Curating an Infinite Basement: Understanding How People Manage Collections of Sentimental Artifacts

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ABSTRACT

Valuable memories are increasingly captured and stored as digital artifacts. However, as people amass these digital mementos, their collections are rarely curated, due to the volume of content, the effort involved, and a general lack of motivation, which can result in important artifacts being obscured and forgotten in an accumulation of content over time. Our study aims to better understand the challenges and goals of people dealing with large collections, and to provide insight into how people select and pay attention to large collections of digital mementos. We conducted an interpretivist analysis of forum data from UnclutterNow.com, where participants discussed issues they face in curating the sentimental artifacts in their homes. We uncovered a number of social, temporal, and spatial affordances and concerns that influence the ways that people curate their memories, and discuss how curation is closely tied to how people use storage and display in their home. In our study, we drew out and unpack "curation regimes" as patterns that people enact to focus the attention they are able to pay to the artifacts in their collections. We close with a discussion of the design opportunities for memory artifacts, which support and facilitate the curatorial processes of users managing digital mementos in everyday life.

CCS Concepts

• **Human-Computer Interaction.** • **Computer-Supported Cooperative Work.** • **Social Computing.** • **Pervasive Computing.**

Keywords

family memory; memory artifacts; sentimental artifacts; memorabilia; digital memento; curation; collection management; digital curation; ubicomp; pervasive computing

1. INTRODUCTION

As homes increasingly become pervasive environments, possibilities open up for creating new kinds of digital family memories. In these environments, there will be an enormous increase in the amount of personal and family data that can be captured and generated for a memorial purpose. Some of this has already been seen as digital photography and social media vastly increased the amount of personal data people create.

Scholars across many disciplines have been grappling with collections of digital memorabilia for over two decades. From a user-centered design perspective, HCI and CSCW researchers have been captivated by designing artifacts to capture, mediate, and organize personal and family memories. Much of this work consists of technical prototypes and their evaluation (e.g., [22], [26], [21], [14]). These systems, which address a number of challenging problems in enabling engagement with digital memories, rest on the design assumption that the content upon which they draw is readily available and contains meaningful memory triggers.

However, Marshall and others have found that currently many, if not most, users find themselves in a state of overload due to a lack of curation [19]. The "benign neglect" users fall back on with respect to their personal digital content allows it to accumulate at a rate and scale that makes it difficult for them to effectively manage their digital artifacts, when management is even a thought at all.

Digital memorabilia are even more difficult to handle than other digital content because of their idiosyncratic and highly personal nature. While there are efforts to create automated and semi-automated content management systems (e.g. [9]), many activities in selecting and categorizing content, maintaining that content over the long term, and considering what to display – the core of what is called "curation" [26] – remain human-driven tasks. Our work provides a way forward for systems designed to help users effectively manage digital content with sentimental value. Helping users with curation of their digital content would be clearly beneficial.

Little is known about the everyday processes of users involved in creating and maintaining collections of sentimental artifacts. While our goal is to understand what happens when people have too much digital content and essentially infinite storage, we wanted to understand what people do now to manage their current sentimental objects and memorabilia. To this end, we conducted a study investigating the everyday work carried out by users overloaded by collections of physical sentimental artifacts. The limitations of physical objects allowed us to consider the potential help we might offer users with digital collections, especially those of memorabilia, by addressing an important question:

- When faced with an over-abundance of sentimental artifacts, how do people decide what to keep, what to pay attention to, and what to cull?

The Infinite Basement. In large physical collections, the limitations of space usually motivate people to engage with and manage their collections at some level to avoid an unchecked accumulation of things. The digital world, on the other hand, has comparatively unlimited storage, which leads people to regard it as a space needing no active management. In this "infinite basement," the problematic allure of virtually unlimited space means nothing ever has to be culled or gotten rid of due to limited space. However, we find that there may be other concerns that motivate people to curate their possessions.

Thus, in our analysis we turn to the value-oriented motivations that people have to curate and maintain their collections, as these motivations can inform our understanding of how people relate to and interact with burgeoning digital sentimental artifacts. Through an interpretivist analysis of 2405 posts about "sentimental clutter," we were able to uncover the unseen and taken-for-granted processes by which users select, organize, and arrange the items in their collections of memory. Below, we will lay out "curation regimes" or patterns of curatorial preferences that people enact when arranging their sentimental collections, and discuss the social, spatial, and temporal dynamics that positively and negatively influence people's curation of their sentimental collections. In our discussion, we will consider how digital content — with much larger amounts of content and with essentially infinite storage — might be different than what people do with physical artifacts. We will also examine the role memory artifacts might play in facilitating curation as they are integrated into the memory practices that people engage in during the course of their everyday lives. First, however, we discuss the previous literature.

2. RELATED WORK

Using sentimental artifacts, or memorabilia, that carry memory for users is tightly bound up with the activities of creating and maintaining those artifacts. In this section, we briefly examine the HIC/CSCW literature for both of these concerns.

Our work started with Peesapati et al.'s [24] arguments that memory should be conceptualized as an activity integrated into the lives of people, and that digital "memory triggers" should be embedded into everyday life. However, integrating digital memory triggers is not trivial. Golsteijn et al. [8] found that while personal digital artifacts had unique affordances beneficial for memory, they were less likely to be considered cherished possessions. They were not treated with the same regard and value as their physical counterparts. Relatedly, Petrelli et al. [27] note that a key problem for the design of digital mementos is that digital artifacts are not easily integrated into the spatial "topography" of the home along with other physical memory objects.

To integrate the digital more fully into the home, researchers have proposed creating devices that merge some of the interactivity of physical objects with digital mementos. These prototype systems do appear to make digital content more accessible and interactive for their owners, from augmenting physical objects with digital contextual narrative (e.g. Memory Box [2]), to lending tangibility to digital content to allow for more natural interactions (e.g. FM Radio [26]). Additionally Odom and colleagues in recent work (e.g., [21]) have explored how to more carefully use the material affordances of the physical to more skillfully tie digital materials into a combined world. However, physical devices with embedded memories, while promising, rest on the assumption that there is readily available content upon which they can draw that has been preselected to contain meaningful and valuable memory triggers. That is, they assume that curation has already occurred.

The practices and processes of selecting, organizing, maintaining, and displaying a collection of material is broadly considered as curation. Curation, while it has a general meaning, has been extensively studied in institutional archives and library science, as well as applied to data and digital curation. Yakel defines digital curation as "[t]he activity of managing and promoting the use of data from its point of creation, to ensure it is fit for contemporary purpose, and available for discovery and re-use" [30].

Everyday users in their homes are not trained in curation nor given time to do the work, as is the case with professional archivists. Several researchers studying how people manage large collections of digital content have found that in practice, curation of digital content rarely occurs. In research done by Marshall and coauthors (e.g.,[17,18]) on individuals' personal stores of digital content, they summarize that, "Despite the acknowledged importance of digital personal information, it is difficult to convince many people of the urgency of this [curation] problem" ([18], p. 3). The urgency of the problem may not be apparent because users primarily access their archives in short-term retrieval contexts.

In a study of professional photographer's preservation strategies for their "born-digital" images, Buchey [4] found that, while photographers non-selectively dumped all the images from their photo shoots into digital storage, they perceived it to be non-problematic because they primarily only used recently stored photos which they could rely on their memory to retrieve. This finding was echoed by a claim from Whittaker et al. [29] drawn from a meta-review of lifelogging studies, that everyday access to digital content tended to be limited to items recently added to the archive. The predominance of short-term engagement with digital content is quite problematic for digital memory artifacts. Researchers in personal digital archiving refer to efforts to shift digital collection management practices towards long-term considerations as "future-proofing" digital archives (e.g. [7,11,29]).

A key motivation for long-term curation practices in personal digital archives, Marshall [18] argued, is that the over-accumulation of digital material can obscure those items that have long-term value. Further, van House and Churchill [10] stress that "passive preservation," simply leaving a artifact to be rediscovered later, is not enough for ensuring that the artifact is available, findable, retrievable and accessible in the future. Since maintaining long-term value is the principle concern of memory artifacts, addressing the seemingly shortsighted lack of curation that characterizes how people currently manage personal digital stores is of paramount importance. Our study focuses on people managing long-lived collections of items important to themselves and their families, often with artifacts spanning generations, to gain insight into user's motivations for curation over time and how those might translate into a digital world.

Computing researchers have attempted to address the lack of curation. One strand of work focuses on automating curation, such as using content metadata and user's preferences from other sources (e.g. [15,20]) to infer what might be more valuable to users to keep. Others have proposed semi-automated ways to engage and assist users in curating their own content [9]. Our work informs those efforts by revealing patterns in the ways that people approach their collections and how these influence people's preferred curation behavior.

In short, existing research has shown that digital mementos can be useful and important to people. However, with today's abundance of digital content, a lack of curation obscures truly valuable artifacts and makes it difficult for existing systems designed for reminiscing and reflection with memory to present meaningful content. To better understand people's motivations and strategies for curation, and what might inhibit it in the digital realm, we examined curation of long-lived collections in the physical world as a useful analogue for how people deal with large collections of sentimental artifacts.

3. DATA COLLECTION AND ANALYSIS

We examined 2,405 posts on two subforums of a public website devoted to "uncluttering" one's life, that is, getting rid of excess belongings and other objects. On this site, UnClutterNow.com[1], some people aim to be minimalists, some people seem to be recovering borderline hoarders, and many people just have accumulated too many things in their lives. Based on their accounts and descriptions, participants were primarily from three geo-cultural regions, North America, Western Europe and Australia. All posts were in English.

We largely focused on posts in the subforum "Sentimental Clutter" where participants discussed issues regarding things that had been important to themselves or other family members, and which formed the basis of personal and family memories. The posts were primarily about problems with objects that invoked remembrances, often with an emotional attachment—what we call sentimental artifacts, memorabilia, or memory objects.

On the Sentimental Clutter subforum, users discussed what constituted sentimental objects, how to rid themselves of excess memory objects, what to keep and store, and what issues they were experiencing in the curation of their memorabilia. Many of the comments were personal stories and advice to others on the forum based on each participant's personal experiences. The subforum postings were almost entirely preoccupied by physical objects, so we supplemented these with posts from the Technology subforum, which included discussions of digital objects, to better understand what was general to sentimental artifacts and what was specific to physical objects. All the posts on the site were from 2010-2013, shortly after the site began, up to when the forum collapsed due to a software change (in the explanation of the forum administrators).

In our qualitative analysis of the forum, we drew out descriptions of participants' memory keeping practices, views of curation, issues around materiality, and design insights. The two authors independently coded the posts, and then together iteratively discussed the codes and organized the codes into themes, following the methods of Charmaz [5] and Clarke [6], updated versions of grounded theory.

We have edited some quotes slightly when necessary for clarity.

4. FINDINGS

Participants in the forum were brought together by a shared experience of at some point feeling *"overwhelmed with our stuff."* The term *"clutter"* signaled for them that they needed to go through some level of curation, to decide what to keep and what to cull from their stores of memorabilia.

Things of sentimental value were designated as clutter by the participants when they interfered with their everyday life and activities and when their artifacts became difficult to engage with

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[1] The names of the site and participants have been anonymized.

because of the sheer quantity. These points are illustrated in a post by LukeMatthew requesting advice on how to *"declutter"* a large paper collection:

...I have accumulated literally thousands (maybe tens of thousands, I'm afraid to count) of pages of documents that contain information I feel is too valuable to just throw away. ... I don't want to lose all this information, but I simply can't have it around anymore in the form it's been in for the past decade. (LukeMatthew)

LukeMatthew's collection was interfering with his way of living by the sheer volume of it in his limited house space. Yet, he valued the documents, and could not simply discard the collection en masse. Others on the forum had similar (if not as dire) problems with their collections of memorabilia. They struggled with too many books, photos, china, Christmas ornaments, records, clothing, love letters, journals, and the like that encroached on their lives, and in some cases the lives of other members of their household, but were nonetheless *"too valuable"* to handle casually.

In the following sections, we outline the challenges participants faced in curating their sentimental collections, including the emotional and resource burdens, and their strategies for effectively handling large amounts of personally significant content.

4.1 The Burden of Curation

While all clutter could *"take over your space,"* unchecked accumulations of artifacts with personal significance and associations to memories created an additional emotional and social burden for participants. A particularly poignant set of threads illustrating this problem came from participants seeking advice and support when trying to deal with sentimental collections related to a loved one after they had passed away. Glasscat6 wrote to the forum as one *"aspiring to be a minimalist,"* meaning that she wanted to keep only a bare minimum of objects of any kind in her home. Yet, after the death of her brother, she felt unable to continue with the same curation practices she had previously held. She described the internal turmoil she felt at dealing with mementos she had of him.

My own clutter problem was pretty much under control and I am aspiring to be a minimalist. Until 4 weeks ago. On November 30 my brother was killed in an auto accident. Now I am just awash in conflicting emotions. (Glasscat6)

Glasscat6 goes on to give an introspective account of her conflict—while she wanted to *"be ruthless"* as a minimalist in paring down her material possessions, she was now faced with the reality that some of these artifacts were the only tangible things she had left of her brother. This had both present implications for her life at home, and also caused concern for how she would pass on memories of her brother in the future.

...I don't want to regret either missing the opportunity to allow my grown children to have a memento from their only uncle, but I don't want to open up a hornet's nest in my own home of items that would be full of painful memories. (Glasscat6)

Participants like Glasscat6 grappled with conflicting desires to hold on to things that represented their loved ones, both for their own memory and for future progeny, while simultaneously desiring to minimize their collections. They also faced the possibility that the continued presence of the memory triggers in their home would serve as *"a weight and a reminder of the pain."* The emotional toll in dealing with this conflict could be intense

and there were no easy answers for those seeking advice. Many participants facing this difficult prospect chose to defer it for a later time, like SimplyJamie, who wanted to declutter after losing a spouse, but confessed in a post, *"I don't dare do it YET."*

The emotional burden of dealing with sentimental clutter was not related only to loss. For some participants, artifacts were not only memory triggers, they were symbolic links to an important part of their lives. UnstuffedLife wrote of his great distress after attempting to discard an old collection of music records.

I have kept those records since my teens. ...I felt like someone had punched me in the stomach. I cannot seem to let it go and then tonight I realized why. That music saved my life... I was depressed in my teenage years and music pulled me through. (UnstuffedLife)

Trying to let go of the records was so emotionally taxing for UnstuffedLife that he could not bring himself to completely cull the collection. Participants responded to his distress by recommending that he digitize the music, thereby saving the collection in some form while reducing the space it took. Although digitizing analog media could be quite time-consuming, participants would often recommend this format translation as a way of relieving the physical burden of having too much stuff, but deferring the emotional tax that accompanied curation decisions. We discuss more about translating sentimental artifacts into different forms in later sections.

While many participants struggled with their sentimental objects due to their personal significance, others felt burdened because of the social relationships the artifacts embodied. For example, Scout wanted to donate some of her old clothing, but struggled with the decision because of the time and effort her mother had put into making the clothes for her.

My mom is a talented seamstress and she's made me clothing since I was a baby. ...I have a hard time donating them even if they don't fit my lifestyle anymore. I mean, she slaved over a sewing machine making custom clothing just for me! Sigh.(Scout)

In addition to the time and resources consumed, participants struggling to curate their collections of sentimental artifacts, faced an emotional burden of dealing with the memories and associations linked to the artifacts. Not all participants had this issue, with some easily discarding highly significant artifacts. But those who did could struggle for months and even years to reach their goals to be *"clutter-free"*. Though curation was difficult, participants felt that it was important.

4.1.1 Attending to Attention
As participants described their curation issues and their reactions, an underlying theme emerged from their discussions: a need for providing attention to their artifacts. An important issue for participants, indeed the crux of designating sentimental artifacts as clutter at all, was being able to attend to and interact with the artifacts they had in their possession. They often decried keeping collections hidden away and inaccessible over the long-term: *"it seems a shame to leave things of any sort boxed up, unused." (Cloud)* For them, simply having an artifact was seldom sufficient for the mnemonic purposes that sentimental artifacts served, they had to be interact-able, as articulated by one participant:

Sentimental objects have to be in sight and touched every once in a while. They must be thought about so they don't lose their relevance. (Lenora)

Many participants felt that artifacts tucked away in storage, out of sight and in a space where they would not interfere with everyday life, would eventually have their significance forgotten. This was not acceptable for these participants, and they sought ways to better attend to their collections. Participants enacted many different curation practices to organize and manage their artifacts. Through these practices, participants leveraged the spatial-material layout of their homes and artifacts to maximize the attention they were able to pay to items in their collections.

4.2 Curation Regimes
In her work analyzing individual's practices with personal digital archives, Marshall noted that people tend to non-selectively keep everything when putting digital artifacts into storage [19]. Some participants in our data had similar behavior with their physical artifacts, but we also found a range of strategic patterns of practices that participants enacted as a means of curating their collections. We refer to these management patterns as "curation regimes." In the forum, participants discussed how they enacted these curation regimes to address the tensions they felt in trying to effectively manage their collections, while also accounting for the effort required by these management activities. We discuss the regimes in three parts, based on what people focus on as they enact the regime: *storage, attention,* and *display.* Though our analysis frames these as distinct aspects of curation, we note that participants talked about engaging in several at the same time, in combination or under different circumstances, in their everyday practices. However, we found them to be useful analytical distinctions to further both analysis and design.

4.2.1 Storage Regimes
Two complementary patterns, "Keep It All" and "Deal With It Later," demonstrated participants' attitudes toward storage.

Keep It All. The "Keep It All" regime was often referred to pejoratively in the forum as *"hoarding,"* due to an underlying belief that quantity diminished quality. When dealing with large collections, saving everything, even when all the items had some value, made it difficult for participants to treat the truly special items differentially. Yet participants had a hard time getting rid of things, especially in choosing among all their valuable items. As an example, Kally wrote about her struggle as a *"pack rat"* fitting a large collection of heirlooms into a new, smaller home. For Kally, the social link provided by her heirlooms made it difficult for her to cull items, even when her space was limited.

I admit to being the family historian/pack rat. However, as we move to a much smaller house, I am in a battle with myself as to what to keep and what to abandon. Is rejecting my grandmothers china like disregarding her hopes for me? Will she call me on it when we meet again in the great beyond?! How on earth can I possibly get rid of the china hutch that was my great-grandmothers and my daughters[sic] namesake? (Kally)

For participants like Kally, though their collection was problematically large, they could not in conscience part with anything and opted to keep it all. As we noted earlier, digitization in this regime allowed people to keep some version of the artifacts in their collection, whether by taking a photograph of an object or scanning a 2D document or photo. This "Keep It All" regime, we note, is one seen and decried most often in critiques from personal digital archiving.

Deal With It Later. Relatedly, when managing a particular collection was too difficult participants would instead opt to "Deal With It Later." This regime appears similar to the "Keep It All" regime, with the slight exception that participants put away the collection with the express intention that they would return to it when they were ready. Claymouse elaborated on this regime in her response to the disquiet expressed by another forum

participant, Ren, at the prospect of getting rid of a collection of children's dresses hand-embroidered by her mother.

Ren, it doesn't sound like you are ready to part with them [handmade dresses]. Get some archival boxes and packing, and pack them away until you decide what to do with them. If you feel so strongly about them, you shouldn't do anything just yet. (Claymouse)

Claymouse recommended that Ren keep everything, but only temporarily. Packing away her dresses in storage would give her time to figure out what she wanted to do. In this example, Ren followed the advice, and in a post a year later, she decided she was ready to let go of the dresses. However, we noticed that in the cases where participants chose to digitize their item as a means of dealing with it later, action could be postponed indefinitely.

The use of digitization in avoidance of curation was, for our participants, a distinct move from purposefully digitizing content. Participant Ess, for example, recounted that *"digitizing was just procrastination"* when he reflected on how he handled his collection of 20-year-old journals. Digitization-as-procrastination was primarily focused on translating valuable content to a less burdensome form, so participants could hold on to as much as possible.

Procrastination was not necessarily detrimental to participants. Having a temporary space was necessary for some participants as an *"intermediate stage"* between keeping and discarding that allowed them time to process through and decide which items had value to them. A participant commented that taking digital photos to preserve important pages of family Bibles, before getting rid of them, was more *"sensitive"* to the struggle of many on the forum than advice to simply disregard one's emotions in the process.

I especially love the suggestion of taking photos of the pieces you treasure e.g. the bible pages such beautiful sensitive advice for someone having a hard time rather than the old "suck it up" routine lots of other people might do! (E.K.)

Another participant, Jossie, recounted her experience digitizing her collection of photos, and using the time put into it to reflect on what was important to her:

So I spent all this time digitizing. And now I realize that at least half of them I am not really interested in saving even in digital form (I probably will save them, since digital space is cheap, but you get what I mean). I think sometimes you need an intermediate stage to allow yourself to let go. (Jossie)

For participants like Ess, Jossie, and E.K., digitization was a means to defer the active management of their collections to another time, but a time when they were ready to deal with it.

However, digital "Deal With It Later" could become problematic when curation is deferred indefinitely. As in Jossie's case, her digital intermediate stage became a de facto permanent storage for her entire collection, whether she thought each item worth keeping or not. Because the focus at the beginning was on saving things to avoid dealing with them, participants might not take the same care in organizing and annotating the content they were saving as they might do for a more permanent arrangement. This can have ramifications later on, as the digital content that is not actively preserved may become more and more difficult to find, access, and revisit the longer it stays in storage [3,10].

4.2.2 Selection Regimes
In addition to their attitudes toward storage, participants' curation decisions hinged on their relationships with artifacts in their collections. People either cherished individual objects that made up a collection, or valued the collection as a whole. When objects were individually valuable, participants evaluated them each on their own merits. However, when objects were valued as part of a larger collection, participants selected artifacts based on relative value in two ways: an artifact's representational ability and its quality.

Keep Some Representative Examples. Participants less concerned about specific objects, and more interested in maintaining a general memory or sentiment decided to keep a representative sample of a sentimental collection. In this case, the value of the collection was driven by a particular project, outcome, or general association, rather than the particular value of any one of the artifacts. An iconic example of this was children's artwork, which parents in the forum discussed at length to try to find alternatives to keeping drawings, paintings, and school projects en masse. In one thread sharing advice on this issue, a parent suggested to *"find a way to create a keepsake product that showcases the kids' art – without the art itself being the keepsake because there really is too much of it. And, because you have a plan in mind, it makes it a lot easier to decide what and how you process all that amazing, oh-so- special art." (rockabilly)*

The collection was important for this parent, but any piece of it was sufficient to stand for the significance of the whole. By creating a product to incorporate some of the art, she created a way to keep some smaller sample that still fit her purposes.

This regime was also used by people who inherited collections from parents or grandparents that they wanted to keep in some way, but did not have room for. Participants would, for example, keep articles of clothing or a few plates:

I've been hanging onto my grandmother's beautiful china for over 20 years. It has a classic design that still looks good today. I've used it maybe once or twice. It takes up so much cupboard space, I've been considering letting it go. I have begun to think I will keep the small plates as special dessert plates and donate the rest. (MsMonica)

When participants chose to keep representative examples, they might select artifacts that were, in their mind, truly representative of a loved one or important time in their life. Others simply selected items that were good enough for their purposes – whether utilitarian or project-specific.

Keep Only the Best. For many participants, the reduction of a collection to *"only those I'm passionate about"(belle)* was a goal they diligently worked towards. This was very common for the forum participants. *"Weeding out"* those artifacts that might be less valuable, participants would *"ruthlessly pare down"* a collection of artifacts to only a few best or favorites, based on their own personal criteria, often repeatedly evaluating and re-evaluating the worth of an item to them until they could confidently say that it was certainly more precious to them than others, or as Terry put it *"I only keep the stuff that makes me really, really smile." (Terry).*

Participants might also place artificial constraints on their collections to force themselves to carefully consider the value of the items. *"I chose a box and what didn't fit in the box, didn't stay." (Koala)* The most simple and pervasive forcing solution was to limit themselves to one small box of content, filled with only the best.

4.2.3 Display Regimes
Thirdly, participants curated their collections in order to arrange them for display. As we noted earlier, keeping things in storage was not ideal, and in response, participants were selective about

what things they kept. But even when a collection had been honed down, at times it was too large to engage with all at once. In this case, participants used several strategies to gradually allow themselves to interact with their whole collection.

Rotate Through Items on Display. For participants with large collections and sufficient storage space, another strategy was to keep only a few items in active use at a time, periodically rotating through them. For Jasper24 who wanted to keep the objects on display in his home *"to a minimum,"* when he wanted to display a new artifact, either he could discard something else or he could display it among a continual parade of things.

I want to keep the decor in my den to a minimum… Now, if I get a knickknack I do like, something else will have to go or I can simply display one item for a while, then take that down and display another. Ideally, I would like to just have one or two simple pieces in the room. (Jasper24)

In this case, artifacts not currently on display were removed from notice, put in some out-of-the-way storage area such as a closet or basement. This allowed him to keep all his artifacts in his possession and enjoy each of them a few at a time while maintaining his preferences for space.

Maintain a Special Collection. In a more specialized curation regime, participants created subcollections. Similar to rotating through artifacts in a collection, in this regime, entire collections were brought in and out of use. Some collections were localized to place in the house or a special container, such as an album, china nook, or a fireplace mantel. Others were local to a particular time, brought out only during particular occasions. This typically included holidays like Christmas where participants had dedicated material set aside to be interacted with only during that time period (as in [25]). Participant MessHero described a special collection of sentimental greeting cards that were only brought out once a year after Christmas:

… the one thing we have done is create a box for special cards. It's stored with our Christmas ornaments in a plastic tote in the crawl space. We take it out every year and on the day we take down our tree, we go through all the cards – mostly Christmas cards, but also special birthday and anniversary ones as well. It's a tradition… (MessHero)

Creating specialized collections preserved the specialness of artifacts, as they would be accessed only on special occasions. As MessHero described, specialized collections might also acquire some ritual or tradition as participants further marked the specialness of the interaction with this distinct set of things.

In their study of family rituals, Petrelli et al. [25] noted that putting up and taking down specialized Christmas decorations marked the beginning and end of the "performance" of a family's Christmas rituals. Putting decorations back into storage was a phase that transitioned families back into their everyday, "mundane life." Just as interacting with special collections enabled families to set apart a particular period for special activities, we see that the ritual likewise served as a purpose and time for our participants to arrange and attend to certain of their sentimental artifacts.

In summary, curation regimes are, as we stated above, patterns of curation practices and everyday work for our participants. The regimes help explain how people choose to store, select, and display their sentimental artifacts. Again we note that these regimes were often combined. Nonetheless, we believe curation regimes may serve as a useful direction for tools that augment and support curation in everyday life.

While we have described these regimes as participant's own curatorial preferences, there were several important additional factors that influenced how and why people curated their content: materiality, social context, and temporal changes.

4.3 The Importance of Materiality

4.3.1 Focusing Interaction
Physical items appeared to have two important characteristics that helped people place and attend to their memories. First, physical objects have materialities that enable interactions important for people's reminiscing. Second, physical objects serve to focus one's attention on specific times, places, and people. In the following excerpt, Marge describes interacting with a box of her deceased grandfather's old clothes:

...my grandfather passed away a couple years ago. I have a box of his clothes that I cannot bear to part with because when I open the box, it smells like him. (Marge)

The box of clothes did not contain a particular memory for Marge, but drew her into the remembered presence of her grandfather. In keeping the box of clothes, she was not holding onto the clothing per se, but the sensory experience that could only be evoked when coming in contact with the clothes. She goes on to explain that she kept the clothes in a very specific manner in order to maintain the evocative smell and to shape her encounters with it:

I don't go looking for the box, and when it is out of sight it is out of mind. However, when I do come across it, I always open it.... In fact, I've kept them boxed up all this time so that they wouldn't lose his scent. I know it might sound strange, but it is comforting to me. (Marge)

The sensory experience of going through the clothes, as well as the locality of the box containing, and at times, obscuring the collection all came together to create a unique memory for her.

Having a physical item can bring back additional memories and facets of those memories, as opposed to relying solely on recollection. In addition to being more evocative, the physical nature of memory artifacts can serve to focus one's attention on specific places, times, and people, as MadeleineM pointed out:

There are a few other things that I've kept that remind me of him strangely (like the car emergency kit he gave me when I turned 18). (MadeleineM)

Participants found foci in a variety of their material artifacts, from dishes that reminded them of their mother, to baby books and infant boxes from their children. Some people had general memory boxes, which stored a variety of memorabilia. Still others had specific collections, like Christmas boxes that contained family mementos such as old Christmas cards and ornaments.

The visibility and locality of a physical object drew attention to memories that those participants wished to foster, reminisce about, or honor. Placing memory artifacts, therefore, is part of the curation process for these participants.

4.3.2 Repurposing the Material
As well, sentimental artifacts with an additional purpose were more likely to find a place in participant's homes and lives. When participants appreciated an artifact and wished to keep it despite its lack of purpose, they would often transform it, either in whole or part to give it a renewed purpose. The process was an attempt to reshape artifacts that were un-keepable in their current state, to fit them into the material environment of a home and into the life of the owner.

For example, Wendi shared how her partner's mother melted down some sentimental jewelry into new pieces that she and her daughter could wear and be reminded of her grandmother often.

My partner's mother had some inherited jewelry that was unwearably old-fashioned but had a lot of sentimental value, so she took it to a jeweler and had it all melted down and refashioned. The best stones went into bangles for her and her daughter...[We] wear the new jewelry regularly. It reminds her and her daughter of the grandmothers they loved. (Wendi)

For this family, being able (and willing) to use the jewelry in their everyday lives was more important than maintaining its current form. They prioritized the sentimental value attached to the jewelry and decided to use the material to create a new set of items that they could share and wear often. In this case, they created items with a similar purpose to the original by creating more fashionable jewelry. Another participant trying to reduce a large collection of souvenir t-shirts amassed from all her life experiences and travels decided to reuse the cloth material of the t-shirt to create completely different objects:

I have 3 strategies 1) get fewer souvenir t-shirts 2) make shopping bags from the old t-shirt and 3) I am currently making a Gee's Bend/modern style quilt with my old college t-shirts. (greenGal)

Creating new artifacts out of old ones was a popular strategy that craftier participants employed to make a collection more manageable. Many appropriated long-standing re-use traditions, such as quilting, to guide their renovation efforts. In addition, having a concrete goal of creating a keepsake helped participants distill their collections by providing a set context of use.

Repurposing an artifact or collection was a distinct and deliberate alternative to digitization when participants needed to compress large and unwieldy collections. While both changed the form of a memento, digitization kept only the trace of an artifact's existence, retaining a shadow of its physical form and none of the physicality that made it useful. On the other hand, in repurposing, artifacts were re-envisioned as a useful item or set of items, intimately linked to the original memory through a shared material base.

4.4 Social Norms and Arrangements

In addition to their personal values and situated needs, people were deeply affected by their social arrangements. In addition to their own emotions and introspection, participants often had to consider their familial context when making curation decisions. As Kirk and Sellen [13] noted, many different family members might have an emotional attachment to the same artifacts. When that sentiment differed among individuals, the handling of the sentimental artifact could cause family tensions and disagreements. Participants described curation as a process influenced by social pressure, subject to social expectation, or dependent on others to fully carry out. We explicate these social tensions through three kinds of situations: dealing with artifacts that symbolize important social relationships, managing artifacts under shared control, and handling artifacts that are distributed socially.

Artifacts that symbolized important social relationships were often a contentious topic for participants. A perceived lack of regard for the artifact and what it symbolized could cause tension. For example, Scout recounted her difficulty in curating a collection of mix tapes her husband had given her while dating. For Scout, the mix tapes had lost their original sentimental value.

She had preserved the content, which was important to her, but she no longer wanted to keep them in physical form:

...I have a bunch of mix tapes he made for me in high school. It was a sweet gesture, and I appreciated it, but it's time for them to go. All my music is digital now, these are duplicated, and we longer have a tape player anyway. They serve no use. You'd think I was shooting him through the heart by mentioning this. He says things like "Doesn't our past mean anything to you?" (Scout)

For Scout, her husband still assigned meaning to the physical objects, and culling them seemed to him like a disregard for the past of their relationship. When interacting with a collection that holds shared sentimental value, Scout could not make curation decisions based on her sole preferences. She had to account for how her husband would perceive and react to her handling of the mixtapes. That left her feeling that her husband *"is holding me back from decluttering."*

For some participants, the sentimental artifacts might ostensibly belong to themselves solely, but nonetheless, they could feel pressured by family to give account for their curation actions. Ctr2004 recounted having to explain her rationale for discarding her collection of childhood mementos to her mother:

I know my mother had some trouble when I donated or trashed some childhood items. In turn showed her all the things I did chose [sic] to keep and explained why those items meant something to me. (ctr2004)

While some participants could pre-empt their family members, like ctr2004, and explain their actions after the artifact had already been handled, many other participants did not want to risk the ire or disappointment of their family members that the loss of a treasured artifact might cause.

An especially pervasive example of this tension in values and curation were negotiations around handling heirlooms or what parents wanted children to perceive as heirlooms. One generation would attach value and significance to an object, and part of their curation process was to hand down or gift a set of artifacts to others in their family.

VickiC recounted the history and burden of a cherished heirloom rocking chair that had been passed down from her grandmother, to her mother, and now to her. Her mother had downsized her home into a smaller apartment and had finally given her the chair:

I have a rocking chair that my grandmother rocked my mother in when she was a baby. My mother gave it to me...after they moved into an apartment. ...I couldn't say no. Even as a little girl, she talked about giving it to me when I had my own home. (VickiC)

VickiC's mother cherished the rocking chair and expected it to be similarly valued by her daughter and handled with special care. From the giver's perspective, it might appear to be an act of generosity to *"bless"* other family members with their excess or unwanted artifacts. However, the inheritors might not share a sense of the value of the artifact or agree with how it was to be handled in their care, if it were to be kept at all. VickiC continued her story, sharing that she only planned to keep the chair until her parents died and were no longer around to care what she did with it.

I resent that chair. ...I wish I could have sold it ... but I was too afraid she'd want to see the chair again. (VickiC)

Tensions arose as people in a shared curatorial relationship, by choice or not, disagreed on how a sentimental artifact was to be handled. In some cases, the artifact featured in several people's memories and each of them had opinions on how it should be

preserved as a token reminder. In other cases, the artifact was considered a symbol of a relationship or continuity within a family, but held particular significance only to one member and not to others.

A third social situation arose when multiple people had parts of the same collection. In her post, K described giving away some of her antique items kept from her grandparents to some of her family members:

Much of what I have is antiques and they really are lovely but I just have too many dishes, figurines, etc. I do know there are other family members who don't have any tangible memories of our grandparents and so sharing these items not only reduces my load but blesses them as well. (K)

For K, giving away some of her heirlooms to other family members allowed her to reduce some of the burden of keeping a large collection, while not actually having to discard the item. In some cases, this strategy worked out fine. Yet in others, as we see in the examples above, the coordinated care of this distributed sentimental collection comes with its own, primarily social, costs and challenges. Participant Sulim summed up the tensions in navigating this shared handling of a distributed collection of sentimental artifacts, saying "*The fault doesn't really lie with the objects or even with the question of keeping them, but with the uncomfortable family dynamics that get brought up when one person is designated keeper by the other people who 'want' the stuff but don't want to be inconvenienced by dealing with it.*" *(Sulim)*

In summary, curation is often socially contextualized, and potential services to facilitate curation must take into account the social context of these types of decisions in order to be effective. Curation can be an individual and personal process, but it can also be bound up in social norms and familial expectations, becoming a negotiated process.

4.5 Curation Changes Over Time

Participants' personal valuations of their memory artifacts were not constant. They changed over time, and this in turn changed their view of how these artifacts should be handled. The dynamics of shifting identities and the evolving meaning of sentimental artifacts was most salient in the forum when participants described rediscovered artifacts they had kept from their psychologically earlier selves. Participants continuously re-assessed the value of their memorabilia against their changing life history, current identity, social contexts, and activities.

4.5.1 Changing Emotional Valence

Curation might shift because of the changing emotional valence of an artifact, for example negatively with photographs containing people who had harmed them or with shared sentimental objects after a divorce. Alternatively, some participants reported growing closer to memorabilia after deaths in the family.

Change was very common for participants. To refer to our earlier findings, many participants enacting a "Deal With It Later" regime demonstrated this shift. When they were unable to deal with emotionally charged artifacts, usually negatively valenced, they would wait for some time until the intensity of the emotion calmed or the valence shifted into a more positive memory.

4.5.2 Reflecting Past and Current Identity

Participants' current identity was also an important consideration in their curation, as participants juxtaposed their current self-identity against the memorabilia of their earlier lives. In a particularly illuminative set of posts about how to deal with old

diaries and journals, participants discussed their tensions with keeping things of sentimental value that they felt no longer represented their personality.

Some discussants preferred to purge their sentimental artifacts of anything that was not currently representative of their identity. For example, participant Alten found 20-year old diaries that had been stored away, and felt immediately obliged to destroy the contents, since his younger perspective was different than his current way of thinking:

I recently rediscovered 10 years worth of paper diaries I had kept through the 90s, and was filled with horror realising I still had them. A brief glance through the pages caused me to cringe at my former perspective, and I immediately wanted to shred them. (Alten)

The thoughts of Alten's younger self were an unwelcome stowaway in his home. Participants like Alten were uncomfortable with contradicting their current identities and worried that others would misinterpret these anachronisms. Alten continued:

I keep thinking how I'd hate to die and have these diaries left behind as a record of my thoughts – and that's because thoughts evolve and old diaries are no longer an accurate reflection of my thoughts and feelings. (Alten)

Those who preferred to purge felt that their "old history" was no longer an accurate representation of their current personality and state of mind. They preferred to keep only those artifacts that were an accurate reflection of their contemporary identity.

Not all participants reacted negatively to encountering their past identity. Some, like Zigzag, thought it was important to keep the journals of her youth, as they served as a record of her past:

Oh, I could never get rid of my own journals!...It's a fascinating document of my late teens through university. Some of it just makes me cringe mightily, but I could never throw them away. (Zigzag)

Although the juxtaposition of her past and present was uncomfortable, the value of Zigzag's journals did not change. Whether choosing to purge or to keep a record of their past identity, participants considered the audience that would be privy to what they left behind.

4.6 Summary

In summary, in our analysis of the major themes and insights into curation behaviors that characterize how people react and respond when they have "*too much stuff*," we found that curation of sentimental content is effortful, not only because of the time, but also because of the emotional burden of curating memory. Nevertheless, participants felt it was an important process to continually engage in, even when they were not overwhelmed by excess, because the purpose of sentimental artifacts could only be fulfilled when they were given the proper attention.

To curate their collections for an appropriate level of attention, participants enacted curation regimes based on their attitudes about storage, relationship to individual artifacts and the collection as a whole, as well as the intended display and use for their artifacts in their homes and lives. When unwieldy collections that participants wanted to keep did not fit into their current home, they might also repurpose the artifacts in ways that integrated it more naturally into their lives. The material nature of the artifact was often used to facilitate re-purposing.

Interwoven throughout participants' deliberations were decisions about how to deal with the changing sentiment associated with

their collections over time, as their identity and circumstances changed, as well as how to account for other social and interpersonal influences that directed their actions.

In the following section, we discuss curation as a set of attention-directing processes and provide implications for designers of next-generation digital memory artifacts and curation support systems.

5. DISCUSSION: CURATING ATTENTION

In our findings we discuss a number of reasons and ways that people select, arrange and adapt their collections of sentimental artifacts. We note that with an "infinite basement" of digital storage, curation decisions need no longer be based on limited space, but instead are based on the need for attention. As Simon [28] pointed out, when space is unlimited, it is attention that becomes the scarce resource. Participants put their effort into maximizing the attention they were able to pay to the artifacts in their sentimental collections. Attention was the focus, whether they were strategically leveraging their storage spaces to hide or put away things that were not appropriate or needed, or carefully selecting artifacts to hone down a large collection, or crafting meaningful ways to display and interact with their collections in their homes.

5.1 Leveraging the Infinite Basement

For physical objects, storage and attention are often intertwined. Objects that can be attended to must also have storage, and deciding about limited storage is based on what is worthy of attention. For digital objects and with an infinite basement, this is no longer true.

One way to reconsider the relationship between storage and attention, is to consider that for some participants, storage served as a background staging area, allowing them to bring things in and out of attention. When some participants needed time to process the emotional significance of an artifact, storage was intentionally short-term and served as an intermediate place where they could defer dealing with highly charged artifacts. For others, storage was a temporary but indefinite holding area as participants struggled to find an appropriate means and timing to discard artifacts they did not want to display or keep. Yet others, with enough storage and large enough collections, rotated important artifacts in and out of storage, bringing those selected artifacts into display.

Artifacts intentionally kept in storage were not simply "*boxed up*" and unused. This is hopeful for addressing the problems of digital storage found by Marshall [19]. We see that storage can be a useful waypoint for enabling and encouraging curation. For designers, a challenge then is to conceptualize digital storage both in design models and in users' mental models as more than a convenient dumping heap (which it might be for some collections), but also as an active and dynamic repository of artifacts destined for display and interaction.

5.2 Placing and Arrangement

Other researchers have noted that the arrangement of sentimental artifacts in people's homes symbolizes participant's personal and familial identity and their relation to others [13,27]. We call out this notion of arrangement, and propose that it is not simply an aesthetic or symbolic practice but also one fundamental to how people order and manage of the artifacts themselves.

The ways participants were able to place, arrange and re-purpose artifacts in their collection stemmed largely from the materiality of the artifacts they worked with. We believe this finding opens a promising new design space for digital curation systems. In previous research on creating "*cherishable*" digital artifacts [8] and technology heirlooms [1], physicality was shown to be beneficial for artifacts for reflection and reminiscing. However, the value beyond the simple evocativeness of embodying collections of digital mementos has yet to be explored.

Translating "born digital" traces into a physical form can enable people to better engage with their large sentimental collections to curate more meaningful memory artifacts by taking advantage of users multi-modal and multi-sensory abilities, lending corporeality to digital traces, and providing a platform that merges into the material environment of their homes. It is quite possible that learning how to "place" digital memories will be a necessary step in understanding how to deal with the onslaught of digital capture and the expansion of digital storage in constructing usable memory artifacts.

5.3 Navigating Shared Ownership

While arranging artifacts around their homes was a way for participants to enact their own identities and relationships, it could cause tensions when their perspectives were not aligned with others. In her study of grandparents, Lindley [16] noted that people with heirlooms and other memory artifacts in their possession considered themselves as stewards and caretakers of certain sentimental artifacts, and thought that the family shared ownership of these items rather than any individual.

In many contexts, a person in possession of a physical artifact is accorded the most privileges and an assumption of final authority. However, we saw that participants could be heavily influenced in how they handled their collection by the opinions and desires of others, even against their own preferences. A person's curation behavior regarding a family's shared artifacts could be markedly different than how they treat other, more personal artifacts.

Dealing with physical artifacts in situations of stewardship and shared ownership, where no one person can lay exclusive claim to a particular artifact, has necessitated extensive social practices to establish ways of dealing with conflict in the material world. Explicit permissions are rarely defined, although as we saw in our data, implicit expectations can be articulated. Tools to help people with the curation of digital artifacts will have to consider how to translate this stewardship model suitably.

For example, an interactive memory box prototype built by Kirk et al. [12] demonstrated that curating digital memorabilia in a collaborative family content can be a contentious activity. It was assumed that giving all family members the ability to add and organize content would be beneficial, but instead even members of the same household experienced stress and contention in the shared curation experience. The existence and ongoing negotiation of these tensions was taken as status quo for Kirk et al.'s participants, but it is not well accounted for in design. In our future work, we will further explore the tensions in shared and collective memory as it is mediated through in representative artifacts, in an endeavor to develop a design approach sensitive to conflicting values inherent in shared ownership.

5.4 Responding to Changing Sentiment

Participants repeatedly emphasized the dynamic nature of curation. Though they might arrange the artifacts in their home and navigate social dynamics in a certain way at present, their curation strategies were not static, but shifted and evolved as they and their social worlds changed over time.

Memory researchers in HCI and CSCW have begun to adopt the perspective that memory is a dynamic process, an ongoing

productive accomplishment as people by themselves and in groups reinterpret the past in light of present circumstances and identities [16,23]. This perspective allows us to account for the dynamics of memory and emotion in curating large collections of sentimental artifacts, especially in considering how and why the sentiment of artifacts changes over time.

A key challenge in incorporating change into the design space is that sentiment does not change for every person in the same way. People may have different impressions of a shared past experience [31], and our data show how these impressions may also evolve differently based on each individual's changing context and personality. A shift in sentiment may also signal a shift in the valence of the memory itself, and can be dramatic – for instance a happy memory might suddenly become quite painful after a loss – and this shift in sentiment may not be shared among all the people who share a particular memory. Systems that facilitate communal recollecting from traces of the past will need to consider tailoring experiences for people with mixed and at times conflicting preferences.

As designers work to create technologies active in an emotional design context such as memory, they must take into account not only differences in sentiment, but also how sentiment changes over time and for different people. Systems designed to create and enhance shared digital memory must be able to address diverging perspectives, both internal to an individual and among different users, to adequately support and mediate these complex contexts.

In all these issues, we emphasize the need for designers to focus more on *integrating* new artifacts and systems into people's environments. Integration requires attention beyond aesthetics to consider the processes by which people include memory artifacts.

6. CONCLUSION

In this paper, we addressed the question of how people deal with an overabundance of sentimental artifacts. We examined physical "sentimental clutter" as a way to understand the means and motivations by which people curate large collections of memorabilia. We unpack how people select and organize content, maintain that content, and consider what to display and use in order to extrapolate how they might interact with large collections of digital mementos. Through an analysis of a forum featuring conversations about issues with sentimental artifacts, we uncovered social, temporal, and spatial concerns that influence the ways that people curate their memories. We drew out curation regimes as patterns of curation practices that people enact in relation to their preferences for storage and selection, as well as to manage the attention they wish to pay to their memorabilia and sentimental artifacts. Based on these findings, we also presented design suggestions about how memory artifacts might be created to fit in and support the curatorial processes of users in everyday life.

An area for further investigation is to take into account families from different sociocultural and economic backgrounds and living situations than the participants featured in our study. Although there appeared to be a wide range of attitudes and preferences represented among our participants, we know from our prior pilot studies that there are significant differences across cultures and living situations in how people create and maintain family memory and the role of objects in those practices. Future work might compare people living in different material cultures, perhaps in different geographic locations, for commonalities and differences to provide a more holistic view of curation in the digital age.

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