Towards a More Cherishable Digital Object

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ABSTRACT

As we go about our everyday routines we encounter and interact with numerous physical (e.g. furniture or clothes) and digital objects (e.g. photos or e-mails). Some of these objects may be particular cherished, for example because of memories attached to them. As several studies into cherished objects have shown, we have more difficulties identifying cherished digital objects than physical ones. However, cherishing a small collection of digital objects can be beneficial; e.g. it can encourage active selection of digital objects to keep and discard. This paper presents a study that aimed to increase understanding of cherished physical and digital objects, and beyond that, of how we perceive physical and digital objects, and their advantages and disadvantages. We identified design opportunities for novel products and systems that support the creation of more cherishable digital objects by extrapolating the advantages of the physical to the digital, exploiting the reasons for cherishing digital objects, and aiming for meaningful integrations of physical and digital.

Author Keywords

Cherished objects, physical and digital media, design research, interaction design, focus groups, home life.

ACM Classification Keywords

H.5.m Miscellaneous.

INTRODUCTION

In our everyday lives we use a large variety of physical objects as we go about our daily routines, such as the clothes we wear, and the furniture we sit on. Apart from utilitarian functions these objects also play a role in shaping and communicating our identities and social relationships, which has been illustrated by material culture studies [e.g. 4, 15, 25]. Next to these physical objects we also use 'digital objects' every day, such as e-mails, websites, or digital photographs. Developments in technology have made it possible, and perhaps unavoidable, to accumulate

large collections of such digital objects, which have come to play a role in communicating our identities and social relationships, just as physical objects do [12, 18, 20]. Capturing, storing and using digital objects can thus be seen as an extension of collecting and using physical objects.

Not all our objects are of equal importance to us: some we have simply accumulated and would easily dispose of; others are precious to us and irreplaceable, for example because of memories attached to them. Studies in social sciences and HCI have given insights in what objects we cherish and why [2, 11, 12, 17, 18, 20, 21] and the more recent ones have started to compare cherishing of physical and digital objects [11, 12, 20]. Without exception these studies have found that participants have more difficulties finding digital objects that they cherish than physical ones. However, cherishing digital objects can be beneficial, for example because it can limit the overload of digital objects many people experience, by encouraging active selection of which digital objects to keep or discard. Next to that, having a selection of cherished digital objects may make further access and use of these objects after capturing and storing them more likely, which can, for example, support reminiscing or storytelling.

This paper aims to shed a light on how the design of new products and systems could make digital objects more cherishable. Given the diversity of objects we cherish in the physical world and the diversity of reasons we cherish these, it was believed that valuable lessons can be learned from the physical world. Therefore, a focus group study was done that investigated what physical and digital objects are cherished, and compared the reasons for cherishing physical and digital objects. Further understanding was reached through a discussion of the advantages and disadvantages of physical and digital in the sessions, which took pre-selected cherished objects as a starting point.

RELATED WORK

The role of physical objects in people's lives has been the subject of material culture studies, which have shown that the ways we live with our objects are closely linked to our personal identities and social relationships [e.g. 4, 25]. For example, Miller's [15] famous study of thirty London homes illustrates the diversity with which people organize their lives and argues that our relationships with material

objects are central to our relationships with other people; material and social routines may also provide a comfort to people. Objects can further serve to extract and reconstruct the past and can help develop recollections [13], and play powerful roles in narratives about the objects and the people interacting with them [4, 10, 25]. Gonzáles further introduces the notion of 'autotopography' to indicate that the arrangement of physical objects with which we surround ourselves, such as clothing or furniture, has an autobiographical function, and says something about ourselves, our memories, histories and beliefs [9]. However, we may not always be aware of this powerful role of objects. According to Miller's [14, 16] 'humility of things' objects have a tendency to disappear into the background because we are used to them, until our attention is directed to them. Miller argues that mundane objects are so important and powerful *because* we are not aware of them and of the role they play in in shaping and illustrating our personal identities and social relationships.

Studies in psychology, HCI, and design have looked at what physical [2, 11, 12, 17, 21] and digital objects [11, 12, 18, 20] are particularly cherished and why, and some of these studies have compared the value of physical and digital objects [11, 12, 20]. Csikszentmihalyi and Rochberg-Halton [2] can hereby be seen as the pioneers of studies into cherished objects with their study into the cherished objects of over 300 Americans. In HCI, Petrelli et al. [21] and Kirk and Sellen [12], for example, both used home tours to identify cherished objects in the home, while the first focussed on memory objects and the latter on home archiving. Odom et al. [17] and Jung et al. [11] used narratives to reach deeper understanding of why some objects become cherished. Some of these studies have proposed design guidelines and opportunities for enabling the existence, creation, or development of more cherishable digital objects, such as the integration of physical and digital, capturing the history of use of digital objects, supporting social possibilities with digital objects, and the creation or augmentation of digital objects [11, 17, 18, 20].

Although it was not always the primary aim, these studies have greatly increased insights in the reasons people cherish physical and digital objects. These studies, for example, aimed at understanding the role of physical and digital objects for memory purposes [20], understanding home archiving [12], or understanding the value and use of digital possessions [18]. As most studies (with the exception of [18]) have started the investigation with both physical and digital objects and have prompted for digital objects only upon the realisation that fewer digital objects were selected, comparisons of physical and digital are often ad hoc and based on different analyses for physical and digital. The study addressed in this paper aims to build on the previous work by asking participants to select both physical and digital objects they cherish and analyse the reasons for cherishing these based on a common framework for physical and digital objects. It was anticipated this would give a more comprehensive overview of the reasons people cherish physical and digital object that overarches multiple areas of interest, such as home archiving, or supporting reminiscence. Further, this study contributes to previous work by exploring further advantages and disadvantages of physical and digital, and by reflecting on if physicality or 'digitality' influences how special an object is perceived to be. These insights are used to identify design opportunities for making the digital more cherishable through the design of novel systems and products.

METHODOLOGY

Because we were primarily interested in participants' perception of their objects the main method used in this study was a set of focus groups, combined with a preparation task. As a research method focus groups, or group interviews, can provide a 'safe environment in which [participants] can share ideas, beliefs and attitudes' [5, p.836]. Compared to individual interviews, focus groups add elements of interactivity between participants that can benefit sharing experiences in the sessions, which was deemed important for this study of cherished objects and the advantages and disadvantages of physical and digital. The focus group study consisted of two 2-hour sessions, done in the UK. In the first session a group of four *parents* (1 male, 3 females, aged 38-49) participated, who were involved in using digital and physical media in their own homes or within their own families. This included people who captured and organized digital photos, made albums of physical or digital photos, or collected or stored physical objects, e.g. for reminiscence or archiving of family possessions. Two participants were further involved in family research using dedicated websites. The second group consisted of five *archivists* (4 males, 1 female, aged 44-71) who were involved in media archiving beyond their own homes and families. This included people who archived media for their profession, archived for a community, were involved in family- and local history research, or archived objects and media for someone else outside their families. See Table 1 for an overview of participants. Since we were primarily interested in objects in the home it was deemed interesting to include participants with these two different background profiles that differed in their primary context for dealing with objects, namely in their homes and beyond their homes, to reach a diversity in attitudes towards, and

Session 1 - Parents			
P1	Male	49	Feelance television director
P2	Female	53	Personal investments consultant
P3	Female	38	Graphic designer/brand consultant
P4	Female	43	Part-time administrator and part-time postgraduate student
Session 2 - Archivists			
P5	Male	44	IT sales consultant
P6	Male	71	Retired and part-time lecturer
P7	Male	50	Writer and editor
P8	Male	46	Web designer/developer
P9	Female	52	Freelance writer and editor

Table 1. Overview of genders, ages, and occupations of the participants in the focus group sessions.

motivations and practices for dealing with objects. Although both groups did indeed give different insights, because a comparison between groups was not our primary concern the results from both groups will be discussed together in the results section.

Participant preparation

As a preparation to the sessions participants were asked to individually select a number of objects from their homes that they considered special. These objects were used as a basis for discussion in the focus groups. Participants were asked to select one to three special physical objects and one to three special digital objects and take photos of these objects in the everyday context in which these objects are placed in their homes. For digital objects, for example objects on a computer, participants were asked to take a picture of the screen of the computer displaying the object. In contrast to the in-situ character of previous studies [2, 11, 12, 17, 19] in which participants were asked to select objects during the time of the interview, in this study the preparation assignment was sent to the participants a week before the sessions, which allowed them to spend some time to think individually about which objects to select and why. Similar to the approach used by Jung et al. [11], the meaning of 'special' was deliberately not defined to open up to different interpretations and discussions of special, although the expectation was that participants would select primarily sentimentally valuable objects. Participants were finally asked to answer a few questions for each object, such as whether it was digital or physical, what it was, why it was selected and why it was special. They were asked to send the answers and photos back via e-mail.

Session outline

Each of the two-hour sessions consisted of three parts. First, a semi-structured opening discussion addressed the selected cherished objects and, beyond that, explored the advantages and disadvantages of physical and digital objects. Participants were asked their backgrounds in working with digital and physical objects in everyday life. In a semi-structured session they were further asked to draw on their own selected special objects to contribute to discussions of which objects they had selected and why, what the advantages and disadvantages of physical and digital are, what it means for an object to be physical or digital, and whether this influences how special it is. Second and third parts of the sessions explored the bridging of physical and digital domains and evaluated ideas for integrating physical and digital. The second part consisted of an idea generation exercise that asked participants to think about how their cherished physical objects could be transformed into digital objects and vice versa, through the use of brainwriting [23]. This exercise served to get participants thinking about changing formats and bridging physical and digital realms. The third part introduced some ideas for integrating physical and digital elements in novel design solutions for cherished objects, in the form of design placeholders [7], and asked participants to give feedback on these ideas. As

the results of the second and third part are geared towards the integration of physical and digital they fall outside of the scope of this paper and will therefore not be addressed in this paper.

Data collection and analysis

Collected data included photos of a selection of two to seven special objects per participant, and answers to the questions about these objects; and photos, written notes, audio and video recordings captured during the sessions.

Data analysis of the selection of special objects, and the answers to questions about these objects, was done using the coding scheme developed by Csikszentmihalyi and Rochberg-Halton [2] in their well-known study of special objects in the home. Their coding scheme, developed by analysing and coding 1,694 special objects from over 300 participants from 82 families, was deemed appropriate for analysis as it covers a great variety of codes for *object categories*, such as furniture, books, plants and visual art, and codes for *meaning categories*, for reasons for valuing objects, such as memories, experiences and associations, which were both employed for this study. Answers to the question 'what is the object?' were coded using the object categories and answers to the questions 'why did you select this object?' and 'why is it special to you?' were coded using the meaning categories. However, because in the original classification no digital objects were included, new categories were created for some digital and electronic objects (in italics in Table 2): handheld electronic devices; movies; digital photos; music files; non-photographic digital images; software; websites; and (portable) computers and accessories. For the reasons for cherishing no additions were deemed necessary because all found reasons, including those for digital objects, fit in the current framework. With the introduced object categories additions this coding scheme was found to be comprehensive and useful for classifying the object types and reasons participants mentioned for selecting and valuing their objects. In addition the *format classification* from Kirk and Sellen [12] was used to classify selected special objects as 'physical', 'digital', or 'hybrid'; the latter being: 'physical instantiations of media content such as cassette tapes, video tapes, CDs and vinyl records, [which can] relatively easily be converted and become part of a larger digital collection, but currently exist in a physical format' [12, p.14]. Relations were then explored between object categories and formats, and meaning categories and formats. Transcripts of the sessions were created and analysed using an open coding approach in two coding iterations.

RESULTS

The results of the focus groups consisted of a selection of cherished, or special, objects with accompanying reasons for cherishing, a comparison of reasons for cherishing between the physical and digital, and insights into the advantages and disadvantages of physical and digital.

Selected special objects

The participants all selected a number of digital and physical objects from their homes; two to seven objects each with at least one physical and one digital object. The nine participants selected a total of 41 objects, which were then classified according to the object categories from Csikszentmihalyi and Rochberg-Halton [2], see Table 2. Further the format classification from Kirk and Sellen [12] was employed to divide objects into physical, digital and hybrid objects. Of the total of 41 objects, 24 objects were classified as physical, 14 as digital and 6 as hybrid. The differences in number of objects per format were caused by participants selecting more physical objects than digital ones, and by reclassifying objects that participants had selected as digital into the physical and hybrid categories. Three objects were classified as both physical and digital, which were counted both in physical and digital, namely a collection of physical and digital photos; a family tree with digital and physical representations; and a combination of a physical and digital diary. Table 2 shows an overview of the classification of object categories and formats, and some examples of selected objects.

Physicality and digitality of objects

Although all participants succeeded in selecting a number of special physical and digital objects from their homes, it was not always straightforward to the participants what constituted a physical or digital object. There were some differences between what objects they selected as physical, digital or 'both physical and digital' and what objects were physical, digital or hybrid according to the format classification, mainly for electronic devices. Hybrid objects were for example called physical: P6 considered his computer a physical object because 'I used to say you've got keyboard withdrawal symptoms if you're away from the computer.' Other objects that were physical and were clearly valued for their physical properties were called digital or 'both digital and physical'. This category consisted of technological devices that use digital technology and give a digital outcome, such as a digital photo camera, a digital alarm clock, or a set of computer speakers about which the owner said it is special because of

its physical properties: 'the design is very organic rather than normal speakers which are usually black square boxes' (P3). There appeared to be some confusion about the format of objects that combined digital and physical elements. This confusion was seen both in classifying objects that had only ever existed in their current format, such as the mobile phone and the digital alarm clock, and classifying objects that had changed, or could change, format, for example digital photographs: 'I sometimes found it difficult […], is it digital or is it physical, for example the photographs. The vast majority are on my computer, but I also like to have some big ones up around the house' (P6). Participants indicated to have some difficulties thinking about 'digital objects': 'you don't see [digital media] as objects. From the start they are not objects. […] Even though most things are ephemeral, these are even more... I mean there's no solid' (P8); 'One of my digital objects is a music file, but I experience it as music. I don't experience it as an object' (P9). It appears that for some participants the term 'object' implies a concrete, often physical, thing, which led them to select digital objects that were in fact, according to the classification used here, hybrid or physical objects. What is more, with current technology more and more objects are of 'blended materiality' [11]. This combination of digital media with a variety of physical products which are often multi-functional and contain large collections of digital media appears to make it difficult to pinpoint digital things that are special. The discreteness of physical and digital is fading and the integration of both seems a promising area for the design for cherishable digital objects. While the next section will compare physical and digital (and hybrid) as separate formats, the discussion will address design opportunities that appreciate these fading borders.

Why are these objects special?

The reasons for cherishing objects were analyzed using Csikszentmihalyi and Rochberg-Halton's [2] meaning categories and classes. The authors distinguish 'person' and 'nonperson' coding classes and categories for reasons that are related to people and related to other aspects, such as memories or experiences. Within these they define 35 categories of meaning grouped into 10 broader meaning

Physical objects	24	Digital objects	14	Examples
Sculpture (e.g. Inuit bone carving)	4	*Digital photos* (e.g. picture of son)	4	**Physical:** "My electric guitar. A UK-made hand-built Gordon-Smith GS1. Given its age it now qualifies as "vintage". It's something I've owned for a long time and have always moved it with me and I was reminded that it is "special" to me when my son asked if he couldn't have it (which request I politely refused!)" (P5)
Miscellaneous (e.g. coat pegs)	3	*Websites* (e.g. Facebook)	4	
Books (e.g. blank notebooks)	2	*Software* (e.g. Skype)	2	
Musical instruments (e.g. electric guitar)	2	Scrapbooks (e.g. iCal diary)	2	
Physical photos (e.g. photo collage)	2	*Music files* (Handel's Music)	1	
Visual art (e.g. portrait of ancestor)	2	*Non-photographic digital images*		
Scrapbooks (e.g. family database)	2	(business logo)	1	
Appliances (toaster)	1			**Digital:** "Skype, because of the amount of travel I do for work, I can keep in touch with my family by hearing AND seeing them - all for free!" (P1)
Collections (stone paper weights)	1	**Hybrid objects**	**6**	
Clocks (alarm clock radio)	1	*Handheld electronic devices* (e.g. iPhone)	3	
Sports equipment (tennis racket)	1	*(Portable) computers & accessories*		
Tools (letter opener)	1	(e.g. laptop)	2	**Hybrid:** "LaCie 250 Gb Hard drives designed by Porsche. Backing up my design work data from my computer is very important to me. Just as storing all the digital photographs I have of my family." (P3)
Camera	1	*Movies* (DVD of home videos)	1	
(Portable) computers & accessories				
(speakers)	1			

Table 2. Classification of object categories and formats, and examples with participants' descriptions of their objects.

classes, for example the meaning class Experience consists of the meaning categories Enjoyment, On-going occasions, and Release; see Table 3. In conformity with the coding scheme, it was likely that more than one 'signification', or reason for cherishing, was found for an object and each reason could be coded under more than one category. Using the coding scheme described above resulted in a total number of 165 significations for the 41 objects, of which 96 were significations for physical objects (n = 24), 49 for digital objects (n = 14) and 20 for hybrid objects (n = 6). For physical, digital and hybrid objects the most coded reason was Self, which means the objects were important for the participants in relation to themselves, for example because they enjoyed doing an activity with the object or because it communicated their values. After Self, the most coded meaning categories, for valuing objects can be seen in Table 4 (the meaning classes are between brackets).

Comparing physical and digital cherished objects
By looking at the distribution of significations over the meaning categories for each format, the differences in reasons for valuing physical, digital and hybrids can be addressed. Figure 1 gives the percentages of significations in each meaning category for the three formats. As addressed earlier, all three formats have the highest percentage of significations in 'Self', which highlights the highly personal nature of cherished possessions, irrespective of their format. When looking at the relations between self and nonperson meaning classes it could be seen that the reasons why these objects relate to the Self are different for the different formats. Physical objects often relate to the self because of their role in on-going occasions or frequent activities, and because of the memories they embody. Digital objects mostly relate to the self because

Nonperson classes (categories)	Person classes (categories)
Memories (memento; recollection; heirloom; souvenir; "had it for a long time")	Self (self)
Associations (ethnic; religious; collections; gift)	Immediate family (spouse; we; children; parents; siblings; grandparents, grandchildren; whole family (nuclear))
Experience (enjoyment; on-going occasions; release)	
Intrinsic qualities of object (craft; uniqueness; physical description)	Kin (relatives; ancestors; in-laws)
Style (style)	Nonfamily (friends; associates; role models, heroes and admired people)
Utilitarian (utilitarian)	
Personal values (embodiment of an ideal; accomplishment; personification)	

Table 3. Meaning classes and categories coding scheme (from [2, p.270-6])

they are associated with a form of craft, for example being created by the participants themselves, followed by the objects' role in on-going occasions, their utilitarian value, and their embodiment of ideals (such as perseverance) and sense of achievement. Hybrid objects, finally, relate to the self because of their role in on-going occasions and their relation to the owner's sense of style. As such, 'on-going occasions', or extensive use, is another class that is quite well represented for all objects, although the reasons for this differ. For physical and hybrid objects this often is because of their intrinsic functions and roles in everyday life, and their positions in the participants' environments influence, and are influenced by, the frequent use: 'I use [my letter opener] almost every day and it has become a permanent fixture on my desk' (P4), and feelings associated with this: '[My toaster] is in daily use and brings me joy! [...] I like not wanting to hide it but have it right next to where we eat in the kitchen' (P3). Digital objects, on the other hand, were in some cases crafted, so the frequent use came from working on them regularly, and in other cases an aid to another activity: 'For at least 10 years, I've been playing this music from these files while I write' (P9).

Physical objects	Digital objects	Hybrid objects
• On-going occasions (Experience): e.g. 'I selected this because I have relied on it to wake me up almost every day since my student days in the late 1980s.' - P4 about her '20 year-old Sony alarm-clock radio that is still going strong'. • Style (Style): e.g. 'I really like the design and performance of these speakers. The design is very organic rather than normal speakers which are usually black square boxes.' - P3 about her computer speakers. • Memento (Memories): e.g. P9 about her 'antique Indian elephant bell': 'When I was a child, my mother would step out the back door and ring this bell to tell me, no matter whose yard I was playing in, that it was time to come home. She also put it next to us, if we were sick in bed, so we could ring if we needed something.' • Enjoyment (Experience): e.g.'Seeing it every day as I go about more mundane jobs brings a smile to my face and it's a joyful reminder to enjoy the present as I rush with every second into the future.' - P3 about her 'magnetic sleeve to display my favourite picture drawn by my son'.	• Craft (Intrinsic qualities of object): e.g. 'I made it and it is a great focus for my creativity.' - P8 about a self-made website. • Relatives (Kin): e.g. P2 about the family research website 'ancestry.com': 'I've been able to connect with others, often only distantly related, to work together on our research. I'm looking forward to sharing some of this new information at a family reunion later this year.' • On-going occasions (Experience): e.g. 'For at least 10 years, I've been playing this music from these files while I write.' - P9 about her music files. • Utilitarian (Utilitarian): e.g. 'This resource is special to me because it allows me to keep track of invoices and payments efficiently. Because the system includes the automatic generation of invoices, I am able to save considerable time each month. [...]' - P4 about her 'In-House Management Database' for work.	• On-going occasions (Experience): e.g. 'I frequently use its several apps (multi-country clock, weather, Sudoku game, occasional internet search, internet radio when away from home, listening to BBC podcasts when travelling)' - P6 about his iTouch. • Style (Style): e.g. 'They were the first "designed" hard drives and beautifully crafted in metal.' - P3 about her 'LaCie 250 Gb Hard-drives designed by Porsche'. • Parents (Immediate family): e.g. P4 indicated her iPhone is special to her 'because it enables me to keep in touch with family and friends via voice/text messaging, especially my father who prefers texting to chatting over the phone.'

Table 4. Examples of reasons in the most coded meaning categories for physical, digital and hybrid objects.

Apart from references to the self, differences can be seen between formats in distribution of references to the other person codes. Physical and hybrid objects were most mentioned in relation to immediate family, because they allowed participants to contact their (nuclear) family members while away from home. Digital objects on the hand, were referred to in relation to relatives and friends, because it allowed participants to keep in touch with family members that lived remotely, but also to find and connect with new family members, for example through family history research on the internet.

Interestingly, craft was one of the most mentioned reasons for valuing digital objects. Although not in all cases craft was explicitly linked to accomplishment, it was often accompanied by a sense of pride in the creation. Most of the objects coded for accomplishment were created by the participants and the feel of accomplishment came from this self-creation. This combination of craft and accomplishment was a major aspect of value for digital objects: half of the digital objects was coded for craft or accomplishment or both. For physical and hybrid this was less prominent with only 21% and 17% respectively.

Finally, a lack of digital objects were found in 'Memories', 'Style', and 'Physical description' classes, while these were quite well-represented for physical objects. While 10% of significations for physical objects where about memories, with 'memento': 'memories in general, not associated with particular occasion' [2, p.270], being the largest category, only one hybrid object was coded for memories (P1's DVD of a family's old home videos), and only one digital object was coded for memories (P5's photo of his son when new-

born and his recollection of when his son was born), despite photographs being one of the largest categories of digital objects (29%). 'Style' and 'Physical description' may imply that the object needs to have a physical body, but the definition of the 'Physical description' class, similar to the 'Style' class, includes 'a description of the representation itself' [2, p.273], which is also applicable to digital things, such as photos. However, such qualities were not mentioned for digital objects, while hybrid objects were valued for example because they were 'stylish' or because they were 'the first "designed" hard-drives', and some physical objects were described as having a good feel, 'workmanship', 'a weird aura' or 'peaceful[ness]'. Further the design of some physical objects was appreciated as 'simple and ingenious', 'organic' or 'playful'.

Advantages and disadvantages of physical and digital
The cherished objects selected by the participants formed the basis for further discussion of the advantages and disadvantages of physical and digital in general. These discussions were semi-structured in nature, so interesting results were followed up on rather than trying to compose a comprehensive list of advantages and disadvantages. The topics mentioned by the participants can be seen in Table 5. The discussions of these topics led to reflections about whether the format of an object, i.e. if it is physical or digital, influences how special is it, which was considered a particularly interesting focus for this section.

As mentioned, this study intentionally did not specify what 'special' meant in order to identify different motivations for considering something special and spark discussions about what it means for an object to be special. Although
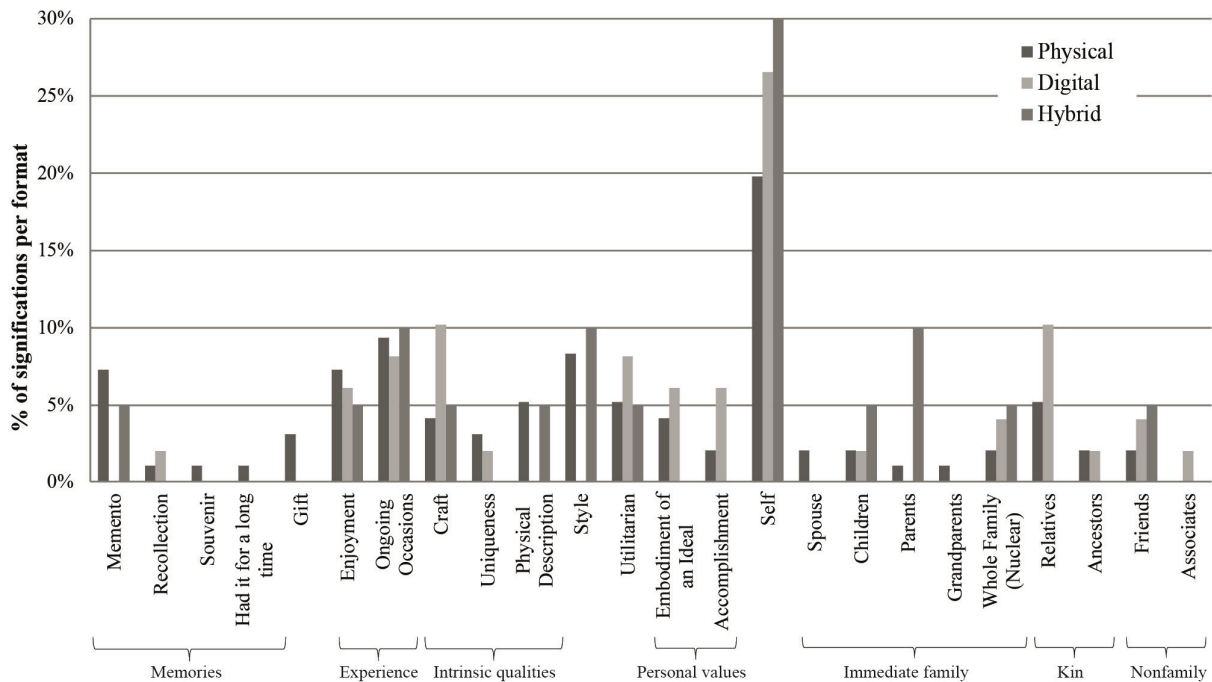

Fig.1. Percentages of significations in each of the meaning categories for the physical, digital and hybrid formats.

participants asked themselves the question 'what does important mean?', even without being asked for sentimental value, they indicated to 'immediately [get] sentimental' (P5) and be 'tied in much more with the physical object', because it 'has ties and memories and things' (P7). Similarly, physical objects were talked about in a positive light; even beyond their obvious functional qualities, e.g. 'I sent you a picture of a tennis racket, because to me that's something I'm very interested in, I love it, that's part of who I am' (P1). Hybrid and digital objects, on the other hand, were considered useful and 'essential', but merely 'tools', e.g. 'I rely on my phone a lot, but I don't like it, so I'd never put it on my list [of special objects]. I can always get another phone' (P6). All in all, it seemed that although physical objects are valued because of sentimental associations and mnemonic qualities, it is the hybrid and digital objects that have most impact on daily life: 'I go to my car and put a Satnav on, I go home and I put the computer on and I access the news in that way more necessarily now than I would, say, reading a newspaper or something. It's just something that just happens now and I really don't think twice about it' (P1).

To understand the impact of format on how special objects are considered to be it is useful to look at a specific category of objects that was discussed at length by the participants: objects that can exist both in digital and in physical form, in what Kirk and Sellen would call $2^1/_2$D objects, which are 'in essence paper or card-based objects' [12, p.12], such as photographs. This category includes objects that were originally physical but had been digitized, and objects that were originally digital but had been printed. For this category it did not seem to matter much if objects were digital or physical and in many cases the digital versions were preferred. A participant explained that when she and her brother were dividing their parents' possessions, they scanned the photos because the physical photos were unique and could not be shared, 'and in fact both of us kept the scan, and the actual photos don't matter anymore' (P4). Advantages of digital photos included the ability to have them displayed on a screensaver, better appearance, and more diverse uses for different purposes.

On the other hand, participants also acknowledged they still wanted photo albums because 'you don't actually look through them the same way if you don't sit down with them physically' (P1), and because they had difficulties knowing what digital photos they had. Similarly, there were advantages of having other paper-based objects physically, such as books or work documents, for example: having a better visual overview, being provided with mental prompts, allowing for easier organization of documents, or having easier access to documents. There were also examples of objects in which physicality was clearly part of the positive experience, such as collecting CD or record covers: 'People collect record covers or CD covers because of the image on it, which is evocative. If you just look at a copied CD without any image on it, you can't read it, it doesn't have the same emotional impact as it would if it had the original illustration' (P8) or watching slideshows: 'I remember as a kid watching [slides], setting up the projector and having a slideshow and watching. And [that physical process] was part of the fun' (P4). Another example of love for the physicality can be found in another participant's reading experience: 'I read this amazing book that was really top-notch design where the bottom third of the page was blank so you could lay it on your belly when you were reading it in bed. And [it had] beautiful wood carving illustrations all the way through it, all these kind of features, stitch bindings […]' (P7). From these examples the question arises what objects would 'have validity' as digital objects. There were objects, mostly hybrid objects, participants were quite keen to have in digital form: 'Music and DVDs take up a lot of space. You can still be quite attached to certain films or music, definitely, but those objects, my CDs, I'd like to get them all onto my hard-drive and clear the space out. So CDs are physical objects, but they are digital media, they are storage' (P8). However, there were also examples of physical objects participants would not want to get rid of in exchange for a picture or other digital representation of the object, or even a physical copy, such as 'the guitar I learned to play on as a child', a bone carving, or an antique Indian elephant bell, because 'it really doesn't translate into not being a three-dimensional

Physical - advantages	Physical - disadvantages
Material properties: materials it is made of, smell, sounds, feel, weight, weight distribution Rarity or uniqueness, also collections and craftsmanship Sensation of an object: e.g. getting a weird or good feeling with an object	Overload of physical objects and the burden of keeping them Memories of objects that were no longer owned by the respondents
Digital - advantages	Digital - disadvantages
Social possibilities: staying in touch, sharing, access to new networks and information Ubiquity of digital media in everyday life, which lead to control and freedom, and new possibilities for home-work balance Efficiency of digital communication and ease of searching for information Easy manipulation of e.g. photos	Overload of digital media and problems in the organisation of these media Privacy concerns regarding online information Fragility and accessibility of digital media, including failing hardware, obsolete file formats, corruption of files, difficulties backing up media Time management: working with digital media was considered time-consuming and had a negative effect on home-work balance Limited possibilities for seeing the history of use of digital media, and for adding a personal touch to files or software

Table 5. Advantages and disadvantages of physical and digital objects.

physical thing' (P5). It appears that despite the advantages of digital, such as easy sharing and less storage space, there are qualities to physical objects that overcome these advantages. While some objects can be equally valued in physical and digital formats, such as photographs, for other objects physicality is so much part of the positive experience it becomes a requirement for considering these objects special.

DISCUSSION

Although the small number of participants, their ages and backgrounds may have influenced the results and made certain themes more likely to be discussed, the combined analysis of reasons for cherishing physical and digital objects and discussions of physicality and digitality were considered useful for deriving some overarching themes of how digital objects can become more cherished through the design of novel products or systems. As discussed, borders between physical and digital are fading and design for more cherishable digital objects can benefit from looking across these discrete formats towards realms of blended materiality. We propose that design recommendations can be derived from extrapolating advantages of the physical; exploiting reasons for cherishing digital objects; and reaching meaningful integration of digital and physical.

Extrapolating the advantages of the physical

We suggest that digital objects can be made more cherishable by extrapolating the advantages of the physical to the digital. One of the advantages of the physical was rarity and uniqueness of objects. Compared to the digital world, where everything can be copied and shared widely and effortlessly, physical objects can truly by one-of-a-kind, or even if mass-produced there is only one instance of that specific object. This difference influences how we share physical and digital objects. While physical objects are truly *given* away, digital objects are *shared* and the owner still retains a copy. While the ease of sharing digital media was considered an advantage of the digital, the participants started questioning the value of this kind of sharing when they considered a future scenario in which copies of physical objects could be shared. They asked themselves: is it the same feeling to receive a copy knowing that others may have received exactly the same? There appeared to be more positive feelings associated with receiving a gift of which you know there is only one instance, than receiving a shared copy. In the current structures of digital media it is difficult and uncommon to give digital objects as gifts in the same way as physical objects can be given as gifts. This was also highlighted by the absence of references to gifts for the selected digital objects, while for the physical it was found to be a reason for valuing objects and 32% of selected objects were acquired as gifts. These findings suggest that an approach to create more meaningful digital objects by extrapolating the advantages of the physical is to look at ways in which the digital can be given as a gift, for example by limiting the possibilities to make and retain multiple copies, or ways in

which the digital can be personalized (the currently limited possibilities for this were considered a disadvantage of the digital) to create objects clearly meant for a specific person.

Exploiting reasons for cherishing digital objects

Exploiting the reasons for cherishing digital objects, as they were found in this study, can be an effective means to make digital objects more special. As the findings show an important reason for cherishing digital object was *Craft*. This was found to be one of the largest classes of meaning for all objects (23% of all objects were valued for 'craft'). Similarly, in Csikszentmihalyi and Rochberg-Halton's study [2], 12% of all objects (205 objects) were coded for the meaning class 'craft' and 44% of the 'parents' generation (the same age group as most of the participants in this study) mentioned craft as a reason to value an object. However, while Csikszentmihalyi and Rochberg-Halton only analyzed physical objects, in this focus group study it appeared that craft was even *more important for the digital* than for the physical; in fact, craft was, along with 'relatives', and after 'self', the second-largest meaning class for digital. Digital craft is a more recent development than physical craft and the relatively recent possibilities to manipulate the digital may have made it more likely to select digital craft, because it was still quite new to the participants. However, in related studies similar results were found: digital objects that were valued were often self-made, augmented, changed through use over time, or had been in other ways the focus of engagement for a longer time [11, 17, 18]. Further, promoting augmentation and modular, adaptable design of digital products [17], exploiting accrual of metadata [18], and turning time spent archiving and managing media into a time of personal expression [22] have been proposed to increase people's engagement with, and attachment to digital objects. This last suggestion can be seen as a solution to the general observation that managing and organizing media is often considered problematic: a duty and responsibility, and not a creative and rewarding practice [6, 20, 24]. By making media organization more personal and creative, this organization can be made less of a struggle. Alternatively, design approaches such as lifelogging [1, 3] have aimed at effortless 'total capture', management, and storage of digital media related to everyday life, thus tuning into the limited time people have at their hands for organizing their growing media collections. Similarly, in their study about home archiving Stevens et al. [22] found that participants would like to 'remove the "work" from collecting, annotating and revisiting memories' [ibid: p.212]. Petrelli and Whittaker [20] also stress the importance of reducing the burdens of management and maintenance to support access and retrieval of digital media, e.g. by using metadata to cluster media. But thus far, such automatic organization means have not effectively been implemented in media archiving systems [ibid]. Apart from the limited technical possibilities for making lifelogging possible, Petrelli and Whittaker raise the concern that such automatic

organization does not fit the diverse and flexible ways in which people want to organize their objects. Physical objects are for example organized by meaning and not by type of object. Digital organization systems should support the different organization structures people want to use, and thus provide a 'more organic view on our digital life' [ibid: p.166]. Thus, it can be seen that there is a lot to be said for enabling more creative and personal practices not only in media organization but also in media creation and augmentation. From this study it appears that craft, although traditionally physical, is an important direction for design when looking at cherished *digital* objects. Self-creation or crafting of digital objects, a creative process in which people are encouraged and supported to use a selection of their digital objects to create new objects or augment existing ones, appears to lead to digital objects with a high level of attachment. Therefore the design of products or systems that support this 'digital craft' could be effective in making digital objects more cherishable.

Reaching meaningful integration of physical and digital
As this study has shown, with the current diversity of things in the physical and digital worlds and the hybrid forms that sit between those, and with the fast developing digital technology, definitions of 'objects' and 'digital' and 'physical' are changing. Participants asked themselves what constitutes a physical or digital object. For some participants the word 'object' implied a physical body, making 'digital' and 'object' a contradiction. However, looking at the digital objects selected it can be seen that people can think about the digital as objects, even though it requires 'a change of thinking'. The distinctions between physical and digital are fading and the changing definition of an object may thus be broadened to include the digital and the objects of blended materiality that are becoming more ubiquitous in everyday life. For many hybrid devices, such as smart phones or hard-drives, there is no clear distinction between *content* and *carrier*. Consequently, when people mention a hybrid object it is not always clear whether it is the content or the carrier that they value. While in some cases the physical form clearly influences the value, for example for P3's 'beautifully designed hard-drives', in other cases the content would be just as valuable on another medium, for example P1's home-videos on DVD. While in these cases it can be argued it is the carrier and the content respectively that is valued, for other devices, such as a smartphone, it is less obvious. The applications and digital content, such as photos and text messages, may be valued, but at the same time the device itself has valuable physical qualities: it has a handy size to carry around; it is robust; or has an attractive design. It can be argued that the boundaries between digital and physical are fading and current devices force us to think differently through more hybrid forms and integrations of physical and digital. For most hybrid objects, however, the physical is primarily a carrier of the digital content and the physical component is optimized to the use of the digital, for

example a big screen on a smartphone optimizes web browsing. Interesting possibilities for new forms of meaningful integration of physical and digital can be considered by *looking beyond the physical as mere container for the digital* and by exploiting the advantages of the physical for this integration, for example by using physical interaction mechanisms, as was done in Cueb, a set of interactive digital photo cubes [8], or by enhancing uniqueness or craftsmanship. This could in turn lead to digital objects, or combinations of physical and digital, that are more cherished.

More meaningful integration of physical and digital can further be reached by *revealing the digital* and making it more part of the everyday environment. While physical objects are used in 'autotopographies' to construct a sense of self of the owner through their positioning in the physical environment [9], digital objects are often hidden on devices. The results of this study indicate this has an influence on the extent to which digital objects are considered special and the reasons why they are considered special. For example, it may have explained the absence of Memories as a reason for cherishing digital objects, despite photos being one of the largest categories of selected special digital objects. One participant, for example, mentioned he did not see the need for a digital photo frame, because he used the screensaver on his computer to display photos (P6). However, his computer appeared to be located in a spare bedroom, away from the rooms in the home where he and wife usually were. Physical objects, on the other hand, are much more embedded in the everyday landscape and may trigger memories simply be being seen.

Apart from better facilitating such reasons that are currently not common for digital objects, revealing the digital may further support the reasons that do exist for cherishing digital objects. Important reasons for valuing physical objects were craft (10% of all significations for digital), achievement (6%) and embodiment of ideals (6%). These were categorized under the overarching function *'defining the self'* by Kirk and Sellen [12]. In their study of home archiving the authors found that in the digital realm this construction of self-identity was more personal and less publicly displayed than in the physical realm: 'The craft one might achieve in the digital realm, either work or art, (currently at least) is more constrained in terms of the physical places where it can be displayed' [ibid, p.17]. While these meaning classes are thus also influenced by the hidden nature of the digital, by the limited possibilities to display the results of craft and accomplishment, the motives for using the digital to create something or relate to ideals and values are strong enough to survive nevertheless. Therefore, interesting design opportunities arise from looking at ways to reveal the digital and to integrate (results of) craft, achievement and embodiments of ideals, more in the everyday landscape. All in all, through a better integration of digital and physical in which the digital is more visible and embedded in the everyday landscape, new

reasons for cherishing digital objects may be facilitated and existing reasons can be supported.

CONCLUSIONS

This paper has addressed a study into cherished physical and digital objects and has compared the reasons for cherishing objects based on a common framework for physical and digital. It has further addressed how distinctions between physical and digital objects are fading, how format influences how special an object is, and general advantages and disadvantages of physical and digital. These findings were used to discuss how the design of novel products or systems may enable the existence, creation, or development of more cherishable digital objects, appreciating the growing ubiquity of objects with blended materiality. Overarching themes that were identified are: the extrapolation of the advantages of the physical to the digital, such as supporting digital uniqueness and gift-giving; the exploitation of reasons for cherishing digital objects, such as supporting digital craft; and the development of meaningful integrations of physical and digital, such as employing physical interaction, uniqueness or craft as a means to make the physical more than merely a carrier for digital objects, and supporting the visibility of digital objects in the in the everyday landscape of the home. More cherishable digital objects can support meaningful use of digital objects, e.g. for reminiscence and storytelling, and can encourage engagement in active selection of meaningful media to keep and use, which is why we believe it is important for designers and developers to consider these issues in future design of products and systems.

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