STORY SHELL: THE PARTICIPATORY DESIGN OF A BESPOKE DIGITAL MEMORIAL

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ABSTRACT

This paper describes the participatory process involved in designing a bespoke, tangible, digital memorial – *Story Shell* - with a bereaved parent. We drew on an emergent framework for digital memorials in considering who should author and experience the memorial, what content should be included, what form the memorial should take, and what message it was intended to convey. A key finding was that the participatory design process itself served as a memorial, by presenting opportunities for the participant to share detailed memories of their loved one. Reflections on the process deliver insights for makers and analysts on how to work in sensitive design spaces, where there is a need to consider not only an object's form but also its situation within a delicate social context.

INTRODUCTION

Memorials serve to create a real or conceptual space in remembrance of a person, event or place. They are ubiquitous across human society, bound up with cultural modes of practice that inform their design and the ways in which individuals engage with them (Moncur, W. & Kirk 2014). Beyond cultural modes of practice, individual responses to the experience of bereavement also have an important effect (Walter et al. 2012). Whilst some use memorialisation to help them to leave the dead behind, others seek to sustain a continuing bond with the dead through memorialisation (Woodthorpe, K. 2011).

The creation of memorials with a digital component is a comparatively new socio-digital phenomenon, offering rich opportunities at diverse scales: from intimate, tangible family memorials embedded with ritual qualities (Uriu & Okude 2010) to virtual memorials to lives lost in events of international significance such as 9/11 (Foot et al. 2005). This phenomenon is part of a larger social shift, as our lives increasingly incorporate a digital dimension (Castells 2011). Reflecting this social phenomenon, there is a growing body of work within the Human-Computer Interaction (HCI) and Computer Supported Cooperative Working (CSCW) communities that centres on *End of Life* (EoL) as a specific event in the lifespan worthy of dedicated focus (Massimi et al. 2012). We contribute to this growing body of work through empirical inquiry into just *how* to design a memorial with a digital component.

In the study described herein, we sought to design a bespoke, tangible, digital memorial - *Story Shell* - with the participation of a bereaved individual. In doing so, we tested out a proposed emergent framework for digital memorials (Moncur, W. & Kirk 2014). Reporting on the study, we first situate it in the context of previous relevant work, and then describe the process and steps involved in designing Story Shell, and its deployment in the participant's home. We close by foregrounding the contributions that this paper makes to HCI and participatory design, firstly in delivering insights for other makers and analysts in how to go about working in sensitive design spaces, and second, by highlighting an unexpected yet positive outcome of the study.

BACKGROUND

The creation of the bespoke digital memorial drew upon literature surrounding bereavement, memorials,

remembering practices, and the use of "research through design" as a process.

Recent work on bereavement in a digital context acknowledges that grief cannot be 'solved' by the development of technology (Massimi & Baecker 2011). However, with thoughtful design, technology may support an ongoing (if asymmetric) relationship whereby the bereaved continues their relationship with a deceased loved one. This support can go far beyond the creation of memorial websites, for example encompassing hybrid digital-physical objects that contain the personal data of the deceased such as Gauler's „Digital Remains" (Gauler 2006), and new socio-digital practices such as Second Life memorial rituals (Haverinen 2014).

The use of personal data in the context of memorialisation calls for a process of curation and re-situating. Devices such as smart phones may well hold an enormous selection of digital artfefacts, yet lack clues as to which artefacts conjure significant memories (Golsteijn et al. 2012). Interactive systems do not routinely support Sellen and Whittaker's „5 Rs" of remembering: recollecting, reminiscing, retrieving, reflecting and remembering intentions (Sellen & Whittaker 2010). This makes the curation of precious memories a time-consuming process. Further, the affective nature of a memorial calls for the creation of an object or experience that is cherishable, distinct from prosaic options for data storage and interaction.

Past examples of memorials that have re-appropriated digital artefacts in a bespoke form include *Thanato Fenestra* (Uriu & Okude 2010), a physical altar that created a meditative atmosphere by displaying digital content flickering to the light of a real candle, and *Spomenik*, which layers audio narrative and geolocation data over a real physical space delivering a memorial experience via a mobile phone (Kirk et al. 2010). Beyond memorials, other hybrid digital-physical objects designed to support human memory include *Cueb* (Golsteijn & van den Hoven 2013), which promotes cross-generational storytelling through the display of a curated set of digital photos across two interactive cubes, and *Photobox* (Odom et al. 2012), a device that prints photos at random from a user's Flickr account to encourage serendipitous re-experiencing of memories through digital materials. These examples share an overarching approach of *research through design*, whereby research uses design action as a tool or a method of inquiry (Golsteijn et al. n.d.).

In contrast, Moncur and Kirk proposed a theoretical framework for the design of digital memorials ("the Framework") (Moncur, W. & Kirk 2014), that contains four central dimensions: actors, input, form and message. *Actors* can be divided into authors, who curate and narrate the content, and audience, who experience the memorial. Individuals, groups and institutions may author memorials, whilst an audience may be public, private or a mixture of both. The memorial's *input* is its subject (a person, a place or an event) and content (material or digital possessions, as well as testimonials provided by the living). The *form* can be virtual, physical or hybrid. It can have concrete (visible) aspects, even performative ones that can be experienced through rituals, gestures, action and the spoken word. These dimensions combine to convey the memorial's *message*, ranged along dimensions of cultural to personal, sacred to secular.

PROCESS OVERVIEW

In this study, we took a *Research through Design* approach to testing out the ideas in the Framework. The Ethics Committee at the University of Dundee gave approval for the study. The main pre-defined phases in the study, summarised in Table 1, were: (0) Study setup and participant recruitment, (1) understanding the participant's requirements, (2) idea generation, (3) creating and (4) deploying a working prototype. The research team had skills in design, socio-digital interaction and psychology.

We chose to work with a single participant to create a truly bespoke memorial, designed in response to an individual experience of loss. Participant recruitment was carried out via flyers at a public conference on death and bereavement, and through personal contacts. We sought a single participant to work with, who had lost a loved one in the last 5 years, who was open to working with us in creating a prototype digital memorial for them, and whose loved one had left behind a range of personal digital data that was still accessible and could be used in the memorial. Involvement of a single participant had advantages and disadvantages: the memorial could be truly bespoke, but we were conscious of high risks from participant attrition. We were fortunate to recruit a mother, Mayra, through personal contacts. Her teenage son Andrew had passed away unexpectedly five years ago.

We adopted a deeply participatory approach, working closely with Mayra. Interactions with Mayra throughout the study were recorded and transcribed, then analysed using a thematic analysis approach (Braun & Clarke 2006). Throughout the process, we were mindful of both the participant's and the researchers' wellbeing. We checked with Mayra after each interview that she was comfortable with the participatory process, and still willing to contribute. The researchers who carried out the fieldwork also debriefed and reflected together on the experience of conducting this highly affecting fieldwork, taking time to acknowledge their own emotions. This was important both for their wellbeing, and to ensure validity in the research (Moncur 2013).

PHASE 1: UNDERSTANDING THE PARTICIPANT'S REQUIREMENTS

In our initial meeting with Mayra, we established that she fitted the inclusion criteria for the study, and was willing to engage actively in the research process.

Separately, we also searched online for her son's name (both a general search and combined with the names of local newspapers) in order to establish how much of the online content about him was easily accessible. We then carried out two semi-structured interviews at Mayra's home (where Andrew had grown up), and at places that were significant to Andrew. The interviews included a social element, with Mayra making us very welcome in her home and offering us food and drink. The questions used in the interviews were grounded in the Framework (Moncur, W. & Kirk 2014), and covered the following topics:

- Who are the actors involved in the memorial? – who will have a voice in creating it, who will experience the memorial?
- What are the inputs? – who is the subject of the memorial, what were the circumstances around their death, what materials do the authors want to include in the memorial?
- What form should the memorial take – should it be digital or hybrid? Should it be static or change over time? Where would it be kept?
- What message should the memorial convey? – should it be cultural or personal, sacred/ secular?

In support of these central questions, we also gathered information about:

- The activities that Mayra undertook in remembering Andrew, their frequency, and how these had changed over time.
- How (if at all) digital content currently supported Mayra in remembering Andrew.
- Events and objects that cued her memories of Andrew.

Over the course of the interviews, questions progressed from high-level contextual ones to specific design-focussed ones.

HOME INTERVIEWS

The *first interview* was carried out in Mayra's home, and lasted three hours. During the interview, we began to address the questions identified above. At our request, Mayra showed us Andrew's Facebook content, and told us what the photos posted there meant for her. His Facebook profile was still active, and contained material that he had published before his death, as well as posts made subsequently by his friends in response to his death. Andrew's Facebook page was open to friends only, but Mayra knew the password and entrusted us with it, so that we were able to look at the content in more detail later. Mayra then showed us physical artefacts that she kept in her home relating to Andrew. A selected group of photos and medals were displayed on dedicated shelves on a small storage unit in a corner of the living room. Other artefacts were stored around the house in boxes: photos, books, music, DVDs, drawings, clothes, paint and brushes, a fitness training diary, and toys. The artefacts served as cues, prompting Mayra to tell us vivid anecdotes about Andrew that gave us wonderful insights into his personality and interests. With Mayra's permission, we took photos of these artefacts.

The artefacts and stories provided a rich source of inspiration, surfacing motifs and symbols that we subsequently used in a set of "mood boards", and ultimately in the memorial. The mood boards, which were used in the second interview, contained collections of images reflecting aspects of Andrew's experiences, interests and personality. One was more biographic and included aspects of his childhood and adolescence, one fitted his current self-representation on his Facebook profile, and one contained themes that Mayra had emphasised during the interview.

The *second interview*, conducted two weeks later, lasted four hours. Visiting Mayra's home, we first got feedback from her on the mood boards, on which subset of colours she preferred, and on our interpretation of the aspects of Andrew's character that the memorial should focus on. Andrew's surviving sibling was at home, and also contributed informally to this feedback. Mayra also brought out a wide range of physical artefacts that she had kept because of their association with Andrew, and told us many stories linked to them. At Mayra's suggestion, we then went with her to locations that had significance for Andrew: the site of the youth organisation that he belonged to, his favourite place in the nearby mountains, and his school - where we met his teachers. We audio recorded the parts of the interview carried out in the home, in transit, and in the countryside. We did not audio-record in the school, as we did not have ethical approval to interview the teachers.

At the end of the interview, we asked Mayra to prepare for our next interaction, in Interview 3. She had told us that she found it difficult to think about what she wanted to include in the memorial, finding the task too abstract. To make this task concrete and bounded, we asked her to select a subset of materials that she would like us to use as inputs to the memorial: ten physical artefacts, ten digital, and five locations. We emphasised that we were simply looking for inspiration at this stage.

REFLECTIONS ON PHASE 1

Our focus in Phase 1 was to gather information that would help us in identifying the *actors, inputs, form* and *message* for the memorial. This was a delicate and time-consuming process. It was essential to build a good relationship with Mayra, as we were asking her to share very personal thoughts and feelings. Talking about this young man, his untimely and unexpected death, and the vivid life that he had lived was (understandably) emotional. Both Mayra and the researchers laughed and cried during the interviews: this natural emotional engagement was integral for us in the research experience (Moncur 2013). We were incredibly

fortunate in having Mayra as our participant: she shared deep insights into the life of her son, her experience of bereavement, and her intrinsically constructive approach to her loss.

There were three important aspects to the interviews: the information provided verbally by Mayra, the artefacts that she showed us, and the contextual understanding acquired through visiting places that were significant to Andrew. Of necessity, the interviews had an exploratory quality. We did not know what to expect, nor what we would design. Nor did we give Mayra examples of previous digital memorials as a starting point, as this could have affected what information she chose to give us. Mayra later reflected that she had wanted more guidance on what to talk about, yet she also identified that she had found the opportunity to talk freely about Andrew the most valuable part of the experience, calling it "therapeutic" and "liberating". Both the artefacts and the visits to places served as important memory cues (van den Hoven & Eggen 2014) for Mayra, surfacing memories and stories connected to Andrew's life. Over the course of the interviews, it became apparent that Mayra took delight in discovering stories about Andrew that were new to her – this was particularly evident at the school, where his teachers shared their own memories and stories of him, and when talking with Mayra about content of Andrew' Facebook pages. Conversely, she was sensitive to memories of Andrew fading in the local community, as his peers at school grew up and moved away.

We were careful to adhere to the ethical approval granted throughout the study, which allowed us to work with participants aged 18 or over who had been bereaved. We made a pragmatic (and polite) decision to speak to Andrew's teachers and brother, using the information that they gave us as background material for our own understanding, but we did not record or report on these interactions as part of the study. This was particularly important with Andrew's brother, as he had not offered to participate in the study even though his mother was very involved and we encountered him at his home. The need to make situational decisions on how to adhere to ethical approval conditions, whilst not rejecting freely given offers of information, is a balancing act (Munteanu et al. Forthcoming).

By carrying out Phase 1, we began to develop the dimensions of the Framework. The *author* of the memorial was, of course, Mayra – working with the researchers. The *inputs* to the memorial were the subject – Andrew, and his personality and experiences. At this stage, we were still uncertain what material or digital possessions to incorporate, but it was clear that stories about Andrew were of central importance. As Mayra was a very tactile person – we were always welcomed to her home with hugs – we took a design decision that the memorial should take a hybrid *form* that was pleasant to touch or hold, rather than a solely digital one. Further, formal and informal rituals were important to Mayra. Her cultural background meant that she undertook annual rituals of remembrance that focussed on celebrating rather than mourning the dead. She also had times of reflection throughout the year when she remembered Andrew – for example, visiting his grave, going for walks to his favourite places, watching one of his favourite films. The *message* was undecided at this point.

PHASE 2: IDEA GENERATION

IDEA GENERATION PROCESS

During Phase 2, we reviewed our field notes and interview data, and distilled out a list of five possible design goals for the memorial:

1. Create a sense of Andrew's *presence* in a place/ object.

2. *Highlight* particular aspects of Andrew's life and personality - perhaps rediscovering things that were lost in the collection of his possessions.

3. Show Andrew's *impact on the lives of others* (preserve his legacy, how he inspired his peers)

4. Create opportunities to *talk about Andrew with others*.

5. *Simplified access* to Andrew's physical and digital artefacts as cues to re-tell the story of his life.

Mayra selected the goals that she liked best - *creating presence* (1) and *simplified access* (5) - over a period of a week, in discussion with Andrew's brother. Beyond these chosen goals, the idea generation phase was heavily influenced by the importance that Mayra attached to stories about Andrew. Her desire to re-experience stories based on memory cues became a central concept, in combination with her desire for Andrew to be remembered.

We oriented to these goals and concepts in a series of brainstorming sessions that used the outputs of Phase 1 as input: interview data, photos of artefacts we took throughout phase 1, our analysis of Andrew's digital content and Mayra's feedback on our mood boards from interview 2. We transferred key points to post-it notes, and moved them around our chosen keywords of *presence, aura* and *simplified access*, generating concrete ideas of how to realize the selected goals and concepts. During this process, we drew on MacIntyre et al's definition of *presence* in a digital context as the mental state of the user in response to being immersed in a virtual application, and of *aura* as the personal and cultural significance of places and objects (MacIntyre et al. 2004). We came up with three initial paper-based design sketches. We showed the sketches to Mayra in Interview 3, talked her through their concepts, and got feedback on what she considered suitable/ impractical for her current rituals, appropriate for remembering Andrew, and that she felt could provide her with a positive experience. During Interview 3, we also asked Mayra what artefacts she had chosen, based on our

request at the end of Interview 2 to select 25 possible artefacts and locations to serve as inspiration.

FINALISED CONCEPT

The finalised concept for the bespoke digital memorial emerged out of Phase 2. We describe it in Figure 1.

> The memorial's **audience** is Mayra. She would also like her surviving son to use it, to help him remember stories about Andrew. The **inputs** are stories about Andrew, triggered by memory cues in the form of original digital photos and digital photos of physical artefacts curated by Mayra. These stories will be gathered from invited family and friends. Displayed in Mayra's home on the display unit reserved for Andrew's things, the memorial has a hybrid **form**, embedding digital audio recordings in a simple, shell-like white sphere that is pleasing to hold – reflecting Mayra's tactile nature. It is activated to tell stories by touch – satisfying the desire for simplified access, and making engagement with the Story Shell an integral, performative part of the experience. The Story Shell invites reflection by drawing the attention inwards through a circular opening at the top that reveals detailed gold decorations inside. The decorations represent elements of the stories that Mayra has told us about Andrew: a rose (reflecting the time he took roses to the memorial site of another), the mountains (for his love of exercising there), abstract symbols representing the country where he spent his life. Reflecting an element of the annual memorials common to Mayra's cultural traditions, the inside is lit by tiny lights. The sound of the stories emanates from the centre, further drawing the attention inwards as stories of Andrew' life are played. The **message** is deeply personal, intended for only one person at a time, containing qualities akin to the quiet reflection afforded by prayer and meditation, to promote Andrew's continued presence in Mayra's life.

Figure 1: Description of finalised concept

REFLECTION ON THE IDEA GENERATION PROCESS

Phase 2 focussed on finding the right concept and design for the memorial. Our participatory approach was more challenging during this phase, as Mayra found the task of creating design concepts somewhat nebulous. Because of this, the ideation phase initially drew on brainstorming activity and discussion between the researchers. However, once we gave Mayra a set of options to choose from in Interview 3, she engaged actively in the process, making suggestions about our design ideas and guiding their refinement. She reported finding the task of choosing a set of 25 artefacts particularly difficult, as she had so many treasured possessions that reminded her of Andrew.

PHASE 3: PRODUCING A WORKING PROTOTYPE

Once the finalised concept had emerged (Figure 1), we moved on to producing a working prototype (Figure 2). There were three aspects to this work: the look and feel of the memorial, gathering stories, and the technical implementation of the prototype.

LOOK AND FEEL

We began by testing out design ideas for the *look and feel* of the Story Shell using paper maché prototypes. These were cheap and fast for finding the right shape and size to use. We experimented with the use of lighting inside the sphere, as well as with the size of the opening and what would be seen inside. We piloted the scale of the memorial and the angle of the opening, asking different people to hold it to establish the most comfortable size to hold with two hands while looking inside. While experimenting with the prototypes, we also discovered that the sound produced generated a vibration in the material of the sphere, introducing an unexpected further dimension to the interactive, sensory experience. The ideal sphere shape was modelled using 3D software, printed in plastic on a 3D printer and then sanded down by hand to create a smooth surface. We incorporated the technical components and slots for LED lights in such a way that they were invisible inside the sphere (Figure 4). We had wanted to 3D print the detailed gold decorations for the interior of the Story Shell, but in the first test print we found that our design was too fragile to 3D print using the resources available to us. Instead, the decorations were laser cut from paper (Figure 3), and then spray painted and fitted inside the sphere by hand.

Figure 2: The Story Shell

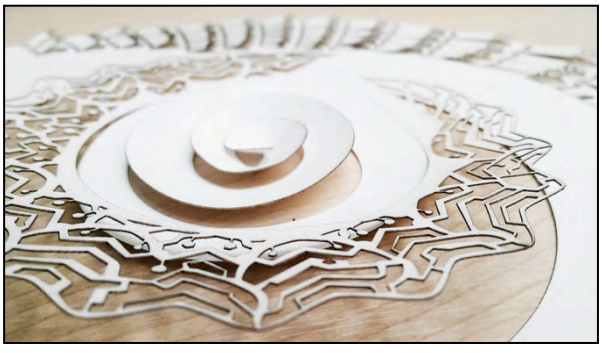

Fig. 3: Laser cut interior decoration

GATHERING STORIES

Gathering stories was unexpectedly difficult. We asked Mayra to select just ten items – either digital or physical – that would trigger memories for Andrew's friends and family. Our plan was for Mayra to then invite selected

friends and family to join a private Facebook group that explained the project and prompted reminiscence via a set of ten selected digital images, in week 22 of the study. Invitees would then be directed to use Speakpipe (speakpipe.com), an online voicemail service to record their reminiscences, which we then planned to download into the Story Shell via its Arduino interface.

Mayra did select ten items, and we put them up online for her. However, we encountered technical problems that prevented a seamless conduit between Facebook, Speakpipe and the Story Shell. More crucially however, we were unable to recruit any friends or family to provide their reminiscences. Anecdotally, Mayra told us that invitees found it hard to overcome their initial inhibitions, were unsure what to say, and felt pressurised by the idea that their story would be recorded and replayed. As a result, we relied on Mayra to record her own stories that were triggered by the set of ten images.

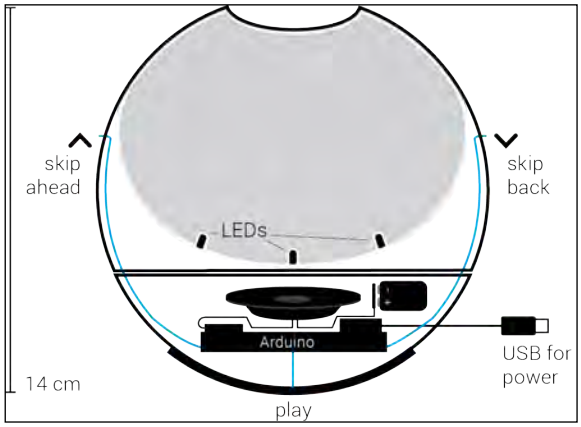

Fig 4: Construction sketch displaying all the elements of the prototype

TECHNICAL IMPLEMENTATION

The Arduino Yún (a microcontroller board) powered three LEDs and a speaker big enough to cause vibrations in the plastic sphere (Figure 5). Sensors were embedded in the base of the Story Shell: these triggered playing of the stories if someone held it. The Arduino had its own Wi-Fi network, and could download and play the audio files recorded by Mayra and initially stored online. However, this took more power than was available in the battery installed inside the sphere: we had to add an external cable providing extra power, impacting adversely on the design aesthetic. It also meant that the Story Shell could not update automatically, but needed to be plugged in before it could search for and download new stories, adversely affecting the user experience.

PHASE 4: DEPLOYING THE PROTOTYPE

Our deployment of the prototype in Mayra's home, in week 23 and 24, encountered practical difficulties. Stories were not recorded by friends and family, only by Mayra herself. Furthermore, Mayra was unable to listen to her own recordings. We visited Mayra at her home, and took the Story Shell back to the research studio to analyse what went wrong with the playback. It turned out that the power supply had caused the problem. Mayra had only had the Story Shell plugged into a power supply when she wanted to use it: once plugged in, the prototype took a long time to find and download recordings. Unaware of the time needed to download, Mayra had assumed that there were no stories at all, and had switched the device off again in disappointment, before it was able to download the stories that were available. We returned the Story Shell to Mayra prior to the final interview in week 26. This gave her time to listen to the stories that she had recorded about Andrew, which had by then been successfully downloaded to the memorial.

During the final interview, we got feedback from Mayra on her experience of using the Story Shell, and whether it met its design goals of creating presence, providing simplified access to digital materials, and enabling her to re-experience stories based on memory cues. We also discussed the process by which Mayra selected the curated set of ten artefacts (Interview 3), her criteria for choosing them, and her experience of recording stories about Andrew. We also used the opportunity to get her feedback on her experience of participating in the study. We asked her about cooperation and our transparency towards her, how she rated the effort she had to make, what she thought about the concept and what she would like to criticise.

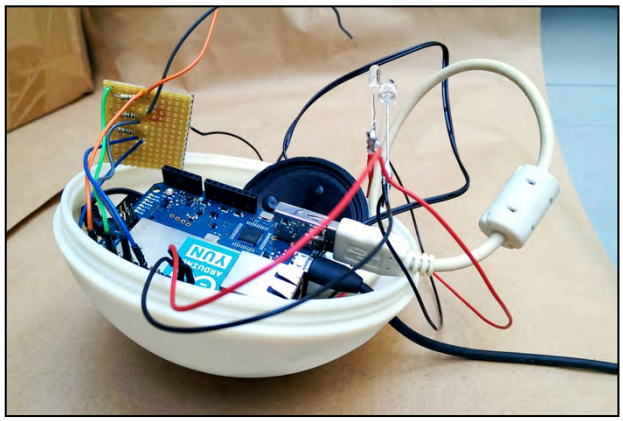

Figure 5: Arduino, speaker and LEDs that go inside the sphere.

REFLECTIONS ON THE DEPLOYMENT

The difficulties encountered in the deployment were frustrating, especially as the project was time constrained. What surprised us was the high level of satisfaction expressed by Mayra during the final interview. It emerged that her satisfaction stemmed from the freedom to talk openly and at length about Andrew. She was also pleased to have gone through Andrew's things, taking time both to reminisce with his brother, and to get rid of a few things that she no longer felt the need to keep – e.g. an old pair of shoes.

A second surprise came when we talked about the stories that Mayra had recorded of her own memories of Andrew, grounded in the ten curated memory cues. She

had found it a difficult task to undertake, and had needed space and time alone to remember and to record the stories. It took her more than a week to record anything at all, because she waited until it felt like the right time: then she did four recordings one after the other. She reported that once she had started recording the stories, she really enjoyed it and found it therapeutic and soothing. The surprising aspect to Mayra's stories was the audience. Her original intention had been to address Andrew's brother as she intended him to listen to the stories, yet without thinking about it Mayra naturally addressed Andrew directly in her stories, for example by saying "Do you remember when you were little…" For us, this implied that our central design goal of presence had been realised, as Andrew was vividly present for Mayra during this experience.

DISCUSSION

This paper described the process and steps involved in designing a bespoke, tangible, digital memorial – Story Shell - for a bereaved parent. The participatory design of the bespoke memorial represents a foray into a new and deeply sensitive area for socio-technical design, and the process did not always go to plan. There were times when Mayra participated more with the process (Phase 1 and 4), and at other times much less so (Phase 3). Throughout the process, Sellen and Whittaker's "5 Rs" of remembering (Sellen & Whittaker 2010) were salient, as Mayra retrieved artefacts to show us, recollected the stories attached to them, reminisced over happy times (and sad ones), reflected on Andrew's life and her bereavement, and remembered his intentions and dreams for adult life.

THE PARTICIPATORY PROCESS

The process of designing a bespoke memorial called for a high level of trust between Mayra and the researchers, clear communication about the time commitment and the intended outcomes of the project. In our initial meeting with Mayra, we made clear that the work was exploratory and at worst could end up producing nothing at all. We agreed in advance that Mayra would be able to review and comment on publications arising out of the research and could also choose whether to have her (and Andrew's) real names used, or be anonymised. Ultimately, Mayra did choose to use real names. We were also meticulous in not using snowball sampling: whilst we would have liked to use data arising from our interactions with Andrew's teachers and brother, we did not have ethical approval to do so, nor their consent. In the conduct of such sensitive research, we felt that it was essential to ensure that our research practice was meticulously ethical.

IMPLICATIONS FOR FURTHER RESEARCH

We found that the theoretical Framework (Moncur, W. & Kirk 2014) withstood the test of use. However, the importance of temporality and ritual warrant greater emphasis and exploration: these were significant for Mayra in her pre-existing practices in remembering Andrew, which drew upon her cultural traditions to give her (and others who loved Andrew) structured opportunities in the year to remember him.

The use of digital technologies is not an end to itself: the most important element of the Story Shell was its (conceptual) capacity to capture and replay stories – memories of Andrew that sustained Mayra's continuing bonds (Walter et al. 2012) with him. There was no distinction between digital and physical artefacts in terms of their capacity to memorialise Andrew: they both served as cues to invoke precious memories.

Although our focus was on creating a tangible artefact embedded with digital technology which could serve as a memorial for Andrew, it became clear that the *process of participating* in its design was the most important aspect for Mayra, as it gave her an audience (the researchers) who truly wanted to get to know Andrew through her memories of him, and had the time to listen. Unintentionally, the study itself can be seen as a memorial to Andrew, with Mayra as its author, the participatory process as its form, and the message being a public secular one, communicated through the medium of this academic paper, that Andrew was much loved and is worthy of remembering. This finding is important in foregrounding opportunities for the *process* of participatory technology design to serve as a goal in itself. Especially in sensitive contexts, there are opportunities for the process to deliver therapeutic benefits to participants. Whilst this has previously been highlighted (Thieme et al. 2013), it remains an underexplored area.

CONCLUSION

By giving a detailed account of the steps undertaken in the design process, we have provided insights for other makers and analysts in how to go about working in sensitive design spaces, where there is a need to consider not only an object's form, but also its situation within a delicate social context. Whilst such work can be challenging, it can deliver benefits to the researcher in the form of novel insights. The process of participating also had benefits for the participant, serving as an act of memorialisation in itself.

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Phase	Activity	Week	Duration	Location	Activity
0	Study setup	1-6	-	Research studio	Literature review, research protocol design, preparation of participant information & consent forms, submission of application for ethical approval.
	Recruitment	6-9	-	Bereavement conference	Produce flyers and circulate
1	Introduction	9	½ hour	Research studio	Informed consent to participate.
	Analyse digital content	10	-		Analyse online material
	Interview 1	12	3 hours	Mayra's home	Participant's bereavement, memory artefacts.
	Interview 2	14	4 hours	Mayra's home, school, mountains.	Location visits, memorial content and focus.
2-3	Interview 3	17	1 hour	Research studio	Review idea sketches
	Meeting 1	22	1 hour		Prototype handover
4	Meeting 2	23	2 hours	Mayra's home	Prototype deployment
	Interview 4	25	1 hour	Research studio	Evaluation