in reminiscing. We imagine this device might be useful if a family member, who is a heavy user of a site such as Flickr, passes away. Their relatives could pay for their account to be preserved inside a device such as this, so that, as well as persisting online, the photo collection would also have a physical form. This would be reassuring to

**FIGURE 9. The Digital Slide Viewer in its display case. (Color figure available online.)**


family members because they would know exactly where the photos were in a manner that is less ambiguous than the online location.

This device has allowed us to speculate on a number of issues. One question it has raised, for example, is around the metadata that is accrued by content being posted online. Images that are shared on a site like Flickr build up layers of additional information beyond the raw image and title, such as tags and comments. They are flagged as being a "Favorite" by other users. The number of times they are viewed is tracked. What does this additional patina of data offer to the family for reminiscing? Might it be interesting to know, for example, which images on the device were flagged as favorite the most while they were stored online?

## 5.4. Building Heirlooms

Although our research is still ongoing, it is worth reflecting a little on what we have learned so far in the design and construction of these three systems. As described earlier, the primary purpose of developing these artifacts was to explore some of the themes we had identified in order to draw out insights around technology heirlooms. This topic concerns itself primarily with the transition of the material with which we

reflect on our pasts and the pasts of others, from a physical form to a digital. In exploring this transition by building real systems we have already identified a number of interesting tensions:

- The tension between (a) materiality and craft and (b) the immateriality of content. Our instinct with all three items has been to build very tangible artifacts, with due consideration to the craft of their construction, and material choices. They are each carefully constructed from wood, a material that ages well and does not have strong technological association. Each object feels unique, designed to seem precious and be put on display, as seems appropriate for objects that are concerned with honoring and reflection. This is somehow at odds with the digital content they contain, which is easy to duplicate and distribute.
- All three artifacts concern themselves with taking content off the network and keeping it "safe" offline. They are all containers, boxes with lids, within which this content can be captured. There is a natural suspicion of the network inherent in these items, that preserving content offline is somehow inherently more secure than keeping it online. Is this suspicion of the long-term stability of the network justified when the offline technologies (particularly displays and hard drives) are themselves very fragile?
- The content of the Backup Box and the Digital Slide Viewer exist online within the context of a social network before they are copied into the devices. Backup Box items come from Twitter. Slide Viewer items come from Flickr. Items on these networks accrue new context through the act of sharing them. On Twitter items are commented upon and re-tweeted. On Flickr, photos become part of a complex web of sharing tools that include comment, favorites, groups, tags, and so on. Is this extended activity worth preserving as another element of the item that could be valuable as a source of reminiscing?
- These three devices are all frames for screens. Digital content is in the end viewed and interacted with through pixels. This makes the container for the content, the box within which it sits, somehow more tangible than the items, which it contains. The digital items can take many forms, and we've chosen a few, from the metaphorical (as slides) in the Slide Viewer, through the chronological (the timeline in Timecard) through to the abstract (the flowers in the Backup Box). There is no such thing as an "authentic" form for digital content. This seems at odds with our choice of "natural" materials for the boxes themselves.

We hope to continue to explore these tensions in more detail using our artifacts in field work (see details next).

## 6. CONCLUSIONS

We have presented a case study based on the design-led process we have undertaken to better understand and to develop a number of artifacts within the

domain of technology heirlooms. This domain touches on complex and subtle matters of individual and social reminiscence, the materiality of objects, and the nature and purpose of memory. It can be a challenge to translate these types of ambiguous domains, with their emphasis on subtle human values, into real artifacts that can add value in the process of research. Although we make no claims for a new methodology to tackle this kind of nebulous area of research and design, we hope there is value in describing how we attempted to get to grips with these issues through a combination of field research, sensitivity to technology trends, and the collection of new concepts for inspiration. In particular, we found that the use of a thematic map to pull together these different resources was a pragmatic and valuable way of both documenting and inspiring new ideas for concepts. Evidence of this is the three prototype heirlooms we have described, work that is ongoing. In a domain as complex as this one, these objects can provide an important function in helping develop new insights and ideas, as well as foregrounding issues that may not have emerged otherwise.

As a next step in this research and design endeavor, we will be using these three artifacts as a prompt for discussion and evaluation in situ, with people in their own homes, and within focus groups. We are interested, for example, in using them to look intergenerationally at issues of bereavement and legacy. Backup Box and Digital Slide viewer, particularly, deal with quite contemporary digital forms because of their connection to Twitter and Flickr, sites that we expect to be more familiar to younger participants. Yet both are objects that are concerned with legacy, a topic that tends to be of more interest to older participants. We are interested to see the range of reactions we may get to these concepts because of this tension between contemporary technology and the passage of time.

Ultimately, researching and developing new concepts for technologies that need to be evaluated beyond our own lifetimes is a challenging undertaking. We need to therefore be creative in our methodologies, where notions of usability testing and even field evaluation over weeks and months will simply not give us enough insight, or perhaps *foresight* where their very long-term value is concerned. This case study shows how we have attempted to get to grips with an often unruly but interconnected set of issues in order to channel our efforts in design. In future, we will have to be equally flexible in the ways in which our designs are assessed and refined. This may call for the invention of new methodologies but is more likely to involve the bringing together of multiple perspectives, diverse disciplines, and an amalgam of techniques in order to shed light on this emerging and important area for research and design.



## NOTES

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***Authors' Present Addresses.*** Richard Banks, Microsoft Research Cambridge, 7 JJ Thomson Avenue, Cambridge CB3 0FB, United Kingdom. E-mail: rbanks@microsoft.com.

Abigail Sellen, Microsoft Research Cambridge, 7 JJ Thomson Avenue, Cambridge CB3 0FB, United Kingdom. E-mail: asellen@microsoft.com. David Kirk, School of Computing Science, Newcastle University, NE1 7RU, United Kingdom. E-mail: david.kirk@newcastle.ac.uk.

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