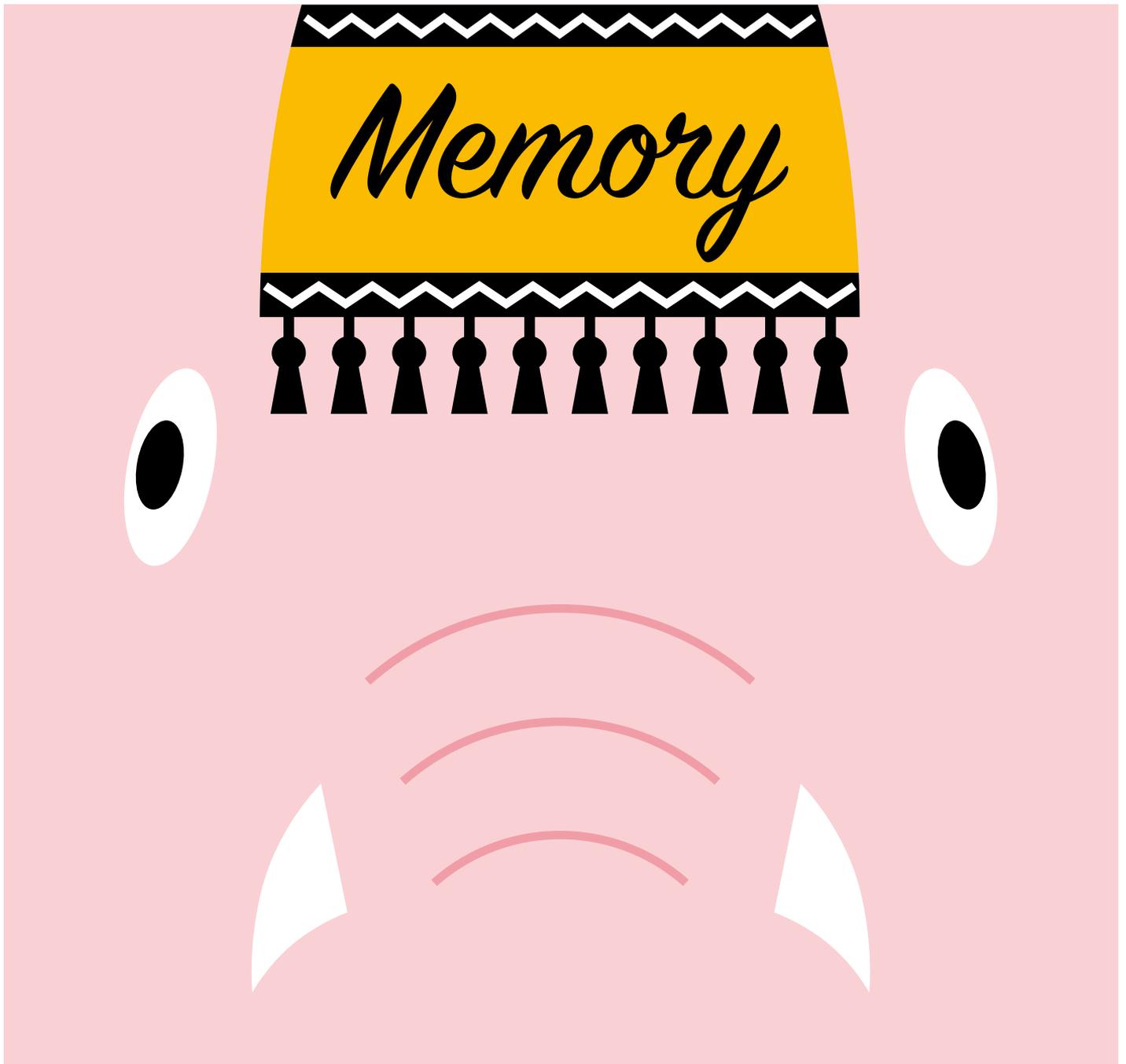


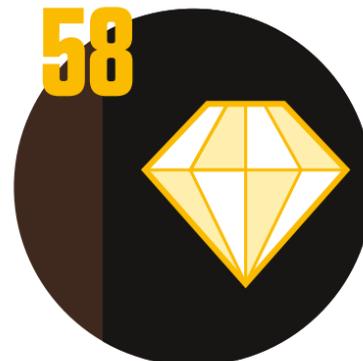
RESEARCH FROM THE SOCIO-DIGITAL SYSTEMS GROUP THAT MIGHT BE USEFUL IF YOU WORK ON PRODUCTS THAT **CONNECT US TO OUR PAST.**

02
ISSUE

THINGS WE'VE LEARNT ABOUT



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We begin by examining the relationship between technology and human memory and suggest that we need to be specific about the kind of memory we aim to support. To do this, we propose the “5 Rs” of memory systems.

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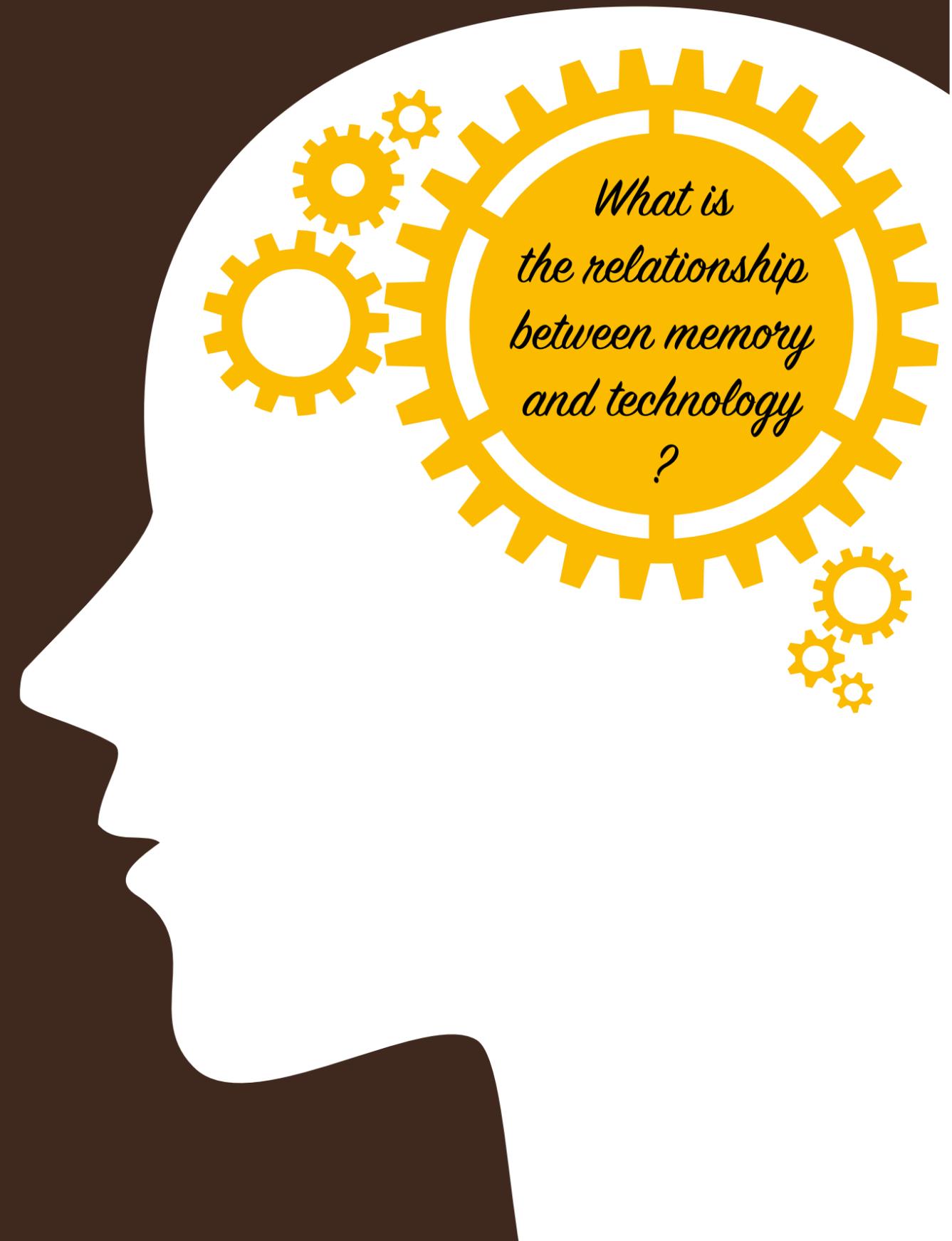
When we die, most of us will leave behind a vast archive of digital data. This section examines some of the issues we will have to confront.

66 MEMORY ISN'T JUST IN THE HEAD

We conclude by examining the array of human values technology can support when we think about connecting to our past.

CHAPTER 1 | DESIGNING FOR HUMAN MEMORY

New technologies can help us look back on our past in new ways, but there are many reasons why we will want to do this and many kinds of memory we might support.



MEMORY &

In today's world of ubiquitous computing, we are capturing more and more data about ourselves and our lives. With new kinds of capture devices, advances in networked computing, and vast increases in storage capacity, we now have the capability to amass huge archives of personal data. In effect, we are each leaving a "digital footprint" behind whenever we interact with technology, whether we like it or not.

Some see this as a potential problem: as we move through spaces where computers are everywhere, but may have disappeared from view, we may not know that we are interacting with technology, or that information about us is being captured. This might create difficulties to do with access and ownership of data, as well as managing and mining these archives.

Others see this as a huge opportunity: such systems can enrich our lives, augment our fallible human memories, and leave a legacy of personal information behind us for future generations. Going back to Vannevar Bush, JCR Licklider and others, technology can be viewed as a way of enhancing our cognitive capacities and enabling us more control over our destinies. As Licklider put it, humans and machines can have a *symbiotic* relationship with one another.

Our research looks at the role that technology might play in helping us all to look back at our past. We seek to understand it and use this understanding to open up the space of new design possibilities. To do this, we have not only used a technological perspective, but used the lenses of psychology, sociology and design too.

WE ARE NOT MACHINES

Claims that are often made about memory and technology tend to equate human memories with data stored in a computer. The term "digital memories" is used as if these are somehow the same as the memories we construct in our heads. For some technological enthusiasts, the aim is to capture as much data as possible, and as many kinds of data as possible (whether these be images, sounds, location data, biosensor data, or data about applications and documents we have used). The implication is that eventually we can capture all of human experience for our own daily use, for sharing with others, and indeed for posterity.

More than a century of research in the psychology of memory has shown that human memories are not best conceived of as a system of data records. Rather, when we recollect our past, we construct rather than access and "replay" our memories. Such constructions are often inaccurate, change over time, and depend on our circumstances.

Not only are human memories not machine-like—human memories cannot be created, captured or somehow stored by a machine ei-



Left: JCR Licklider (or "Lick" as he was known) was one of the most important figures in the early history of computer science. In 1960, he wrote an influential paper called "Man-Computer Symbiosis" which envisioned the ways in which technological systems could support human frailties.

Right: Vannevar Bush was an American engineer and visionary who published a much cited article in 1945 called "As We May Think" in which he described the concept of a desk called the "Memex". With the Memex desk, all of a person's documents and communications could be stored along with a record of one's interactions with them.

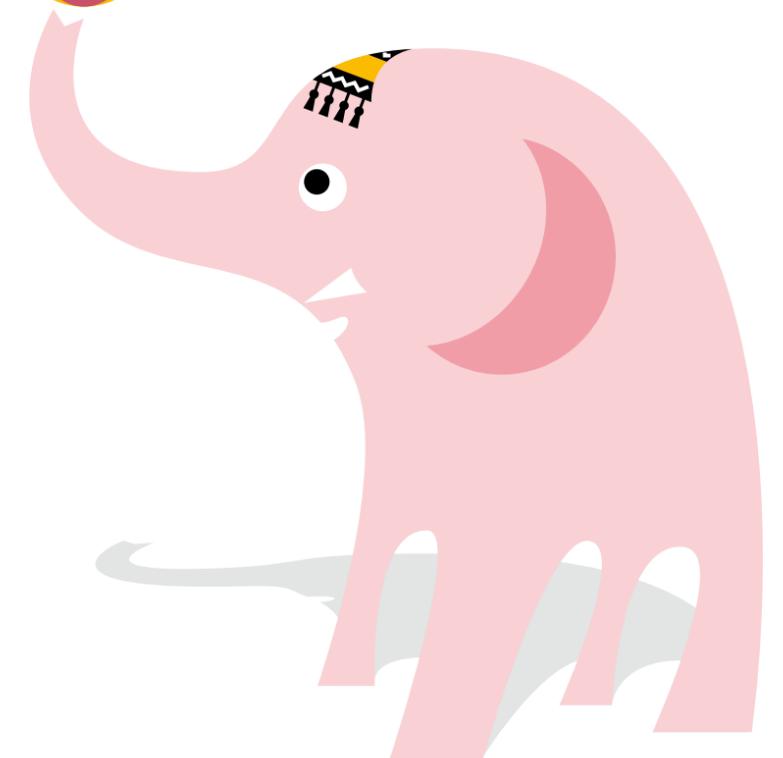
TECHNOLOGY

The 5 R's for Memory Systems

ther. Rather, the data we capture through and store within technological systems are better thought of as cues to trigger these memory processes, or to help us re-experience our past. Furthermore, how these cues work depend on what kind of memory is being invoked.

Our own research has shown that, more broadly, digital archives of personal data can be used in fact in many different ways, some to do with supporting memory and some not. We characterise this as the 5 R's of memory, corresponding to five different kinds of value that technology might deliver when we think about supporting human memory. These are: Recollecting, Reminiscing, Retrieving, Reflecting and Remembering Intentions.

These 5 R's can help us define the end user experience we are trying to achieve. Here we need to bear in mind that they may represent very different design goals. In other words, a system optimised for reminiscing may be quite different from one optimised for retrieval. The 5 R's are described in more detail next.

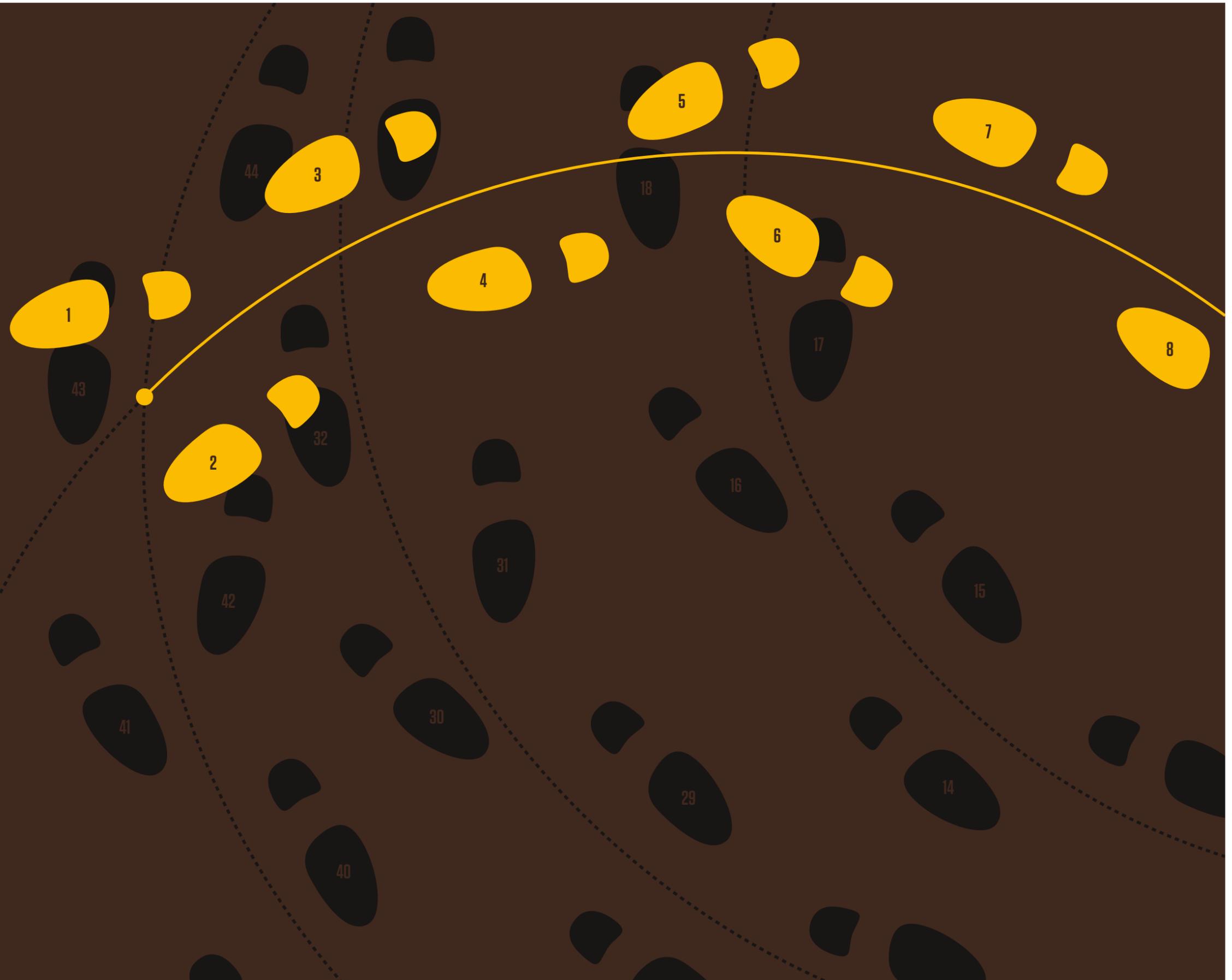


RECOLLECTING

Technology could help us mentally “re-live” specific life experiences in the sense of being able to think back to specific past, personal experiences in detail (often called “episodic” memory). This can be for practical purposes such as remembering aspects of an important experience we have forgotten. Examples include: relocating lost physical objects by mentally retracing our steps, recollecting faces or names by remembering when and where we met someone, or remembering things we had promised to do by trying to recall things discussed in a meeting.



If you are designing a system to support **recollection**, then we know there are some kinds of cues that are better triggers than others. For example, rich visual images seem to be good cues for recollective memory. Also, place, event and people cues are stronger than using time as a cue.



REMINISCING

As a special case of recollection, technological systems could also help users spend time mentally re-living past experiences for emotional or sentimental reasons. This can be done either by individuals, or socially, and as an (often pleasurable) end in itself. This kind of recollection is what often occurs when we watch home videos with others, or flip through photo albums with friends and family.



If you are designing a system to support **reminiscing**, you need to think about optimising the experience of sharing either for people who are together, or for experiences to bring remote people together. Such systems might also support the elicitation and recording of spontaneous storytelling.





RETRIEVING

Systems could help us retrieve facts or other kinds of digital information we have encountered in the past, such as documents, emails or Web pages. This might involve recollection (we might retrieve a document by remembering where we were or who we were with when we wrote it, for example). Alternatively retrieval might involve keyword searches, looking things up in directories or other databases, or simply looking in likely places. In other words, retrieval need not

involve any kind of recollection at all, as long as there are other ways to find the sought-for information. Examples of retrieval include doing a Web search for a person you have met before so you can remember what they look like, or finding the minutes of a meeting for action items rather than trying to recall the events of the meeting.



If you are designing a system to support **retrieval**, the emphasis should be on the fast and efficient searching of large databases of heterogeneous information. Such systems might allow users to search not just using keywords, but using a variety of metadata and methods.

REFLECTING

New technologies might support a more distanced or abstract representation of personal data to facilitate reflecting on and reviewing past experience. This might include examining the patterns of past experiences, such as aggregated data about one's behaviour over time. Or, alternatively, it might be about looking at one's past experiences from a different angle or perspective. Here, the value is not in the "re-living" of past events, but in seeing things anew and framing the past differently. That is, value is less to do with memory per se, and more about other things such as learning and self-identity. Examples here include keeping track of your running routes and times to assess your level of fitness, or recording your travel habits to see how you might reduce your carbon footprint.



If you are designing a system to support **reflection**, you need to think about providing users with many different ways of viewing information about their past activities. This could include looking at the data along a timeline, by location, or by associating it with different activities or people. The key here is to provide new views onto the past.



REMEMBERING INTENTIONS

Finally, another vital class of memory concerns remembering prospective events in one's life, as opposed to those things that have happened in the past. In our everyday activities we are constantly required to defer actions until later, and plan future activities. Examples of remembering intentions or "prospective memory" include remembering to run errands, take medication, attend appointments or carry out other planned activities.



If you are designing a system to support **remembering intentions**, the focus needs to be on how to deliver reminders in a timely manner, perhaps using time, location or other contextual cues to trigger the reminders. If people get reminded at the right time and place, the content of the reminder is less important.



Lifelogging with



Bottom: The Sensecam camera. A range of sensors on the device trigger the taking of photos automatically.

Lifelogging technologies can be seen as a special but emergent class of technologies, where information about our personal activities is captured automatically throughout the course of our daily lives, and with minimal effort or intervention required. This can be contrasted with conventional cameras and video recorders which we use deliberately and under our control.



Sensecam is a wearable device developed in our lab which takes pictures from the perspective of the wearer based on changes in light, heat and movement and using a fish-eye lens as shown above. Hundreds of images are typically captured in the course of a normal day. Many studies are being carried out to see how Sensecam might help people with memory impairments and here, Sensecam shows some exciting potential for helping in the consolidation of memory.

With normal populations, our research has shown that there are many different ways in which lifelogging data can mediate memory. In one study, we found that Sensecam images supported both the recollection of everyday events (mentally being able to relive past events) and also the retrieval of past events. In the case of retrieval, we found that these images helped people to know what must have happened in the past, even if they could not really recall those

events having happened. More than this, in the long term, Sensecam images were better for supporting knowing what must have happened than truly recalling those events.

In another study, we compared and contrasted image data with locational data collected from a lifelogging system which combined Sensecam images with GPS data shown on a map. Here we found that images provoked more detailed memories of events than locational data. Locational data, on the other hand, was better at allowing people to reflect on their own habits and activities in a way that the image data did not.

How might SenseCam be used in everyday life by households? Here we find that the use of Sensecam may be less about remembering the past as it was, and more about reflecting on our past in new ways. The peculiar fisheye view of the Sensecam camera meant that sometimes these pictures

were appreciated not for their realistic portrayal of life as it was, but for offering up a different kind of view. Sometimes the aesthetics of the images were appreciated, making something otherwise ordinary remarkable. Other times, SenseCam photos and their presentation in a time-lapse stream made the mundane aspects of life more noticeable, with participants noting their surprise upon discovering aspects of their lives that they would not normally contemplate. The nature of this reflection has also been shown to differ across different groups of people. Young couples are more likely to use the cameras in playful and creative ways, for example.

Taken together, these studies highlight the fact that Sensecam data acts in different ways to support memory. These data are not just for revisiting the past: they can be used for retrieval of information, reflection and reminiscence too.



CHAPTER 2 | KEEPING THINGS

Most households can point to both digital and physical objects that they cherish. New technologies offer the potential for sharing and protecting our family archives into the future.



*How can we
keep and protect
the digital and
physical objects
we treasure?*

Household Treasures

Digital technologies open up entirely new realms of possibility for keeping and creating artifacts that households will treasure over generations. While there is a large body of work examining the issues around professional preservation and archiving, few researchers have looked at this in the home.



In a study of households, we asked people to tell us about the things (both physical and digital) that they chose to keep and why. These interviews and tours around homes turned up all kinds of objects, from children's artwork and collections of shells gathered on holiday, through to treasured emails and digital documents buried on computers. Physical objects were more commonly talked about, some of which were proudly displayed (such as a hat signifying graduation) and others hidden away (such as a mother's collection of old teen magazines). Digital objects too were held to be precious, such as a nearly complete record of the various text messages and email communications one couple kept as a remembrance of the early years of their relationship.

In all, we established six main reasons for why people—and in this case households—kept objects. Each of these in essence represents a kind of human value that we can design for.

Note that many of these are not about personal reasons for archiving materials, so much as reasons which have to do with the family or the household. And when we look at family life, physical objects are central to those archiving practices alongside our growing collections of digital media.

This suggests that there might be interesting new opportunities to design technologies based on a deeper understanding of household practices. But it also points to new opportunities for understanding why physical objects are cherished, and perhaps linking the digital and physical worlds more closely. One approach is to think about how digital objects might take on some of the properties of physical artefacts. Taking inspiration from physical objects, we could offer up more diverse ways to display digital objects, to change them over time, and to change their use over time.

Another approach is to think about how to more closely link digital and physical objects together in richer ways. Physical objects can be scanned into digital systems, for example, not to replace those objects but to create new and interesting collections or amalgams of objects. Likewise, physical objects can be augmented with stories that might be captured, accessed and stored in the digital world. There are many new possibilities once we broaden our view of what home archiving is about, and what values are embodied within these practices.

In what follows we describe the six main reasons that households treasure objects in more detail.

Far left and below: People preserve objects that remind them of events and periods in their lives that are important to them.



DEFINING THE SELF

Keeping things is a way of expressing or preserving something about yourself and your identity, whether this is displayed in “public spaces” in the home, or hidden away in the attic. A box of objects from childhood or from teenagehood is a good example of this. In the digital realm, past project work or documents are also kept for this reason.

CONNECTING WITH THE PAST

Sentimental objects are sometimes kept to form connections with the past. A good example of this we saw was a book of jam recipes that one woman inherited from her grandmother, complete with handwritten corrections and comments. Using the book was a way for her to remember and feel closer to her grandmother.



HONOURING THOSE WE CARE ABOUT

Many objects in the home are displayed so as to draw attention to and honour people in the household or important friends and family. Displaying artwork made by young children is a good example of this.



FRAMING THE FAMILY

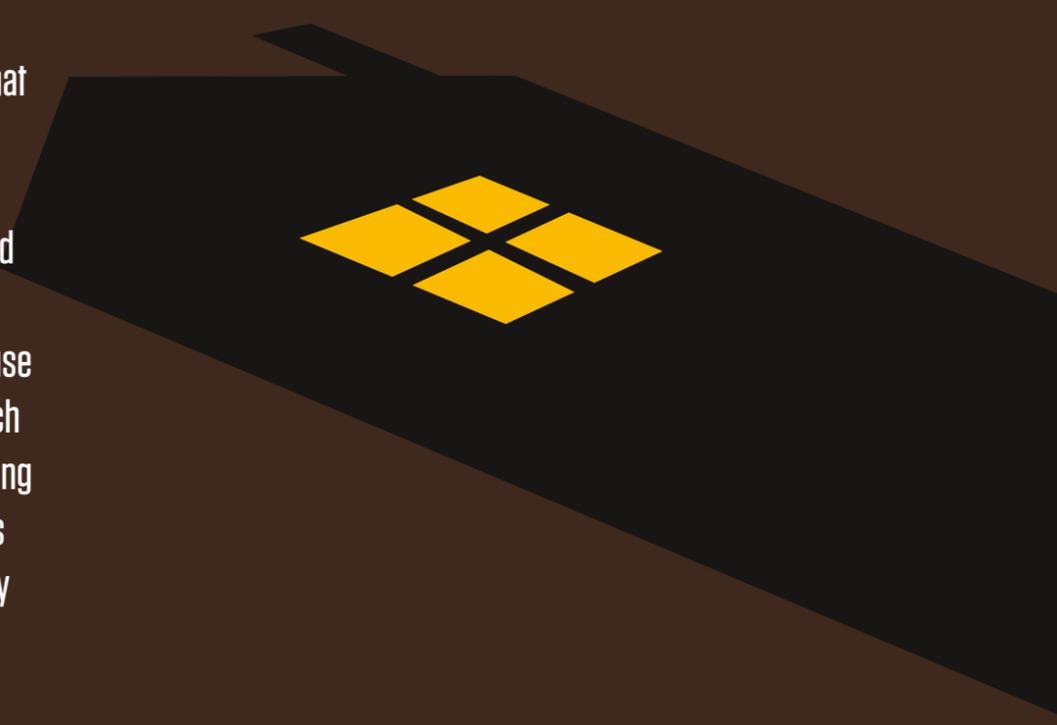
Many things of importance to a household are bound up with decisions about how the “face of the family” should be displayed in the home. For example, displays of objects collected on holiday, or paintings which show the family’s religious connections are a way of showing what the family is about.

FULFILLING DUTY

Another reason for keeping things has to do with the drive to do one's duty for the sake of the household or for future generations. One family we interviewed had adopted children both of whom arrived with a collection of baby toys. The mother had diligently stored these items away when the children outgrew them to preserve a tangible link for the children to their former lives.

FORGETTING

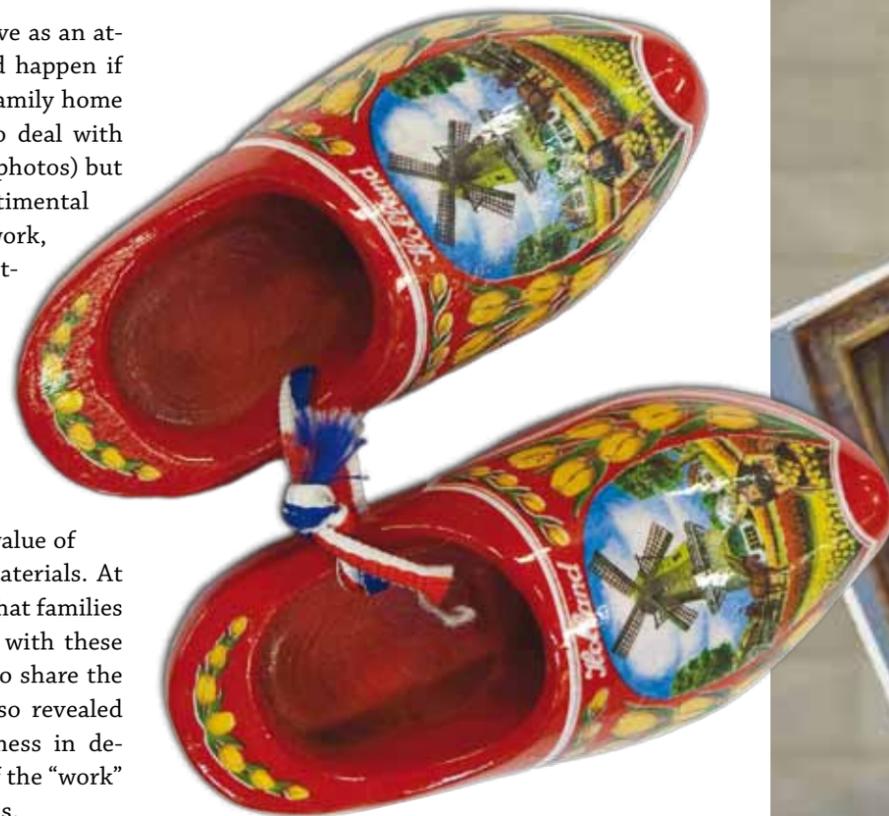
Another aspect of keeping things, and one that is rarely considered, is the extent to which we archive items to forget them. One young woman told us about letters she had received from her mother, which she still keeps, but which are painful to her. They are kept because they are important, but they are stored in such a way that they are out of sight. The same thing can happen with things stored on computers so that they are not stumbled across yet they are not deleted.



FAMILY ARCHIVE

We developed the Family Archive as an attempt to explore what would happen if one device that lived in the family home served as a place not just to deal with digitally born content (such as digital photos) but also to scan in physical objects of sentimental importance, such as children’s artwork, souvenirs collected on holiday or old letters and pictures. This was a bespoke multi-touch system that allowed households to store and arrange photos into virtual boxes, along with scanned physical objects. The system was deployed into three family homes for one month each.

The results of the trial showed the value of being able to be playful with these materials. At the same time, it highlighted the fact that families wanted the tools to be more creative with these collections of objects, and to be able to share the things that they created. The trial also revealed the importance of balancing playfulness in design with efficiency for getting some of the “work” done when dealing with these materials.



CHAPTER 3 | MANAGING THINGS

We need to find new ways of dealing with the ever-increasing collections of digital data that people capture such as photos and videos.



Dealing with our Digital Stuff

We now turn to the kinds of digital content that people capture more deliberately, focusing on the photos we take and keep over the course of a lifetime. These ever-increasing collections for most of us now sit alongside our legacy collections of paper photos which may be organised in albums or be gathering dust in shoeboxes or drawers in our homes.

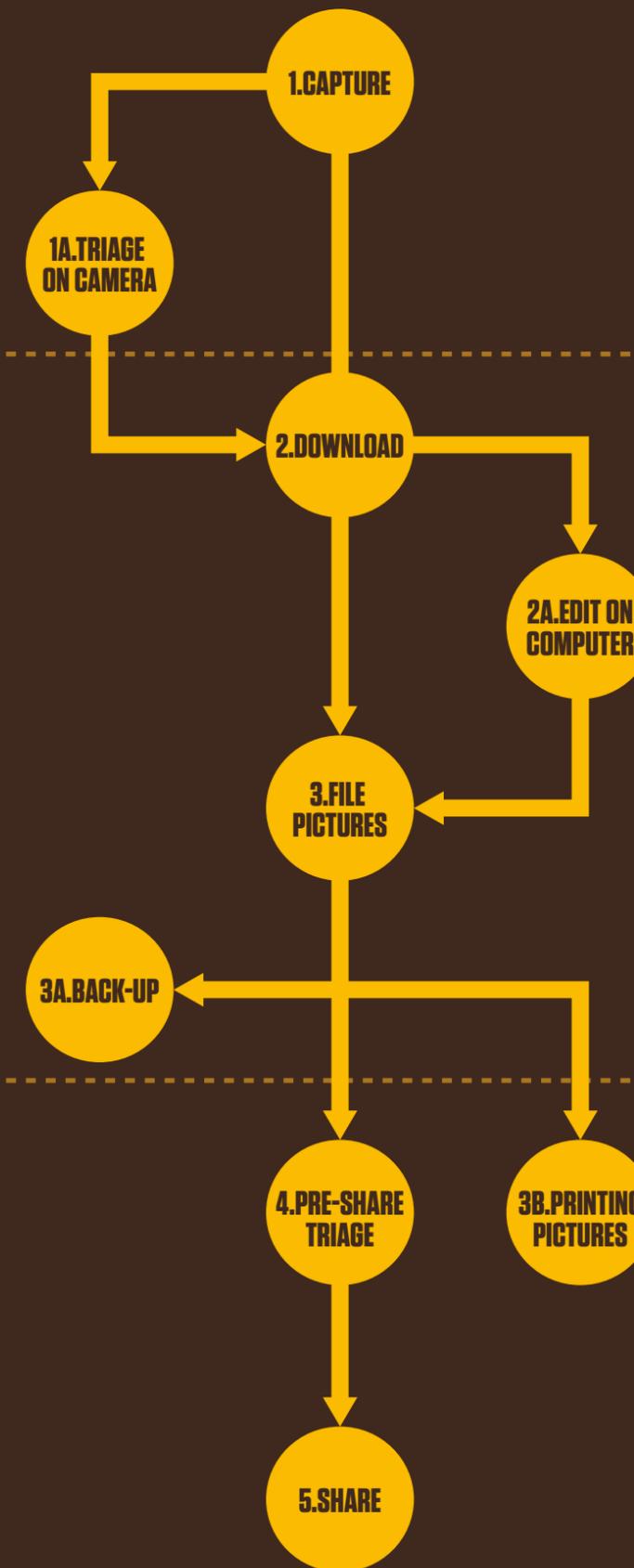
Our research has helped to map out the “life-cycle” of work that people do with photos. Here, we have been most concerned with the activities that people engage in from the point of capture to the point at which they share these materials with others. This is important because we have found that often, prior to sharing their digital photos, most consumers spent a great deal of time reviewing, downloading, organising, editing, sorting and filing them. We have described these practices as “photowork” recognising that these activities are both effortful and time-consuming.

Interviews with people in their homes led us to map out three main phases at which photos are dealt with: pre-download (on the camera), at-download (on the PC), and then pre-sharing (also on the PC). Each of the phases consists of some key activities people engage in including triaging or sorting their photos (usually into ones to keep, ones to delete, and special ones to share), editing or modifying photos, filing and organising photos, and occasionally printing. Sharing of course often follows on from photowork, using many kinds of methods from giving prints, to posting images on social networking sites.

In all of this, there are some important findings to highlight with regard to the need for quick ways of triaging photos, powerful ways of browsing, and tools for creativity.

Right: A shoebox full of unorganized photos.

Far right: The flow of activities related to photowork.



THE BURDEN OF TRIAGING

By far the most common and time consuming activity in managing photos is the triaging or sorting of them, often occurring during all three major phases of activity (pre-download, at-download and pre-sharing). This kind of activity is done by considering any one photo against a collection of others, and making decisions about each one such as what to keep and what to delete, what to share and what not to share.

One obvious implication is that if we want to reduce the work that people do with photos and make it a more pleasurable experience, we need to design systems to better support quick and flexible sorting and triaging, whether this be on the capture devices themselves, or on the PC. Here, multi-touch interfaces and gestural techniques make sense as new ways to do these kinds of actions quickly and easily. But we can also think of using, for example, computer vision techniques to help speed up and facilitate sorting. For example, these techniques could be used to isolate and cluster poor quality or blurry images for quicker triaging.



A DISTINCT LACK OF SEARCH

We found very little evidence that consumers often search for particular photos. Rather than focussed searching, consumers spend much more time doing goal-directed browsing in the sense that they typically look for clusters of photos around an event, person or theme through scanning and viewing large collections. This is quite different to what we do with impersonal collections of images, such as we find on the Web where directed search is more common.

This points to the need to refocus our design efforts on new and richer ways to browse through our collections rather than to search through them. For example, intelligent ways to support search, such as the ability to search by content, might be better deployed as tools to help users cluster and view large collections of images. Consider, for example, an algorithm which supports search for particular classes of objects (cars, trees, people and so on). Rather than implementing a “search by similar object” feature, such an algorithm could support new ways of viewing collections clustering by object type. Likewise, intelligent “search” tools which look for a particular object, presence of people, similar layouts, similar scenes and so on, could instead allow users to see their collections in new ways through filtering and grouping along different criteria. This could support the “narrowing down” of collections into sub-groups which then becomes the basis of the more focussed browsing we have seen users do.



HELPING PEOPLE BE CREATIVE

People want to be creative with their photos, especially just prior to sharing. This includes not just modifying individual photos, but creating collections, annotating them, and telling stories with them. By its very nature these kinds of tasks are time-consuming, but we have also seen that over-automating these processes confuses users.

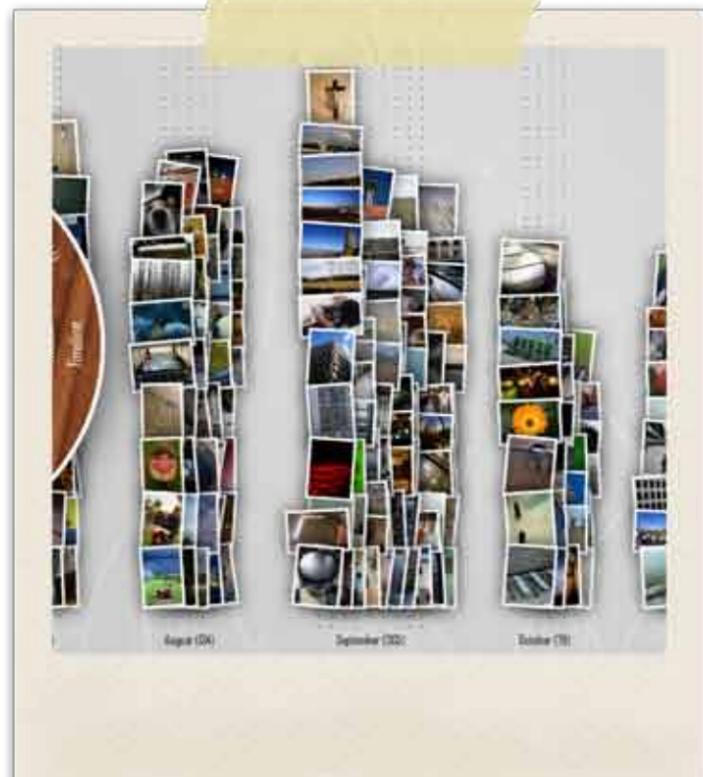
All of this means that people will value tools which allow people to be creative without having to carry out repetitive work or use complex features. This means finding the right balance between the aspects of photo editing and creation which are fun and playful, and those which are burdensome and effortful. One potential middle-ground is for automatic editing tools to offer up a series of potential “solutions” to a user and to let them choose. For example, an “auto-cropping” tool might be applied to an image, but would present several possible alternatives to a user to select from. It also means that users might like a choice of tools which allow them to create new kinds of artifacts with photos, such as album templates, playful animations, or gifts that can be printed out.





Making

MEMORIES



Our first archiving concept (Family Archive) showed that users wanted to be able to more efficiently sort through and organise their digital materials. They also wanted more of an emphasis on creativity, and more connections to the larger ecosystem of technologies we use to capture, display and share digital media.

Accordingly, our Memory-Making system allows easy uploading of photos from mobile devices by simply placing those devices in a drawer attached to the Microsoft Surface. Physical objects are scanned in using a scanner which might be mounted under the kitchen cabinets and triggered by a simple gesture. Once digital and physical objects are in the system, they can be easily sorted and tagged using multi-touch gestures, or simply dragged to any digital picture frame in the house.

Objects which are kept in the central archive can be viewed along a flexible timeline. Key here is that any of these objects can also be used to create digital scrapbooks. Scrapbooks can contain any mixture of digital photos or videos, and scanned physical objects. They can also be annotated with text, hand-drawn markings, or even sound. We also have the concept of a digital piñata which is created and filled with digital media. The piñata is labelled and left on the surface, and can then be opened by striking it with the palm of the hand, the media then spilling out on the table.

Far Left: A timeline view of items in the Memory-Making system. Just one way to browse through its contents.

Above: A digital photo album. The Memory-Making system offers tools for getting creative with digital things.

CHAPTER 4 | SHOWING THINGS

Things that trigger memories often have material form and are inexorably linked to the social practices in which these materials are used.



Photographic Memories



Photographs are probably one of the most obvious ways we make memories visible and indeed tangible. Our memories of the past are deeply entangled with the photos we have, so much so that it is sometimes hard to distinguish between what is a memory and what is merely a recollection of a photograph's content.

The truth is it is probably not all that helpful to separate the two. The imagery in things like photos form part of what and how we remember. Moreover, the material form and arrangement of the photos similarly play their part in the remembering. It is this latter point of showing things such as photos that we want to draw out in this section. We'll aim to show that how we actually put photos on show is just as important to the ways

we remember as their content, and that this opens up options for designing digital media displays.

The photos displayed around our homes—photos of children, parents and grandparents, of old homes, school days, vacations, etc.—can take many forms. Sometimes a photo can be framed and placed amongst others on a mantelpiece or as part of a wall arrangement, sometimes it can be simply taped or pinned to a wall or pin board, and sometimes it may be casually propped up on a desk or shelf. Evident from our research with family homes is that these different kinds of display change the ways content is remembered. So the differences in formality, tidiness, persistence, intention, etc. give an indication of what aspects of the past we might recollect and reminisce about.

To offer some examples, the formality of photo displays usually found on mantelpieces tend to memorialise the past, celebrating particular family members. The framing of photos in wood or some kind of metal, and the carefully thought-out arrangements can convey who is important in a family and a hierarchy of importance. Alternatively, photos casually pinned to boards or walls are usually of something more recent and ephemeral. They might be of a day out or something casually snapped, and capture a momentary mood. The temporary quality of the photo's display has some bearing on how it is seen and the content recollected.

REMEMBERING RELATIONS, PAST AND FUTURE

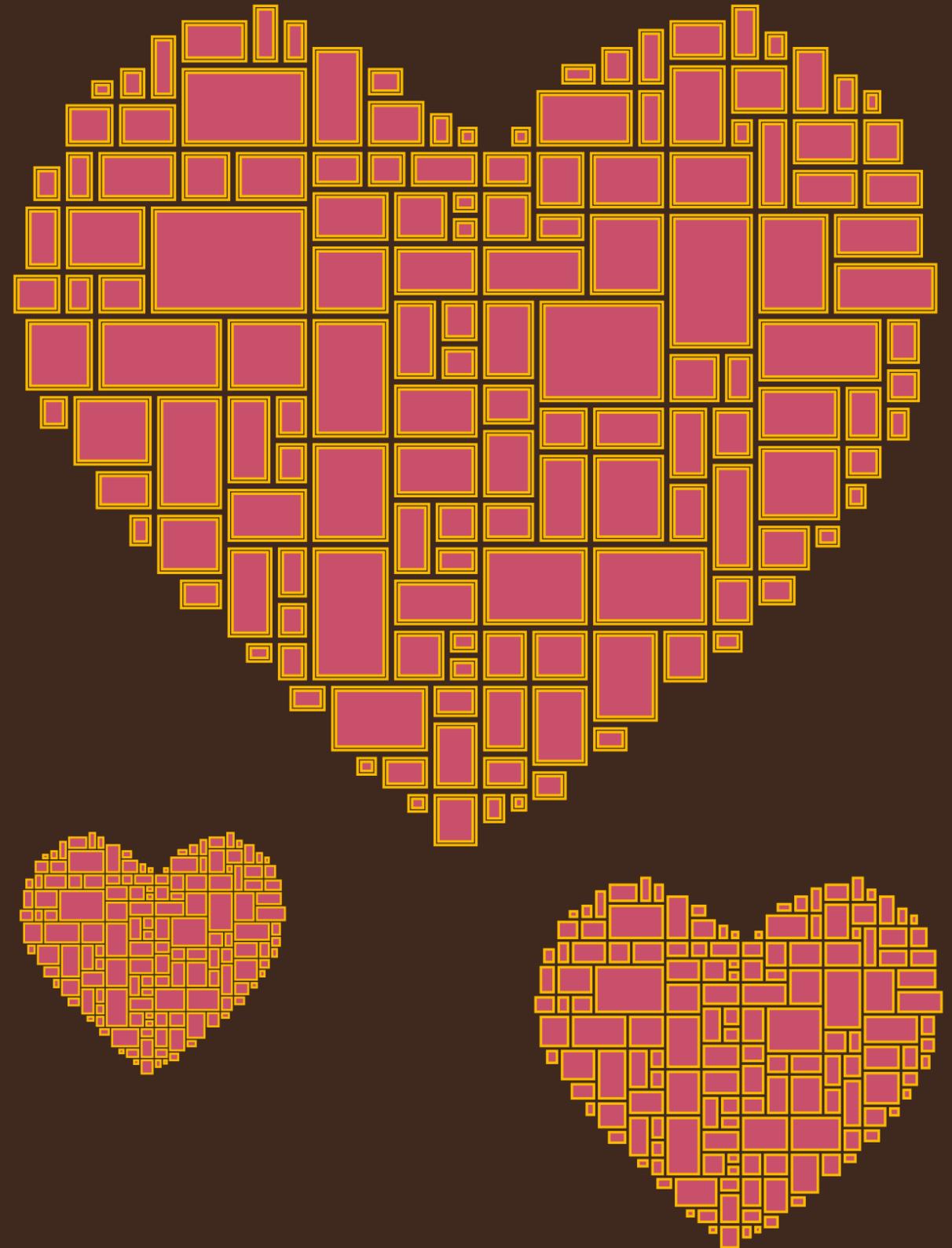
The ways photos are shown express something about how we want our homes and families to be, as well as how we want them to be remembered.

These materialisations of remembering also do something else. They bring us together in particular ways. Pictures of ourselves with friends or with our families and loved ones provide a sense of our shared histories with others. Likewise, the ways we group photos in collages or framed collections express something about the relationships between the people and places we know. The social ties we remember then are not dictated merely by the content of the photos. Photos also embody a record of our social relationships through the ways we show them.

While photo displays help us to recollect and reminisce about our past relationships, they also in a sense fall into the fifth category of the five Rs we introduced earlier, remembering intentions. Surprisingly, perhaps, they help us to remember what we want our homes and families to be like, the hopes we aspire to. The ways we combine photos on display, the degrees of formality, the choices of prioritising

some photos over others, and so on, all add up to express a ‘hoped for’ idea of what we’d like our homes and families to be. In short, they can be about remembering what we want for the future as much about remembering the past.

This dual function of photo displays—in which they help to remember both what has past and what we want for the future—is nicely illustrated by the ‘family displays’ that are common in homes. These photo collections often incorporate a sense of history by displaying a sequence of generations from great grandparents and grandparents to a household’s children. At the same time, though, they portray how a household wants their family to be remembered. The sequence of photos enshrines a very particular idea of lineage, giving emphasis to what is seen as memorable and special about a family.



CURATED AND NEGOTIATED MEMORIES

Memories are contested through what photos we show and how we show them.

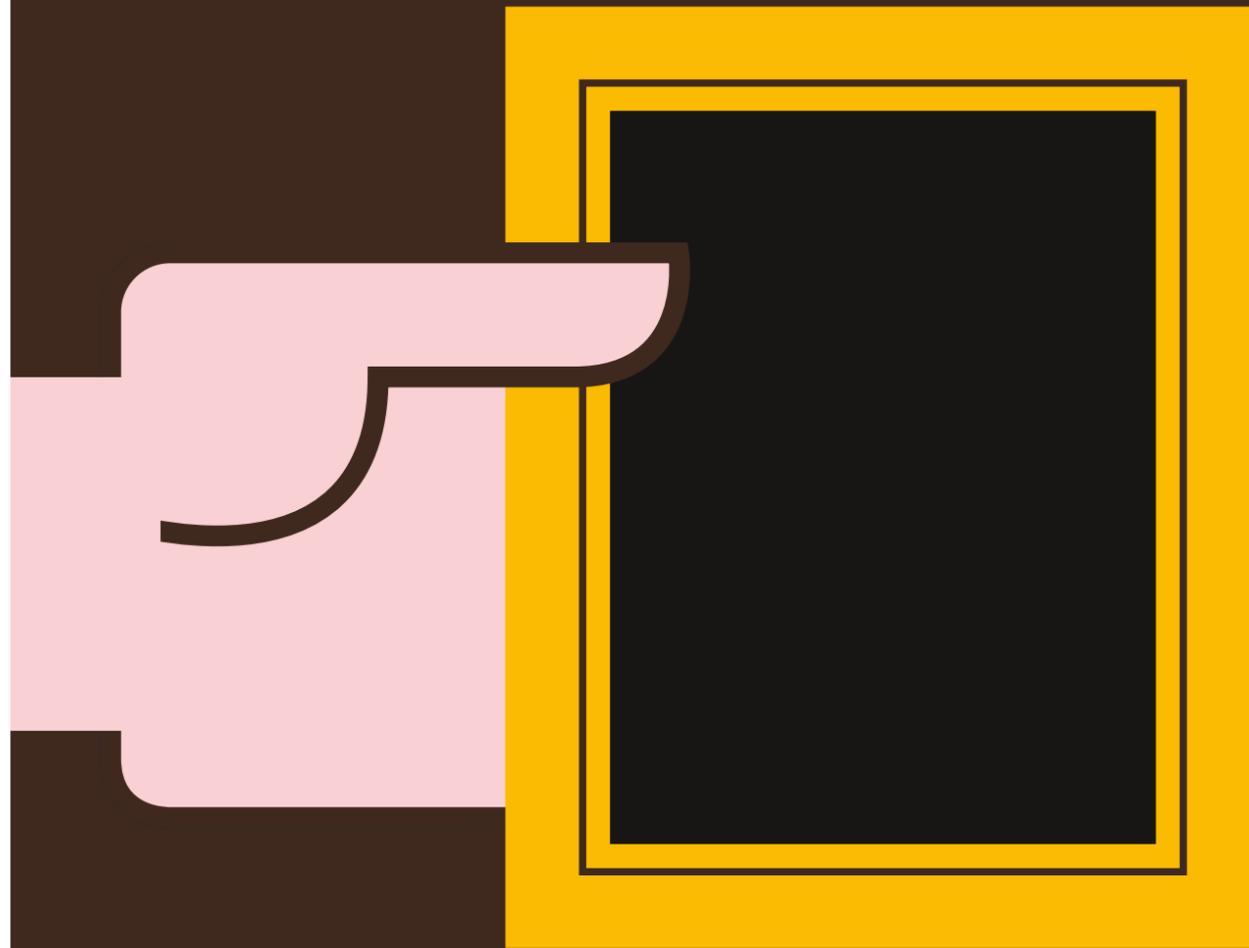
With this idea of photos being an expression of what might be or what is hoped for, a further point to consider is who in a household puts photos on display. We have found that a great deal of influence if not power is exerted by the people who display photos. Those we call the

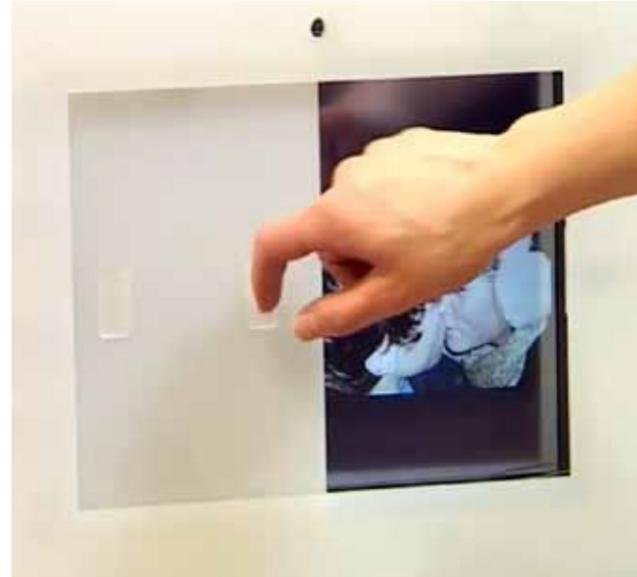
curators of household photo displays play a major role in shaping the memories that are constituted in a home. In essence, they are the arbiters of at least one version of a home's past and future.

This provides us with another important perspective on the making of memories. We see that memory making is not something that occurs strictly in isolation, nor is it confined to

the inner workings of the mind. Memories are also given form and managed socially. In the case of household photo displays, we see there are people who have more say over how families and homes are remembered. Also, this form of remembering is inevitably negotiated between household members. The most obvious example of this is how bedrooms usually become the places for teenagers to display their photos and other

forms of media. Their materialised memories are for whatever reasons relegated to personal spaces, and not readily available for household or public consumption. There are then certain kinds of memories through photos that are socially sanctioned in homes. Infringements on these are carefully managed and often guarded against.





SLIDING

With the different reasons for showing photographs and how homes go about showing them, it is striking how few options there are for displaying digital photos. Many current software solutions tend to prioritise the personal management of photos. Yet there is a paucity of choices when it comes to using these same photos to express things about the past and the hoped for future.

PC screensavers and digital photo frames that cycle through pre-defined collections of digital photos can provide a compelling way of serendipitously remembering the past. However, in light of the rich and varied ways conventional photos are used, these technologies seem a little crude. Our design work, to date, has focused on exploring the options for this space. The aim has been to experiment with the unique qualities of digital technologies and how they might lend themselves to evoking memories. Some of this work has explored expanding the number of ways digital photos might be displayed.

As well as these solution-led proposals, we have also been thinking about how device designs can be used to think more openly and to ask questions about the ways photos are put on show. The key difference here is that design is used as a strategy for thinking and further research, as opposed to an end in itself. PhotoSwitch is an example of this approach to design. It comprises an opaque case with two photo display regions. A door can be slid to reveal one region, whilst obscuring the other so that only one region can be displayed at a time. This demands that a choice be made over which of two photos to display.

Designing PhotoSwitch, the basic premise was to invite households to discuss their practices surrounding photo displays and, specifically, how they negotiate and decide what photos to display. We purposefully wanted to introduce a dilemma for households, provoking them to reflect on their shared practices surrounding showing photos. To this end, in deployments we had a parent in each participating household choose a collection of photos and a teen-

DOORS

ager choose their own collection. Each of these collections was then assigned to one of the two regions, e.g. the parent's to the left region and teenager's to the right. Thus new photos could be displayed but at the cost of obscuring someone else's.

As an interventional artefact, PhotoSwitch provoked questions around the curatorial control (or distribution of control) of a family's material memories. By forcing a choice to be made over the photo displayed, the device demanded one to question why some photos should be shown and others not—why someone's memories of family and home should be privileged over another's. PhotoSwitch also raised issues around curatorial control and in particular the common role a parent in a home takes to manage an idea of family, past and future. Because PhotoSwitch offers the opportunity for such curatorial authority to be openly contested, immediate, visible tensions arose in the deployments.

Issues such as these open up the design possibilities for displaying of photos. For example, PhotoSwitch invites

questions about the visibility of decision making when it comes to choosing photos to display. Importantly, it does not dictate whether a display should make the choices of curation visible. Rather, it highlights that such a factor might be taken into account when designing a display.

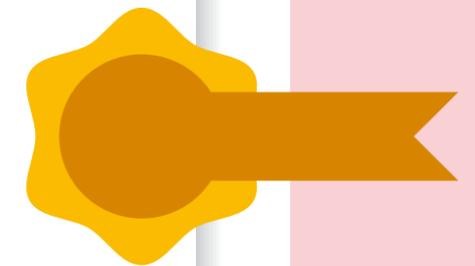
In terms of how families are remembered, PhotoSwitch draws attention to the choices that are likely to demand negotiation between family members around where and when to display photos. It invites speculation on how a design might distribute curatorial control and thus allow for differing ideas of the past and future. PhotoSwitch thus provokes inquiry into design's role in engaging family members in active co-participation around photo display and memory making.

Top Images: PhotoSwitch. Sliding the door reveals one picture while hiding another, forcing people to think about why some photos should be shown and others not.

CHAPTER 5 | LEAVING THINGS BEHIND

When we die, most of us will leave behind mobile phones and hard disks full of data, not to mention masses of data “in the cloud” that our loved ones will have to deal with.

How do we design technologies so that meaningful materials will be passed on to future generations?



Making Arrangements

Passing on the things that matter to us raises the issue of whether such materials will be protected and accessible for generations to come, but also whether they will be meaningful to those who inherit them without imposing a burden on future generations.

To uncover what some of these issues might be, we conducted a series of interviews with 11 people who had recently lost a loved one (see Odom et al, 2010, for more details). A focus here was on two issues: their relationship with objects (both physical and digital) that had been bequeathed or inherited; and how they used technologies to attempt to maintain a link with those who had passed away.

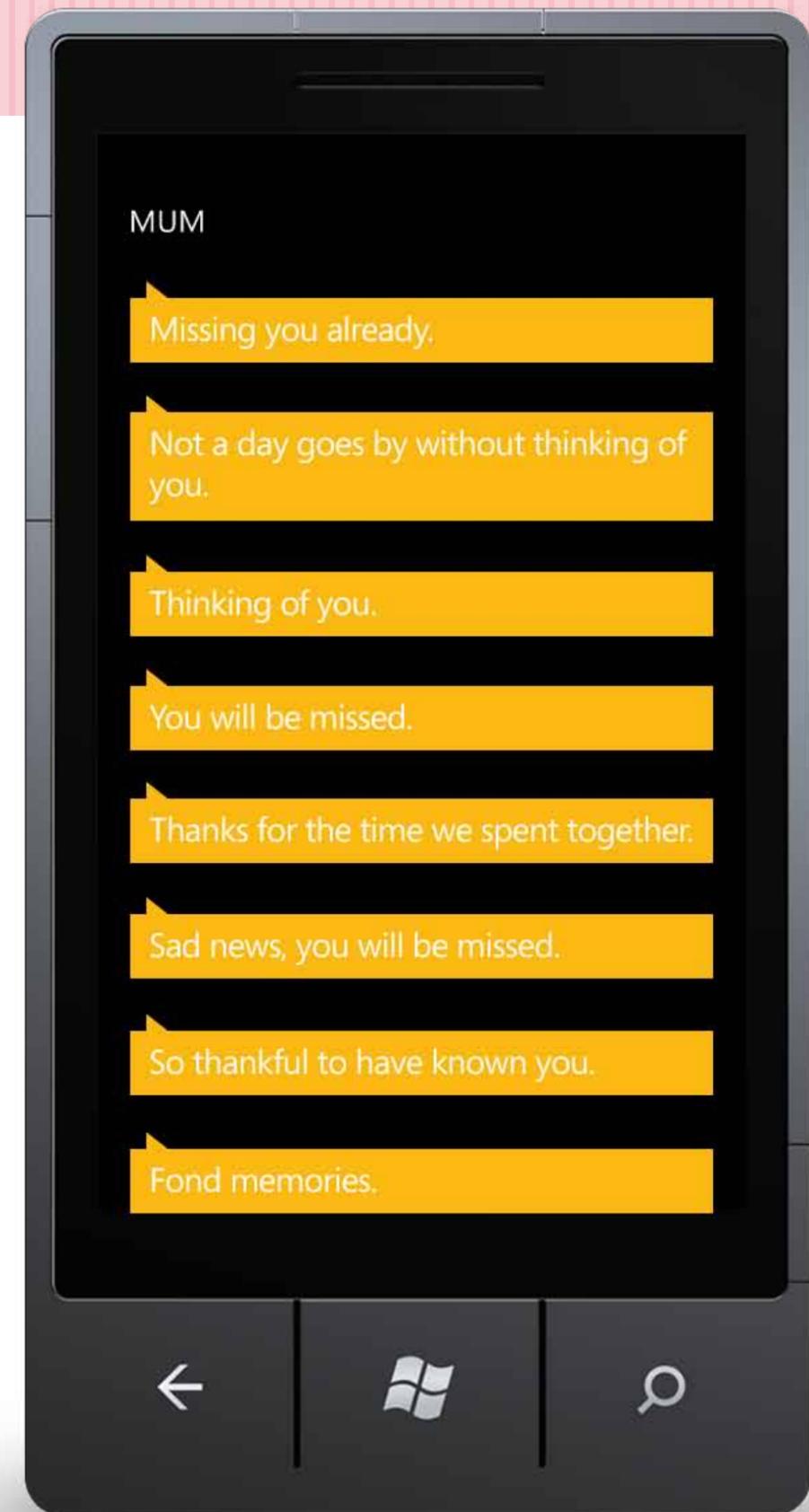
Some of the key findings include the fact that, whilst the bereaved often left objects of historical or personal importance, many things are unfiltered and lack any kind of accompanying story as to what is important to keep and why. Digital “stuff” is perhaps the worst in this regard, as often entire hard disks are left behind with vast collections of documents, email, pictures and videos. Not only is some of this material potentially sensitive, it places a huge burden on the person who must sort through it and make decisions about what is important and what is not.

Another set of issues has to do with how the bereaved find ways to use technology to invoke and maintain relationships with those who are gone. For example, the bereaved may continue to send text messages and voice-mail to their departed. Problems arise, however, when technology begins to offer up unwanted and unwelcome reminders of their loved ones. Some instances pointed to occasions when Facebook notifications would be sent from the accounts of people who had passed away. Many social networking sites are beginning to demarcate people’s data differently for those who have died, but this has yet to become widespread. More commonly, coming across emails, voice messages and text messages have to be dealt with by burying these digital materials deep in a technology’s file structure so they would be protected, but not intrude in the course of daily interaction.

The results of this study suggest a number of ways in which the design of technology needs to “future proof” itself. Accessibility and protection are obvious technical challenges that need to be addressed. Alongside this, however, this study points to the need for richer forms of contextualisation for materials that are archived. This would include ways of filtering digital materials or easily attaching narratives to them. It also highlights the need to develop more nuanced ways of storing, managing and displaying digital materials. For example, it is clear that users sometimes want a way of putting things into “deep storage” or at least to have more control over where things are kept, and how they are brought in and out of awareness.

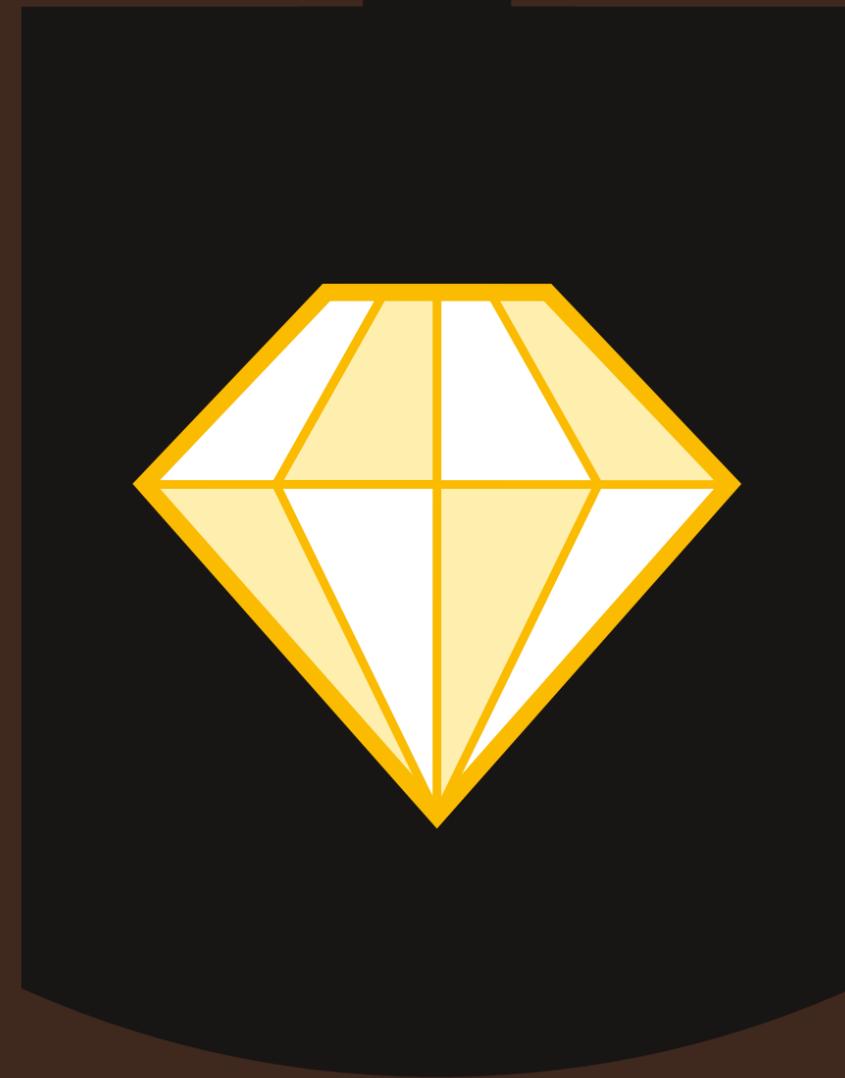
Right: Technology is often used as part of the process of bereavement.

Below: PCs and other digital artifacts are now a common part of inheritance.



A LACK OF FILTERING

In contrast to handing over the entire contents of one's digital life, there may be virtues in passing down key selections—leaving space for recipients to make sense of what is left behind and perhaps inscribe another layer of value onto the legacy it evokes. There are few digital tools that allow us to do this easily and creatively.



A CONTINUING RELATIONSHIP

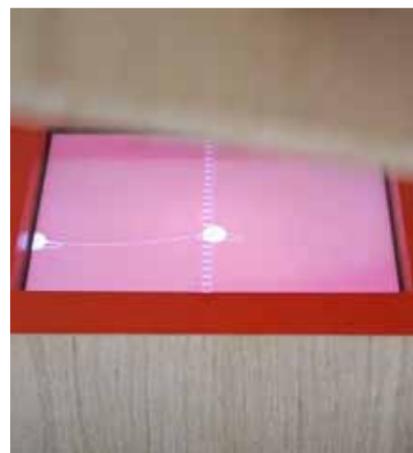
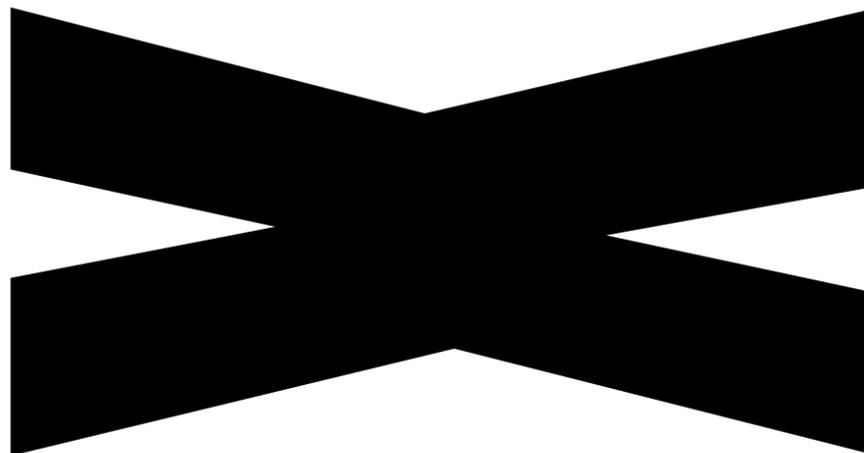
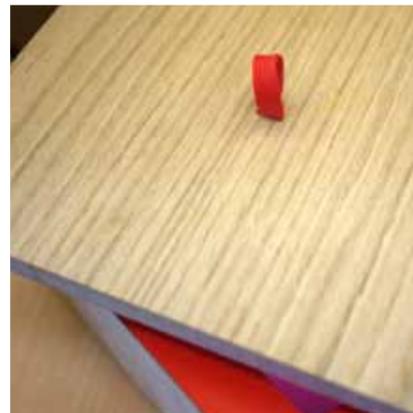
When someone dies, that relationship doesn't simply end. Technology can be used to give us a greater sense of connection with the person we miss.



PERSONAL SIGNIFICANCE VS. HISTORICAL LEGACY

Some objects left in a will are personally significant, emphasizing the idiosyncratic aspects of a relationship with the departed. Some objects are significant to the broader family, and are more classically family heirlooms. Better storytelling tools might help highlight and pass on the significance of objects from generation to generation.

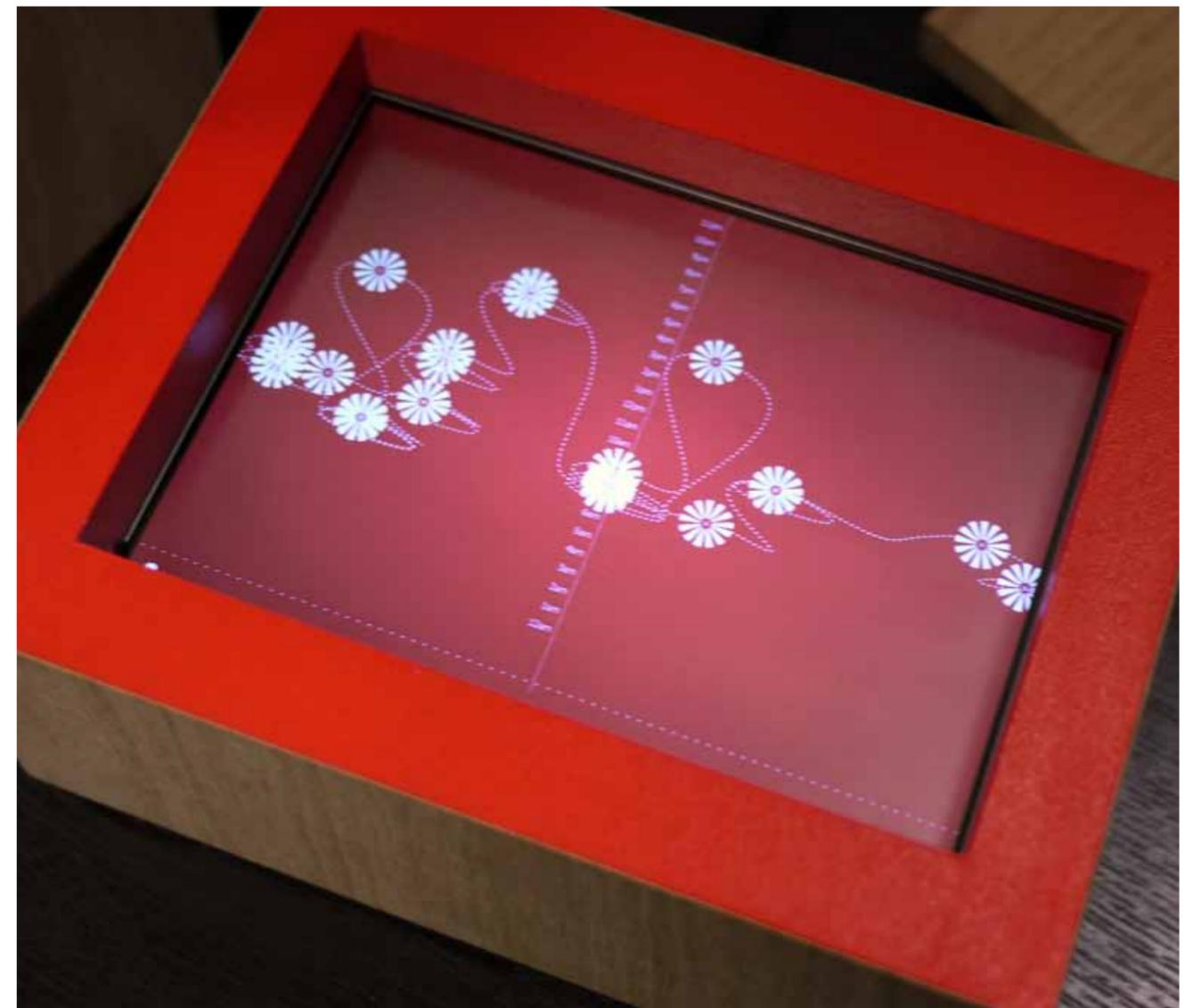




Backup Box was built in response to a specific observation seen in the field in (*Odom et al 2010*). In that study we talked to a woman who had inherited a large number of diaries from her late grandmother and late mother. She observed that “So many of the diaries just say things like ‘Cleaned kitchen. 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 thirty or forty years. What use might the box hold if its owner passes on and it is inherited by another family member? To begin to try and answer such questions, Backup Box was created as a conceptual piece that we have used in interviews to elicit responses from our subjects, to help them imagine the role their contemporary communications might play in the future.

Left and below: Backup Box. Removing the lid reveals a timeline for navigating back through years of archived Tweets.



CHAPTER 6 | THE FUTURE OF LOOKING BACK

Our studies show that there are many exciting opportunities to design systems that help us look back on our past in new ways.



*What are the
human values that we
can design for?*

Connecting to our Past



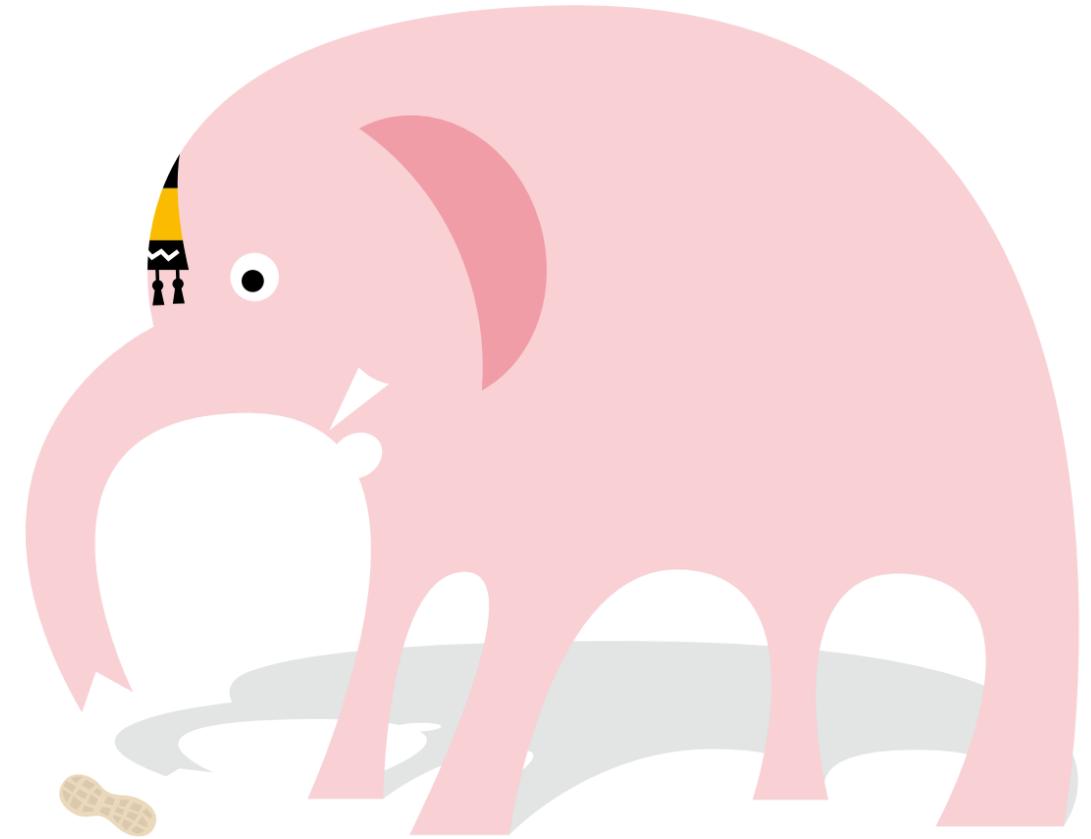
Our research has shown that there are many different ways in which new technology can support human memory.

Some of these ways can make our day to day lives easier, by helping us efficiently find information, or reminding us of things that we planned to do. Others are more about looking back on our past for emotional or therapeutic reasons: to reminisce, for example, or to reflect on and analyse our lives. Note that in our discussion of these examples, we never assume that memories are somehow embodied in machines. Rather, we assume that technologies capture a set of cues or resources that can spark or support acts of memory in the everyday world.

But more than this, we have explored how the future of looking back isn't simply about human memory in all its diversity. By considering the

broader role of memory in our everyday lives and in many different contexts, we begin to examine how connecting to our past points to a range of human values, which opens up the design space for new technologies.

Once we understand this range of human values, we can now pose more focused questions about how these technologies ought to be designed. These human values can guide us toward what features are important and lead to a deeper understanding of our target users. By doing this we can ensure that digital technologies will help us look back on our past in new ways, and will help us share and protect our personal data for generations to come.



Human values to consider when designing for memory

- *Reflection and self-understanding*
- *Being creative*
- *Expressing ourselves*
- *Constructing and displaying ideas of family*
- *Preserving and protecting the things that connect us to our past*
- *Honouring those we care about*
- *Fulfilling our duty towards our loved ones*
- *Contextualising the things that matter to us to create a legacy*
- *Helping us hide away or protect us from the things that are painful*
- *Strengthening our social bonds through reminiscing*

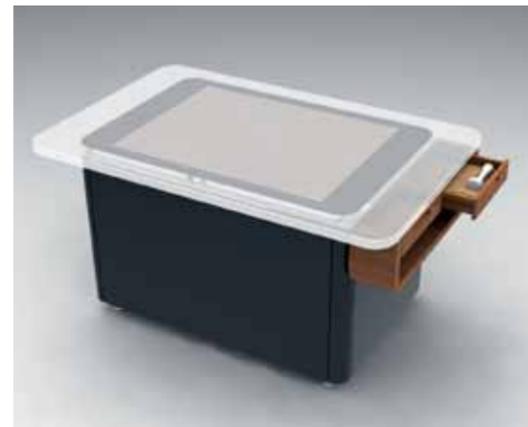
SOCIO-DIGITAL SYSTEMS

Socio-Digital Systems (SDS) is one of the research groups at Microsoft Research in Cambridge, UK. As a group, SDS aims to use an understanding of human values to help change the technological landscape in the 21st Century. Beyond making us all more productive and efficient, we ask how we can build technology to help us be more expressive, creative and reflective in our daily lives.

Our group considers a broad range of human values, aims to understand their complexity and puts them front and centre in technology development. An important aspect of this endeavour is the construction of new technologies that, in turn, we ourselves can shape. In so doing, we may create new ways that help us to actively realise our aspirations and desires, to engage with or disconnect from the world around us, to remember our past or to forget it, to connect with others or disengage from them. Important here are technologies which ultimately make our lives richer, and which offer us choice and flexibility in the things that we do.

SDS does this through the bringing together of social science, design and computer science. We believe that by understanding human values, we open up a space of new technological possibilities that stretches the boundaries of current conceptions of human-computer interaction.

For more information on our group, and our current themes, projects and publications, please visit research.microsoft.com/sds



READING

Banks, R. (2011).

[The Future of Looking Back.](#)
Microsoft Press.

Banks, R., Kirk, D., & Sellen, A. (2012).

[A Design Perspective on Three Technology Heirlooms.](#)
Human-Computer Interaction (Special Issue on Personal Memories).

Kirk, D., Izadi, S., Sellen, A., Taylor, S., & Banks, R. (2010).

[Opening up the Family Archive.](#)
Proceedings of CSCW 2010. ACM Press.

Kirk, D. & Sellen, A. (2010).

[On Human Remains: Value and Practice in the Home Archiving of Cherished Objects.](#)
Transactions on Computer-Human Interaction. ACM Press.

Kirk, D., Sellen, A., Rother, C., & Wood, K. (2006).

[Understanding “Photowork”.](#)
Proceedings of CHI 2006. ACM Press.

Harper, R. Rodden, T. Rogers, Y., & Sellen, A. (2008).

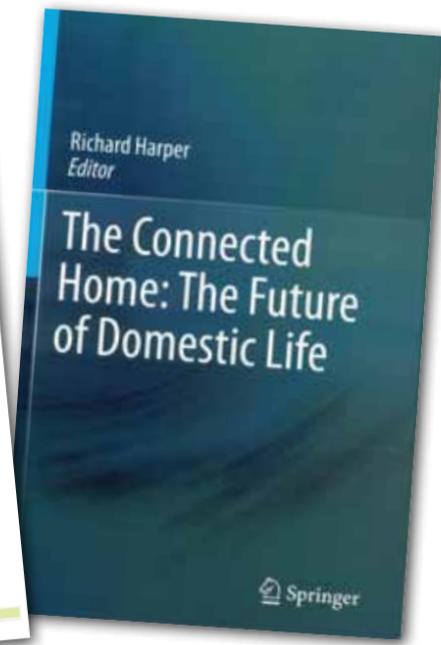
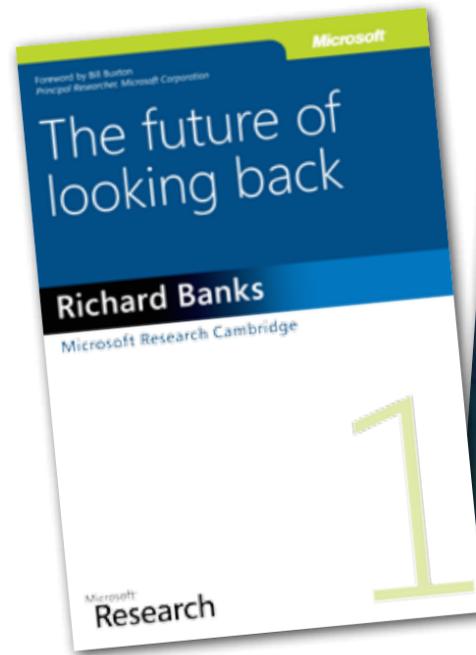
[Being Human: Human-Computer Interaction in the Year 2020.](#)
Microsoft, Cambridge, UK.
research.microsoft.com/hci2020

Harper, R., Randall, D., Smyth, N., Evans, C., Heledd, L., & Moore, R. (2008).

[The Past is a Different Place: They do Things Differently There.](#)
Proceedings of Designing Interactive Systems 2008. ACM Press.

Kalnikaite, V., Sellen, A., Whittaker, S. & Kirk, D. (2010).

[Now Let Me See Where I Was: Understanding How Lifelogs Mediate Memory.](#)
Proceedings of CHI 2010. ACM Press.



Lindley, S.E., Randall, D. Sharrock, W., Glancy, M., Smyth, N., & Harper, R. (2009).

[Narrative, Memory and Practice: Tensions and Choices in the Use of a Digital Artefact.](#)
Proceedings of the 23rd BCS conference on Human Computer Interaction. BCS Press.

Lindley, S.E., Glancy, M., Harper, R., Randall, D., & Smyth, N. (2011).

[Oh and How Things Just Don't Change, the More Things Stay the Same: Reflections on SenseCam Images 18 Months After Capture.](#)
International Journal of Human-Computer Studies. Elsevier.

Massimi, M., Odom, W., Banks, R., & Kirk, D. (2011).

[Matters of Life and Death: Locating the End of Life in Lifespan-Oriented HCI Research.](#)
Proceedings of CHI 2011. ACM Press.

Odom, W., Harper, R., Sellen, A., Kirk, D., & Banks, R. (2010).

[Passing On and Putting to Rest: Understanding Bereavement in the Context of Interactive Technologies.](#)
Proceedings of CHI 2010. ACM Press.

Odom, W., Banks, R., Harper, R., Kirk, D., Lindley, S. & Sellen, A. (2012).

[Technology Heirlooms? Considerations for Passing Down and Inheriting Digital Materials.](#)
Proceedings of CHI 2012. ACM Press.

Sellen, A. (2011).

[Family Archiving in the Digital Age.](#)
In R. H. R. Harper (Ed.) *The Connected Home: The Future of Domestic Life.* pp. 203-236. Springer.

Sellen, A., Fogg, A., Hodges, S. & Wood, K. (2007).

[Do Life-Logging Technologies Support Memory for the Past? An Experimental Study Using Sensecam.](#)
Proceedings of CHI 2007. ACM Press.

Sellen, A. & Whittaker, S. (2010).

[Beyond Total Capture: A Constructive Critique of Lifelogging.](#)
Communications of the ACM, May, 2010.

Taylor, A. S., Swan, L. & Durrant, A. (2007).

[Designing Family Photo Displays.](#)
Proceedings of ECSCW 2007.
Springer.

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