POSSESSIONS AND SELF EXTENSION IN DIGITAL ENVIRONMENTS: IMPLICATIONS FOR MAINTAINING PERSONAL INFORMATION

Amber L. Cushing

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the School of Information and Library Science.

Chapel Hill
2012

Approved by:

Donald Case

Diane Kelly

Susan Kleine

Helen Tibbo

© 2012
Amber L. Cushing
ALL RIGHTS RESERVED

Abstract

AMBER L. CUSHING: Possessions and self extension in digital environments: Implications for maintaining personal information
(Under the direction of Dr. Diane Kelly and Dr. Deborah Barreau)

This research explores individuals' relationships with their personal digital information through the concepts of digital possessions and self extension. Two studies were conducted. In the first study, twenty-three participants were interviewed about their definitions of digital possessions and digital legacies, and about their connections to their personal digital information. In the second study, forty-eight participants were asked to conduct three Q sorting tasks in order to gain a better understanding of their thoughts and opinions regarding self extension to digital possessions and maintaining digital possessions for a digital legacy. Findings revealed that digital possessions: 1) provide evidence about the individual, 2) represent the individual's identity, 3) are recognized by the individual as having value and, 4) provide a sense of bounded control. Self extension to digital possessions exists on a multilayered spectrum consisting of the characteristics of self extension to possessions, possession attachment, and use. Finally, participants used "archival logic" when maintaining digital possessions, preferring characteristics that describe primary and/or secondary values of digital possessions. Results have implications for the tools, strategies, and methods archival professionals use when helping people create and maintain digital legacies.

Dedication

For Deborah Barreau (1949-2012)

A wonderful advisor, researcher and mentor who was taken from this world too soon. I will be forever grateful for your advice, your guidance, and the confidence you instilled in me.

Acknowledgements

I have a long list of people to thank who have helped and supported me over the past five years. First, my family: Mom and Jack, Dad and Sue, and my sister Heather, for always being there for me.

I'd like to thank my committee without who helped make this document the best it could be: Deborah Barreau, Donald Case, Diane Kelly, Susan Kleine, and Helen Tibbo,

I am fortunate to have a long list of friends and colleagues who supported me in multiple ways throughout the past five years, from supplying feedback to helping distract me when I needed a break, to just being there to listen-I thank you: Tayo and Katie Atoro, Tessa Beers, Laura Christopherson, Rachael Clemens, Amanda Click, Kaitlin Costello, Erin Edwards, Allison Fox, Carolyn Hank, Julia Khanova, Kjersti Kyle, Alex Polly Lopes, Susan Morrison, Maura Murphy, Sanghee Oh, Jason Priem, Sarah Ramdeen, Lori Richards, Anne Scott, Laura Sheble, Cassidy and Thomas Sugimoto, and Amy VanScoy.

Several SILS faculty and staff also helped and deserve recognition here: Aaron Brubaker, Tammy Cox, Gary Marchionini, Mark Snyder, and Barbara Wildemuth.

TABLE OF CONTENTS

I. Introduction 1

1.1 Objective 4

1.2 Research Questions 5

1.3 Significance of the study 6

II. Literature Review 8

2.1 Archival concepts of personal recordkeeping 9

2.1.1 Archival appraisal theory, post "paradigm shift" 9

2.1.1.1 A brief history of American archival appraisal practice since 1880 9

2.1.1.2 Society and the formation of a documentary heritage 13

2.1.1.3 Documentation strategy and functional analysis 14

2.1.1.4 Macroappraisal 15

2.1.2 Collecting and acquisition 17

2.2 Personal information management 22

2.2.1 Defining personal information management 22

2.2.2 PIM activities 24

2.2.3 Organizing as a PIM activity and its relationship to maintaining 25

2.3 Maintaining behavior and relationship to possessions 27

2.3.1 Personal digital archiving 32

2.3.2 Keeping everything 38

2.4 Digital objects as possessions 40

2.5 Self extension to possessions 42

2.5.1 Self extension and measurement....45

2.5.2 Past self and future self....49

2.5.3 Self extension to possessions vs. attachment to possessions……52

III. Overview of approach....54

3.1 Relationship between interviews and Q method sorting tasks....54

3.2 Sampling 55

3.2.1 Pre-screen Questionnaire 57

3.3 Recruitment....58

3.3.1 Response 59

IV. Characteristics of digital possessions and a digital legacy 60

4.1 Research questions addressed 60

4.2 Digital possession interviews....60

4.3 Data collection 61

4.4 Data analysis 61

4.5 Findings 62

4.5.1 Characteristics of digital possessions....62

4.5.1.1 Provides evidence about the individual 63

4.5.1.2 Represents identity....65

4.5.1.2.1 Representing identity through interests 65

4.5.1.2.2 Representing identity through moods and feelings 68

4.5.1.2.3 Representing identity to others 69

4.5.1.2.4 Hesitation to representation 70
4.5.1.3 Are deemed as having value 71
4.5.1.3.1 Sentimental value 71
4.5.1.3.2 Monetary value 73
4.5.1.4 Provides a sense of bounded control 74
4.5.1.4.1 Sharing 78
4.5.2 Self extension in digital environments 81
4.5.2.1 Imbued with meaning 82
4.5.2.2 Contributes to a sense of identity 82
4.5.2.3 A vehicle to extend the identity to others 83
4.5.2.4 Self extension to the past 84
4.5.2.5 Self extension to the future 86
4.5.3 Digital possessions and a digital legacy 87
4.5.3.1 Displays a progression, tells a story 88
4.5.3.2 Specifically maintained/developed for people other than the individual 89
4.5.3.3 Represents the individual (in a good light) 90
4.5.3.4 Provides evidence of the individual, usually on the Internet 91
4.5.3.5 Is created or manipulated by the individual 92
V. Points of view of digital possessions and a digital legacy 93
5.1 Research questions addressed 93
5.2 Q method 93
5.2.1 Concourse 94
5.2.2 Q sample 95

5.2.3 Conditions of instruction 99

5.2.4 Sorting along the quasi-normal distribution 103

5.3 Data collection 104

5.4 Data analysis 105

5.5 Findings 106

5.5.1 Sorting task 1 109

5.5.1.1 Factor 1 (positive and negative loadings), "Evidence and memory" 112

5.5.1.2 Factor 2 (positive loading), "Attachment, purpose, and use" 114

5.5.1.3 Factor 3 (positive and negative loadings), "Meaning, attachment, and representing self" 117

5.5.1.4 Factor 4 (positive and negative loadings), "Identity and purpose" 119

5.5.1.5 Factor 5 (positive loading), "Use and attachment" 121

5.5.1.6 Summary, sorting task 1 122

5.5.2 Sorting task 2 125

5.5.2.1 Factor 1 (positive and negative loadings), "Accomplishment aide" 127

5.5.2.2 Factor 2 (positive and negative loadings), "Meaning, attachment, and identity" 130

5.5.2.3 Factor 3 (positive loading), "Attachment and displaying identity to others" 134

5.5.2.4 Summary, sorting task 2 136

5.5.3 Summary of self extension in digital environments 139

5.5.4 Sorting task 3 140

5.5.4.1 Factor 1 (positive loading), "Use and purpose" 143

5.5.4.2 Factor 2 (positive loading), “Disagreement with attachment” 145

5.5.4.3 Factor 3 (positive loading), “Represents identity”..... 147

5.5.4.4 Factor 4 (positive and negative loadings), “Remembering vs. evidence”..... 149

5.5.4.5 Factor 5 (positive loading), “Attachment and meaning” 151

5.5.4.6 Summary, sorting task 3 153

5.5.5 A comparison between self extension to digital possessions and the desire to maintain digital possessions for a digital legacy 155

VI. Discussion, implications and limitations 155

6.1 Limitations 163

VII. Conclusions and future directions 167

Appendices.....175

Appendix A. Pre-screen questionnaire 175

Appendix B. Observation and digital possession interview protocols 178

Appendix C. Code dictionary 180

Appendix D. Factor Arrays, sorting tasks 1-3 184

References.....187

LIST OF TABLES

Table

1. Summary of motivations for maintaining digital possessions 33

2. Study sample groups 56

3. Interview participants.....62

4. Primary value Q sample statements 97

5. Secondary value Q sample statements 98

6. Relationship between conditions of instruction and research questions.....107

7. Q sort sampling 108

8. Factor matrix for sorting task 1 110

9. Participants loading onto Factor 1, sorting task 1 112

10. Distinguishing statements for factor 1, sorting task 1 113

11. Participants loading onto Factor 2, sorting task 1 115

12. Distinguishing statements for factor 2, sorting task 1 116

13. Participants loading onto Factor 3, sorting task 1 117

14. Distinguishing statements for factor 3, sorting task 1 118

15. Participants loading onto Factor 4, sorting task 1 119

16. Distinguishing statements for factor 4, sorting task 1 120

17. Participants loading onto Factor 5, sorting task 1 121

18. Distinguishing statements for factor 5, sorting task 1 122

19. Summary of all factors, sorting task 1 123

20. Factor matrix for sorting task 2.....126

21. Participants loading onto Factor 1, sorting task 2.....128

22. Distinguishing statements for factor 1, sorting task 2.....129

23. Participants loading onto Factor 2, sorting task 2.....131

24. Distinguishing statements for factor 2, sorting task 2.....132

25. Participants loading onto Factor 3, sorting task 2.....134

26. Distinguishing statements for factor 3, sorting task 2.....135

27. Summary of characteristics for each factor, sorting task 2.....137

28. Factor matrix for sorting task 3.....142

29. Participants loading onto Factor 1, sorting task 3.....143

30. Distinguishing statements for factor 1, sorting task 3.....144

31. Participants loading onto Factor 2, sorting task 3.....144

32. Distinguishing statements for factor 2, sorting task 3.....144

33. Participants loading onto Factor 3, sorting task 3.....148

34. Distinguishing statements for factor 3, sorting task 3.....148

35. Participants loading onto Factor 4, sorting task 3.....149

36. Distinguishing statements for factor 4, sorting task 3.....150

37. Participants loading onto Factor 5, sorting task 3.....152

38. Distinguishing statements for factor 5, sorting task 3.....152

39. Summary of characteristics for sorting task 3.....154

40. Salient characteristics of digital possessions with corresponding archival concepts.....160

LIST OF FIGURES

Figure

1. Example of the process of creating Q sample statements.....55

2. Characteristics of digital possessions.....63

3. Screenshot of FlashQ, demonstrating initial sorting of the Q sample 95

4. Q sample structure, interpretation of statements.....96

5. Screenshot from FlashQ, with sorting task 1 instructions 100

6. Screenshot from FlashQ, with sorting task 2 instructions 100

7. Screenshot from FlashQ, with sorting task 3 instructions 101

8. Screenshot from FlashQ, of preliminary sorting instructions.....102

9. Screenshot of sorting the Q sample along the quasi-normal distribution 102

10. Spectrum of self extension to possessions in digital environments with individual example.....139

I. Introduction

In a world of cheap digital storage, individuals can easily *accumulate* a vast amount of digital items, but *maintaining* those digital items requires more time and effort. Research has shown that individuals rarely need or want to maintain every digital item they create, save, and/or download. So what is really important in one's digital life? What personal digital items are worth the effort to maintain and why? Currently, there is little research about how individuals maintain personal digital items for "our lives and beyond," or for their digital legacy.

If one was asked to think about maintaining possessions for our lives and beyond, several items may come to mind. Some individuals might choose family heirlooms, or materials that hold personal/family significance. These items can represent an individual's identity and serve as a legacy after the individual's death. In an increasingly digital world, do these same possessions exist in a digital environment? Do individuals consider digital items to be possessions and if so, what can the maintaining of these digital possessions for a digital legacy say about individuals' relationships with their personal digital information?

What an individual decides to maintain for a digital legacy is similar to the process of archival appraisal. Through archival appraisal, archivists use theory to determine what content in institutional archives will be preserved. While many appraisal theories exist and can be applied to managing digital content in personal records collections, no appraisal theory has yet been specifically developed to address

maintaining personal digital material. An examination of the process of individuals' maintaining decisions for a digital legacy, can lay the groundwork for a new theory of the appraisal of personal digital content.

In addition to appraising digital content in personal records collections once they are ingested to an institutional archive, archivists can work with the creators of digital content before the material is donated to the institutional archive. In this sense, archivists act as consultants to assist creators of content with their personal digital records. A deeper understanding of how individuals maintain and manage their personal information before the information is considered "archival," provides further context that can bolster archivists' abilities to work with creators of digital content.

While archival literature and personal information management (PIM) communities have both explored issues associated with maintaining personal digital information, the literature is seldom co-cited. Most PIM research explores individual's archiving behaviors at the collection level (John, Rowlands, Williams & Dean, 2010; Kaye, Vertesi, Avery, Dafoe, David, Onaga, Rosero, & Pinch, 2006; Kirk and Sellen, 2010; Marshal, Bly & Brun-Cottan, 2006; Marshall, 2007; Marshall, 2008a; Marshall, 2008b). Research has found that individuals imbue digital possessions with value and that these possessions can represent identity (Kaye et al., 2006; Kirk & Sellen, 2010). However, most research discusses these digital possessions as digital *collections*, or personal archives. This could be related to Marshall et al.'s (2006) finding that it is often easier for individuals to assess value in digital possessions in aggregate, rather than at an item level. Utilizing archival research in conjunction with PIM research can inform a

study to wholly explore the maintaining of personal digital information, for our lives and beyond.

Before considering how archivists can work with creators of digital content or exploring how individuals maintain a collection of digital material, it is necessary to understand an individual's relationship with a single digital possession. What is a digital possession and how do users understand the concept of a digital possession? While individuals may have different digital possessions, the possessions may hold similar meaning for their owners.

An application of the concepts of possession and self extension in digital environments can provide insight into the issues created as an outcome of ubiquitous access to personal information, and can also inform the practice of maintaining personal information for a digital legacy. According to Furby (1978a), the most salient characteristic of a possession is the ability to control it. Thus far, the concept of *digital* possessions has yet to be explored in conjunction with maintaining personal digital information.

The concept of self extension can be applied to digital possessions to explore the connection between a digital possession and identity. Mostly used in consumer behavior, the concept of self extension assumes that individuals understand that their possessions can contribute to their identity (Sivadas & Machleit, 1994). Individual possessions can reinforce our identity to ourselves and serve as vehicles to display our identity to others.

If *digital* possessions can represent identity, can *digital* possessions reinforce our identity to ourselves and display it for others? If so, understanding the concept of a digital possession and the concept of self extension to digital possessions can be useful to

individuals as they determine which digital possessions most reinforce and represent their identity. Such information can prove useful as individuals reflect upon their identity in a digital environment and attempt to maintain a digital legacy. Further, this information can be useful to archivists, as they attempt to work with creators of personal digital information, that may some day find it's way to an institutional collection.

1.1 Objective

The overall aim of this study is to introduce and expand the current research on digital possessions, self extension in a digital environment, and the concept of a digital legacy and to lay the groundwork for the development of an appraisal method, tools and strategies that will assist individuals with maintaining digital content for our lives and beyond. Previous research has discussed digital possessions at the collection level, usually as a personal digital archive. In order to explore the issue of maintaining personal digital information, it is important to start with personal digital possessions, rather than entire collections. The first objective of this study is to empirically investigate the individual's understanding of a digital possession and the maintaining of digital possessions for a digital legacy.

The next objective of the study is to explore the characteristics of self extension in a digital environment. Researchers in consumer behavior have demonstrated that self extension can influence behavior, but researchers have yet to explore self extension in the digital realm. A study of the characteristics of self extension in a digital environment, coupled with a consideration of its implications for maintaining a digital legacy, can provide individuals with information about how they understand their digital possessions

to reinforce their identity to themselves and display their identity to others; and how the digital possessions can form a digital legacy.

While self extension is not the only concept that can be used to explore the maintenance of digital possessions or the creation of a digital legacy, it is a step forward in offering individuals information about their relationship with their personal information. How individuals understand the relationship with their personal information and how personal information represents them is important in the current digital world, with relaxed social mores about what personal information and how much personal information is appropriate to be shared on the Internet, which Mayer-Schönberger (2009) reminds us, may exist indefinitely.

A secondary objective of this research is to lay the groundwork for future studies of how the concept of a digital possession can be utilized by individuals and information professionals to maintain personal information.

1.2 Research Questions

The main research questions are:

RQ1. How do individuals define digital possessions?
RQ2. What characterizes self extension in digital environments?
RQ3. How do individuals characterize the digital possessions that they desire to maintain for a digital legacy?
RQ4. How do the characteristics of self extension in digital environments relate to the characteristics of digital possessions that individuals desire to maintain for a digital legacy?

Overlap may exist between the characteristics of self extension in a digital environment and the characteristics of digital possessions that individuals desire to maintain for a digital legacy. The research questions above help unpack this belief:

before one can explore the maintaining behavior associated with digital possessions, one needs to understand how individuals define their digital possessions (RQ1).

In the literature, Furby (1978a) states that individuals conceive of their possessions as being part of their self concept. If this also applies in digital environments, then the characteristics of digital possessions should relate to the characteristics of self extension in digital environments, which is that possessions can contribute to, reinforce, and represent identity. RQ2, *what characterizes self extension in digital environments?* explores this issue.

Digital possessions are maintained for a purpose that provides context for the maintaining behavior. In this study, participants were asked which items they would like to maintain for a digital legacy, or items that they would like to maintain beyond their life. Participants' concepts of a digital legacy provide the needed context to study maintaining behavior (RQ3).

As stated above, overlap may exist between self extension to digital possessions and the desire to maintain digital possessions for a digital legacy. After addressing research question two and research question three, one should be able to answer RQ4, which explores how these two sets of characteristics relate to one another.

1.3 Significance of the Study

This study will contribute to ILS by providing one of the few empirical investigations of the individual's understanding of a digital possession, as well as by applying the concept of self extension to an ILS problem. Furthermore, the extension of self to digital possessions will make contributions to ILS, as well as consumer behavior,

as few researchers have yet to study the characteristics of self extension in a digital environment.

The results of this study will provide data that can be used by such areas of ILS as personal information management (PIM), human computer interaction (HCI), archives and preservation, and information behavior. While PIM researchers could gain insight into a less frequently studied area of PIM, HCI researchers might be able to better understand how individuals interact with computers when maintaining digital possessions. While information behavior has previously focused on information seeking and use, maintaining behavior could fall under the information behavior realm and expand the research arena. Archivists could gain insight into how to work with creators of personal digital content.

The results from this study may also lay the groundwork for the development of future work, in which a tool or exercise might be developed to assist individuals with the management of their digital possessions in an online environment, to assist individuals with the development of a personal archive for purposes of forming a digital legacy, and/or to assist archivists as they attempt to work with creators of digital material that will eventually be donated to a personal records collection in an institutional archive.

This study also makes methodological contributions to ILS. Q method is a research method seldom used in information science. This study will demonstrate the usefulness of Q method in studying individuals' relationships with information.

II. Literature review

The literature reviewed below provides information on previous research related to archival concepts of personal recordkeeping, archival appraisal, personal information management, determining the value of digital possessions, personal digital archiving, and self extension to possessions. While early discussion of personal records in electronic form alerted archivists to the changing format of personal information that they may ingest to their institutional repository and how they may best work with creators of such content, research on maintaining digital possessions and personal digital archiving address the practices associated with maintenance, including empirical investigations of the use of digital items, as well as opinion regarding the practice of maintaining personal information. Findings include the discovery that digital information can represent identity, although the link to self extension is not stated (John et. al, 2010; Kaye, 2006; Kirk & Sellen, 2010).

Self extension research explores different representations of the concept, including extension to the past self, the current self, and the future self. Previous research demonstrates that self extension can influence behavior, but self extension to digital possessions is not discussed. Similar to self extension to possessions, possession attachment describes what can be considered an "extreme" form of self extension to possessions.

Overall, the literature reviewed situates the study and demonstrates that the study will address questions in the area of digital possessions and self extension in a digital environment that have not previously been explored.

2.1 Archival concepts of personal recordkeeping

Maintaining personal digital information is framed by a greater discussion about archival theories of appraisal and archival duties associated with personal records in the archival literature. Archival appraisal is related to a discussion of maintaining digital objects because maintaining involves decisions about what to keep and what to discard. According to the *Glossary of Archival and Records Terminology*, appraisal is defined as "the process of identifying materials offered to an archives that have *sufficient value*[1] to be accessioned." (Pearce-Moses, 2005). Archival value is defined as the significance of an item that justifies its preservation (Pearce-Moses, 2005). While individuals may not engage in the identical process of appraising digital objects that is used by archivists to appraise records accessioned to institutional collections, one aim of this study is to understand how individuals determine which digital items to maintain for a digital legacy. Therefore, it is important to consider the theoretical components of appraisal theory, *post paradigm shift*[2], as it may relate to how individuals consciously maintain some digital objects over other digital objects.

---

[1] Emphasis added by me

[2] Cook (1997) argues that archival discourse has shifted over the last century and can be summarized by five [shift] themes: a) the justification of archives for purposes dictated to the management of the state to justification of archives for socio-cultural purposes, b) the idea that everything is kept to the introduction of appraisal c) appraisal guided by a focus on the potential use of the individual records to a focus on the records creator and the context of records creation, d) the notion that the archivists is impartial to the notion that the archivist can shape archival heritage, and e) the idea that archival theory is static to the idea that

Personal records collections usually have been held in manuscript repositories that have an institutional mission to collect material, usually from donations. Much of this literature was published in the mid-1990s when many archivists were addressing the issue of electronic records in personal collections. After a burst of articles during this time, archival literature addressing the topic of personal records in archival collections has been produced at a slower pace. Many of these articles discussed archival appraisal and its relation to personal records collections.

2.1.1 Archival appraisal theory, post "paradigm shift."

Cook (1997) argued that a "paradigm shift" in archival appraisal thinking occurred in the late 1980s and was marked by the publication of new appraisal theories that focused on society and records creators, rather than solely focused on the information contained within records and documents. Appraisal theories put forth by Booms (1987), Cook (1992) and Samuels (1992) demonstrate this paradigm shift. A brief examination of appraisal concepts until the 1980s demonstrates that the theories put forth by Booms, Cook and Samuels are more theoretical than previous appraisal strategies. However, the theoretical underpinnings of these theories provide a new way to conceptualize value in records.

2.1.1.1 A brief history of American archival appraisal practice since 1880.

Early concepts in modern archival appraisal can be traced to the *Manual for the Description and Arrangement of Archives* in 1898, originally published in Dutch by Samuel Muller, Johan Feith, and Robert Fruin (Cook, 1997). According to Cook, the "Dutch manual" was revered as one of the first documents that contained archival

---

archival theory changes over time. The themes that Cook uses to explore the paradigm shift informs modern archival thinking on appraisal.

concepts because of its widespread influence. The Dutch manual contained a list of rules, the most recognized being the concepts of *provenance* and *original order*. The principle of provenance or "respect de fonds," dictated that records of different origins remained separate to preserve the context supplied by a records collection (Pearce-Moses, 2005). Original order stated that records be maintained in the original order set forth by the creator, in order to preserve context and allow for access as the creator had intended (Pearce-Moses, 2005).

The next major text to influence the modern archival profession was the *Manual for Archive Administration* written by Sir Hillary Jenkinson, published in 1922. Jenkinson, the Deputy Keeper of the British Public Records Office, wrote of the importance of an archive for its impartial evidence and the archivist as the guardian of that evidence (Cook, 1997). Jenkinson's concept of an archive built upon that of the Dutchmens' ideal that a record collection should be minimally altered from the time it was transferred from the creator. The job of the archivist was to keep the collection, not select it.

Influenced by the manuals published by the Dutchmen and Jenkinson, American Theodore Schellenberg published *The Appraisal of Modern Public Records* in 1956. Known as the "father of archival appraisal," Schellenberg published his text in a time when the United States National Archives was facing an onslaught of government records during the post World War II era: it was obvious that every record could not be kept. Schellenberg wrote that records had a primary value and a secondary value: the primary value was of use to the creator and the secondary value was of use to the researcher. Part of the archivist's task was to use this value system to decide which records (those of

secondary value) should be archived. Secondary value could be divided into two more concepts: *evidential* value that revealed evidence, and *informational* value, which provided content about the record creator or creating body (Schellenberg, 1956). Evidential values of records referred to records that documented the functions of the records creator, whereas informational value of records referred to the actual content of the records and how it related to actions of the governing body.

Archivists were to rely on their archival training, historical training, and information from ”subject specialists” to determine which informational content was important enough to accession to the archives (Cook, 1997). Subject specialists were individuals who had knowledge of content in the records. For example, an archivist using the Schellenberg manual to appraise records about US space policy could consult an individual with specialized knowledge of US space policy.

Since the release of *The Appraisal of Modern Public Records,* many archivists have understood that they should consider future use by researchers when determining which records were of value. However, this task was difficult and has been compared with that of staring into a crystal ball. How could any one archivist predict what future researchers would need to support their research? How could archivists predict future research topics? Three appraisal theories developed in the past three decades have attempted to shift the focus of determining the value of records away from the record creating process and record use. Cook (1997) labeled this a shift to a more “societal paradigm” of the appraisal of records because the appraisal theories emphasized society in determining the value of records.

2.1.1.2 Society and the formation of a documentary heritage.

In 1987, a 1972 appraisal theory by German archivist Hans Booms was translated into English and printed in the Canadian journal *Archivaria*. According to Joldersma and Klumpenhouwer who translated the article, Booms (1987) responded to the claim made by Eastern German archivists that Marxist archival practices were inherently better than archival practices in capitalist countries.

Booms (1987) aimed to explore how society, as a concept, might be related to the formation of a documentary heritage. Booms (1987) argued that individuals experienced events in relation to a group, or a society. Within a society, certain views of events and of the world become dominant and came to be regarded as norms. These dominant norms influence an individual's behavior and experiences. An individual should not be viewed as detached from society as an individual was constantly influenced by his own experiences, which were in turn influenced by societal norms (Booms, 1987). Archivists helped construct a documentary heritage for society because archivists determined which records were of value and served as historical sources. In Marxist countries, the *state* dictated the dominant ideology and society was not free to determine its own norms (Booms, 1987).

According to Booms (1987), archivists should consider how societal process related to records when determining the value of the records. Archivists should examine cotemporary understandings of events to determine the value of contemporary records. Essentially, public opinion about a contemporary event was representative of how society viewed the event. According to Cook (1997), Booms revised this statement in 1991,

stating that the archivist should not consider public opinion, but the functions of record creators that society had deemed representative of society itself. Thus, the function of a record creator in society could help archivists determine the value of the aforementioned creators' records in documenting the heritage of society. For example, an archivist could argue that since people in American society elected a senator to represent them, the records that document the senator's role in society should be preserved.

While more theoretical than Schellenberg's approach, Booms' (1987) concept represented a framework to direct practical appraisal strategies. A similar line of thinking related to self extension is the decision to maintain digital objects. As individuals make conscious decisions about which digital objects to maintain, it could be understood that objects to which the self extended could be more representative of the individual. Therefore, one could hypothesize that the digital objects that are most representative of an individual are the digital objects that are most often maintained or should be maintained.

2.1.1.3 Documentation strategy and functional analysis.

Like Booms (1987), Samuels (1986) emphasized that archivists look beyond the content of the records when making appraisal and collecting decisions. Samuels developed *documentation strategy*, which called on archivists to develop a plan to ensure documentation of a specific geographic area, topic, process or event in society. In documentation strategy, archivists should coordinate with similar institutions to develop key areas to document and then set out to collect materials in those areas. According to Cook (1992), documentation strategy was criticized because of the possibility that archival institutions could begin to overlap with each other if they aimed to collect in the

same area and that decisions about key areas could be difficult to discern due to many different opinions.

Likely responding to criticism, Samuels (1992) revised documentation strategy to become *functional analysis*. In functional analysis, the notion of coordinating with other institutions to agree on key collecting areas was deemphasized in favor of an emphasis on making collecting and appraisal decisions based on modern society versus the records currently available (Samuels, 1992). Samuels advised archivists to work with record creators in areas designated by functional analysis so that the record creators would then donate the records to the archival institution when appropriate and thus, a designated key area was then documented. Archivists were advised to rely on their own knowledge of their institution and conduct research about their own institution in order to understand what needed to be documented. Only after planning key collecting areas, should the archivist begin to collect new records to supplement and compliment the existing institutional collection. According to Samuels, "functional analysis provides an understanding of why specific documentation is sought" (p. 16).

2.1.1.4 Macroappraisal.

Cook was partly inspired by Booms (1987) when creating guidelines for the macroappraisal model (Cook, 1997). According to Cook (1992), the focus in macroappraisal was on the "macro" context of the records, as revealed through their creators' functions, programs, activities and transactions" (p. 33). Bailey (1997) described macroappraisal by stating that "the focus of appraisal needs to shift from determining the value of the actual records for research purposes to assessing the functional-structural circumstances which led to their creation" (p. 94). According to

Cook (1992), archivists should first seek to understand why records were created, rather than deciding which created records should to be kept. Utilizing this theoretical underpinning, an appraisal policy could be developed that reflected the concepts of macroappraisal (Cook, 1997).

The national archives of Canada began using a macroappraisal strategy to appraise new acquisitions. In this strategy, the focus was on the record creators with the assumption that the creators, the organizations, and the citizens with whom they interacted, indirectly represented society (p. 94). According to Bailey (1997), part one of the macroappraisal model called for the identification of "criteria to assign priorities to record-creating structures within the functional context of society and variables to determine the nature and importance of the interactions of individual citizens with those structures and functions" (p. 94-5). Once completed, part two called for the archivist to examine the interaction of function, structure, and citizen in the records, in order to gain an "image" of society that should be preserved. In this stage, societal context was developed (Bailey, 1997). Part three called for archivists to utilize "microappraisal" (Bailey, 1997). In microappraisal, archivists determined the time periods covered, authenticity, volume and legislative requirements of the records. Microappraisal was similar to the traditional concept of appraisal for use first proposed by Schellenberg, but this type of appraisal was only preformed on the records first selected for preservation using the macroappraisal strategy (Bailey, 1997).

Similar to Booms' (1987) theory, macroappraisal emphasized the documentation of society over the preservation of documents with a mind toward future research topics. Macroappraisal also emphasized that archivists work with record creators to determine

value in their records, before the records arrived at an institutional archive. The question of value was also present as individuals attempted to gain control over their personal digital objects.

When Cook (1997) contended that to determine value, archivists should look to the record creators and determine why the records were created, he removed the need for assessing value from the actual record. Similar to the theoretical underpinning of macroappraisal, value of personal digital items could be assessed using more than the document or object itself. The decision of whether or not to maintain a digital object could not only be based on an examination of the digital object, but could also include a determination of the creator's extension of self to the digital object.

2.1.2 Collecting and acquisition.

Collecting is often a central part of the mission of a manuscript archives; the archives specialized in collected items in contrast to items created by a specific organization that the archive could have a mandate to collect. The *Glossary of Archival and Records Terminology* has defined a "collecting archive" as "a repository that collects materials from individuals, families, and organizations other than the parent organization" (Pearce Moses, 2005). Acquisition referred to materials received by an institution.

When discussed in the realm of personal archives, collecting and acquisition often manifested through a discussion of donor relations. In his early discussion of the challenges archivists' faced in accessioning electronic personal records into institutional archives, Cunningham (1994) suggested utilizing the records continuum model and suggested that collecting archivists become actively involved in the pre-custodial records

creation phase of personal records. Developed by a research group at Monash University in Australia, the records continuum model de-emphasized the traditional time constraints placed upon archivists by the records life cycle.

When following the records life cycle model, archival records moved through stages of creation, active use, retention, and disposition; archivists traditionally did not come in contact with the records until the retention phase. Utilizing the records continuum model, archivists were not limited to interacting with the records during a specific time during the life of the record (Pearce Moses, 2005). Cunningham (1994) suggested that archivists practice early intervention during the pre-custodial records creation phase as a method to address electronic personal records. Early intervention during this stage involved interacting with the records creator while she was still in the process of creating the records. Cunningham (1994) explained that personal records archivists usually left personal records management to the creator and only interacted with the donor when she was ready to transfer records to the archives, which was usually at the end of the donor's life. Continuing with Cunningham's (1994) argument, when considering permeance issues associated with electronic records, it became necessary for personal records archivists to involve themselves earlier in the donor's life, while the donor was still creating records. By creating an early relationship with the donor and maintaining the relationship over time, the archivist could provide advice to the donor as she managed her collection.

Cunningham (1994) acknowledged that involving archivists during the records creation phase could cause problems by altering how an individual managed and created her personal records. However, Cunningham considered this a minimal risk when

compared with the alterative of waiting until the end of life when some electronic records could have become inaccessible due to loss and compatibility issues. In contrast, Hurry and Onuf (1997) considered the early intervention of an archivist into a creator's records fraught with unintended consequences. Labeling Cunningham's (1994) suggestion as "radical," Hyry and Onuf (1997) responded to the call for early intervention by suggesting that the involvement of an archivist could influence the creation of an individual's records in "unforeseen ways" (p. 43). Furthermore, Hyry and Onuf (1997) argued, the job of an archivist was made terribly difficult by having to develop long term relationships with donors, and when archivists were involved in the records creation phase, they would be forced to make hasty appraisal decisions, without the "benefit of time and hindsight" (p. 43).

Two years later, in 1999, Cunningham responded to Hyry and Onuf's (1997) contentions. Conclusively writing "objections overruled," Cunningham (1999) reiterated his strong belief that personal records archivists should be involved throughout the entire life of the records. He bolstered this statement with the ominous prediction that personal records archivists could become obsolete if they remained separated from the records creation process. Cunningham also warned that without early intervention, parts of our collective heritage would ultimately be lost.

Heeding Cunningham's advice, in 2006, Thomas and Martin developed the Personal Archives Accessible in Digital Media (PARADIGM) project "to explore how archivists might select, acquire, process, store, preserve and provide access to the digital archives of individuals for the use of future researchers" (p. 29). The first archival study to explore how archivists could best assist individuals as they maintain their personal

digital information, Thomas and Martin (2006) noted that archivists traditionally tended to distance themselves from record creation, which was one of the reasons personal records had not been previously addressed by the digital preservation research community. Archivists who worked with the PARADIGM project practiced Cunningham's (1994; 1999) suggested early intervention (Thomas & Martin, 2006). In addition to the concept of early intervention in records creation, the PARADIGM project utilized the reference model for an Open Archival Information System (OAIS) in an attempt to blend the two models. The OAIS described the components and process necessary for digital archives (Pearce Moses, 2005).

PARADIGM project archivists visited politicians and their staff in political offices to discuss deposit and preservation, as well as to learn which records were most important to the politicians and their staff. One technique that the PARADIGM archivists used to discover the importance of records was to practice a survey stage, in which screen prints or text files of directory lists on all office computers were captured so that the archivists and political staff could begin a dialogue about the digital files (Thomas & Martin, 2006). Thomas and Martin (2006) acknowledged that their suggestion of working with creators was controversial because it completely rejected the Jenkinsonian archival tradition, which stated that archivists should resist exerting any influence on records at any stage of the record life cycle. However, like Cunningham (1994; 1999), they ultimately argued that if digital records were to be preserved, "the era of an impartial, passive keeper of records has surely passed" (Thomas & Martin, 2006, p. 45).

The theme of early intervention was also present in articles that documented viewpoints of archivists recounting their personal experiences working with personal records collections held at archival institutions, and personal observations of archival work. Paquet (2000) chronicled her experiences working with personal records at the National Archives of Canada and in recounting, explained that if archivists intervened shortly after records were created, archivists could then have opportunities to educate creators about the necessity of preserving their electronic records. Paquet (2000) discussed her two pronged strategy to address personal records when working with donors, a proactive approach to address recently created records and a passive approach to address records created using older forms of technology that potential donors may not be able to access using current technology. Paquet (2000) found that by explaining that records created using older forms of technology could be accessed by the National Archives of Canada, Paquet was able to gain the trust of several potential donors. When discussing recently created records with donors, Paquet (2000) found that she was able to slowly educate potential donors about the necessity of maintaining their electronic records.

Similarly, relying on his own observations, Borrows (2006) recommended the development of a set of standardized protocols to address personal records in archival institutions and suggested early intervention with records creators.

The discussion of early intervention in the collecting of personal records suggests that explaining archival principles to individuals may increase the likelihood of the individuals to donate their records to an institutional archive, but it also suggests that

archival knowledge could be useful to individuals as they attempt to manage their personal digital collections.

As the archival profession continues to enter the digital environment, many members of the archival community recognize the role of the archivist in helping individuals manage personal collections of maintained digital material (Cox, 2008). Whiles research studies such as PARADIGM push involvement of the archivist "back" to the creation phase of the records continuum, archivists should not assume that what they know about how individuals managed paper records in the typical records lifecycles can seamlessly apply to digital records along the records continuum. Before involving the archivist, it is necessary to gain insight into how individuals manage and maintain personal information. PIM literature meets this goal, by providing data about people's personal habits associated with personal digital information.

2.2 Personal information management

2.2.1 Defining personal information management.

According to Jones (2007a), personal information management "refers to both the practice and the study of the activities a person performs in order to acquire or create, store, organize, maintain, retrieve, use and distribute the information needed to complete tasks (work related or not) and fulfill various roles and responsibilities" (p. 453). PIM is often discussed in conjunction with systems. Barreau (1995) defined a personal information management system as "an information system developed by or created for an individual for personal use in a work environment" (p. 327). In discussing the psychology of personal information management, Lansdale (1988) wrote "the primary reason for keeping this information is to be able to retrieve and use it in the future" (p.

55). From these definitions, PIM can be summarized as task-driven, work-related, reuse-centric and retrieval-centric.

Most early PIM studies conducted from the 1980s to the mid 2000s explored the use of information retrieval to complete a task. However, more recent studies have acknowledged that it can be useful to examine PIM practices in a different context. Decoupling PIM from the traditional context of information retrieval can expand the use of PIM activities within the context of achieving a goal or completing a task. PIM activities could be valuable for reasons beyond the completion of a task.

Within PIM, personal information was broken down into units. A personal space of information (PSI) included information that was:

- owned by an individual,
- about an individual,
- directed to an individual,
- sent to an individual,
- already experienced by an individual,
- useful to an individual, and
- "information tools, objects and constructs used to manage the information" (Jones, 2008, p. 43).

Individuals have exerted varying degrees of control over this information. For example, PSIs include information on an individual's computer hard drive, such as personal writing. In addition, information within a PSI also includes one's medical records, kept in a physician's office. The information in these medical records is about the individual, but it is not within the individual's physical control (Jones, 2008). Each individual only has one, massive PSI. Jones (2008) argued that in order to make a PSI more manageable, information should be broken down into collections, known as personal information collections (PIC). Jones (2008) defined PICs as "activities that people do in relation to

their PSIs" and relied on the analogy of a collection as an island in a sea of information to explain PICs (p. 47). Jones also stated that only when an individual has made a conscious effort to control a collection of information could that collection be known as a PIC.

2.2.2 PIM activities.

According to Jones (2008) a PSI "establishes an arena for the essential activities of PIM" (p. 46). Jones distinguished the following PIM activities: keeping activities, referring to the input of information into a PSI; finding/re-finding activities, referring to the output of information from a PSI; and *meta-level activities*, referring to the maintenance and organization of information within a PSI. According to Jones' model, an information need could trigger keeping or finding/refinding. For example, if an individual wished to remember to attend a birthday party on December 30th, she might enter "party" into the December 30th box on her online calendar, a keeping activity. On December 30th, she might look in her online address book for the location of the restaurant where the party was being held; a refinding activity. Looking in the online address book and looking at the calendar would be considered the meta-level activities as they helped map the needs (remembering the party date and finding the party location) to the information (December 30th and the restaurant address).

Meta-level activities have included *organizing*; *maintaining*; *managing privacy and the flow of information*; *measuring and evaluating;* and *making sense* (Jones, 2008). Meta-level activities are not traditionally triggered by an information need or task, as with keeping and finding activities. *Maintaining* has been broken down into stages:

getting organized, maintaining for now, maintaining for later, and maintaining for our lives and beyond (Jones, 2008). [As mentioned above, meta-level activities have existed to map information and need.] According to Jones (2008), individuals engage in the maintenance of information when the information would likely be needed for future use.

2.2.3 Organizing as a PIM activity and it's relationship to maintaining.

While Jones (2008) defines organizing and maintaining as distinct meta-level PIM activities, he acknowledges that the terms are often used together and sometimes used interchangeably. While maintaining refers to "all decisions and actions related to the composition and preservation of personal information collections," organizing focuses on "how items in a collection are interrelated and distinguished from one another through the assignment of names and other properties…" and that "organizing preserves an essential connection between us and our things…" (p. 156). Thus, maintaining could include organizing, especially if an individual maintains a digital object, in order to preserve a connection to the digital item. Further, one may organize an item and later maintain it. The studies described below related to organizing personal information exposes the characteristics that individuals use when organizing their personal information. These characteristics are relevant to the maintaining discussion, as many of these organizing characteristics may form the salient characteristics of maintained personal information.

In her study of how individuals organize documents in their own offices, Kwasnik (1989) found that overall, her participants most frequently cited *use* when discussing their classification decisions of information in their offices. According to Kwasnik, the results

indicated that participants chose classification categories that provided the most usefulness, with the least amount of cognitive effort.

In studying context as a factor in PIM systems in electronic environments, Barreau (1995) found that use was one of the most frequently mentioned dimensions of the personal classification of work documents on a computer as well as maintained documents on a work computer. Value and time were also stated as dimensions of classification.

In their studies of how participants file information and find information on their computer desktops, Barreau and Nardi (1995) found that participants filed information in places where they could be reminded to take some action related to the information and that use was the primary determinant of how the information was categorized. Information was placed in locations that would remind the participant, making location an important element in organization.

Boardman and Sasse (2004) found that value influences selection of a PIM strategy and that participants were more willing to take the time to organize files over which they felt a strong sense of ownership. Thus, an individual's concept of value influenced his/her organization of personal information. Due to a finding that participants seldom officially archived information, Boardman and Sasse also recommended that theories of "archiving" be replaced with usefulness, and suggested using the terms "active" and "inactive" (p. 590).

Finally, Whittaker and Hirschberg (2001) found that participants were less likely to discard paper archives in which they had invested effort in filing, even when participants were unsure of the item's value. This finding suggests that organization is

akin to effort and effort is exerted toward things of value at a certain time, though the concept of value may change over time. While effort suggests value, according to Smith (2007), individuals will not invest time and effort in preservation without incentives, even though use of content can be understood as a demonstration of value. Value and use are intertwined with organizing and maintaining (preservation).

Overall, organization is an effort, which may impact an individual's maintaining behavior. The characteristics of time, use, and value remain influential in organizing personal information. Knowing that the organizing is linked with maintenance, these characteristics may be relevant in the maintenance of personal information as well.

2.3 Maintaining behavior and relationships to possessions

Studies of maintaining behavior begin to offer insight into what possessions individuals' value and may continue to value in the future. In addition to maintaining, these studies explore individuals' relationships with physical and digital possessions that may have implications for the digital environment.

Frolich and Murphy (2000) designed a memory box with recordable audio as a feature so that individuals could record audio to add to their souvenirs. The researchers interviewed eight families about the memory box and found that one of the most desirable features of the memory box was its ability to save, or maintain, stories to share with other individuals, especially among family members.

Stevens, Abode, Truong and Vollmer (2003) built upon the memory box idea to create a living memory box prototype specifically designed as a central location for a family archive. Stevens et al. conducted interviews with 13 parents and three focus groups of 2-4 individuals in order to determine general family archiving needs and gain

feedback about the prototype. From the interviews, the researchers found that overall, families wanted to remove the "work" from collecting and annotating memories; make the inclusion of physical possessions a primary feature of the device; develop "natural" interactions; and enable storytelling for the device. Stevens et al. directed participants to complete a journal with questions about family memories in their homes before the focus groups, so participants would be prepared to discuss relevant information during the focus groups. Overall, the researchers found that the prototype met many of the needs described by the participants, but that the participants were still concerned about the long term durability of the information put into the living memory box.

Stevens et al. (2003) contrasts the finding that participants desired to remove the "work" associated with maintaining memories with that of scrapbookers, who described the scrapbook making process as "therapeutic." The contrast is important in thinking about maintaining behavior: if maintaining is described as "like work" for some or as "therapeutic" by others, is there a middle ground between these two attitudes? In general, what does the overall population associate with maintaining and what are the implications for maintaining digital possessions?

Directly related to Jones' (2008) concept of maintaining for our lives and beyond, Kirk and Banks (2008) explored the design and development of technology heirlooms, defined as "a technological/digital artifact that is designed with the intent that it might outlive it's owner and come to be passed on, and that in some way either materially or conceptually it might carry with it an imprint or impression of the previous owner" (p. 1). Challenging the notion that many technological possessions, programs and information forms were not designed to last, Kirk and Banks explained a range of areas they might

pursue in order to understand: "the qualities of interaction with a possession that might imbue it with significance" (p. 2). Kirk and Banks first explored the ability for a digital surrogate to be created for physical possessions that have personal meaning. This idea had potential because it allows for digital possessions and physical possessions to be kept in the same area/system, but it was still unclear whether or not individuals would have the same relationship with a digital surrogate that they had with a physical possession. However, Kirk and Banks suspected that individuals would have the same relationship with digital possessions that they had with physical possessions, if the digital possession were generated in the same way as the physical possession, i.e., a bequeath from a loved one. The researchers proposed to study three areas of inquiry: online memorials; bequeathing of content; and digital patina, or the temporality of possessions to reach their goal of gaining insight into design of technology heirlooms. The "method of generation" overlap between digital and physical may be a promising avenue to pursue when comparing digital possessions with physical possessions.

Also concerned with the idea of passing on material, Petrelli, van den Hoven and Whittaker (2009) directed 10 families to create a time capsule of items that represented themselves that would be viewed 25 years later. The participants were provided with "probes" including a two week diary, a local map and sticky notes with the heading "messages to the future," and scrapbooking materials that were designed to trigger reflection on the past and thinking about the future. Findings indicated that photographs were the most common item added to the time capsules; possessions once in use and personal belongings were also popular, followed by craftwork, ephemera and publications. Only 3% of participants included video in their time capsule. Participants

described their chosen items as representing people, the identity of the family, experiences, places, and life today. Overall, Petrelli et al. found that individuals preferred to reconstruct memories from selected cues rather than from a lifelog that recorded all life events. Individuals also did not like to annotate their possessions or memories.

Kirk and Sellen (2010) explored the values behind home archiving in order to understand how and why sentimental artifacts were maintained and how archiving was used for more than to trigger remembering. Kirk and Sellen toured the homes of 11 families in order to understand what kinds of possessions families maintained and then returned to the homes to conduct interviews with the families. During the interviews, participants were prompted with images of their own items that the researchers captured during the tours. Participants were asked about their feelings toward the possessions, why they kept the possessions, and how they had kept the possessions. Participants were also prompted to reflect upon the differences between the physical and digital possessions.

Kirk and Sellen (2010) found that physical and digital possessions often served as a trace of, or mechanism for, "sacred" things (things regarded with some kind of reverence). Participants imbued the possessions with value because they served as traces of something sacred. Fewer digital possessions than physical or "hybrid" (possessions with physical and digital characteristics) possessions were kept, perhaps because digital possessions had less ability to serve as traces for the sacred.

The maintained possessions were often removed from functional use. The most common digital items were digital photos and videos. Emails were less popular, but were kept by at least one couple, who kept the emails from when they had first dated. Kirk and

Sellen identified six values associated with home archiving, beyond the broad purpose of remembering: defining the self, forgetting, fulfilling duty, framing the family, connecting with the past, and honoring those we care about.

The researchers also examined whether the possessions were hidden from view or publically displayed. While possessions that framed the family and honored those we care about were found in public view, the possessions that represented self identity were less likely to be publically displayed.

With a goal of developing new technologies that would enhance individuals' perceptions of value in their virtual possessions, Odom, Zimerman and Forlizzi (2011) interviewed 21 teens and tweens (ages 12-17) in their bedrooms, about their material and virtual possessions, as well as had each participant provide a tour of their bedroom. Odom et. al characterized virtual possessions as

> "The many objects that are losing their lasting material form, such as books, music, photos, plane tickets and money. In addition, we also consider them to include things that never traditionally had material form, such as video game avatars; electronic messages including email, SMS, IM and status updates; social networking profiles; personal behavior logs, such as purchase histories; visited locations form services such as brightkite.com; and a listing of activities, such as jogging routes from MapMyRun.com" (p. 1491).

Odom et. al, found that homework assignments, blog entries, status messages from SMS, archived SMS messages, digital video, digital artwork, digital music and digital photos to exist in participant's collections. In addition, Odom et al. found several characteristics associated with virtual possessions, including but not limited to

- Evidence participants were transitioning to the cloud for file management because of the ubiquitous access the cloud provides;
- A desire to move virtual possessions around a digital environment
- An understanding that virtual possessions can represent identity to others

- A feeling of control over social networking sites, in contrast to their physical location as teens (living in their parents homes)

Considering these findings, Odom et. al suggested that a focus on the accrual of metadata, placelessness and presence, and presentation of selves would provide the greatest avenues for design.

While not focused on maintaining digital possessions, Odom et al. still discerned findings relevant to maintaining digital possessions. While their definition is more example than description, it acts as a starting point when considering digital possessions. Further, their exploration of teens' relationships with digital possessions introduced behavior that could apply to maintaining such possessions for the "our lives and beyond."

2.3.1 Personal digital archiving.

Personal digital archiving fits Jones' (2008) activity of maintaining for our lives and beyond. Overall, the literature does not provide a solid, unanimous definition of a "personal digital archive." In general, most literature (see Table 1) that discusses a personal digital archive omits a definition of the term and instead discusses human behavior surrounding a personal digital archive (personal digital archiv*ing*) or tool development to assist in management of a personal digital archive. Further, the research omits a discussion of digital possessions and instead discusses the possessions collectively, as the archive/archives. To fully understand the maintenance of personal digital possessions as they form a personal digital archive, it is important to begin with an exploration of digital possessions.

Table 1
Summary of motivations for maintaining digital possessions

Citation	Motivation
McKemmish (1996)	
	as evidence of witnessing
Kaye et al. (2006)	
	to build a legacy
	to share information
	to preserve important possessions
	to construct identity
Jones (2008)	
	to reinforce our goals and values
	as a mirror of our lives
Petrelli et al. (2009)	
	to recall memories
John et al. (2010)	
	as a witness to creativity
	for sentimental reasons
	for personal memory
	to retain digital public samples
	for reuse
	to promote self esteem
Kirk & Sellen (2010)	
	to define the self
	to forget
	to fulfill a perceived duty
	to frame the family
	to connect with the past
	to honor people we care about

Boardman and Sasse (2004) do not define a personal digital archive, but they do state that "archive" is not a clear term to describe maintained material. After conducting their study of the cross tool use related to file, email, and web bookmark usage of 31 participants, Boardman and Sasse (2004) concluded that the word "archive" was not a sufficient term to describe maintained material because the material is maintained in different ways. Instead, material should be referred to as "active" or "inactive." The researchers also found that participants devoted little time to maintaining their personal collections beyond sporadic "spring cleaning." Only major life changes, such as starting

a new job, prompted extensive maintaining activities. As a result, Boardman and Sasse (2004) labeled maintenance of personal collections a "low priority" (p. 587). However, the researchers disputed the previous claim that archived information was not useful to individuals and provided examples of participants referring back to archived information.

Kaye et al. (2006) conducted site visits, office tours and semi-structured interviews with 48 scholars at a university in order to understand the personal archiving strategies of academics. Kaye et al. found that academics not only archived material in order to retrieve it later, but also archived material in order to build a legacy, share information, preserve important possessions and construct identity. According to the researchers, these values could effect the design of a personal archive. In addition, the design of the personal archive frequently reflected the archiver. Kaye et al. was also unable to identify any "best practices" for archiving among the scholars due to the diversity in use of tools and individual goals, methods, and styles. Kaye et al.'s finding that individuals archive to construct the self is similar to the archiving values of defining the self, discovered by Kirk and Sellen (2010).

In the reports of various studies, Marshall (2007; 2008a; 2008b) and Marshall, Bly and Brun-Cottan (2006) outlined problems and challenges associated with personal digital archiv*ing,* but like Kaye et al. (2006), did not provide a definition of a personal digital archive. From Marshall et al.'s (2006) work, the reader can only assume that a personal digital archive is accessed by a personal computer in the home (as this is how the participants mentioned accessing a personal digital archive) and is not directly related to work tasks. The only other example Marshall (2008a, 2008b) provided is an allusion to a shoebox; in discussing the sense of a digital place, Marshall (2008a) mentioned that

it was easier to maintain special archival documents when they were kept in a shoebox under the bed, but no similar digital shoebox existed.

Concerning archiving behavior, Marshall (2007; 2008a; 2008b) and Marshall et al. (2006) identified four main attributes, challenges and/or tasks associated with personal digital archiving: digital stewardship/curatorial effort, distributed storage, long term access, and value and accumulation.

The attribute of value and accumulation is the most relevant to a discussion of maintaining behavior. For Marshall (2007; 2008a), determining the value of digital belongings was necessary in order to address mounting personal collections. Digital storage was viewed as cheap, so people could delay decisions about what to save and what to delete. It was not uncommon for someone to have thousands of email messages in an inbox, especially with email providers such as *Gmail* offering gigabytes of free storage. According to Marshall, search was an unsatisfactory method for finding one's digital possessions. To ensure long-term survival of digital possessions, individuals should not ignore collections and let them grow haphazardly, decisions needed be made about what to keep and what to delete.

Deciding what to keep was linked with assessments of value at a specific point in time: valuable stuff stayed and stuff of little value was deleted. This made sense in theory, but Marshall et al. (2006) discovered that people put off making value judgments, engaged in spontaneous clean up, and relied upon periodic loss to limit their digital collections. Still, individuals desired a sense of control over their digital belongings. Like curatorial effort, people did not like to make value judgments.

In order to reign in growing individual collections of belongings that may or may not be valuable, Marshall et al. (2006) called for the development of "heuristic notions of value." These heuristics would be imbedded in personal archiving systems and would help people deal with the monumental cognitive load of making value judgments. From their observations, Marshall et al. observed that people expressed value by demonstrated worth or how often the item was replicated, the creative effort invested in the item creation, the time spent creating the item, the item stability, and the emotional impact that the item had on them.

From Marshall's research, it was evident that individuals neglected the preservation duties associated with the care of their digital belongings, were unlikely to maintain their personal digital items in a centralized location, had difficulty refinding their personal information using search or browsing techniques, and had difficulty making decisions about what to maintain in their digital collections and what to discard (Marshal et al., 2006; Marshall, 2007; Marshall, 2008a; Marshall, 2008b).

While Marshall's research in the area of personal digital archiving has been the most extensive, others have added to the topic since the publication of her work. Literature produced as a result of the British Library's Digital Lives project has produced empirical research on the issue. From the review of literature conducted for the Digital Lives study, Williams, John and Rowlands (2009) defined a personal digital archive as "informal, diverse, and expanding memory collections created or acquired and accumulated and maintained by individuals in the course of their personal lives, and belonging to them, rather than the institutions or other places of work" (p. 341). While this definition addresses the issue of ownership, it does not address how archiving

happens. For example, are the digital possessions that consist of a personal digital archive *selected* or are they just the items that are *not deleted*?

In reporting the overall project, John et al. (2010) included an investigation to better understand individual behavior related to creating, acquiring, sharing, storing, and retrieving personal information and building (passively or actively), their personal archival collections. The researchers conducted interviews with "high profile" or "emerging" creators whose work would be of interest to repositories; and collected data from one online survey of the public, and another online survey of academics. The researchers discovered that participants maintained information for it's ability to serve as reference information, for reuse, to evoke personal memories and context, to promote self esteem, for sentimental or memorial purposes, and as witness to an individual's past effort and creativity (p. 9).

Although she does not distinguish between paper and digital personal archives, McKemmish (1996) addresses maintaining behavior from the point of view of institutional archivists who maintain personal collections. McKemmish examined several personal collections of authors. According to McKemmish, evidence of the social uses of personal archival collections can be found in the writings of many popular authors and she examines their writing in her study. According to McKemmish, "recordkeeping [was] a "kind of witnessing." On a personal level it is a way of evidencing and memorializing our lives; our existence, our activities and experiences, our relationships with others, our identity, our "place" in the world" (p. 28). Like Kirk and Sellen (2010) and Kaye et al. (2006), McKemmish found that personal archiving served additional purposes beyond the retrieval of items for future use.

2.3.2 Keeping Everything.

As the literature about personal digital archiving has not defined the boundaries of a personal digital archive, it is difficult to perceive what personal digital data is part of an "archive" and what is not. Williams et al. (2009) does include *collections* in their definition of a personal digital archive, which suggests boundaries, but this is not a definitive statement. Therefore, the practice of "keeping everything" is relevant as some individuals may consider "a collection of everything" a personal archive.

According to Tan, Berry, Czerwinski, Bell, Gemmell, Hodges, Kapur, Myers, Oliver, Robertson and Wood (2007), Jones (2007) labeled the removal of keeping decisions the "keep everything strategy," which the authors argue in their study. While keeping and organizing were linked as PIM activities, some scholars argued that organizing was not needed. In this strategy, everything was maintained. In order to find an item, an individual was required to search amongst everything.

Tan et al. (2007) argued that individuals keep everything because it is impossible to accurately predict future use. Tan et al. provided two examples in which keeping everything could be useful. In reminiscing, keeping everything could provide an experience of reliving the past for some individuals. In addition, Tan et al. provided a detailed example of how keeping all information recorded from a SenseCam could assist individuals suffering from memory loss.

While reminiscing is a legitimate purpose for keeping information, it was not explained why keeping *everything* assisted reminiscing better than making conscious decisions about what to maintain. Petrelli et al. (2009) found that individuals preferred to reconstruct memories from selected cues rather than from a lifelog that recorded all life

events. While recording daily life and playing it for the victim of a brain injury was proven useful, there was no correlation made between keeping everything for those individuals who did not suffer from brain damage.

Keeping (as in the keep everything strategy) is not the same as *maintaining.* Keeping everything does not involve a decision making process, what digital items survive do so because of lack of decisions to maintain or delete.

Like Tan et al. (2007), Czerwinski, Gage, Gemmell, Marshall, Perez-Quinones and Skeels (2006) also argued that an individual could not accurately predict what information would be used in the future. Czerwinski et al. acknowledged that keeping everything could lead to excessive clutter, which made for less effective search and browsing. They also indicated that some people did not want to keep everything (and thus remember everything) because some memories were too painful. This finding is similar to Kirk and Sellen's (2010) finding that some individuals archived in order to allow themselves to stop thinking about something because they knew it was archived.

According to Cutrell, Dumais and Teevan (2006), individuals who organized their personal information could still have difficulty retrieving the information. Therefore, organizing might not be "worth it." Essentially, "search can mitigate the need to organize one's personal electronic information" (Cutrell et al., 2006, p. 60). Further, search could assist the user in re-finding information more quickly than organizing the information (Cutrell, 2006).

Tan et al. (2007), Czerwinski et al. (2006) and Cutrell et al. (2006) all justified their arguments for keeping everything based on the concept that retrieval was the ultimate goal. While the researchers acknowledged the difficulties individuals had in

predicting future use, the reuse and retrieval-centric nature of the argument overlooked the possibility that the maintaining process could serve more of a purpose than as a bridge to retrieve information. Findings by Mckemmish (1996), Kaye et al. (2006) Petrelli et al. (2009) and Kirk and Sellen (2010) all demonstrate that individuals maintain personal archives for more than just future retrieval. Therefore, a keep everything approach may not be sufficient if the individual is archiving in order to forget, connect with others, or reinforce and establish identity.

2.4 Digital objects as possessions

While the characteristics of physical possessions have been clearly defined, digital possessions are more ill-defined (Schau & Gilly, 2003). Research about the concept of possessions can be used to gather insight into how individuals relate to their physical possessions and can set a baseline for how individual may associate with their possessions in a digital environment.

In her attempt to define the dimensions of possession, Furby interviewed 150 American participants and 120 Israeli participants in kindergarten, second grade, fifth grade, eleventh grade, and adults about possession and ownership, and then performed a content analysis on interview responses. Furby found that having control over the use of a possession was the most salient characteristic of a possession. According to Furby:

> "The magnitude of the control one exercises over one's possessions (i.e. the magnitude of the correlation between one's efforts to influence a possession and perceived effects of those efforts) is often of the same order as the control one exercises over one's body, and thus possessions may be included in one's concept of the self" (p. 61).

Furby (1978b) expands this argument by explaining that control can link possessions with the self. Individual human behavior exists on a continuum of control,

and the items that individuals recognize as their possessions are at the high end of the control continuum. Furby also places body movements at the high level of control (for example, I can control my hand as I type this document). As both possessions and the body exist at high levels of control, Furby contends that the self can relate to one's possessions. While Furby did not discuss digital possessions specifically, digital possessions appear to fit her definition, but more research is needed on the issue.

In their study of consumers and the creation of a personal webspace, Schau and Gilly (2003) used the term "digital possession," but did not clearly define it. From their discussion, digital possession referred to "digital associating," or the ways in which consumers associated themselves with physical possessions in digital space (online).

In their study of how consumers psychologically perceived ownership of digital content that they provided in online public domains, Lee et al. (2008) cited Furby's (1978) finding that control is the most salient characteristic of possession and proceeded to describe the research methods of their study, without explaining the link between possessions and digital content. Lee et al. proposed that the more the right to control is given to a content provider sharing digital content online, the stronger the possession attachment would be, which would also strengthen the desire to share the digital content. Lee et al. found that the more rights an individual had to control digital content, the more likely the individual was to attach to the digital content and desire to share the content, but "digital content," or digital possession, was never defined.

Siddiqui and Turley (2006) studied the role of "virtual possessions" as replacements for physical possessions. Specifically, the researchers explored the role of email, ecards, ebooks and journals, digital photos, online newspapers, digital audio/video

files and musical instruments as virtual replacements for tangible possessions. Little detail is provided about the research methods (only multimodal ethnography is stated), but the researchers found that participants were hesitant to completely transition from tangible to digital. For example, one participant still printed out all her digital photos. The authors also stated that participants experienced less of an emotional attachment with virtual possessions than with tangible possessions, but a discussion of how emotional attachment was observed or measured was not included. Participants also felt that they had less control over their virtual possessions than their tangible possessions. Overall, the authors concluded that in the eyes of the consumer, virtual possessions did not completely replace tangible possessions. While little detail about the characteristics of digital possessions was included in the article, Siddiqui and Turley (2006) clearly considered tangible (physical) possessions to be different from virtual (digital) possessions.

2.5. Self extension to possessions

Russell W. Belk first utilized the concept of self extension to explain consumer behavior in 1988, arguably changing the field of consumer behavior from that point on (Schau, 1998). According to Belk (1988), self extension was the perceptual concept that the self can extended to possessions. The concept is related to the understanding that individuals regard their possessions as part of themselves. Possessions to which the self could extend included the body; internal processes of the mind and body; ideas and experiences; and those persons, places and things to which one feels *attached.* In explaining the origins of self extension, Belk (1988) relied on a Csikzentmihalyi and Rochberg-Halton (1982) statement that individuals invested "psychic energy" in "an

object to which we have directed our efforts, time and attention" (p. 144). The psychic energy came from the individual, so the possession was now imbued with a part of the individual.

In addition, Belk (1988) also used the verb "cathect" to describe self extension. By definition, to cathect is "to charge with mental energy; to give (ideas, etc.) an emotional loading" (Oxford English Dictionary, 2010). Therefore, self extension to a possession can be described as a possession in which an individual imbues emotion.

While Belk (1988) was the first to apply self extension to possessions in the field of consumer behavior, his original definition of the concept was difficult to grasp. Shortly after Belk published his seminal piece on self extension, Cohen (1989), responded with an article entitled, "An Over Extended Self?" While Cohen applauded Belk for calling attention to actual examples of consumer behavior, Cohen's main problem with Belk's work was the lack of empirical evidence to support the concept of extended self. Cohen also questioned the defining elements of self extension, saying that the concept lacked meaning due to Belk's heavy reliance on anecdotal evidence.

Belk (1989) responded to Cohen's (1989) criticism by citing several empirical studies that demonstrated that individuals viewed their possessions as part of themselves. Belk (1989) also stated, "boundaries of the extended self are perceptual, not psychical or psychological" (p. 129). However, Belk still failed to provide a clear definition of self extension.

In a recent interpretation of Belk's work, Schau (1998) stated "goods as meaning receptacles is one of the central tenets of Belk's work on extended self" (p. 39). Schau explained that according to Belk (1988), once possessions become a part of the extended

self, “the objects become repositories of the intangible aspects of the self” (p. 39). According to Belk (1988; 1989) and Schau’s (1998) interpretation of Belk, self extension means that possessions that are a part of the extended self can be imbued with meaning, but this definition is somewhat weak.

In his introductory book about consumer behavior, Solomon (2002) defined the extended self as comprising of “those external possessions that we consider a part of us” and that material possessions can “help to form a consumer’s identity” (p. 138). According to Solomon, the self can extend at the individual level (to personal possessions), family level (to family possessions), community level (a sense of belonging to a place) or group level (belonging to part of a group, like a sports team fanbase). In addition, self extension can be used to define consumer’s social roles.

According to Sivadas and Machleit (1994) the extended self can be defined as "the contribution of possessions to individual identity" (p. 143). As self extension is a *perceived* concept (Belk, 1989), self extension is the perception that possessions contribute to individual identity. These possessions can serve as vehicles to extend and then display our identity (Sanders, 1990 as cited by Sivadas and Machleit, 1994). In this sense, possessions to which our self has extended can come to represent us and we can view these possessions as imbued with meaning.

According to Belk (1989), self extension is most useful in the study of post-acquisition consumer behavior. According to Belk, “very little is known about use, disuse, and disposition following acquisition” (p. 131).

2.5.1 Self extension and measurement.

According to Belk (1989), "we can measure the degree to which various things are perceived to be a part of a person's self" (p. 130). Belk cites a study conducted by Prelinger (1959) as an "adequate" method used to measure self extension. Although not explicitly stated, Prelinger used Q sampling and Q sorting to measure the levels of self extension perceived in possessions. Prelinger (1959); Dixon and Street (1975); Belk (1989); Belk and Austin (1989), and Sivadas and Machleit (1994) all conducted studies that measured the self extension of possessions.

Prelinger (1959) asked 100 college students to make a list of terms that represented ideas or concepts that they believed to be "a part of their own selves." From these lists, Prelinger developed a list of 160 items which he put on cards and then divided the cards into eight categories: psychological or itraorganismic processes (i.e., the conscience), body parts, possessions within the close physical environment, possessions from the distant physical environment, personal identifying characteristics and attributes, possessions and productions, other people, and abstract ideas (in Q method, this process is known as developing a Q sample). He then asked 60 participants to sort the items into piles labeled "part of my Self" and "not part of my Self" (in Q method, this process is known as Q-sorting). The card sorting activity was then repeated, and participants were asked to sort the two piles into two more piles of whether they felt "sure" or "not so sure" about the cards in the 'part of Self' and 'not part of Self' piles. The piles were then labeled 0-3 with cards that scored a 0 or 1 (cards that were not part of my self) and cards scoring a 2 or 3 (cards that were considered to be part of my self). Prelinger was able to determine a rank ordering among the items in his eight categories. The findings suggest

that individuals conceived of self regions and each item that was sorted existed in a self region emanating from the body. The items closer to the body were more closely aligned with one's self concept and the items further away were not as aligned with an individual's self concept.

Dixon and Street (1975), measured self extension in their exploration of the "direction and extent of age-related differences in self-definition" (p. 157). Dixon and Street predicted that self-extension to one's body, psychological processes, identifying characteristics and possessions would increase from childhood to adolescence. The researchers recruited ten boys and ten girls at ages 6, 8, 10, 12, 14 and 16. The 120 participants sorted "a list of items similar to Prelinger's but reduced to 42 in order to avoid loss of interest and adapted to the vocabulary of a 6 year old" (p. 158). Instead of being directed to sort the cards into possession that represent "self" and "not self," the terms "you" and "not you" were used. The two piles were then sorted into four piles, similar to the Prelinger method. The researchers found that girls identified more items as self at every age and as boys aged, they considered more items as self and that the number of participants who thought an item was part of his or her self followed a rank order similar to the rank order discovered by Prelinger.

Belk conducted a similar study in 1989, in order to explore "how central various entities are to our sense of self and to examine certain consequences of such identification with these things" (p. 152) and to "examine the relative importance of community, market, and personal possessions to self identity" (p. 153). Market objects are possessions that could be individually owned or shared with others (automobile models, shampoo brands, etc.), personal possessions includes body parts and our relationships

with other people, and community possessions include cities, public monuments and public officials. Belk used a convenience sample of 248 adults ranging in age from 19-78, with a mean age of 31.5. The participants reviewed a list of types of people, places and things and "listed their favorites" (of items on the list) "or the ones that applied to them" (p. 156). The list of favorite things was combined with a list of shared things and things for which no choice existed. The participants then sorted the 96 items into two piles: "self" and "not self." The two piles were divided into two more piles "a lot of not-self" and "a lot of self." The sorting was an exact replication of the sorting instructions that Prelinger supplied to participants. Belk then collected demographic information as well as organ donation information and information about product care and use that was reported in Belk & Austin (1986).

Belk (1989) observed that market possessions and personal possessions were more important to individuals than community possessions. Like Dixon and Street (1975), Belk observed a gender difference in "ratings of self relevance": women rated decorative possessions highly, while men rated athletic items as more central to self (p. 156). Belk also found that older participants were more likely than younger participants to cathect body parts and individual possessions, whereas younger participants rated sensations and feelings as more central to extended self. Overall, Belk states that the differences associated with age and sex are "predictable" (p. 161). In addition, Belk found that people tended to take *better care* of items with a higher self extension rating. This was true of dwellings, body parts and automobiles.

Sivadas and Machleit (1994) aimed to explore whether self extension could be measured using a method that was "faster and easier" than Q method (p. 143). Sivadas

and Machleit developed a Likert scale to "assess the extent to which an individual has incorporated a particular possession into the extended self" (p. 143). Sivadas and Machleit began by exploring the difference between self extension and personal importance/relevance. Sivadas and Machleit hypothesized that:

- "Individuals are more likely to be attached to things that are a part of their extended self" (p. 144).
- "Individuals are more likely to take good care of things that are part of their extended self" (p. 144).
- "A gift [was] more likely to be part of an individual's extended self when the gift-giver is part of that individual's extended self" (p. 144).

During phase one, 113 participants responded to a 12 statement, seven point, Likert scale for incorporation/self extension and attachment, and made lists of their favorite possessions. Factor analysis was conducted and the questions were reduced from 12 to seven. The remaining Likert statements were then adapted to a format of fill in the blank questions so that the researchers could measure self extension (seven statements) or attachment (three statements) for a specific possession, supplied by the participant.

For phase two, the researchers measured importance/personal relevance using a "seven-point semantic differential format" for each of the 137 participants' car, favorite college sweatshirt/t-shirt, and "the last gift they had received" (p. 146). Factor analysis was conducted and one statement was dropped to better fit the model. Discriminant validity was then tested and confirmed. In addition, the hypothesis that individuals were more likely to be attached to possessions to which their self had extended was supported for car, favorite sweatshirt/tshirt, gift and gift giver. The hypothesis that individuals take *good care* of things that are part of their extended self was confirmed for all four items.

In addition to studies conducted by Prelinger (1959), Dixon and Street (1975) and Belk (1989), a study conducted by Belk and Austin (1989) in which propensity to donate organs was explored used the Q-sample and Q-sort technique from Q method to measure self extension. Interestingly, these studies did not use Q Factor analysis to analyze the data collected from the Q-sort. Prelinger (1989), Dixon and Street (1975), Belk (1989) and Belk and Austin (1986) assigned the "self" and "not self" (or in the case of Dixon and Street, "you" and "not you") piles a score from 0-3 and then the mean for each item was calculated. Results were presented as a ranking of the possessions that received the highest mean score.

2.5.2 Past self and future self.

Sivadas and Machleit (1994) established that individuals could perceive their possessions as contributing to their identity, therefore displaying and extending identity. Often, the self extended to possessions that served as a link to the past. With these possessions, individuals were able to maintain links to their past or a collective past. In addition, the self could extend to possessions that contributed to the identity individuals *want to have*, but may not have had in the present. The following research examines the past, present and future self.

According to Belk (1990), in addition to extending beyond our bodies to possessions, the self could extend backward and forward in time. Individuals look to the past and to the future to develop a sense of themselves. For example, some individuals looked to their lineage and ancestors to define themselves and were motivated to engage in genealogical research. Possessions such as photographs have been used to recall part

of our past, and consolidate a sense of self. Photographs could also be used to remind us of who we have become.

Possessions have supported an aggregate sense of self in the past (Belk, 1990). As previously described by Belk (1989), the aggregate self could include family, work, city, and nation. Museums and archives have assisted individuals in maintaining a sense of the past. While the possessions in museums and archives were not an individual's personal possessions, these artifacts provided a sense of being collectively owned and aided in the maintenance of a local or national sense of self. One such example could be the "Star-Spangled Banner" United States flag that is on display at the Smithsonian Museum of American History. The self of many Americans could extend to the flag, even though it is not their personal possession. This concept is similar to the one proposed by McKemmish (1996).

Expanding Belk's (1990) concept that the self could extend backward and forward in time, Morgan (1993) proposed the concept of the *possible self*. The possible self was

> "a part of the working self-concept [and] [drew] on representations of self and experiences encountered by the individuals in the past and activities of the current self, combining these with imagined representations of the self in the future" (p. 430).

Essentially, the possible self was a way that we could imagine ourselves. As noted by Morgan, the possible self had the potential to be a powerful motivational force in consumer behavior, as consumers were motivated to purchase products that represented who they *wanted* to be, instead of who they actually were.

The possible self could be negative or positive. For example, a negative view of the possible self could cause the individual to imagine herself as out of shape and then motivate her to buy a treadmill, an urge to avoid the negative view of the possible self. A positive view of the possible self could cause the individual to imagine himself as intelligent and could motivate him to enroll in a graduate program. Morgan (1993) did not empirically explore the possible self, but called for other consumer behavior researchers to do so.

As Morgan (1993) categorized the possible self as having a negative or positive view, Patrick et al. (2002) incorporated these views into the concept of a "hoped for" possible self and a "feared" possible self (p. 270). Patrick et al. hypothesized that "consumers were able to attribute products, services and activities to the approach of envisioned hoped-for selves" and that consumers were able to attribute products, services and activities to the avoidance of envisioned feared selves (p. 271). To test these hypotheses, the researchers administered a survey to 81 participants in which participants were first asked to list three "hoped for" images and then list any products, services, or activities that were relevant to achieving the hoped for images. Participants were then asked to do the same for a feared image (Patrick et al., 2002). Results indicated that participants were easily able to complete this task and in total listed 341 products, services, and activities relevant to a hoped for self, and 325 products, service, and activities relevant to a feared self. Participants related more examples to the hoped for self (Patrick et al., 2002). Patrick et al. also found that participants' possible selves reflected the participants' life tasks. In addition, life domains in which participants possessed possible selves included occupational, physical, personal, economic and

familial. Further, women tended to rely more on products and services to achieve a hoped for self and feared self, and men tended to rely more on activities to achieve possible selves (Patrick et al., 2002).

2.5.3 Self extension to possession vs. attachment to possessions.

When compared with self extension to possessions, attachment to possessions can be viewed as "taking a step further" in a relationship with a possession. Attachment to possessions involves self extension, but includes other characteristics. According to Kleine and Baker (2004), material attachment is "a multi-faceted property of the relationship between a specific individual or group of individuals and a specific, material object that an individual has psychologically appropriated, decommodified, and singularized through a person-object interaction" (para. 5). Material possession attachment is distinguished from experience attachment, brand attachment, and place attachment. Kleine and Baker list nine characteristics of attachment:

- "Attachment forms with specific material objects, not product categories or brands;
- Attachment possessions must be psychologically appropriated;
- *Attachments are self extensions*;
- Attachments are decommodified and singularized;
- Attachment requires a personal history between person and possession;
- Attachment has property of strength;
- Attachment is multi-faceted;
- Attachment is emotionally complex; and
- Attachments evolve over time as the meaning of the self changes" (para. 18).

According to the definition above, individuals cannot attach to a *digital possession*, because digital possessions are not "specific material objects." However, some characteristics of the definition of possession attachment above may exist in the digital realm, which has yet to be explored.

As stated above, while an attachment can be a self extension, a self extension is not an attachment, even though, on occasion, self extension can include attachment.

Sivadas and Venkatesh (1995) conducted the only study this far that examined the difference between attachment and self extension. Sivadas and Venkatesh (1995) examined the relationship between "object incorporation in the extended self and object attachment" (p. 406). A significant distinction between possession attachment and possession incorporation in the extended self could not be distinguished.

Overall, a review of the available literature demonstrates areas ripe for further research in the realm of personal maintaining behavior. Research available explores personal digital archiving behavior, without empirically defining a personal digital archive from the user's perspective. Literature on self extension to possessions explores only physical possessions and not digital possessions. Finally, no work exists that explores self extension to digital possessions, in relation to the maintaining behavior of personal digital possessions.

III. Overview of approach

3.1 Relationship between interviews and Q method sorting tasks

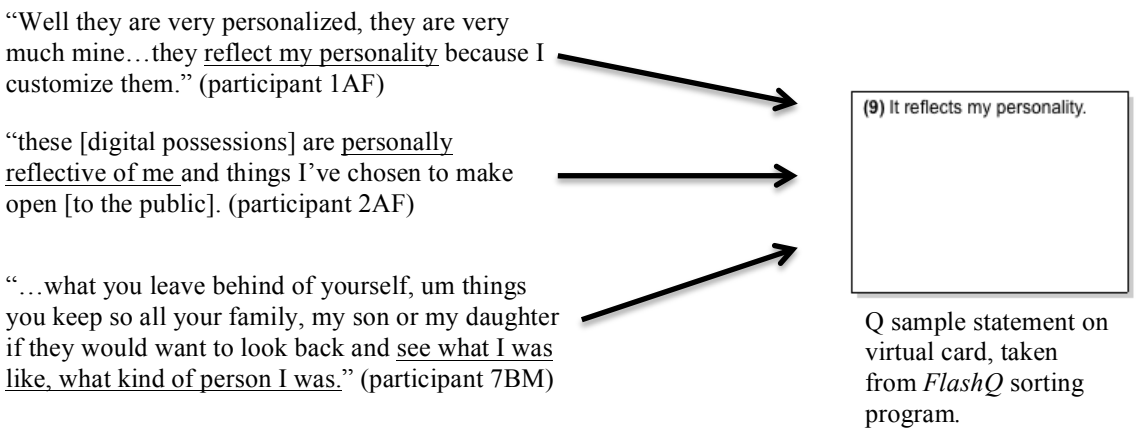
In order to explore the research questions concerning self extension to digital possessions and the desire to maintain digital possessions for a digital legacy, it was necessary to develop a research design that would allow the researcher to gather data on a participant's self-developed *definitions* of digital possessions, a participant's self-developed *characteristics* of digital possessions and digital legacy, and the *relation* of self extension to a digital legacy. All research questions were related to an individual's opinion of the issues at hand.

Interviews and Q method allowed for this type of data collection and provided the ability to answer the research questions. Interviews were utilized to develop a definition of digital possessions (RQ1) as well as common characteristics of self extension to digital possessions (RQ2) and a digital legacy (RQ3). Q method was used to confirm the definition and characteristics, as well as compare self extension to digital possessions with the desire to maintain digital possessions for a digital legacy (RQ4).

Interviews were conducted first, in order to develop the corpus of statements (Q sample) that would be used for the Q sort tasks. Participants were asked about their definitions of a digital possession and digital legacy, and to describe their digital possessions. Interview results were compared with the motivations for maintaining digital content gathered from literature and displayed in Table 1. The sixty most frequently mentioned characteristics of digital possessions during the interviews were

used to create the sixty individual Q sample statements. Figure 1 displays a diagram of the process of creating a Q sample from interview data.

Figure 1
Example of the process of creating Q sample statements



Many of these statements overlapped with the motivations from previous literature. The validity of the Q method study comes from the development of the Q sample.

3.2 Sampling

The aim of the sampling method was to develop a sample of participants that would be interested and/or engaged in making maintaining decisions. According to Whittaker and Hirshberg (2001), individuals tend to assess their archives at periods of life transition. Levinson's cross-era transitions pinpoint stages of life transition, providing a relevant sample of participants primed for making maintaining decisions due to the context that their life stage (and age) provides. Therefore, ages of the samples were anchored utilizing Levinson's (1990) concept of cross-era transitions. Table 2 lists the periods of life transitions and the ages associated with those life stages. (Due to the difficulty of obtaining access to individuals under the age of 18, the early adult transition

sample began at age 18, even though Levinson states that this transition could begin as early as age 16.)

Table 2

Study sample groups

Transitional period	Age	Interviews		Q sort	
		Group	Size	Group	Size
early adult	18-24	A	6-8	D	16
mid-life	38-47	B	6-8	E	16
late adult	58-67	C	6-8	F	16

Quota sampling was used to create 6 sample groups. The samples were stratified according to sex and age. According to previous studies of self extension to possessions (Belk, 1987; Belk, 1988; Dixon & Street, 1975; Kleine et al., 1995) men and women extend to possessions differently. In previous studies, women reported self extension to possessions at slightly higher rates than men, especially self extension to body parts. Women were also more likely to extend to decorative objects and other people, while men were more likely to extend to large items, athletic items, and personal achievements (Belk, 1989). Therefore, every attempt was made to keep the gender distribution even in each sample.

According to Table 2, Levinson's (1990) "early adult" transitional period is marked by graduating from high school and college, separating from one's parents, and developing an adult perspective. The "mid-life" transitional period is associated with a change in individualization and the start of reflection on one's life thus far. Finally, the "late adult" transitional period is most marked by a transition to retirement and increased reflection about one's life.

3.2.1 Pre-screen questionnaire.

In addition to transitional age as a requirement for participation, individuals were required to have a collection of personal digital information and be interested in maintaining that information.

As a result, potential participants were ask to complete a prescreen questionnaire in order to estimate their interest in maintaining information. This questionnaire also served as a tool to exclude individuals that may have abnormal thoughts associated with maintaining possessions, such as thoughts associated with compulsive hoarding. Participants were asked if they had a personal computer with digital items and prescreened with the Saving Cognitions Inventory (SCI) before being enrolled in the study. Developed by Steketee, Frost, and Kyrios (2003), the SCI was originally designed to measure hypothesized beliefs about possessions. The researchers believe that extreme beliefs about emotional attachment to possessions, concerns about memory, control over possessions, and feelings of responsibility toward possessions were related to *compulsive hoarding*, or the "excessive collection and failure to discard objects of apparently little value, leading to clutter, distress, and disability" (Pertusa, Frost, Fullana, Samuels, Steketee, Tolin, Saxena, Leckman & Mataix-Cols, 2010, p. 2). Compulsive hoarding is related to self extension to possessions: Furby (1978b) believed that control played a large part in self extension to possessions and is frequently cited by hoarding researchers (Frost & Gross, 1993). It was necessary to exclude possible compulsive hoarders from the study due to their likelihood of reporting abnormal thoughts about maintaining possessions, and due to the likelihood that participating in a Q sorting task in which participants were asked to sort statements, could be emotionally stressful.

Potential participants followed a link from one of the recruitment emails to a short questionnaire (see Appendix A) designed in *Qualtrics*, including the SCI. Participants who score below a 78 on the SCI were eligible for enrollment in the study. According to Steketee et al.'s (2003) results, a score of 78 was found to be within 1 standard deviation of the mean of a diagnosed hoarder. In addition, potential participants were asked their age, sex, and interest in participating in the digital possession interview, sorting exercise, or both. The first participants who qualified for each sample A-C and expressed interest in participating in the digital possession interview were enrolled in the study, until the sample size met capacity. The next participants who scored below a 78 on the SCI and meet the age and sex qualifications for samples D-F were enrolled in the sorting exercise, until those samples meet capacity.

3.3 Recruitment

Participants were by sending several email announcements to the UNC community via the UNC mass email listserv, by flyers posted on the UNC campus and around the town of Chapel Hill, and by word of mouth offering anyone interested to take the pre-screen questionnaire online. Once potential participants passed the prescreen questionnaire, they were sent an email, inviting them to schedule a time for an in person interview with the researcher or to meet with the research to participate in the Q sorting tasks. Participants were offered an interview until the gender and age group quota for each sample group was met, and they were then offered participation in the Q sorting tasks exercise. Once enrolled in the study, participants were offered a $10 incentive.

3.3.1 Response

Of the 250 individuals who completed the prescreen survey, 118 scored below a 78 on the prescreen survey[3]. While a score of 78 and above on the SCI is a rough estimate of potential for compulsive hoarding (due to prevalence of hoarding thoughts), the result that 47% of the individuals who took the prescreen SCI questionnaire scored within the compulsive hoarding range is quite irregular, considering estimates that hoarding afflicts 5% of the population (Pertusa et al., 2010). Overall, the prescreen survey was found to be overly restrictive; the SCI may be overly sensitive. Future research could design an "interest in maintaining" questionnaire, or a digital hoarding questionnaire to better measure interest in maintaining information.

[3] The prescreen survey opened April 26, 2011 and closed September 16, 2011. Total number of individuals who completed the prescreen survey includes data from June 2, 2011-September 16, 2011. The initial IRB reviewer requested that scores not be recorded for individual who scored above a 78 on the SCI, as the participants would not consent to the collection of data until being enrolled for an interview or sorting exercise. Upon review of an IRB modification, a different IRB reviewer changed this request. I then contacted the IRB after speaking with a representative, she confirmed that all SCI scores could be recorded because participants were electronically consenting to take the prescreen questionnaire. As such, the total number of individuals who took the prescreen questionnaire is likely higher than 250.

IV. Characteristics of digital possessions and a digital legacy

4.1 Research questions addressed

Study 1 used interviews to explore the following research questions:

RQ1. How do individuals define digital possessions?
RQ2. What characterizes self extension in digital environments?
RQ3. How do individuals characterize the digital possessions that they desire to maintain for a digital legacy?

4.2. Digital possession interviews

The digital possession interviews were conducted before the Q sort tasks associated with the Q method. During the interviews, participants described their digital possessions and their concept of a digital possession. Participants brought along their personal laptop/smartphone/iPad, etc. and used them as a prompt to recall examples of a digital possession, if desired. Participants also provided a laptop tour, if they desired. During these tours, participants would choose to open specific files and/or programs to show the researcher. Participants were also asked how they defined a digital legacy and their interest in maintaining digital possessions for a digital legacy.

While the interviews provided important data about the characteristics of a digital possession and potential motivations for maintaining digital possessions, the interviews also served as a technique to develop a concourse and then Q sample, to be sorted during the Q sorting tasks (discussed in the next section).

The goal of the interviews was revised after conducting the pilot study. During the pilot study, participants were asked about their personal digital possessions and then

for their definitions of a personal digital archive. After some consideration, it became necessary to investigate the definition and characteristics of digital possessions before investigating an entire collection, or personal digital archive.

4.3. Data collection

An interview guide was developed in order to gather data during the interviews. The questions promoted inquiry about the characteristics of a digital possession, the meaning of a digital possession, examples of a digital possession, interest in and motivation for maintaining a digital possession. Furby's (1978a) research questions were consulted to develop the interview guide. Participants were asked to define a digital possession and a digital legacy (see Appendix B). Interviews were audiorecorded and transcribed. Pseudonyms were assigned to all names mentioned by participants during the interviews.

The data collected during the interviews was used to construct statements that were sorted during the Q sort. For example, during the pilot study, when asked which digital possessions represented participants' identities, some of the participants responded that the programs on their laptop (search engine, email, etc.) that were always open most represented their identity. This utterance about a digital possession could be used to form the statement, "I frequently work with these items and they are frequently open on my computer."

4.4. Data analysis

The interview data was analyzed using nVivo 8. Categories for analysis were developed from the interview guide as well as data that emerged from the interviews.

Once the general codes were developed, all interview transcripts were coded. See Appendix C to view the code dictionary.

4.5. Findings

The first twenty-three participants who passed the prescreen survey, were the appropriate age and sex, and responded to an invitation for an interview, were interviewed. A list of demographics is included in Table 3.

Table 3
Interview participants

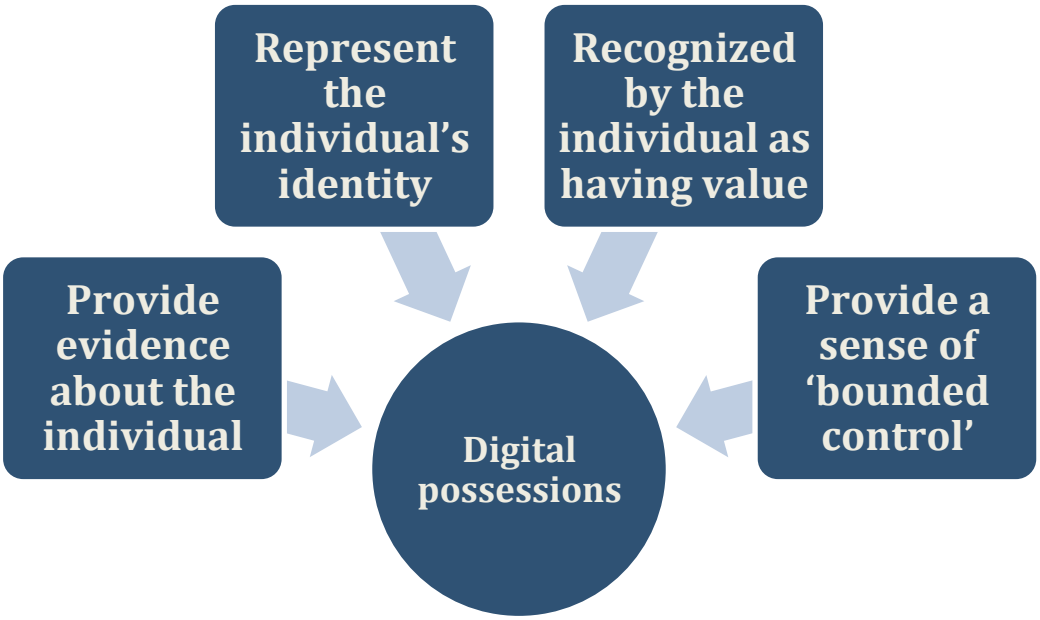
transitional period	age	phase 1	
		group	size
early adult	18-24	A	4 male/4 female
mid-life	38-47	B	4 male/3 female
late adult	58-67	C	4 male/4 female

4.5.1. Characteristics of digital possessions.

While some participants expressed they had never thought of their digital items as possessions, they spoke of how the concept "made sense" because the digital items were like possessions. Some participants were less likely to adopt the term digital possession. Most often, these participants were members of group C, the 58-67 year old age group. One participant explained that it was difficult to understand digital items as possessions because his life spanned several decades with physical possessions, but only spanned a few years with digital items. Overall, participants' definitions of digital possessions coalesced around 4 salient characteristics (Figure 2):

- Providing evidence about the individual,
- Representing the individual's identity,
- Recognized as having value by the individual,
- And a belief that individuals have a 'bounded control' over their digital possessions.

Figure 2
Characteristics of digital possessions



These four characteristics described in Figure 2 above distinguished digital possessions from other digital items in participants' PSIs. In order to be considered a digital possession, the digital item needed to meet most of the characteristics described above.

4.5.1.1 Provides evidence about the individual.

Participants often spoke of how their digital possessions provided evidence of the individual. Most often this was mentioned when referring to financial documents, such as tax forms and receipts. Often these documents provided evidence of an activity, identifying information, and/or provided authenticity.

Passwords also fall under this category. Participant 1BM described this class of digital possessions as "I'd be adrift without them," while participant 5CF explained digital possessions "are things that help me with my life." These digital possessions

assisted participants in the digital environment, by providing authenticity. While a tax form includes a social security number that uniquely identifies the individual, it also provides evidence of paying taxes. Passwords provide authenticity in the digital environment, by identifying the individual.

True of several participants, participant 1BM specifically identified digital possessions as "unique to me." Digital possessions that provide evidence are often unique to the individual and demonstrate authenticity.

A digital possession that provided evidence often made an activity possible for the participant. For example, evidence of taxes paid prevents legal penalty and passwords prevent access to licensed and/or private digital material. In her study of the meaning of physical possessions, Furby (1978) also found "making an activity possible" a characteristic of physical possessions. Furby's finding "makes possible some activity or convenience for owner" ranked third in her second graders and adult age groups and ranked forth in her fifth graders age group (American participant groups). However, it did not rank highly for any of the Kibutz or non-Kibutz participant groups.

Providing evidence about the individual is similar to the concept of archival value and literary warrant. Participants *justified* maintaining these possessions because they provide evidence about them, just as the significance entwined with archival value justifies preservation of content in institutional repositories. Further, stating that the digital possessions provided evidence links this characteristic of digital possessions with the archival concept of evidential value, or the value that the item provides to the individual.

The archival term literary warrant suggests that requirements for maintaining electronic records derive from authoritative sources that are accepted by society and codified in literature. When participants described digital possessions as providing evidence and authenticity, they are creating literary warrant for their own collection of digital possessions.

4.5.1.2 Represents identity.

Digital possessions represent an individual's identity back to themselves by representing the individual's interests, thoughts, and moods. Individuals also expressed that digital possessions could represent their identity to other people. This characteristic echoes findings by Kaye et al. (2006) and Kirk and Sellen (2010) that individuals maintain digital objects because the objects represent their identity which is also similar to the archival theory of macroappraisal. According to macroappraisal, archivists emphasize the circumstances that lead to the creation of the record over the potential for future research value (Cook, 2001). Individuals emphasized their interests, thoughts and moods when describing the digital possessions that most represented their identity. Using the logic of macroappraisal, these digital possessions that emphasize interests, thoughts, and moods would be maintained to represent the individual in the creation of a digital legacy.

4.5.1.2.1 Representing identity through interests.

Participants often spoke of how their digital possessions communicated information about their interests and hobbies, which provided an image of who they were. Similarly, Odom et al. (2011) found that teens often displayed their identity through interests, reflected in their desktop wallpaper. In this sense, interests serve as a

lens through which to view identity. As interests were emphasized by the individual as representative of identity, then digital possessions that represent interests are therefore good candidates for the individual to consider in the development of a digital legacy.

Many other participants expressed that they could share part of their identity with others, through sharing information about their interests or information about themselves engaged in their interests. This was often true of photos and Facebook (including photos displayed in a Facebook account). Participants often spoke of sharing photos of themselves engaged in their interests on Facebook. According to participant 1AF:

> "I like to do a lot of activities and things so like that's on my Facebook that I like to do such and such and it's also very expressive so it kinda shows, like, my background as a person as well."

According to participant 4BF:

> "I'm a volunteer EMT so I have pictures of that on [Facebook] and so the way that I represent myself… people can see that and that it's important to me."

For some participants, the mere act of recording information about their interests was sufficient; the information was not necessarily shared. Participant 1CF had an impulse to record information about her interests:

> "In the 80's and 90's, I used to knit a real lot. And after I had made quite a few things, I said I really need to write this down and I kept a list of all the stuff I had made. Now I stopped doing it when I moved here in '95 'cause nobody wears sweaters, but um, but it's the same impulse, that same impulse to record…it's the same impulse as saving photographs. Um digitally, ya know, if I were probably knitting now, I'd have a word document that I listed everything. So it is useful in that sense."

Individuals also used others' knowledge of their interests as gauges of how well someone knew their identity. For example, participant 2CM stated: "people who know me know

that I'm a big jazz fan so most of what's on my iPod is jazz." Participant 2CM modifies his statement with *people who know me*, suggesting that those who know his identity well know of his interests, which are demonstrated through his digital music collection.

This sentiment was also expressed by other participants who shared information about interests with select groups of people. For example, participant 1AF states:

> "the possessions that represent me on the internet…there aren't as many as in my private collection. Like my iTunes and things like that. It's not on the internet and people would probably be really surprised, every one of my friends have been surprised about my iTunes, like from my Facebook that's like public that people can see it's...I go to College, I major in music, I did these activities, I'm an artist, I like to go and read and go to performances and meet other artists and just explore different countries and speak languages. But my iTunes [opens file on her laptop], it's just really eclectic."

Through this utterance, participant 1AF explains that the public can see her Facebook account and can learn limited information about her identity, but she only shows her friends her iTunes account, which deeper explains her identity.

Participant 2bM agreed with this sentiment. He states:

> "my friends who see me, who I have on Facebook, might have a good idea just because it's a, ya know, links to things that you like and if they have access to your information they can see what things you like do, of books you like to read…but I'm not sure that still gives you a full 100%"

Also included in interests was family. Many participants spoke of sharing photos of their family, especially their children:

> Participant 2BF: "I tend to take photos of you know during activities I like to do things places that I've been and you know um interests that I have a family. Things like that."

If participants were concerned that their interests would be perceived negatively by others, they made sure not to share the information with others, as there was concern it

would represent their identity in a negative way. Participant 3BF spoke of how one of her interests embarrassed her, so when she put the information on the internet for the public to see, she did not use her real name:

> "I don't think I have a secondary identity that I'm trying to keep up of what I want like… like I'm a closet…well this is funny but this is good it's all anonymous cause I can share this with you and not be embarrassed. So um I am of the age that I grew up on *Little House on the Prairie* books and the Wilder stories are coming out this month, and so some lady sent me a link to it and you can actually register for a free copy of the book, and you're reading all these posts on it I was just doing it this week and all these people are obsessed with it and I was just like…I had no idea now, I loved it and read them and kept the books I would never put that out there in a thing but I did post a comment for that free book."

Participant 7AM makes it clear that some of his digital possession are not to be shared:

> "…my girlfriend…I might not feel comfortable with her just a ya know meandering through my computer, um not because of anything in particular but it just feels it has the aurora of being private and you know intimate to myself."

4.5.1.2.2 Representing identity through moods and feelings.

Some participants spoke of moods and feelings as more important for representing identity than photos that display interests, activities, and expertise. This was also found by Odom et al. (2011), who found that teens searched for desktop wallpaper that represented their moods and is similar to macroappraisal logic; individuals were more concerned with what the digital possessions represented than the digital content. When comparing her blog and Facebook, participant 1AF stated that her blog represented her more: "there's more private information, there's more details and also on my blog it's like I'm talking essentially…my thoughts." In addition, her music was more representative of her identity than Facebook:

> "music files would be a good example of reinforcing my identity in that you know I have certain types of music I listen to for certain moods and I feel like those really reinforce who I am at that moment" (participant 4AM).

In reference to an old Facebook profile photo, participant 7AM stated:

> "…I also had like a um a picture of Tupac Shakur that was just like a painting, so that may have reflected my mood at that time of being like frustrated with society…"

4.5.1.2.3 Representing identity to others.

Often, participants spoke of how digital possessions represented their identity *to other people.* This often came up in discussions of sharing digital possessions, most frequently using social media applications. According to participant 1CF: "something like Facebook does allow us to represent ourselves to other people and I do use it for that purpose." Participant 2AF stated that "some things are personally reflective of me…and I have chosen to make them open." Most individuals echoed this response: they carefully chose which digital possessions represented a part of their identity they wanted to highlight and they therefore chose to share this digital possessions with other people, often using social media such as Facebook, Twitter, a blog, or a photo sharing application. Participant 2AF described the information she shared with others as information she was "intentionally using to share information about [herself]."

Participants recognized the ability of social media platforms like Facebook to sculpt the identity they wished to share with others. Participant 3AF commented on this in her description of Facebook, which allowed her to "have a different kind of [internet] persona" if so desired.

4.5.1.2.4 Hesitation to representation.

While individuals recognized that sharing digital possessions that represent their identity allowed them to highlight particular aspects of their identity to others, some participants were quick to say that some digital possessions that represented their identity were likely of little interest to others, so they did not share them. For example, participant 4BF spoke of how she used Facebook to share information about herself, but she was careful when she shared pictures of her cats on Facebook because she thought other people would not be interested in them:

> "there are a couple pictures of Abigail [a cat] that you know, based on what she is doing and where she is will never be shared. You know, the picture is adorable to me, but it's not the same to someone else."

She also spoke of how she did not want to be known as "the crazy cat lady."

Participant 1CF was quick to state that her digital photos represented her identity to others, but also added

> "there's tons and tons of photos in here that I'd never dream of putting on Facebook, at least partially, because I don't think people will look at them."

Participant 6BM believed that his collection of old radio show recordings represented him, but he was careful to share them with people who he thought "would get something out of them."

Participant 8AM spoke of his interest in nature photography and how this represented him, but also how he was careful to share this information:

> "I only sparingly post one or two [photos] on Facebook every now and then, but I keep a lot of them for myself, so in the process I try to weed out what other people would enjoy to see or what represents how I would want [others] to perceive me as you know, taking a good picture."

These participants selectively choose aspects of their personality to extend parts of their identity, rather than their complete identity.

4.5.1.3 Are deemed as having value.

For most individuals, digital possessions retained some sort of value that distinguished them from other digital items. This value was usually expressed as sentimental value, monetary value, or time. This sense of value is similar to the concept of archival value: it is used to justify preservation of the item. Archival value was also compared to the finding that digital possessions provide evidence about the individual.

4.5.1.3.1 Sentimental value.

Participants often described their digital possessions using sentimental terms. Kleine and Baker (2004) describe relationships with possessions that are "emotionally complex" as possession attachments, not self extension to possessions. As stated in the literature review, possession attachment can be understood as an extreme form of self extension to possessions because of the added characteristics, one of which is an emotional component. However, in this study, sentiment, monetary value, and time were not mutually exclusive. Participant 5CF expresses value through music that "speaks to her":

> "The [digital] music is just what I love, stuff I either remember, you know, from when I was younger, or I listened to a radio show and I, Ya know, was exposed to new music, music I haven't heard before, so it's um you know, there's nothing in the music that I would call really educational, it's all just stuff I like, it's stuff that speaks to me."

Participant 1BM expresses sentimental value in association with loss, and the feeling of being adrift without something:

> "they tend to be things that I feel I want to hold onto for a long time. Um that um how you can be in some cases sad if somehow the computer died and they couldn't recover some of these things, um. You know that happens to real, so called real possessions to sometimes, if your house burns down and a tornado comes and everything's gone…the images especially are the one's I'd like to think about and keep and have some sentimental value just like a regular picture would. Um, and yet I'll be kind of adrift without that password um document. Um and I have a hard time remembering some my passwords, ya know, like anybody else, I have, I don't know how many, a couple dozen things I ya know, Amazon.com, and ya know bank account, email, the University makes you change your password every 2 months. Etc., etc., etc., so um, I'd feel kind of adrift if I didn't have that, so those are, I want to hold onto these things I guess."

Participant 3AF described a connection to her digital possessions:

> Participant 3AF: "I guess you kind of feel connected to it."
> Researcher: "How so?"
> Participant 3AF: "um, like you would be upset if you lost access to it."

Participant 1CF also expressed sentiment when describing her digital possessions. In this case, the sentimental value was associated with a family member:

> "There's a ton of stuff on [my iPhone] that I care about, um it wouldn't kill me if I lost it or it broke, because I could replace all of it, but um or just about all of it but yeah this has got an mp3 of my daughter saying Happy Birthday."

Participant 4BF also expressed sentiment associated with her cat, Bandit:

> "I think I would be sad if I lost the photos of Bandit [a deceased pet cat] but um, I mean it's not like it would take away who he was and I would never remember him again, I would you know?"

According to Cox (2008), the *romance of the document*, or the storytelling nature of personal information, accounts for why individuals grow attached to personal records. The photos of Bandit the cat that are described above, are a gateway into a story about Bandit's life.

These findings also mirror those of Kirk and Sellen (2010), who found that possessions (physical or digital) serve as traces for "sacred things," like a deceased family member. Participant 6BM described sentimental value and the desire to share a digital possession with someone:

> "you don't want to lose photos just for sentimental reasons and in case I'd ever want to look back at them. You know I don't sit around and peruse my old photos, but every now and then I'll think, oh you know, I really I remember that time and want to pull up a photo or share it with somebody over e-mail or something."

Participant 6BM's quote associates remembering with sentimental value, which Kirk and Sellen (2010) found to be a characteristic of maintained possessions in the home and Kleine and Baker (2007) found to be associated with possession attachment.

4.5.1.3.2 Monetary Value.

When discussing monetary value, participants frequently mentioned downloaded items such as music, movies, books or other applications they would use on a device. Participant 2AF drew a distinction between sentimental and monetary value:

> "I think I take a lot of care with my pictures and my music um 'cause I think like the pictures to me are priceless in some ways but the music is like tangibly expensive if I were to lose my music collection."

According to participant 3CF:

> Participant 3CF: "I would say all the digital possessions I have I tend to maintain, over a period of time just because of the investment that I have in them so …."
> Researcher: "So like emotional, or monetary, or…?"
> Participant 3CF: "I don't know, I think monetary."

Often, money was associated with time, as the time it would take to replicate a lost digital possession, or to recreate information:

> "I'll go in and delete my deleted items, I go in and do all that sort of stuff with the email and that sort of thing, and just look at what I don't need and things that I don't think I can recreate myself and would take a lot of time, I do tend to save." (participant 3CF)

In addition, digital possessions that represented a time investment were deemed as retaining value:

> "I did keep one presentation that I made for class for my friend, the class my friend was teaching and I kept my senior thesis because those things…I felt not really proud of but they both represented a large investiture of time" (participant 7AM).

Digital possessions were also valuable because they represented a connection to someone. According to participant 6CM:

> "we have copies of music somewhere [else] so um it's not going to be a great loss if we lose that, but things that I guess I've created like pictures that have significance, important connections to me and are an important part of our family… that I would like to keep."

4.5.1.4 Provides a sense of bounded control.

As they described their digital possessions, the issue of ownership was sometimes confusing for participants. For example, participants could pay for an iTunes song and put it on their computer. They then considered it as "theirs." However, digital rights management, or DRM, limits what the individual can do with that music file, thus limiting the individual's control. Kleine and Baker (2007) describe possessions as anything an individual recognizes as "theirs," which is distinguished from a legal definitions of ownership. Furby (1978a) found control to be the most salient characteristic of a physical possession. Furby came to this conclusion, after conducting content analysis of her interviews. *The right to control use* of a possession was one of the most frequently mentioned characteristics of possession. So what does "the right to

control use" look like in a digital environment? What does control look like in a digital environment, where individuals frequently enter licensing agreements where they provide a company with access to their (seemingly) personal information, in order to participate in certain aspects of the digital environment?

Participants expressed a sense of *bounded control* through the ability to maneuver digital possessions around a digital environment. Participant 1AF also expressed bounded control by defining digital possessions as items that can be modified: "Something that I create or modify myself, that uses digital technology." In this sense, not everything that exists in one's webspace is a digital possession. Items that the individual has *manipulated* are digital possessions.

Participant 4AM also described bounded control through the ability to move items from machine to machine: "um I guess it's anything electronic that I can move and carry with me potentially….move from machine to machine." In addition, participant 2CM described this as he mentioned migration: "Um, when I got a new computer ya know they can just switch your…ya know, move everything over. Migration, what do they call that?"

According to these participants, a sense of control in a digital environment is described as the ability to move an item and control its location. While a digital item cannot be touched like a physical possession, the notion of "moving" implies manipulation.

Odom et al. (2011) found similar results in interviews with teens, who reported a preference for storing digital possessions in the cloud, which allowed for mobile access.

Furby's (1978) finding that the *right to control use* is a salient characteristic of physical possessions translates to the digital environment as ability to control location. Further, participants recognized that they "gave away" some control of the digital possession when signing up for Facebook, so *right to control use* is relevant, but not so much as *right to control location.*

Facebook provides an example of bounded control in a digital environment. Most participants spoke of Facebook at some point during their interviews. When asked if Facebook was a digital possession, many participants initially said yes, but after thinking about it more, they admitted they were unsure, and mentioned that Facebook had access to their information and could use it for their own interests, thus limiting their control over their information in the social media application:

> Participant 1BM: [referring to Facebook] "I know my postings…and know that I can't control that. That Facebook could suddenly say well we're going out of business, not that they are going to but ya know what I mean they can say we're shutting down, sorry and you'd lose all your photos and things you have there."

Upon closer examination, it became clear that when participants discussed Facebook, they were not necessarily discussing Facebook as a whole; they were referring to *possessions in* Facebook. Participant 4AM clearly expressed this:

> Participant 4AM: "um I would consider the actual like, electronic files, the music files, the digital photos…I consider those to be part of like a digital possession but for cloud services and web sites like Facebook and twitter and stuff like that I would not consider those actual possessions."
> Researcher: "Okay. Can you talk about why?"
> Participant 4AM: "um I guess because you don't like get files and music you can move around and actually have I guess kind of an abstract form and like shape where as Facebook I feel it is more a web site more assuming to be access. However like the data held by Facebook would I guess count as digital possessions."

Participant 7AM also drew a distinction between Facebook as a whole and the individual items in Facebook:

> Participant 7AM: "something which could be, um quantified…reduced to perhaps a single file and transmitted to someone. Something which you could, ya know enclose borders around."
> Researcher: "Okay, so it has boundaries?"
> Participant 7AM: "Right. Rather than just my Facebook profile, individual items."

Participants 4AM and 7AM describe Facebook as a place in which to *put* digital possessions. In this sense, one can conceive of Facebook as a digital storage unit, much like once conceives of a physical storage unit. Like a physical storage unit, an individual enters into an agreement with the storage facility to "rent" space, for a fee. In this analogy though, the storage unit agreement serves as Facebook's user license, in which the individual "pays" Facebook with access to their personal information. The individual then places their physical possessions in the physical storage unit. Although the physical possessions are now on the property of the storage facility, they are still the individual's possessions. Considering this, individuals can place their digital possessions such as photos, links to articles, status updates, applications, etc. in Facebook, but the individual still recognizes them as their own possessions. Some storage units do have fencing, chickenwire, or bars around them: Facebook is most like those because the digital possessions in Facebook are available for the world to see.

In this sense, Facebook becomes an important location for maintaining digital possessions, which mirrors Barreau and Nardi's (1995) finding that desktop placement of personal information is significant for the individual. While Barreau and Nardi determined that individuals placed information on the desktop as a reminding function,

findings from this study suggest that individuals place digital possessions in Facebook because they represent participants' identity *and* allow them to share the digital possessions with others. This function of digital possessions is the essence of Belk's (1988) description of self extension to possessions: that the possessions represent the individual's identity and can serve as vehicles to extend the individual's identity to others. In the digital environment, this form of extension is as simple as placing a digital possession in Facebook, for the world to see. Facebook as a location is well understood, as participants are careful what they share, and not to share something that would extend their identity in a less than flattering light. Goffman (1959) found similar findings in his study of how participants presented different sides of themselves to others.

4.5.1.4.1 Sharing.

Some participants spoke of sharing digital possessions via email, again evoking a sense of bounded control. While a participant could control a digital possession by sending it as an email attachment to a single individual, they could not control whether or not that attachment would be forwarded on to anyone else.

Belk (2007) defined sharing as "the act and process of distributing what is ours to others for their use and/or the act and process of receiving or taking something from others for our use" (as cited in Belk, 2009, p. 717). Belk proposed that sharing be viewed using two perspectives: *sharing in* and *sharing out. Sharing in* was usually exemplified by sharing within a family. According to Belk's concept of extended self, the self could extend to family members just as it could extend to possessions. Thus, sharing with family or close friends extended the self boundary; a way to connect with another person.

In contrast, sharing out was closer to commodity exchange and preserved the self boundary (Belk, 2009). Sharing out is used as a way to assert the self, without necessarily making connections with other people.

Individuals exemplified sharing in and sharing out in the ways that they choose to share their digital possessions. Participants often made the distinction between the two forms of sharing by categorizing some digital possessions as more "personal" or "private" than others. Information described as personal or private was more often used to share in versus share out. According to participant 1AF:

> "Um for me there's differences, definitely. I have a couple blogs that are mine and those are more private and I limit that access to let the public eye. It's not searchable, my public name is not on it, and you can only receive the post if you're on my list. And it's emailed to people. So that's a more private, honest blog for family and a few friends. But there are other digital possessions that are more open and public like my Facebook; I'm pretty open on my Facebook. But then again I have, like, the settings on that are only certain people can find me. But overall those are the main differences how private or public I am."

Participants also described using different forms of social media applications for different kinds of sharing. Where as one application was used for sharing more personal, private information (sharing in), another application was used for more professional sharing (sharing out): "I use Facebook for personal things and then Twitter for professional things" (participant 1BM).

Participants also spoke of how they would hold back from sharing certain digital possessions on Facebook. This is another example of sharing out: the participant was willing to share some digital possessions, but the goal was not to create a link with other individuals, the goal was to preserve a very specific self boundary:

> "I'm actually in a temporary position so I'm job searching so I make sure my Facebook is job search appropriate and you know, not that I'm ah partying

> uncontrollably these days but just the idea of what's visually you know appealing to them I don't try to make um comments or connections link other things that could be controversial" (participant 3BF)

As mentioned above, participants were hesitant to share information in which they did not think others would be interested. This hesitancy could represent a reluctance to share out: if individuals were not sharing to connect with another individual, then there was little interest to share in order to preserve the self boundary. Some participants expressed surprise at what others would share using social media. Participant 7CM expressed surprise at hearing the news that former Congressman Anthony Weiner shared sexually suggestive photos using the social media application Twitter. According to news reports, the photos were supposed to be shared with one woman, but was accidentally shared with all his Twitter followers. It is important to note that sharing in and sharing out was not specific to social media applications. As in the examples above, Facebook is used for sharing in for participant 1BM, and sharing out for participants 1AF and 3BF.

While digital objects must not meet all of the above characteristics, digital possessions are likely to meet most of the above characteristics. When compared with Furby's (1978a) salient characteristics of physical possessions, control was still relevant in the digital realm, as represented by a perceived sense of bounded control in the digital environment. Furby found that control can link possessions with the self, which could be related to the findings that digital possessions provide evidence of the individual in the digital environment and represent the individual to other people in the digital environment. Furby also found value relevant to possessions, though it was rated

significantly lower than other characteristics, such as use of the object (distinguished from the ability to *control* use of an object).

The finding that three of the four identified salient characteristics of digital possessions are similar to the archival concepts of evidential value, macroappraisal, and archival value suggest that archivists could utilize concepts from their own profession when working with creators of digital content. The finding that individuals described applying "archival logic" when evaluating digital possessions, supports Cox's (2008) suggestion that archivists could become consultants who offer advice to individuals as they manage their personal and family archives.

4.5.2 Self extension in digital environments

As stated in the literature review, self extension to possessions is a concept with the following characteristics:

- possessions to which the self has extended are *imbued with meaning* (Schau, 1998);
- possessions can *contribute to a sense of identity;*
- and possessions to which the self has extended can act as *a vehicle to extend the identity to others* (Sivadas & Machleit, 1994).

Participants easily grasped the concept that digital possessions could extend their identity to others. They often practiced this phenomenon by placing possessions that they thought represented them in social media applications, like Facebook. These possessions were often described as having meaning because of what they could convey about the individual. However, participants did not always recognize their digital possessions as directly contributing to a sense of identity. Digital possessions contributed to identity as they were shared with others via social media applications or through email

communications. While not all digital possessions were shared, sharing was frequently mentioned as supporting an individual's concept of a digital possession.

4.5.2.1 Imbued with meaning.

> "well generally the photos that I have, the personal photos that I have, are photos that are somehow meaningful to me. They are not just any photographs I have, my mom will send me photographs of her vacations that I look at them and delete them-I don't save those so, [the photos] have a particular meaning to me and or some level of meaning of to me" (participant 5BF).

Some participants imbued their digital possessions with meaning and often expressed this in descriptions of how digital possessions could represent value. While this is explored above in the section *recognized has having value*, participants also expressed this value in discussions of loss. Participant 1CF described this meaning as a feeling:

> "it's the feeling of having it. It's the feeling…first of all it wouldn't feel good to throw away something from my daughter, um it's if she writes a text that says, " love you, miss you" something like that, that if … I can't throw something like that away. That would be like throwing away a letter she wrote to me. I can't you know, there are plenty of people I can throw stuff away from, but my children, not so much."

4.5.2.2 Contributes to a sense of identity

Most participants agreed that their digital possessions reflected their identity back to them:

> "I would say music files would be a good example of reinforcing my identity in that you know I have certain types of music I listen to for certain moods and I feel like those really reinforce who I am at that moment" (participant 4BM).

> "…if I showed pictures of my son um, that's a representation of showing to other people but also reinforcing my identity as a father" (participant 1BM).

> "um when most people look at [the items on my laptop] they see what kind of person I really am, I'm a very techno um nerd, geek I keep up on the latest high tech software coming out and updates and stuff so most people say that side of me as a computer geek…" (participant 7BM).

In the quotes above, participant 4BM described how his music reinforces his identity to himself. In contrast, participant 1BF gained a sense of identity from viewing the digital photos, but also from displaying the digital photo to others; participant 7BM gained a sense of identity from his digital possessions, which was manifested through the lens of someone else viewing the possessions. While participants discussed how possessions could reinforce their identity back to them, the ability of a digital possession to contribute to identity after it was displayed to others, was more common. For some individuals, displaying the digital possession for others appears to play an important role in self extension in a digital environment. Sharing or displaying digital possessions to others is made easy using social media applications, when compared with the ability to share physical possessions. Access is also important: thanks to storage in the cloud, digital possessions can be accessed by multiple individuals at a time, so a participant can share a digital possession without losing access to it, as one would loose access to a physical object during the time it was in use by someone else.

4.5.2.3 A vehicle to extend the identity to others.

When considering the characteristics of self extension to possessions, using the possession as a vehicle to extend one's identity to others was by far the most frequently discussed characteristic of self extension in a digital environment. As mentioned in the previous section, this is likely related to the finding that sharing and displaying digital possessions to others appears to reinforce self extension in the digital environment. According to participant 5AF, her music and pictures extended her identity because

others could learn about her through her digital possessions:

> "I really like listening to music and so I guess you could tell by the amount of music that I have on my own computer and I guess just like in terms of the pictures they are just, um they are also important to me, that I have, and I guess you could tell different things about my life or experiences I've had, through them."

A college professor, participant 5BF saw herself represented through her image collection that she shared with her students, who in turn could learn about her identity:

> "so the stuff that I'm interested in personally and intellectually that I sort of connect with my identity as who I am as a scholar, is a subset of those larger images that I have, but my students experience all of them."

4.5.2.4 Self extension to the past.

According to Belk (1990), the self can extend backward and forward in time. *Self extension to the past* was also demonstrated through self extension to possessions. Specifically, self extension to possessions is associated with self extension to the past. Self extension to the past:

- helps support our understanding of ourselves;
- acts as repositories of the past;
- serves as a link to the past;
- and can trigger nostalgia (an emotional response) (Belk, 1990; Baker & Kennedy, 1994).

The characteristics of self extension to the past were supported in this study. Participants described using digital possessions to better understand themselves; connect with their interests in the past, connect with individuals from their past using social media, and to store memories and engage with possessions in ways that triggered nostalgia. These characteristics were often intertwined with one another: a digital photo could hold memories, but could also serve as a link to the past, while triggering nostalgia.

Some participants described that they could gain a sense of who they were in the past, by looking back at digital possessions from the past:

> "The music tells you a little bit about what I'm into, my style my general style of music um the pictures represent a little bit of my childhood and while I was like as a kid growing up watch me as I every year changing becoming more and more dorky looking" (participant 7BM).

Participant 5AF spoke of how her past thoughts could reinforce her identity:

> "I guess um probably, my journal entries do, um just cause like I could read them at a later date or um and um understand when I was thinking at a time…"
> Other participants used social media to understand themselves.

Participant 3BF expressed that Facebook allowed him to connect with people from his past, which led to discussions about the past. Through these discussions, she was able to gain a greater sense of who she was:

> "Definitely the past because I'm connected with people [on Facebook] who knew me then and so they're reminding me of you know interests I had or you know um things that we did…"

Participants described that digital possessions could act as repositories of the past by holding memories:

> "[Digital photos are] sort of a um, memories and moments that I don't want to lose, but you know like I said I have the CD and I'm ready to put it in a safety deposit box…" (participant 4BF).

By far, participants considered digital photos to be the digital possession that most represented memories:

> "They are generally photos of the kinds of things that I love you know the flowers um I have cats and of the cats um if I go someplace into something beautiful and I want to remember it I'm going to photograph it" (participant 5CF).

4.5.2.5 Self extension to the future.

Self extension to the future is often described as an extension to whom an individual may desire to become. As with self extension to the past, self extension to possessions helps the individual explore different self concepts and imagined self concepts. While participants were far less likely to agree that digital possessions could represent their future, some participants spoke of how digital possessions could represent who they wanted to become. As was found with self extension to the past, these characteristics are intertwined in the digital environment.

Similar to self extension to the past, participants described how digital photos could evoke many characteristics of self extension. Participant 1BM described how he had a photo of his current girlfriend on his desktop and how this photo represented the future:

> "Like I said I'm divorced last year and Jane (Doe) is my first post-divorce girlfriend, so I kinda think about hers [photo] ya know. Not to over think it too much because we just dating but every now I think "maybe that's"…ya know, kind of a turn toward the future."

While participants could see the topics they were writing about linked to the future, many participants were hesitant to link digital possessions with the future, especially if those digital possessions were shared:

> "I'm more conscious now when I say something, how my opinion might change in the future because I don't wanna say anything now and then seem like a hypocrite or contradict myself in the future, especially if it's um, just a little ways down the road and I don't want say anything that might make me look bad online, or it might make me feel stupid like if there's an issue that I don't necessarily feel completely educated about, I don't want to say anything about it now because I want to wait until I have more information" (participant 8AM)

Some participants described how digital possessions could represent what they want to become in the future. This finding was more typical for participants in Group A, the 18-24 year old participants:

> "Like my Facebook, I can see that and my iTunes, definitely especially being an artist and primarily I've had the most experience with music so I can see myself recording things and like having my recordings on my iTunes in the future" (participant 1AF).

While "future self" was a more difficult concept for participants to grasp, the finding that participants selectively chose aspects of their personality to represent to others suggests that digital possessions that extend the identity to others are controlled by the desire to present a certain self:

> "I think in in my writings some of which I guess you know are technically on web sites, so they're not just emails to friends, um but I would say, they reflect who I want to be as, ya know, sort of an academic person. So half the words you know I'm that I might write I certainly wouldn't be able to come up with on my own maybe in a regular conversation but they, they represent um... a very, ah well educated, Um, thoughtful type of person that's who you know I want to be, I may be like that sometimes and not at others and so that would be sort of yah, reflecting my ideal vision of myself in that context" (participant 7AM).

Overall, self extension to possessions exists in the digital environment. However, when compared with studies of self extension to physical possessions, findings suggest that while participants are less clear about how a digital possessions can directly contribute to a sense of identity, digital possessions definitely extend one's identity to others, due to the ease with which digital possessions can be shared in the online environment, especially when utilizing social media applications. As the ubiquity of the digital environment in individual lives continues to grow, the perceived contribution of digital possessions to identity may continue to grow as well.

4.5.3 Digital possessions and a digital legacy.

When asked to define a digital legacy, most participants expressed that they had never heard the term before or thought about the term. One participant reported vaguely remembering reading something about it in a magazine. Raising the issue with some participants caused questions, as most of them were not sure what would happen to their digital possessions after they died. One participant felt uncomfortable even discussing the topic, as she thought it was morbid. Even though most participants had never thought about the issue or heard the term, they were able to define it. While some participants focused on relationships with other people, what a digital legacy could say about their personality, or how a digital legacy was created, some individuals focused on the purpose of a digital legacy. The common characteristics of a digital legacy were:

- displays a progression, tell a story
- specifically maintained/developed for people other than the individual
- represents the individual (in a good light)
- provides evidence of the individual, usually on the internet
- is created or manipulated by the individual

An exploration of these characteristics provides a wider understanding of how individuals define a digital legacy.

4.5.3.1 Displays a progression, tells a story.

All participants attempted to answer this question through different angles. Participants who attempted to define the term through purpose, often spoke of how a digital legacy was designed to tell a story or the progression of a life. Participant 1AF described the breadth of a digital legacy:

> "I would say a digital legacy comprises of digital possessions that show as start point and progression. Whether that be in a person's life, or they have digital possessions that kind of pinpoint certain times in their life or whether it shows

> their growth in a certain area of life as like whatever their talents and skills are whether it be in computers or art or writing or law making, that sort of thing."

While participant 1AF was more relaxed with the guidelines of a digital legacy, participant 3BF was adamant that a digital legacy be consistent, without any gaps:

> "I think that the idea of a legacy is that there would be um no gaps in it, so I think that it's, it would be to me, a legacy would be a complete picture as opposed to just intermittent or sporadic pop-ins."

Participant 4AM emphasized the ability to see growth and change in life through the progression of a digital legacy:

> "I guess that's kind of showing the progression of someone throughout their life I guess through digital possessions, I guess through pictures and whatnot, you can really see how someone changes through these sort of these pictures, through time."

4.5.3.2 Specifically maintained/developed for people other than the individual.

Most participants agreed that a digital legacy, whether collected and maintained with intent or not, was specifically for the benefit of other people. Participants mentioned that a digital legacy was for family members, especially children. Even some participants who did not have children, stated that if they did have children, their digital legacy would be for those hypothetical children:

> "things that I guess I've created like pictures that have signif-, important information, connect to me and are an important part of our family that I would like to keep" (participant 6CM).

> "I would have to say is what you leave behind of yourself, um, things that you keep about your family, or my son or my daughter would want to look at to see how I was like, what kind of a person I was back then, and what I was growing up, what I am now, or what I was now for whatever reason" (participant 7BM)

When participants mentioned being childless, they acknowledged that a digital legacy was for other people, but were unsure whether their digital legacy would be of interest to anyone outside of family:

> "I don't have children, I'm not that close to the other members of my family, um my husband…I wouldn't expect him to outlive me by much, so you know I mean he could…ya know, who would want it? Who would want my digital legacy, I'm not sensing people will be um, clamoring for it" (participant 5CF).

Some participants did mention that their digital legacy would include their work product and could potentially be of use to future researchers:

> "I would say it's what a researcher after the fact would care to share, um that's who ended up with the power to share" (participant 8CM)

Participants also mentioned that digital possessions could be of use at funerals and to create digital memorials that can be made available online or through Facebook, and that such products would be considered part of a digital legacy.

4.5.3.3 Represents the individual (in a good light).

As stated above, when considering what possessions to share via social media, some participants were careful about what possessions they chose to share, as some possessions would not be of interest to many people. Further, participant 4BF explained that she was careful not to post too many photos of her cats on Facebook because she did not want people to think her "a crazy cat lady." This behavior was also common as individuals considered their digital legacy. Some participants spoke of wanting specific digital possessions to be part of their digital legacy because of the feeling that they presented a positive representation of themselves:

> "I guess like I would think of um, somebody's accomplishments being preserved in a digital form so what comes to mind are like um, published papers or something like that" (participant 5AF).

> "…some things I feel like…should not be kept, but other things you know like the good times, I guess I would want to keep. Ya know, photos of my friends all having a good time or having a lot of fun, I would definitely want to keep those as a digital legacy… I mean frankly speaking ya now, immature nights with alcohol involved, that sort of thing, I feel like you know'd, be fun but while and in

> college. Once I leave college, I'm feeling that sort of thing should be left behind" (participant 4AM).

While participant 5AF believed that a digital legacy consists of accomplishments, participant 4AM wanted to "weed" his digital legacy of evidence of himself that he described as "immature." McKemmish (1996) reported similar results in her exploration of personal recordkeeping behavior: individuals or the family members of individuals would try to control a legacy by destroying some written evidence of the individual. Other notable figures attempted to control their legacy through the records they were willing to donate to institutional archives. Participant 4AM continues to state this point:

> "I mean I guess the benefit to a digital legacy is verses a physical one is that whoever controls the digital files can control what image that digital legacy leaves, and so um I feel like things do not represent me I guess do not represent who I view myself as -I would want to get rid of."

4.5.3.4 Provides evidence of the individual, usually on the Internet.

Throughout the interviews, some participants expressed anxiety over the fact that traces of their existence could exist on the internet for an undetermined about of time. Several scholars have written about this and even suggested that all information on the internet have an expiration date, in order to quell this concern (Mayer-Schönberger, 2009). Some participants described a digital legacy as evidence of one's existence on the web:

> "I would tie it to the Internet a lot-I think, and so it's just kind of the um, the sum of everything that is directly traceable to you, um that is like on the Internet. So like if you were to Google yourself, like what would come up and just, or even on Facebook, like all of the things that you posted and so just whatever is out there for people to see, and can be traced back to you" (participant 2AF).

Some participants expressed remorse for what might be available about them on the internet, but accepted that they had little control of this information:

> "[What's available on the Internet about me] could be frightening, too many things I said on my in internet forums ya know, late at night, after too many beers or something like that. Ah…that's the only that the negative side of a digital legacy" (participant 6BM).

This recognition of a lack of control is similar to the sense of bounded control that characterizes the definition of digital possessions, presented above.

4.5.3.5 Is created or manipulated by the individual.

Most participants agreed that a digital legacy consisted of items created or manipulated by the individual. While individuals could have many digital items on their harddrive or in their webspace, only those that bore the unique "touch" of the individual could be considered part of their digital legacy:

> "If I created it then you know I would consider it my digital legacy…I don't think something can be my legacy that I've just bought, you know?" (participant 2CM)

Participant 5CF described this creation and manipulation more broadly:

> "It would be digital objects that had um, a person had consciously acquired either through creation or through just acquisition."

The "consciously acquired" aspect of this definition recalls research on collecting behavior: collectors often saw their collections are representations of themselves, mainly through the act of bringing together items that adhered to self-defined boundaries (Belk, Wallendorf & Holbrook, 1991). Considering this finding, it may be useful to further explore how a digital legacy compares to a collection, and determine if individuals impose similar boundaries on the digital possessions, such as representing the individual in a good light, or telling a story.

V. Points of view associated with digital possessions and a digital legacy

5.1 Research questions addressed

Study two used Q method to address the following research questions:

RQ2. What characterizes self extension in digital environments?
RQ3. How do individuals characterize the digital possessions that they desire to maintain for a digital legacy?
RQ4. How do the characteristics of self extension in digital environments relate to the characteristics of digital possessions that individuals desire to maintain for a digital legacy?

5.2 Q method

Developed by Stephenson in 1935, Q method is primarily used to explore individuals' points of view on an issue. Using this method, the viewpoints of a sample of participants can be grouped into a few categories, portraying the main viewpoints about a topic. Most often, researchers use qualitative methods to gain a participant's viewpoints about an issue, but Q method can be used to gather this information quantitatively. The goal of Q method is to model a participant's viewpoints on an issue, using quantitative methods (McKeown & Thomas, 1988). According to Kerlinger (1986), Q method is also particularly useful in exploratory research because it allows the researcher to gain "an empirical purchase on slippery problems like the abstractness of attitudes and values" (p. 518).

Q method consists of:

1. developing a *concourse* of items,
2. narrowing down the concourse of items to a *Q sample*,
3. directing participants to sort the Q sample according to a *condition of instruction*,
4. and conducting *Q Factor analysis*.

5.2.1 Concourse.

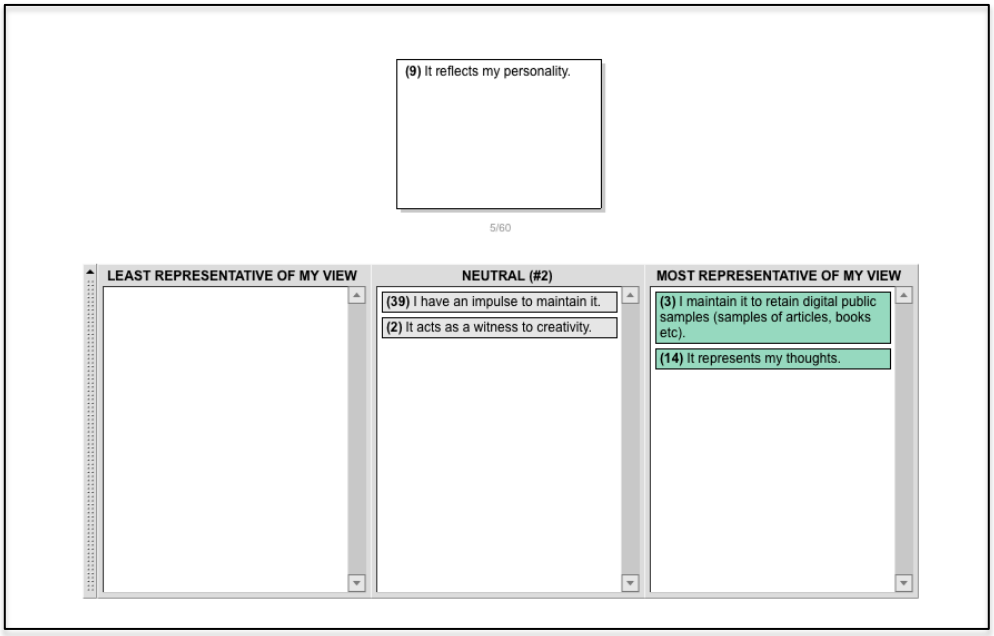
In order to develop a corpus of items for the Q sort, the researcher typically develops a concourse. A concourse could consist of words, statements, or objects. From the concourse, a researcher would draw a subset of statements, items or words to develop a Q sample, which would then be placed on cards, for a subject to sort. For this study, the concourse and the Q sample consisted of the most common statements about digital possessions, gathered from the digital possession interviews (see Figure 1) and gathered from relevant literature listed in Table 1. When the motivations for personal archiving from existing literature overlapped with interview data, natural language from interview data was used. For example, "It represents my interests" was phrased as "It represents what I'm into"; a direct quote from a participant that describes this characteristic of digital possessions.

Kerlinger (1986) and McKeown and Thomas (1988) suggest the minimum number of items (cards to sort) in a Q sample to be 60. However, Kerlinger reported success with as few as 40 statements. According to Brown (2002), the items in the Q sample are used in order to bring about the point of view at issue and not serve as an inventory of all available statements.

5.2.2 Q Sample.

From the concourse, a researcher would draw a subset of statements, items, or words to develop a Q sample, which would then be given a number for identification, and placed on cards, for a participant to sort. Figure 3 below is a screenshot from the computer sorting program *FlashQ*. Statement cards dropped down from top of the screen and the participant initially dragged the cards to one of three virtual piles, represented by three columns: least representative of my view, most representative of my view, and neutral.

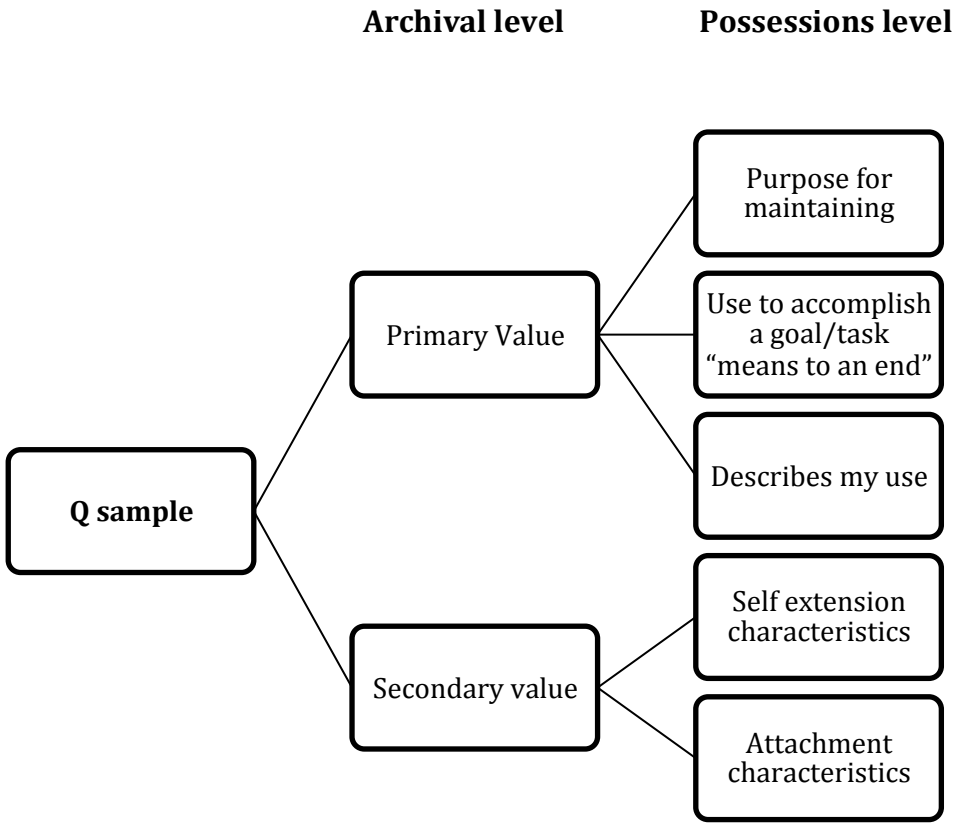
Figure 3
Screenshot from FlashQ demonstrating initial sorting of the Q sample



The Q sample statements were created from the existing literature about motivations for personal archiving and participant utterances from the digital possession interviews. The concept of archival value as well as the concept of possessions was imposed onto the Q sample as a hierarchy to provide structure, which is displayed by Figure 4. Q sample statements either described primary value or secondary value.

Considered types of archival value, primary value dictates the value of the possession comes from the purpose for which it was originally created. Secondary value dictates that the value of the possession comes from purposes other than the reasons for which it was originally created. For example, statements that begin "It represents…" communicate that the participant values the possession beyond its primary purpose.

Figure 4
Q Sample Structure, interpretation of statements



Tables 4 and 5 detail the Q sample statements. The number associated with each statement represents the code used to represent the statement in statistical analysis. As the digital possession interview guide was designed to explore self extension to possessions, there are more statements in the Q sample that fall under the "self extension

characteristics" heading. However, it is evident from the interviews that self extension to possessions characteristics are not the only characteristics that individuals desire to maintain for a digital legacy or that they participants use to describe their relationship with their digital possessions.

Table 4
Primary value Q sample statements

Primary value statements	
Purpose for maintaining	
3	I maintain it to retain digital public samples.
29	I maintain it in case I ever need it again.
31	I want it to be secure.
38	It's useful as a record.
39	I have an impulse to maintain it.
Use to accomplish a goal/task	
4	It helps me forget.
5	It helps me fulfill a (perceived) duty.
17	It helps me achieve my goals.
19	It helps me sort things out.
33	It helps me function.
37	It allows me to reflect on things.
Description and use	
8	It's something I modify myself.
24	It's for work/school, its professionally related.
34	It keeps me connected.
41	It's accessible anywhere.
44	It's aesthetically pleasing.
47	I don't think of it as a possession.
51	It's easy to use.
54	I can categorize it.
60	There is no hard copy of it.

Table 5
Secondary value Q sample statements

Secondary value statements			
	Self extension characteristics		**Attachment characteristics**
1	It is evidence of my witnessing.	43	It gives me joy.
2	It acts as a witness to creativity.	49	It represents a time investment.
6	It's something I create.	52	I look at it/open it frequently.
7	It is mine and no one else's.	53	It has sentimental value.
9	It reflects my personality.	55	I've spent a lot of time with it.
10	It shows my background.	58	It gives me a sense of pride.
11	I share it with the public.	59	I wouldn't feel right deleting it.
12	It's a holistic representation of myself.		
13	It represents what I'm in to.		
14	It represents my thoughts.		
15	It helps me communicate with people.		
16	It represents who I am now.		
18	It represents a history/chronology .		
20	It represents change in me.		
21	It helps me remember.		
22	It's unique to me.		
23	It's something I want to hold onto.		
25	It represents my family.		
26	It's nostalgia.		
27	It represents a side of me.		
28	It's important to me.		
30	It's a visual representation of a memory.		
32	It's something I want to leave behind for others after I die.		
35	It represents the best of me.		
36	It represents a shared experience.		
40	I have control over it.		
42	It represents my experiences.		
45	It helps me remember my childhood.		
46	I would be upset if it were lost/deleted.		
48	It's a time capsule of who I am.		
50	It represents quirks about me.		
56	Other people wouldn't be interested in it.		
57	It contains information about me.		

5.2.3 Conditions of instruction.

The Q sample statements (Tables 4 & 5) consist of characteristics and values associated with digital possessions. These statements were directly developed from participant utterances provided during the digital possession interviews. The Q sample was sorted three separate times. Participants were directed to think of one of their own digital possessions for each of the three sorting tasks (and inform the researcher of this target) and then sort the Q sample according to each of the following conditions of instruction:

1. Reflect on your digital possession that most reinforces your identity to you. Sort the cards according to "least representative of my view" to "most representative of my view."
2. Reflect on the digital possession that most displays your identity to others and sort the cards according to "least representative of my view" to "most representative of my view."
3. Reflect on the digital possession that you most want to maintain for your digital legacy and sort the cards according to "least representative of my view" to "most representative of my view."

Figures 5-7 are screenshots from FlashQ that participants saw when engaged in sorting exercises 1-3. The instructions direct participants to choose a digital possession according to the condition of instruction and then "share it with Amber" (the researcher). The researcher sat next to participants while they engaged in the sorting task in order to observe the participant and clarify any questions they might have about sorting. Participants were encouraged to speak aloud while sorting, but few did. After completing each sorting exercise, participants were asked if any of the statements "stood out to them" or if they had any reflects to share about the sorting experience.

Figure 5
Screenshot from FlashQ with Sorting task 1 instructions

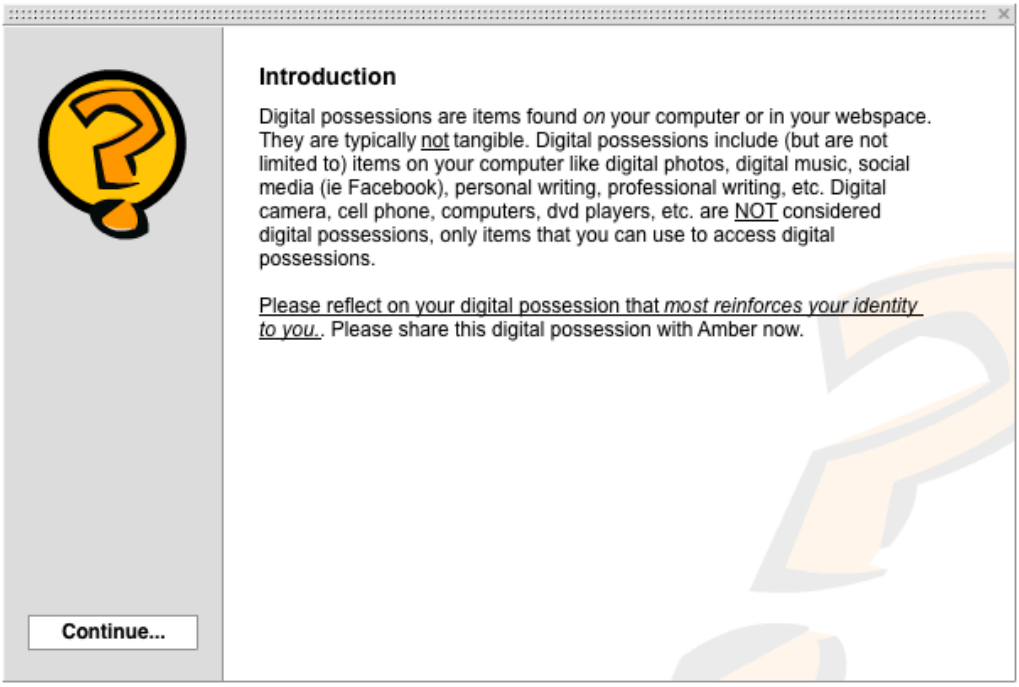


Figure 6
Screenshot from FlashQ with Sorting task 2 instructions

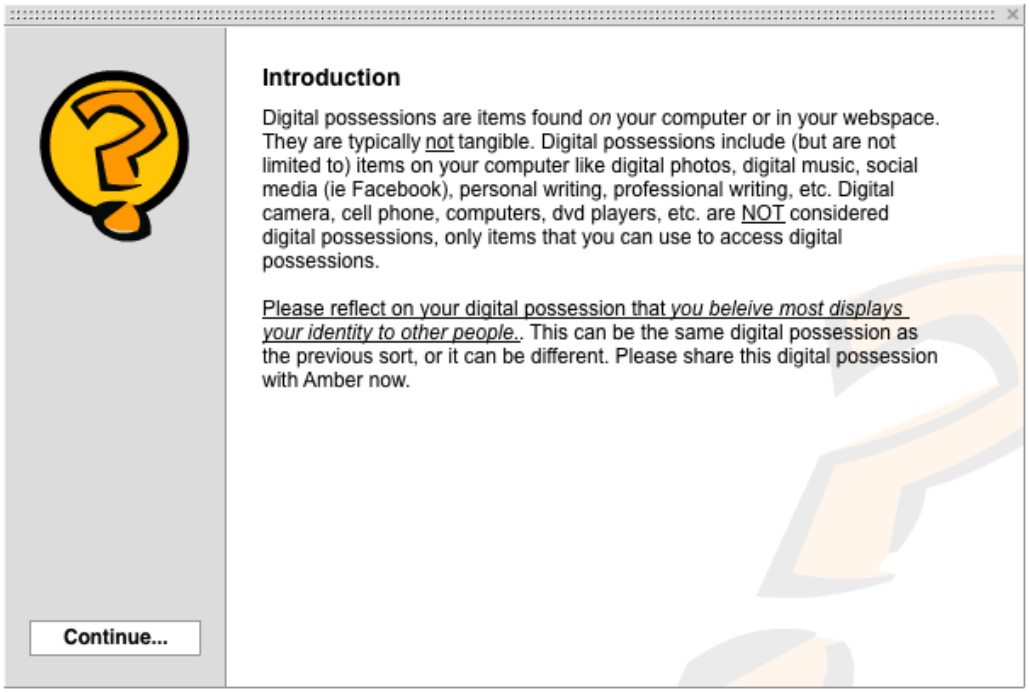
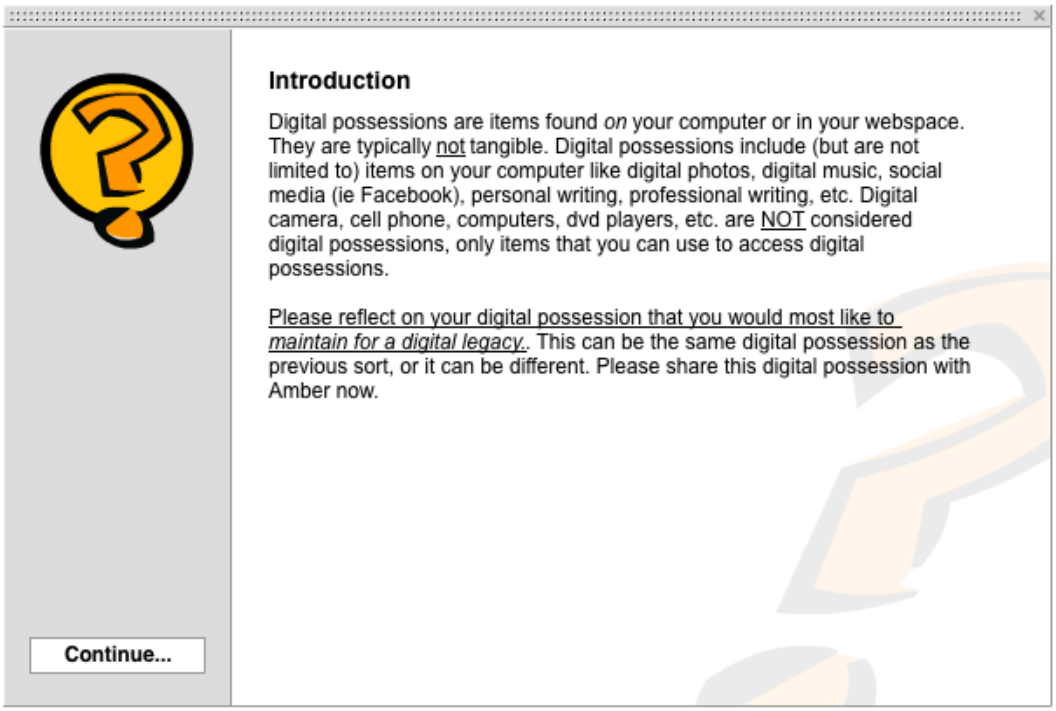


Figure 7
Screenshot from FlashQ with Sorting task 3 instructions



Once they clicked continue, participants were then instructed to model their point of view by rank, ordering the Q-sample (statements on cards) along the condition of instruction. Figure 8 is a screenshot of the next screen participants saw during the sorting exercise, after choosing a digital possession.

Participants were initially asked to sort the virtual cards into three piles and then sort the cards along the distribution from -5 to +5. This preliminary sorting into three piles helped participants become familiar with the statements before sorting each statement along a more detailed distribution with 11 columns. The three columns (piles) used to initially sort the statement cards are visible behind the instructions in Figure 8 and in Figure 3. Figure 9 displays the quasi-normal distribution, or the shape along which participants were instructed to sort the statement cards, after initially sorting the cards

into three columns (piles). The participant original sort was displayed at the bottom to provide the participant context.

Figure 8
Screenshot of preliminary sorting instructions in FlashQ

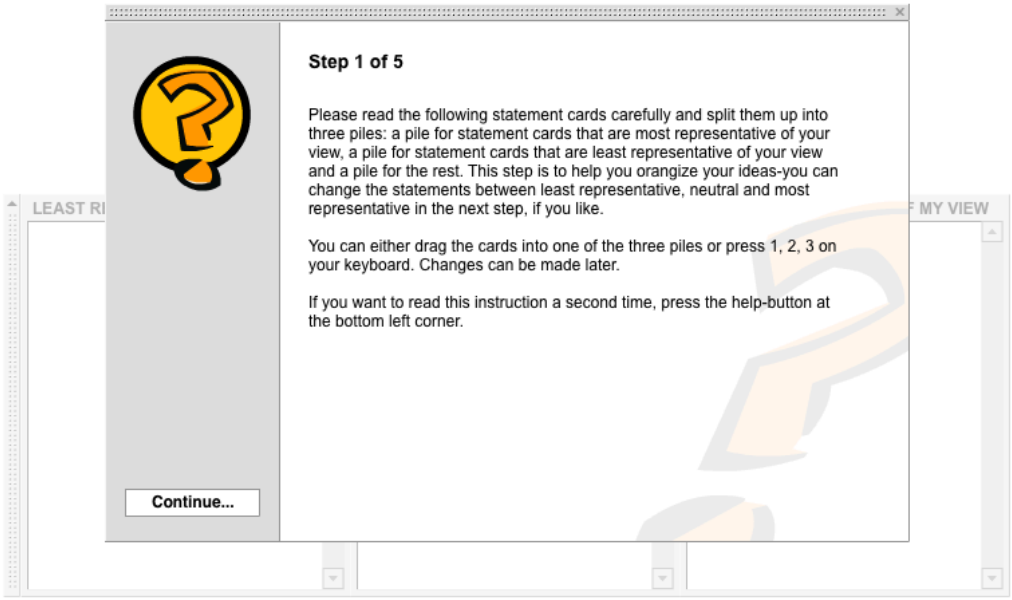
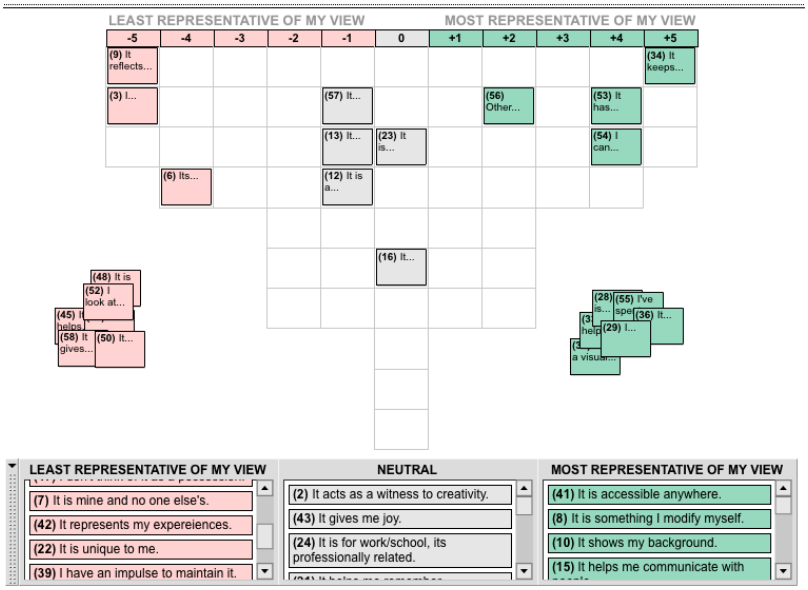


Figure 9
Screenshot of sorting the Q sample along the quasi-normal distribution



5.2.4 Sorting along the quasi-normal distribution

A *forced quasi-normal distribution* (see Figure 9) Q sort diagram was used for the three Q sort tasks. The quasi-normal distribution is the shape of the diagram upon which the participant sorts the statement cards. The "V" shape made by the boxes in the columns, visible in Figure 9, are referred to in Q method as "quasi-normal" because previous studies have found that most sorting tasks tend to move toward resembling this shape (Brown, 1993). The quasi-normal distribution is considered forced because the shape is pre-determined by the researcher, not the participant.

In Figure 9, the participants first sorted the virtual statement cards into three piles using FlashQ: least representative of my view, neutral, and most representative of my view. On the next screen, participants then sorted the statement cards along the quasi-normal distribution.

The forced distribution has previously faced criticism related to the requirement that participants align the Q sample cards using a certain design. According to Brown (1993), research has found that "persons judging the stimuli will tend to establish a hedonic midpoint that will produce balance (half above and half below the midpoint), and they will distribute the stimuli in such a way as not to deviate significantly from a normal curve" (para. 3).

Q methodology scholars have found that the forced versus free distribution does not effect the correlation during Q Factor analysis. Brown (1971), Block (1956), and Cottle and McKeown (1980) all conducted studies comparing the forced distribution and the free distribution, and all found no significant difference between distributions. Cottle and McKeown conducted the most extensive study, in which they tested 17 different

distribution diagrams and found that in all cases, the distribution loaded on the first Factor. Block found that the forced distribution yielded *more* discriminations than the free distribution. A distribution that produces more discriminations is most desirable because it provides more information. The forced distribution is more reproducible, making it more reliable.

In addition, Brown states that the quasi-normal distribution *should be used in most cases*, with the exception being a controversial issue. For example, if the condition of instruction were asking about opinions on abortion (a known controversial issue), the researcher *could* choose the forced normal distribution to allow for the traditional extreme opinions on the issue.

5.3 Data collection

Each participant who passed the prescreen survey was placed in a sample group according to age, outlined in Table 2. After verbally instructing participants how to use the FlashQ sorting program and what the program would instruct them to do, participants began the sorting task. The research sat next to the subject during the sorting task to observe and be available to answer any questions. Though few participants did, participants were encouraged to think aloud during the sorting tasks. Participants completed three sorting tasks, as outlined in Figures 5-7. After each sorting task, participants were asked if any statements "stood out to them" or if they had any reflections to share about the sorting experience. Participants were also asked if it was easy to difficult to sort the statements along a spectrum of -5 to +5.

5.4. Data analysis

The data was analyzed using the computer program *PQ Method.* PQ Method is a statistical program specifically tailored to the needs of Q factor analysis. PQ Method provided factor loadings for each item in the Q sample. Factor loadings are clusters of individuals that share similar opinions about the sorting tasks. Brown (1993) explained that factors could be conceived of as "qualitative categories of thought" because they represent a way of thinking about the issue at hand that all individuals that load on the Factors have in common. For example, in sorting task 1, which asked participants to sort the statement cards according to the digital possession that most reflected their identity back to them, all the participants who similarly ranked the statement cards loaded onto the same factor. Thus, a factor represents a cluster of participants who share the same opinion about the characteristics of the digital possession that most reflects their identity back to them. These participants share the same opinion about the characteristics of their digital possession even though they each chose their own digital possessions that were relevant to them. For example, factor one could represent five participants who believe that the digital possession that most reflects their identity back to them "represents their personality" (one of the statement cards). However, one participant on the factor could have chosen a specific digital photo and another participant could have chosen a digital music collection. What the participants on this factor have in common is *how they conceive of their own digital possessions that reflect their identity back to them*, which is that the digital possession reflects their identity back to them by "reflect[ing] their personality."

The factor loadings model was then theoretically rotated by PQ Method to get a model of better fit. According to Brown, the factor loadings matrix and the factor array scores are the most commonly reported data in discussing Q method results (Stephenson Research Center & Logan, 1996). Factor arrays (Appendix D) quantitatively display the difference between the factors (profiles) along the distribution (-5 - +5).

5.5 Findings

Each of the three Q method sort conditions of instruction were designed to map to study research questions, as demonstrated in Table 6. Sort conditions 1 and 2 were designed to evaluate self extension and were based on Sivadas and Machleit's (1994) statements that:

- possessions to which the self has extended are recognized as part of oneself;
- and possessions to which the self has extended can act as a vehicle to extend the identity to others.

Sort condition 3 attempted to gain context about the digital possessions that individuals would most like to maintain for a digital legacy, through the sorting and ranking of statements.

RQ4, *How do the characteristics of self extension in digital environments relate to the characteristics of digital possessions that individuals desire to maintain for a digital legacy?* is answered by comparing the findings of Q sorting tasks 1 and 2, with Q sort task 3.

Participants were directed (see Figures 5-7) to think of a digital possession according to the conditions of instruction listed in Table 6. After stating the digital possession, participants sorted the 60 item Q sample of statements (on virtual cards). Statements were developed from the digital possession interviews, during which

participants were asked to define and describe digital possessions (Table 4).

Table 6
Relationship between conditions of instruction and research questions

Sort order	condition of instruction (directs the sorting)	map to research question
1	Sort the statements according to *the digital possession that you believe most reflects you identity back to you.*	RQ 2. What characterizes self extension in digital environments?
2	Sort the statements according to *the digital possession that you believe best represents your identity to other people.*	
3	Sort the statements according to *the digital possession that you would most like to maintain for a digital legacy*.	RQ 3. How do individuals characterize the digital possessions that they most desire to maintain for a digital legacy?

After ranking the statements along the -5 to +5 distribution, participant scores were analyzed using the statistical analysis program *PQ Method*. PQ Method produced a correlation matrix that was then rotated using a varimax rotation solution. The varimax rotation suggested a five Factor solution. Tables 8, 20, and 28 display the Factor loadings for each of the 48 participants for sorting tasks 1-3. Defining sorts for each Factor (cluster of individuals who similarly ranked the statement cards for each sorting task) are bolded, based on Schlinger's (1969) formula to determine significant Factor loading: $3*1/\sqrt{n}$. Forty-eight participants (see Table 7) completed three Q sorts based on the condition of instruction listed in Table 5. Only Factors (clusters of individuals who similarly ranked the statement cards for each sorting task) on which more than two participants (whether positive or negative) load are considered representative of a defined opinion in each sorting task (Brown, 1980).

Table 7
Q sort sampling

transitional period	age	study 2	
		group	size
early adult	18-24	D	8 male/8 female
mid-life	38-47	E	7 male/9 female
late adult	58-67	F	8 male/8 female

Overall, no trends in sex or age were found on the factors in Q sorting task 1-3. However, trends were noted in the responses individuals voiced after completing each sort task. Individuals in Group e (38-47 years old) and Group f (58-67) reported that it was difficult to think of digital items as possessions. One participant expressed this by saying that he spent less of his lifetime with the digital possessions then he had spent with the physical possessions. Many older participants assumed that the sorting tasks would be "easier" for younger participants since these younger participants would have spent more of their lifetime with digital possessions. A participant in Group F expressed this by saying his granddaughter's first word was "iPod."

While participants in Group E (ages 18-24) did not report having as much difficulty grasping the term "digital possession," as participants in the older age groups, they did not necessarily find the sorting tasks "easy." Younger participants did report that they least liked sorting task 3, as they did not prefer to think about death, whereas the older participants had an easier time grasping the concept of a digital legacy. Participants of all ages reported that sorting task 2, "choose a digital possession that you think best represents your identity to other people and sort the cards…" was by far the easiest because thinking about what others think of you is familiar.

5.5.1 Sorting task 1

Table 8 displays the factor loadings, age group, and sex for each of the 48 participants for sorting task 1. The factors represent clusters of participants who sorted (ranked) the statement cards in a similar manner. The statement rankings (ranked from -5 to +5) for each factor represent the "average" ranking that each statement received on the specific factor.

If more than two participants loaded negatively on a factor, the negative loadings represent an opinion distinct from the positive loading on the factor. A negative loading on the Factor is not a polar opposite of a positive loading, but represents a different distinct opinion and can be analyzed as if it were a distinct factor. Therefore, some factors have positive and negative loadings, while some factors only have positive loadings (Hogan, 2008). A negative loading on a factor should be explored individually, not in conjunction with a positive loading.

Thirty-seven of the 48 participants loaded onto a single factor for sorting task one, which is displayed in Table 8. The five columns in Table 8 represent the five factors. The first column represents each participant. To find which factor a participant loaded onto, simply find the participant number (ex. 32) and follow the row to determine which column the bolded numeral is in (ex. Participant 32 loads onto Factor 2).

Table 8

Factor matrix for sorting task 1

Participant #	1	2	3	4	5	Age Group	Sex
5	-0.0338	**-0.2853**	0.1002	0.0131	0.0410	18-24	female
9	**-0.4997**	0.1588	0.0626	0.1416	0.2080	18-24	female
12	**0.5551**	-0.0054	-0.1047	0.2590	0.0821	18-24	female
14	0.0194	0.0413	0.1694	**0.4921**	-0.0507	18-24	female
15	-0.0918	-0.1229	**-0.3651**	0.1512	0.1611	18-24	female
16	**-0.3406**	0.0170	-0.0063	-0.0002	0.1105	18-24	female
18	-0.0336	0.0351	0.0256	**-0.3037**	-0.0086	18-24	female
24	0.2436	-0.1689	0.1087	0.2539	0.2101	18-24	female
1	**-0.3345**	-0.0556	0.0349	0.2131	-0.0332	18-24	male
2	0.0417	0.0488	**-0.3192**	0.0138	-0.0775	18-24	male
21	0.0862	0.1401	0.1933	**-0.4051**	0.0148	18-24	male
22	-0.1629	**0.4605**	-0.1062	-0.0908	-0.0661	18-24	male
25	0.1784	0.1965	**-0.5290**	0.0267	-0.0613	18-24	male
42	0.3771	**0.4017**	-0.3555	0.0734	0.0654	18-24	male
45	-0.0413	0.0387	**0.4354**	-0.2589	-0.0962	18-24	male
46	-0.1936	0.1677	0.2753	0.0428	0.2785	18-24	male
	1	2	3	4	5	Age Group	Sex
19	0.0733	0.0359	0.0261	-0.0593	**0.3618**	38-47	female
20	-0.2042	0.1171	0.3264	0.2212	0.1130	38-47	female
23	-0.2483	0.2307	0.2515	**0.4137**	0.3193	38-47	female
28	-0.0003	-0.0691	-0.0508	0.0771	**0.5816**	38-47	female
29	0.0530	0.0576	**-0.4572**	0.0681	0.3418	38-47	female
30	0.0388	-0.0729	-0.0193	0.1299	**0.3284**	38-47	female
31	0.0245	**0.4807**	0.1393	0.0079	0.1496	38-47	female
41	0.1248	-0.1856	0.0647	**0.2672**	-0.1025	38-47	female
48	0.0677	0.0325	**0.3878**	-0.0551	-0.3036	38-47	female
10	**0.2949**	0.1197	0.1780	0.1030	-0.0864	38-47	male
26	-0.0038	0.3671	-0.2018	0.3410	-0.3083	38-47	male
32	0.1259	**0.4052**	-0.0154	-0.2567	0.0111	38-47	male
34	0.1669	**0.4093**	0.1798	-0.1285	0.1212	38-47	male
35	**0.4434**	0.2564	-0.1041	0.3270	-0.2152	38-47	male
36	0.2535	-0.1379	-0.0172	0.2832	0.0991	38-47	male
44	0.1219	-0.0575	**0.3409**	0.2037	0.1038	38-47	male
	1	2	3	4	5	Age Group	Sex
3	**0.4665**	0.0816	-0.1324	0.0174	0.2347	58-67	female
4	-0.1907	0.1735	-0.1797	-0.0956	0.2532	58-67	female
6	0.1557	0.0593	0.0770	**-0.3566**	-0.1228	58-67	female
7	-0.0523	-0.0814	0.1186	-0.1881	-0.1104	58-67	female
8	-0.0860	-0.0595	0.0807	-0.2745	**0.5011**	58-67	female
11	0.3671	0.3555	-0.1564	0.1738	0.2373	58-67	female
13	**0.5636**	-0.0763	0.0019	-0.0726	-0.0577	58-67	female
27	**0.2897**	-0.0352	0.0143	-0.0246	0.0534	58-67	female
17	-0.0476	-0.0771	-0.0570	0.1972	**0.2618**	58-67	male
33	-0.0037	0.1794	0.2788	-0.2585	0.0001	58-67	male
37	0.2452	-0.2176	-0.0170	0.0530	-0.0297	58-67	male
38	-0.0633	0.2449	**0.5620**	0.3552	0.0011	58-67	male
39	-0.0195	**0.5468**	0.2576	-0.1714	-0.2896	58-67	male
40	0.0916	-0.0386	0.0846	**0.4082**	-0.3603	58-67	male
43	-0.1975	**0.3886**	0.0694	0.0461	-0.1332	58-67	male
47	0.1041	0.2621	0.2174	0.0181	-0.1473	58-67	male
% variance explained by each Factor	5	5	5	5	4		

Participants may not have loaded onto a single factor due to a lack of a distinct opinion on the issue. In the case that participants appeared to evenly load onto more than one factor, the loadings were excluded (Brown, 1980). When analyzing which statements (cards) most significantly define each factor, it is necessary to explore the statements as a whole, not individually. Only by exploring all the distinguishing statements as a whole can the data reveal the characteristics of the opinion that each factor represents. As significantly loading statements are analyzed together as a set, individual statements can appear on more than one factor. For example, the statement "It brings me joy" could receive a +5 on Factor 1 and a -3 on Factor 5. This statement would then be analyzed in context with the other statements that similarly load on the factor. It is impossible to repeat an exact combination of significant factors with the same scores in the same order, on more than one factor.

Participants often chose digital photographs, digital music, or Facebook as the digital possessions that most reflected their identity back to them, which then directed the sorting of the Q sample for sorting task one.

Below, each Factor is described in detail. Distinguishing statements are reported for each Factor; a complete list of Factor arrays is available in Appendix D. According to Brown (1980), extreme Factor loadings (-5, -4, -3, +3, +4, and +5 in this study) most distinguish a Factor, and are reported. Factor loadings in the middle of the distribution designate indifference (-2, -1, 0, +1 and +2 in this study) and are not generally reported. Defining characteristics were analyzed and mapped to the hierarchy in Figure 4.

5.5.1.1 Factor 1 (positive and negative loadings), "Evidence and memory aide"

Nine participants (6+, 3-) loaded onto Factor 1. Table 9 displays demographic information about each participant that loaded onto Factor 1. Participant rows that are in bold loaded negatively onto the Factor. The factor includes participants with a variety of genders and ages; four of the six participants who positively loaded onto the Factor chose digital photos as their digital possession that most reflects their identity back to them. All three of the participants who negatively loaded into the Factor were in age group D (18-24 years old).

Table 9
Participant loadings onto Factor 1, sorting task 1

participant #	age group	sex	Digital Possession
12	18-24	female	digital photos on my computer
16	18-24	female	My collection of music
9	18-24	female	Facebook
1	18-24	male	personal writing
35	38-47	male	digital pictures
10	38-47	male	My person music library both music I've created and music that I like to listen to by other musical artists.
13	58-67	female	digital photographs
3	58-67	female	Digital photos
27	58-67	female	Collection of web pages articles presentations and media interviews from my work

Table 10 provides the statements that distinguish the Factor. Only two statements positively distinguish a positive loading on this Factor. "It acts as a witness to creativity" (secondary) is related to McKemmish's (1995) finding that personal recordkeeping provides evidence of one's existence; in this example, through a creative endeavor. This is perhaps related to the interview findings, in which participants expressed that digital possessions represented their identity by representing their interests. This statement is linked with characteristics of self extension to possessions because the statement reflects that a digital possession can act as evidence (through witnessing).

Table 10
Distinguishing statements for Factor 1, sorting task 1 (and their loadings on other factors)

#	Statements	Factors				
		1	2	3	4	5
		rnk	rnk	rnk	rnk	rnk
2	It acts as a witness to creativity.	**5**	3	4	-5	-5
21	It helps me remember	**3**	-1	-1	-2	-2
44	It's aesthetically pleasing.	**-4**	2	0	1	1
53	It has sentimental value.	**-4**	2	0	-1	-1
18	It represents a history/chronology.	**-5**	-3	0	-3	0
3	I maintain it to retain digital public samples.	**-5**	-4	2	4	-2
26	Its nostalgia.	**-5**	5	5	-2	-3

"It helps me remember" (secondary) also distinguished a positive loading on Factor 1. In this example, the digital possession acts as an aide to assist remembering. In contrast, "It's nostalgia" (secondary) had the most negative loading on this Factor. According to Baker & Kennedy (1994), nostalgia is remembering, but an emotional response is also present. Therefore, the positive and negative loadings of this Factor are distinguished by remembering without an emotional response and remembering with an

emotional response. Those participants that positively loaded onto the "Evidence and memory" Factor (Factor 1) lack an emotional response when remembering, where as those participants that negatively loaded onto the "Evidence and memory" Factor do conceive of an emotional relationship with the possessions, when the digital possessions are used for remembering.

In addition, "It has sentimental value" (secondary) and "It's aesthetically pleasing" (primary) ranked a -4 for this Factor. "It has sentimental value" is related to emotion and is likely related to "It's nostalgia."

While statements that describe an emotional relationship with the digital possession appear to define the negative loadings on "Evidence and memory", the Factor is also defined by a description of the possession. These statements, such as "It's aesthetically pleasing" (primary) and "I maintain it to retain digital public samples" (primary) suggest that the participant does not conceive of the digital possession beyond its utilitarian value and describes it as such. Overall, a negative loading on Factor one is defined by a mix of an emotional reaction, as well as an absence of self extension to the possession whereas a positive loading on Factor one is characterized by self extension, as demonstrated through remembering. A positive loading on the factor represents secondary values, while a negative loading represents a combination of primary and secondary values.

5.5.1.2 Factor 2 (positive loading), "Attachment, purpose, and use"

Eight participants (7+, 1-) loaded onto Factor 2. Table 11 includes demographics for the participants who loaded on the Factor. Subject 5, which is bolded, distinguishes

the only participant who loaded negatively onto the Factor. Participants from both sexes and all age groups loaded onto "Attachment, purpose, and use" (Factor 2). The digital possessions chosen include a variety of social media applications, communication tools, work products, and music files.

Table 11
Participants loading onto Factor 2, sorting task 1

participant #	age group	sex	digital possession
5	18-24	female	Facebook
22	18-24	male	any one of the songs that I consider my absolute favorites on my iTunes playlist which would include any songs that I have rated as having five stars. These are songs that I listen to over and over because they evoke any of a number of strong emotions a characteristic in music that I think is valuable to my sense of self.
42	18-24	male	Digital music
31	38-47	female	My email
34	38-47	male	My CV
32	38-47	male	Digital images/pictures of me and people around me.
39	58-67	male	Sermon files.
43	58-67	male	Bluegrass music files

Table 12 provides the statements that distinguish the Factor. The positive statements that define the Factor fall under attachment characteristics (secondary), purpose for maintaining the possession (primary), and description and use categories (primary). "It represents a time investment" (secondary) and "It represents what I'm in to" (secondary) suggest that the participant conceives of the digital possession as representing more than it's primary value. The representation of time is related to a characteristic of attachment to possessions, that individuals had a history of time spent with the possession (Kleine & Baker, 2004). "I maintain it in case I ever need it again"

(primary) describes the participant's purpose for maintaining the possession, while "It's for work/school, it's professionally related" (primary) describes use of the possession. Both of these statements suggest that the participant does not conceive of the possession beyond it's primary value; there is no secondary value present, such as that the possession can represent identity.

Table 12
Distinguishing statements for Factor 2, sorting task 1(and their loadings on other factors)

#	Statements	Factors				
		1	**2**	3	4	5
		rnk	**rnk**	rnk	rnk	rnk
49	It represents a time investment.	2	**5**	-2	3	-4
29	I maintain it in case I ever need it again.	0	**5**	2	0	-2
24	Its for work/school, its professionally related.	-1	**4**	1	-2	5
13	It represents what I'm in to.	-2	**4**	-4	-2	-4
30	Its a visual representation of a memory.	0	**3**	-2	1	0
4	It helps me forget.	1	**-3**	3	4	3
19	It helps me sort things out.	-1	**-4**	4	2	1
51	Its easy to use.	1	**-4**	1	-2	4

The negative statements that define this Factor represent a disagreement with statements. These negative statements also represent use, but how the digital possession *helps* the participant accomplish something. This is similar to Furby's (1978) finding that possessions can provide a "means to an end." Overall, the statements that define this Factor are spread across a spectrum from a utilitarian view of possessions to self extension to possessions, to possession attachment.

5.5.1.3 Factor 3 (positive and negative loadings), "Meaning, attachment, and representing self"

Eight participants (4 +, 4-) loaded onto Factor 3. Table 13 displays demographic information for each participant that loaded onto the Factor. Participant rows that are bolded represent participants who loaded negatively onto "Meaning, attachment, and representing self."

Table 13
Participants loading onto Factor 3, sorting task 1

Participant #	age group	sex	digital possession
15	18-24	female	Digital Music
45	18-24	male	My programming software used to write other programs
2	18-24	male	My blog
25	18-24	male	The collection of music stored on my computer.
48	38-47	female	my blog
29	38-47	female	digital photos
44	38-47	male	A book draft
38	58-67	male	genealogy photos

Table 14 provides the statements that distinguish the Factor. Factor 3 is most defined by the statements "It's important to me" (secondary), "It's a holistic representation of myself," (secondary) and "I've spent a lot of time with it" (secondary). While "It's important to me" and "it's a holistic representation of myself" are related to self extension characteristics, "I've spent a lot of time with it" suggests a personal history, which Kleine and Baker (2004) determined was a characteristic of possession attachment. In contrast, "It helps me sort things out" (primary) suggests participants view the possession as an aid to accomplish a task and/or goal. Negative loaders on

"Meaning, attachment, and representing self" largely disagree with these findings: they do no attach to the digital possessions or extend their selves to the possessions.

Table 14
Distinguishing statements for factor 3, sorting task 1(and their loadings on other factors)

#	Statements	Factors				
		1	2	**3**	4	5
		rnk	rnk	**rnk**	rnk	rnk
28	It's important to me.	3	-2	**5**	3	2
55	I've spent a lot of time with it.	-1	0	**5**	0	3
19	It helps me sort things out.	-1	-4	**4**	2	1
12	It's a holistic representation of myself.	0	-2	**4**	0	0
6	It's something I create.	0	-1	**3**	0	0
42	It represents my experiences.	-2	2	**-3**	0	0
47	I don't think of It as a possession.	3	1	**-3**	0	5
52	I look at it/open It frequently.	4	4	**-3**	5	2
60	There is no hard copy of it.	1	-1	**-3**	2	0
5	It helps me fulfill a (perceived) duty.	0	2	**-4**	2	0
32	It's something I want to leave behind for others after I die.	0	1	**-5**	-2	-1

A negative loading on Factor 3 represents a utilitarian view of digital possessions. While "It's something I want to leave behind for others after I die" (secondary) suggests that possession may be imbued with meaning beyond use, "I don't think of it as a possession" (primary) suggests a lack of self extension to the possession.

Positive loaders' disagreement with "It's something I want to leave behind for others after I die" and "I don't think of it as a possession" suggest that these participants disagree with the statements: while these participants do believe that the digital items are possessions, they do not believe that they would like to have the possessions represent their digital legacy.

Overall, a positive loading on "Meaning, attachment, and representing self"

suggests self extension mixed with use and a negative loading on "Meaning, attachment, and representing self" suggests a lack of self extension.

5.5.1.4 Factor 4 (positive and negative loadings), "Identity and purpose."

Seven participants (4+, 3-) loaded onto Factor 4, "Identity and purpose for maintaining." Table 15 details the demographics for participants who loaded onto the Factor. Participants in bold text loaded negatively onto the Factor. The Factor includes both sexes and all age groups. Digital possessions on this Factor include a variety of items such as photos, music, social medial applications, work product and communication.

Table 15
Participants loading onto Factor 4, sorting task 1

participant #	age group	sex	digital possession
14	18-24	female	Music
18	18-24	female	professional writing from classes
21	18-24	male	A picture from the Little Rascals of a young boy on a row boat.
23	38-47	female	Digital pictures
41	38-47	female	Digitized letters of my grandparents
6	58-67	female	Facebook
40	58-67	male	saved photos

Table 16 provides the statements that distinguish the Factor. While the statement "It allows me to reflect on things," (secondary) suggests self extension as a contribution to identity, "I maintain it to retain digital public samples" (primary) suggests a purpose for maintaining the digital possession, and "I have control over it" (secondary) relates to the interview finding that participants perceived that they had a sense of bounded control over their digital possessions, specifically that they had control over with whom they

chose to share the digital possession. Considered together, these statements suggest a combination of self extension and a purpose for maintaining the possession. In contrast, a disagreement with the negatively ranked statements "It acts as a witness to creativity," (secondary) "Its accessible anywhere," (primary) and "It's something I modify myself" (primary) suggest a disagreement with only conceiving of the possessions for their designated use.

Table 16

Distinguishing statements for factor 4, sorting task 1 (and their loadings on other factors)

#	Statements	Factors				
		1	2	3	**4**	5
		rnk	rnk	rnk	**rnk**	rnk
37	It allows me to reflect on things.	-2	-5	0	**5**	-5
3	I maintain it to retain digital public samples.	-5	-4	2	**4**	-2
40	I have control over it.	-1	-1	0	**4**	-1
27	It represents a side of me.	5	-5	-5	**-3**	5
46	I would be upset if it were lost/deleted.	-2	0	0	**-4**	1
16	It represents who I am now.	0	0	1	**-4**	1
36	It represents a shared experience.	2	2	1	**-4**	0
8	Its something I modify myself.	1	1	-1	**-5**	2
41	Its accessible anywhere.	2	-1	-2	**-5**	3
2	It acts as a witness to creativity.	5	3	4	**-5**	-5

A negative loading on this Factor is most linked with use. These participants do not conceive of their possession beyond the possession's designated use. Overall, "Identity and purpose for maintaining" suggests a sense of self extension through a contribution to identity, combined with an understanding of the purpose to maintain the digital possession. In contrast, the negative rankings suggest an understanding of use of the possession with a lack of self extension.

5.5.1.5 Factor 5 (positive loading), "Use and attachment."

Five participants (5+, 0-) loaded onto Factor 5. Table 17 displays demographics for participants who loaded onto the Factor. "Use and attachment" is the only Factor for sorting task 1 onto which a majority of female participants loaded. In addition, no participants from age group d (18-24 year olds) loaded onto "Use and attachment." The Factor included a variety of digital possessions including photos, work product, and music.

Table 17
Participants loading onto Factor 5, sorting task 1

participant #	age group	sex	digital possession
28	e	female	Digital photos
19	e	female	personal financial history spreadsheet
30	e	female	personal writing
8	f	female	digital photographs
17	f	male	music collection

Table 18 provides the statements that distinguish the Factor. Factor 5 is most distinguished by positive statements, as zero participants loaded negatively on the Factor. "It's for work/school, it's professionally related" (primary) and "I don't think if it as a possession" (primary) are the most distinguishing statements, followed by "It's easy to use," (primary) and "it's evidence of my witnessing." (secondary) None of these statements indicate self extension. Only the weakest positive ranking statement, "I've spent a lot of time with it," (+3), suggests a personal history with the possession, a characteristic of possession attachment.

Table 18
Distinguishing statements for factor 5, sorting task 1 (and their loadings on other factors)

#	Statements	Factors				
		1	2	3	4	**5**
		rnk	rnk	rnk	rnk	**rnk**
24	Its for work/school, its professionally related.	-1	4	1	-2	**5**
47	I don't think of it as a possession.	3	1	-3	0	**5**
51	Its easy to use.	1	-4	1	-2	**4**
1	It is evidence of my witnessing.	-4	-5	-5	0	**4**
55	I've spent a lot of time with it.	-1	0	5	0	**3**
49	It represents a time investment.	2	5	-2	3	**-4**
56	Other people wouldn't be interested in it.	4	0	2	-1	**-4**
17	It helps me achieve my goals.	1	0	-2	2	**-5**
2	It acts as a witness to creativity.	5	3	4	-5	**-5**

The negatively ranked statements on "Use and attachment," "It acts as a witness to creativity," (secondary) "It helps me achieve my goals," (secondary) and "Other people wouldn't be interested in it" (secondary) suggest a disagreement with the digital possession as evidence, use as an aid to accomplish a task/goal, and displaying identity to others.

Overall, this Factor appears to be defined by a description of use of possessions. "It is evidence of my witnessing" also suggests a purpose for maintaining the digital possession.

5.5.1.6 Summary, sorting task 1.

Table 19 below summarizes the characteristics of each Factor for sorting task 1. Overall, the Factors for sorting task 1 suggest self extension in four out of the five Factors. Two of the three key characteristics of self extension were present: possessions were recognized as being imbued with meaning and possessions were recognized as

contributing to identity. This demonstrates that participants did conceive of their digital possessions as extensions of their identity.

In addition to characteristics of self extension, the characteristic of emotion on Factor 1 suggests that participants on this Factor may also *attach* to digital possessions. While attachment to possessions was not explored in this study, this finding suggests that it might be worth exploring the concept in future research. Attachment also suggests an extreme form of self extension, suggesting that the strength of self extension may differentiate the Factors.

Table 19
Summary of all factors, sorting task 1

Factor		Statement summary	Possessions level	Archival level
1	+	Evidence	Self extension	Secondary
		Memory aide	Self extension	Secondary
	-	Emotional Relationship	Attachment	Secondary
		Use	Description and use	Primary
		Represents history	Self extension	Secondary
2	+	Interests	Self extension	Secondary
		Time	Attachment	Secondary
		Purpose for maintaining	Purpose for maintaining	Primary
		Use	Description and use	Primary
3	+	Importance	Self extension	Secondary
		Represents self	Self extension	Secondary
		Time	Attachment	Secondary
	-	Helps with a task	Use to accomplish a goal/task	Primary
		Legacy	Self extension	Secondary
		Lack of possession	Description and use	Primary
4	+	Reflection aide	Use to accomplish a goal/task	Primary
		Public preservation	Purpose for maintaining	Primary
		Control	Self extension	Secondary
	-	Evidence	Self extension	Secondary
		Use	Description and use	Primary
		Shared experience	Self extension	Secondary
		Emotional relationship	Attachment	Secondary
5	+	Use	Description and use	Primary
		Evidence	Self extension	Secondary

This sorting task helped define what other characteristics appear along with self extension to possession: use, purpose for maintaining and use to accomplish a task. The different factors represent different compositions of primary and secondary value associated with digital possessions. This information helps begin to define a spectrum of self extension to digital possessions.

Use and the purpose for maintaining were present in many of the factors. This suggests that possessions that individuals conceived of as extension of their identity also had "maintaining qualities." This could also be related to previous findings by Kwasnik (1989) and Barreau (1995) that perceived that use is related to how individuals classify personal information. While participants were not classifying information in this exercise, the fact that use was commonly understood as a characteristic for representing identity to oneself suggests that self extension to possessions may play a role in how individuals classify and organize their information. Further, the combination of use and purpose for maintaining could suggest that individuals classify and organize personal information for the same reasons that they maintain personal information.

With respect to possession level, each Factor for sorting task 1 represented a combination of self extension to possessions, possession attachment and/or use and a utilitarian understanding of the possession. From this study, it appears that points of view on self extension to possessions are subtle and multi-faceted; aside from extreme examples, many of the statements that define an individual's relationship with a digital possession do not necessarily agree: for example, a digital possession can be understood

as being utilitarian, but one can also have an emotional attachment to the possession, two characteristics which can conflict with one another.

5.5.2. Sorting task 2

For sorting task 2, participants were asked to sort the Q sample (see Table 3) according to the digital possession that they believed best represented their identity *to other people*. This differs from sorting task 1, which asked participants to sort the Q sample according to the digital possession that most represented their identity *back to them*. According to Divides and Machleit (1994), reflections of identity to oneself and to others are aspects of self extension to possessions.

Table 20 displays the Factor loadings, age group, and sex for each of the 48 participants for sorting task 2. Thirty-seven of the 48 participants loaded onto one of the three Factors. Nearly half of the participants (17/37) chose Facebook or a digital possession within Facebook as the digital possession that most displayed their identity to others, to direct the sorting exercise.

Table 20

Factor matrix for sorting task 2

Participant #	1	2	3	Age Group	Sex
5	**0.3157**	0.1515	-0.0430	18-24	female
9	0.0503	**0.3086**	-0.0711	18-24	female
12	0.0825	**-0.4845**	-0.0901	18-24	female
14	0.2349	**0.2876**	0.0049	18-24	female
15	-0.2674	**0.3796**	0.3237	18-24	female
16	-0.0255	-0.0804	0.1705	18-24	female
18	-0.2313	0.1999	**0.3211**	18-24	female
1	0.0958	0.1641	-0.0258	18-24	male
2	**0.2901**	0.0384	0.2192	18-24	male
21	0.2199	-0.2010	0.1723	18-24	male
22	**0.4135**	-0.0816	0.3850	18-24	male
25	0.1792	-0.0436	**0.4020**	18-24	male
42	**0.4282**	-0.0415	-0.1400	18-24	male
45	0.2434	0.1712	0.0708	18-24	male
46	**0.4051**	0.2707	-0.3306	18-24	male
	1	2	3	Age group	Sex
19	0.1822	-0.2168	0.1117	38-47	female
20	**0.4493**	-0.0446	0.1051	38-47	female
23	**0.3772**	-0.3606	-0.1768	38-47	female
28	-0.2016	0.0977	**0.2548**	38-47	female
29	0.0600	**-0.4138**	0.1019	38-47	female
30	-0.0281	**0.3831**	0.1925	38-47	female
31	**0.4583**	-0.3376	-0.1603	38-47	female
41	**-0.3557**	0.0272	0.0075	38-47	female
48	0.3094	**0.4574**	0.0376	38-47	female
10	0.0853	-0.0780	**0.6254**	38-47	male
26	0.2096	0.1441	-0.1326	38-47	male
32	-0.1158	-0.0358	**0.4781**	38-47	male
34	0.0007	0.0105	**0.4248**	38-47	male
35	0.2413	**0.3643**	0.0262	38-47	male
36	-0.1284	**-0.4547**	-0.2986	38-47	male
44	0.1709	0.0792	0.0652	38-47	male
	1	2	3	Age group	Sex
3	-0.0554	**0.3197**	-0.2971	58-67	female
4	**-0.3664**	0.1252	-0.0864	58-67	female
6	**0.3902**	0.0054	-0.1693	58-67	female
7	-0.0219	0.0436	**0.4390**	58-67	female
8	**-0.2656**	0.0666	-0.1659	58-67	female
11	**0.2913**	0.0720	-0.0141	58-67	female
13	0.0181	0.0050	**0.4731**	58-67	female
24	**0.3335**	0.0161	-0.2827	58-67	female
27	0.0407	0.0875	-0.0495	58-67	female
17	-0.0676	-0.1109	**0.4313**	58-67	male
33	-0.0429	**0.3999**	-0.1240	58-67	male
37	0.0663	0.1863	0.2409	58-67	male
38	-0.0428	0.2520	-0.1203	58-67	male
39	0.0468	**0.3232**	0.0067	58-67	male
40	**-0.2780**	-0.0487	0.1667	58-67	male
43	-0.0483	0.2031	0.1146	58-67	male
47	-0.1912	**0.3679**	-0.1894	58-67	male
% variance explained by each Factor	6	6	6		

As stated in the section "*provides a sense of bounded control*," when participants spoke of Facebook they were usually referring to possessions in Facebook, rather than their whole Facebook account. A complete list of Factor arrays for each of the 48 statements can be found in Appendix D.

Overall, participants reported it much easier to think about how others saw their identity in digital possessions versus how they themselves saw their identity reflected in their digital possessions. One participant suggested that most people already think about what different possessions say about them, so the concept was more familiar than reflecting on one's own possessions.

5.5.2.1 Factor 1 (positive and negative loadings), "Accomplishment aide"

Fifteen participants (11+, 4-) loaded onto Factor 1. Table 21 displays the demographic information, including the digital possession each participant chose for this Factor. The Factor includes females and males, as well as all age groups. The sex distribution includes a majority of females (10 females, 4 males). All participants from age group E (38-47 years old) and age group F (58-67 years old) are female, and only one participant from age group d (18-24 years old) on this Factor is female. Half of the participants chose Facebook as their possession; others chose digital music, digital photos or a blog.

Table 21
Participants loading onto Factor 1, sorting task 2

participant #	age group	sex	digital possession
5	d	female	iTunes library
42	d	male	Digital music
22	d	male	Facebook page
46	d	male	iTunes/music library
2	d	male	Facebook page
31	e	female	Digital photographs
20	e	female	Facebook
23	e	female	Facebook page
41	**e**	**female**	**Professional website/blog**
6	f	female	Facebook
24	f	female	digital photo album
11	f	female	email
4	**f**	**female**	**photos**
8	**f**	**female**	**email**
40	**f**	**male**	**face book**

Table 22 displays the defining statements for the Factor. The most distinguishing statements (ranked +5) for Factor one, "It helps me achieve my goals," (primary) "It allows me to reflect on things," (primary) and "It helps me forget" (primary) suggest that the possession is used as a "means to an end" which mirrors Furby's (1978) finding that a possession is used to accomplish a task/goal. "It represents change in me" (secondary) and "It represents a side of me" (secondary) suggest self extension. The other positively ranked statements describe the possession, suggesting that the participant does not conceive of the possession beyond it's primary use. If the participant cannot conceive of a digital possession beyond its primary use, then it is unlikely the participant can conceive of the digital possessions as representing identity.

Table 22
Distinguishing statements for factor 1, sort task 2 (and their loadings on other factors)

#	Statements	Factors		
		1	2	3
		rnk	rnk	rnk
17	It helps me achieve my goals.	**5**	0	-2
37	It allows me to reflect on things.	**5**	1	-2
4	It helps me forget.	**5**	0	3
20	It represents change in me.	**4**	-3	0
38	It's useful as a record.	**4**	-2	2
59	I wouldn't feel right deleting it.	**4**	1	0
52	I look at it/open it frequently.	**3**	0	-1
27	It represents a side of me.	**3**	-2	-5
7	It is mine and no one else's.	**3**	0	-4
24	It's for work/school, its professionally related.	**-3**	3	3
26	It's nostalgia.	**-3**	-5	5
18	It represents a history/chronology.	**-4**	0	-1
55	I've spent a lot of time with it.	**-4**	1	0
33	It helps me function.	**-4**	2	0
2	It acts as a witness to creativity.	**-5**	5	5
51	It's easy to use.	**-5**	5	-5

A disagreement with the negatively ranked statements “Its easy to use” (primary) and “It acts as a witness to creativity” (secondary) suggests that participants who positively load on the “Accomplishment aide” (Factor 1) did not conceive of the digital possessions for only their primary purpose or conceive of the digital possessions as evidence of creativity.

On the negative end of rankings, “It’s easy to use” scored a -5 and describes use of a possession, while “It acts as a witness to creativity” also scored a -5 and suggests the purpose for maintaining is for evidence. These statements suggest utility, which suggests that participants do not conceive of their digital possessions beyond their primary value.

The negative end of Factor 1 also suggests possession attachment: "I've spent a lot of time with it," (secondary) and "It's nostalgia" (secondary) suggest an emotional relationship with the possession. "It represents a history/chronology," (secondary) suggests a representation of identity.

Overall, this Factor is determined by a concept that the possession can act as an aide to accomplish a task or goal. In addition, "Accomplishment aide" represents self extension to possessions and is characterized by the possessions having the ability to contribute to one's identity. In contrast, the negative loadings are characterized by use of possessions and possession attachment.

5.5.2.2 Factor 2 (positive and negative loadings), "Meaning, attachment, and identity."

Twelve participants (9+, 3-) loaded onto Factor 2. Table 23 provides demographic information for the participants who loaded onto "Meaning, attachment, and identity" (Factor 2). Participant information that is bolded describes participants who negatively loaded onto the Factor. While participants from all three age groups are represented on the Factor, the majority of participants are female and about half of all participants chose Facebook as their digital possession that most represents their identity to other people.

Table 23
Participants loading into Factor 2, sorting task 2

participant #	age group	sex	digital possession
15	18-24	female	Facebook pictures
9	18-24	female	Facebook
14	18-24	female	twitter
12	18-24	female	Facebook
48	38-47	female	My blog
30	38-47	female	Facebook page
29	38-47	female	Facebook
35	38-47	male	Facebook account
36	38-47	male	Facebook account
3	58-67	female	digital photos
33	58-67	male	Data analysis programs I write at work.
39	58-67	male	Sermon files
47	58-67	male	statistical analyses

Table 24 displays the most distinguishing statements for the Factor. The positively ranked statement "Its important to me" (secondary) suggests that the possession is imbued with meaning, a characteristic of self extension.

Table 24
Distinguishing statements for Factor 2, sorting exercise 2 (and their loadings on other factors)

#	Statements	Factors		
		1	**2**	3
		rnk	**rnk**	rnk
28	It's important to me.	1	**5**	0
51	It's easy to use.	-5	**5**	-5
25	It represents my family.	1	**4**	-2
42	It represents my experiences.	-2	**3**	2
47	I don't think of it as a possession.	0	**3**	1
35	It represents the best of me.	-5	**3**	-4
20	It represents change in me.	4	**-3**	0
32	It's something I want to leave behind for others after I die.	-4	**-3**	-4
10	It shows my background.	-1	**-3**	5
23	It's something I want to hold onto.	-1	**-4**	1
43	It gives me joy.	2	**-4**	0
53	It has sentimental value.	-1	**-4**	1
50	It represents quirks about me.	1	**-5**	-2
1	It is evidence of my witnessing.	0	**-5**	-3
26	It's nostalgia.	-3	**-5**	5

"It represents my family" (secondary) and "It represents my experiences" (secondary) suggest that the participants who load on this Factor understand their possessions to represent aspects of their identity, or self extension to the possession. In contrast "I don't think of it as a possession" (primary) conflicts with this finding. How can a participant conceive of a digital item as representing identity (a secondary value), but not conceive of that digital item beyond its primary value? According to one of the salient characteristics of self extension to physical possessions, self extension to a possession occurs when an individual can perceive of the possession as representing aspects of his identity. This finding calls into question whether individuals conceive of their digital possessions and physical possessions with the same characteristics.

Upon reviewing Furby's most salient characteristics of physical possession, none of the characteristics are tied to the "physicalness" of the possession, all salient characteristics are linked with how an individual conceives of the possession, which leads one to believe that "physicalness" does not matter. What defines this shift in salient characteristics when considering self extension to physical possessions versus self extension to digital possessions?

One explanation might be the presence of characteristics of possession attachment, which can be considered an extreme form of self extension to possessions. Attachment may make up for this loss of physicalness, when considering the difference between physical to digital possessions. During sorting, one participant in the 58-67 year old age group mentioned that he had spent less of his life with digital possession than with physical possessions. If other participants employed this thinking, then self extension to digital possessions may rely more on attachment to possessions (a characteristic of possession attachment is a personal history with the possession) than was found in previous research on self extension to physical possessions. For self extension to a digital possession to occur, possession attachment may need to be present to make up for a lost element that the physical possession provides. Future research should further address this issue-specifically why some individual do not consider a digital item a possession and the implications for self extension to digital possessions.

On the negative end of the rankings, "It's nostalgia" (secondary) and "It has sentimental value" (secondary) suggest an emotional relationship with the possession, a characteristic of possession attachment. "It is evidence of my witnessing" scored a -5,

which suggests evidence as a purpose for maintaining. "It's something I want to hold onto" scored a -4, and "It's something I want to leave behind for others after I die" scored a -3" which all suggest purposes for maintaining digital possessions.

Overall, this Factor's positive loading statements suggest possessions imbued with meaning and possessions that can extend and display one's identity to others. In contrast, the negative rankings are characterizes by possession attachment and a purpose for maintaining the possessions.

5.5.2.3 Factor 3 (positive loading), "Attachment and displaying identity to others."

Nine participants (9+, 0-) loaded onto Factor "Attachment and displaying identity to others." Table 25 below details the demographic information for participants who loaded onto the factor.

Table 25
Participants loading onto Factor 3, sorting task 2

participant #	age group	sex	digital possession
18	18-24	female	digital photos
25	18-24	male	collection of fan made comicks on my computer
28	38-47	female	digital photos
10	38-47	male	my music library
32	38-47	male	Digital pictures/images of me and people around me that are shared/shown with/to the public/other people.
34	38-47	male	Photo of my family
13	58-67	female	professional writing
7	58-67	female	Facebook
17	58-67	male	professional writing

All age groups are represented by the Factor and the sex ratio for this factor is somewhat even (4 females, 5 males). Unlike Factors 1 and 2 for this sorting task, only one participant chose Facebook as their digital possession. Table 26 displays the most distinguishing statements for the Factor. The statements "It's nostalgia" (secondary) and "It represents a time investment" (secondary) suggest a personal history mixed with emotion for the possession. In addition, "It shows my background" (secondary) suggests self extension to the possession.

Table 26
Distinguishing statements for factor 3, sorting exercise 2 (and their loadings on other factors)

#	Statements	Factors 1	2	**3**
		rnk	rnk	**rnk**
26	It's nostalgia.	-3	-5	**5**
10	It shows my background.	-1	-3	**5**
49	It represents a time investment.	2	-1	**4**
29	I maintain it in case I ever need it again.	-1	1	**4**
34	It keeps me connected.	0	-2	**4**
39	I have an impulse to maintain it.	-2	-1	**3**
41	It's accessible anywhere.	-2	-1	**3**
4	It helps me forget.	5	0	**3**
1	It is evidence of my witnessing.	0	-5	**-3**
11	I share it with the public.	-1	1	**-3**
22	It's unique to me.	0	2	**-3**
44	It's aesthetically pleasing.	1	-1	**-3**
7	It is mine and no one else's.	3	0	**-4**
51	It's easy to use.	-5	5	**-5**
3	I maintain it to retain digital public samples.	-1	-2	**-5**
27	It represents a side of me.	3	-2	**-5**

Other statements: "It keeps me connected" (primary) and "It helps me forget" (primary) suggest that the possession helps the participant accomplish a task/goal.

Finally, “I maintain it in case I ever need it again” (primary) and “I have an impulse to maintain it” (primary) suggest purposes for maintaining the possession.

The negatively ranked statements represent a disagreement with the point of view that the statements represent. Comparing the negatively ranked statement “I maintain it to retain public digital samples” (primary) with the positively ranked statement “I maintain it in case I ever need it again” (primary) implies that participants who loaded onto this factor maintain digital possessions for their own benefit, not for others.

Overall, this Factor is distinguished by possession attachment, extending and displaying identity to others, use to accomplish a task/goal, and purpose for maintaining. Again, self extension is mixed with a utilitarian concept and possession attachment for this Factor, suggesting that a combination of these characteristics defines self extension to digital possessions.

5.5.2.4 Summary, sorting task 2.

A summary of characteristics for sorting task 2 is displayed in Table 27. All factors included a mix of self extension characteristics, attachment characteristics, description and use, use to accomplish a goal/task and/or purpose for maintaining. While some Factors emphasize self extension, some emphasize use. This information provides further data about the salient characteristics of self extension to digital possessions and supports the development of a multilayered spectrum for self extension to possessions.

Table 27
Summary of all factors, sorting task 2

Factor		Statement summary	Possessions level	Archival level
1	+	"Means to an end"	Use to accomplish a goal/task	Primary
		Represents me	Self extension	Secondary
		Description	Description and use	Primary
	-	Description	Description and use	Primary
		"Means to an end"	Use to accomplish a goal/task	Primary
		Attachment	Attachment	Secondary
2	+	Represents identity	Self extension	Secondary
		Description	Description and use	Primary
		Meaning	Self extension	Secondary
		Use	Description and use	Primary
	-	Emotional relationship	Attachment	Secondary
		Evidence	Self extension	Secondary
		Description	Description and use	Primary
		Purpose for maintaining	Purpose for maintaining	Primary
3	+	Personal history	Attachment	Secondary
		Shows identity	Self extension	Secondary
		"Means to an end"	Use to accomplish a goal/task	Primary
		Purpose for maintaining	Purpose for maintaining	Primary

The findings for this sort task suggest that while self extension to a digital possession exists, some participants hesitate to think of the digital items as possessions along the same lines that they think of physical possessions. Furby (1978) did not find that "physicalness" was a salient characteristic of the physical possessions. However, the findings from this study that the characteristics of self extension to digital possessions are often coupled with characteristics of possession attachment, suggest that the presence of the possession attachment characteristics may be necessary for some participants to

perceive self extension to digital possessions, in order to make up for a missing element that the digital environment lacks.

5.5.3. Summary, self extension in digital environments (Findings, Q method sorting tasks 1 and 2)

Previous studies have explored self extension to physical possessions; this study is the first to conduct an in depth exploration of self extension to digital possessions. Sorting task 1 and sorting task 2 explore two dimensions of self extension to possessions: that possessions to which the self has extended can reflect one's identity back to himself and that possessions to which the self has extended can represent one's identity to others. Characteristics of self extension to possessions are as follows:

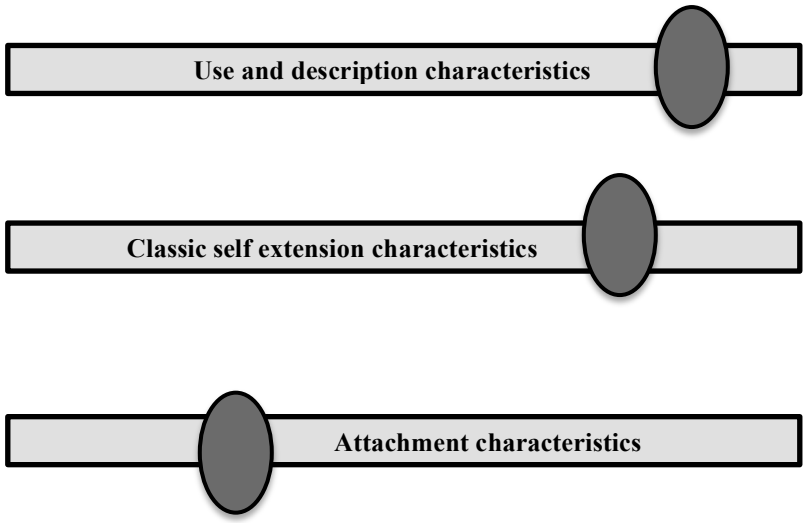
- possessions to which the self has extended are *imbued with meaning* (Schau, 1998);
- possessions can *contribute to a sense of identity;*
- and possessions to which the self has extended can act as *a vehicle to extend the identity to others* ((Sivadas & Machleit, 1994).

The characteristics of self extension to digital possessions rank differently for different groups of participants. While some participants considered the digital possessions that reflect their identity to themselves or others to be imbued with meaning, other participants understood the digital possessions to contribute to a sense of identity and/or extend their identity to others. This finding suggests that individuals may possess a preference for a specific combination of characteristic of self extension to digital possessions.

These findings also suggest that varying degrees of self extension to possessions can exist on a multi-layered spectrum, as visualized in Figure 10. Statements reflecting description and use characteristics, previously established self extension to possessions

characteristics, and possession attachment characteristics were present for most Factors; Factors differed in the ranking of each of these statements. While self extension to physical possessions can be considered a single layered spectrum (absence of self extension to presence of self extension), a multi-layered spectrum describes self extension to possessions in the digital environment. An individual exists along each of the three layers of the spectrum to produce their individual opinion about self extension to digital possessions. Considered as a set, an individual's placement on these three layers of the spectrum define self extension in digital environments.

Figure 10
Spectrum of self extension to possessions in digital environments with individual example



The finding that *use* of a possession and the *purpose for maintaining* a possession were repeatedly found in conjunction with characteristics of self extension to digital possession across Factors in both sorting tasks imply that these characteristics may also define self extension to digital possessions. Alternately, Furby (1978a) found that use and responsibility for care of possessions to be two of the salient characteristics of

possessions. This suggests that while some participants can extend their identity to their possessions, others cannot, and merely describe the digital possession's primary value. These participants would fall on the weak end of the self extension to possessions and attachment to possessions layers of the multi-faceted spectrum in Figure 27.

The following characteristics of possession attachment were present in the Factors for both sorting tasks:

- a personal history with the possession;
- and an emotional relationship with the possession (Kleine & Baker, 2004).

Kleine and Baker found that self extension to possessions, in addition to six other characteristics, define possession attachment. However, characteristics of self extension to possessions and possession attachment do not always coexist on a single Factor. It is possible that possession attachment contributes to self extension to digital possessions for some individuals. This finding could support Sivadas and Machleit's (1994) hypothesis that a more intense sense of self extension to possessions can contribute to possession attachment.

5.5.4 Sorting task 3

For sorting task 3, participants were asked to sort the Q sample (see Table 3) according to the digital possession that they would *most like to maintain for a digital legacy*. A digital legacy was defined as "the concept that a digital possession can extend beyond your life." This is similar to the definition of a digital legacy suggested by Carroll and Romano (2010): "When you pass away you will leave behind your digital

content. Taken as a whole, this content is your digital legacy. (Kindle location p. 209-210).

Forty-one of the 48 participants loaded onto one of the five Factors for sorting task 3, as detailed in Table 28. Digital photos were the most common digital possessions chosen. In addition, Facebook, digital music, and personal websites were also frequently chosen.

Table 28

Factor matrix for sorting task 3

	1	2	3	4	5	Age Group	Sex
5	**0.3823**	0.0525	0.0782	-0.0706	0.1857	18-24	female
9	**0.3918**	0.0243	0.2995	0.1595	0.2736	18-24	female
12	-0.0447	**0.5287**	-0.1286	-0.0553	0.1692	18-24	female
14	**0.4658**	0.1341	0.4142	-0.0012	-0.0615	18-24	female
15	0.0430	0.0803	**0.6691**	-0.0567	-0.1020	18-24	female
16	-0.0470	-0.0934	0.1396	**0.5652**	-0.0700	18-24	female
18	0.0095	0.1015	-0.0312	0.0678	0.1721	18-24	female
24	0.0535	-0.1357	**0.3344**	0.0889	0.0837	18-24	female
1	-0.1302	-0.0428	-0.2663	0.2109	0.1260	18-24	male
2	-0.1011	-0.2782	-0.0701	-0.0475	**-0.3577**	18-24	male
21	0.0408	**-0.3758**	-0.0734	-0.0392	0.0327	18-24	male
22	-0.1841	-0.0018	-0.0228	0.0430	**0.3257**	18-24	male
25	**-0.2728**	-0.0173	0.1661	0.0125	0.0918	18-24	male
42	**0.4823**	0.2095	0.2633	-0.0183	-0.0561	18-24	male
45	-0.2363	0.2183	0.3076	0.0371	-0.2871	18-24	male
46	0.1094	0.1532	-0.0451	**0.4545**	-0.0913	18-24	male
	1	2	3	4	5	Age Group	Sex
19	0.1920	-0.0205	-0.0059	**0.3936**	0.1194	38-47	female
20	0.0050	0.1761	**0.4197**	0.0762	-0.0584	38-47	female
23	0.1310	-0.1794	-0.0451	**-0.3537**	-0.1131	38-47	female
28	-0.1079	-0.1492	0.0783	-0.2212	**0.5408**	38-47	female
29	**0.4413**	0.2770	-0.1174	-0.0484	0.0146	38-47	female
30	0.2818	**0.4046**	0.1127	-0.0030	0.1096	38-47	female
31	**0.4970**	-0.1071	0.1189	0.1444	-0.0767	38-47	female
41	**0.3747**	0.1603	0.1837	0.0394	0.2513	38-47	female
48	-0.2502	0.2684	0.2235	0.1018	0.0865	38-47	female
10	0.1713	0.2325	**0.4330**	0.2314	0.1022	38-47	male
26	0.0959	**0.4262**	-0.3543	-0.0354	0.0811	38-47	male
32	0.1455	0.1185	-0.3433	**-0.4041**	0.0223	38-47	male
34	0.0433	-0.0291	0.0372	**-0.5126**	-0.0009	38-47	male
35	0.2386	0.0595	0.0181	0.0172	**0.5579**	38-47	male
36	0.3690	-0.2044	0.0808	-0.3290	-0.0131	38-47	male
44	0.0944	0.3200	**0.4207**	-0.0020	0.1850	38-47	male
	1	2	3	4	5	age group	sex
3	0.3749	-0.0329	**0.4825**	-0.2838	0.0574	58-67	female
4	0.2005	0.0810	0.2702	**0.3962**	-0.1262	58-67	female
6	-0.1230	-0.2494	-0.1709	**0.4040**	0.0555	58-67	female
7	0.0327	**0.3239**	0.0607	0.0101	0.0911	58-67	female
8	-0.2444	0.1696	0.1530	**-0.3807**	-0.2367	58-67	female
11	-0.2054	-0.2881	0.0464	-0.0098	**0.4654**	58-67	female
13	**0.5389**	-0.0397	-0.1473	0.2917	-0.1154	58-67	female
27	**0.5208**	-0.1385	0.4305	0.0367	0.0706	58-67	female
17	0.0457	0.2378	-0.1095	0.0068	**0.6608**	58-67	male
33	0.0999	**0.3537**	0.3135	0.1098	0.0513	58-67	male
37	0.0849	-0.0370	**0.2779**	-0.0838	-0.0075	58-67	male
38	-0.0116	-0.2784	0.2968	-0.1902	-0.0312	58-67	male
39	0.0479	**-0.4187**	-0.1131	0.1389	0.2374	58-67	male
40	0.0057	**0.4180**	-0.0228	0.0062	-0.0584	58-67	male
43	0.3160	0.1947	0.1926	0.1683	-0.1477	58-67	male
47	**0.5756**	-0.0648	0.2269	-0.2022	0.0560	58-67	male
% variance explained by each Factor	7	5	6	5	5		

5.5.4.1 Factor 1 (positive loading), "Use and purpose."

Eleven participants (10+, 1-) loaded onto Factor 1. Table 29 details the demographics of participants who loaded onto Factor 1. While all age groups are represented, the majority of participants who loaded onto this Factor are female. Most participants chose digital photos as the digital possession they would most like to maintain for a digital legacy.

Table 29
Participants loading onto Factor 1, sorting task 3

participant #	age group	sex	digital possession
14	18-24	female	photos
9	18-24	female	Facebook
5	18-24	female	Facebook
42	18-24	male	Digital photos
25	18-24	male	nonprofessionally created art
31	38-47	female	Digital photographs
29	38-47	female	digital photos
41	38-47	female	Digitized letters from grandparents
13	58-67	female	digital photos
27	58-67	female	Pictures and stories of family vacations
47	58-67	male	photographs

Table 30 displays the most distinguishing statements for the Factor. The statements "It's easy to use" (primary) describes use of the possession. Many of the other positively ranked statements on the Factor "I have an impulse to maintain it," "I maintain it to retain digital public samples," and "It's something I want to leave behind for others after I die" are associated with the purpose for maintaining. Since the condition of instruction directed participants to "think of a digital possession you would

most like to maintain for a digital legacy," these statements describe the purpose of a maintaining a digital legacy.

Table 30
Distinguishing statements for Factor 1, sorting task 3 (and their loadings on other factors)

#	Statements	Factors				
		1	2	3	4	5
		rnk	rnk	rnk	rnk	rnk
60	There is no hard copy of it.	**5**	1	3	0	-4
51	It's easy to use.	**5**	4	-2	1	2
46	I would be upset if it were lost/deleted.	**4**	-3	0	2	0
39	I have an impulse to maintain it.	**4**	-1	2	0	-1
3	I maintain it to retain digital public samples.	**4**	-3	5	5	-3
32	It's something I want to leave behind for others after I die.	**4**	1	0	-4	1
34	It keeps me connected.	**3**	-4	-1	-5	0
47	I don't think of it as a possession.	**3**	1	1	-2	-4
35	It represents the best of me.	**-3**	2	4	0	5
56	Other people wouldn't be interested in it.	**-4**	0	2	-1	1
16	It represents who I am now.	**-4**	0	-2	0	0
5	It helps me fulfill a (perceived) duty.	**-4**	1	-3	-2	0
57	It contains information about me.	**-5**	0	-2	1	0
52	I look at it/open it frequently.	**-5**	2	0	1	-3

Only two positive statements suggest self extension: "I would be upset if it were lost/deleted" (secondary) and "Its something I want to leave behind for others after I die" (secondary). In the context of this condition, "Its something I want to leave behind for others after I die" does not provide much information as the definition of a digital legacy is closely aligned with this statement.

"There is no hard copy of it" (primary),"Its easy to use" (primary), "It keeps me connected" (primary) and "I don't think of it as possession" (primary) all describe the document. "I don't think of it as a possession" suggests that as was found in sorting task 2, the digital possessions that individuals want to maintain for a digital legacy lack a

quality that physical possessions retain, causing some participants to reject the digital items as possessions.

The negatively ranking statements on this Factor, specifically "It contains information about me," "It represents the best of me," and "It represents who I am now" suggest contributing to a sense of identity. As these statements rank negatively, participants that positively loaded on this Factor disagreed with the concept that the digital possessions they would most like to maintain for a digital legacy contribute to a sense of identity.

Overall, this Factor describes use and suggests a purpose for a digital legacy, but also suggests that the digital possessions lack a quality of physical possessions.

5.5.4.2 Factor 2 (positive loading), "Disagreement with attachment"

Eight participants (6+, 2-) loaded onto Factor 2. Table 31 displays the demographics for each participant that loads onto the factor. All three age groups are represented, but more members of age group F (58-67 years old) loaded onto this factor than other age groups. Slightly more men than women loaded onto the factor (3 women and 5 men). Half of the participants chose digital photos as their digital possession, while other participants chose work products/personal accomplishments and correspondence.

Table 31
Participants loading on Factor 2, sorting task 3

participant #	age group	sex	digital possession
12	18-24	female	digital photos
21	18-24	male	rowing records from HS crew team on HS website
30	38-47	female	digital photographs
26	38-47	male	photos
7	58-67	female	personal letters/email
40	58-67	male	digital photos
33	58-67	male	A memorial book about my mother.
39	58-67	male	Book manuscript

Table 32 displays the distinguishing statements for Factor 2. The statement "It acts as a witness to creativity" (secondary) suggests that the digital possession can contribute to a sense of identity by representing a unique characteristic that could help define an individual. "It represents a side of me" (secondary) and "It represents quirks about me" (secondary) also suggest that the digital possession can represent aspects of identity. "It helps me function" (primary) and "It helps me forget" (primary) suggest that the possession is used to help the participant accomplish a goal/task. "I can categorize it" (primary) describes organization of the digital possession. Finally, "It's easy to use" (primary) describe use.

Table 32

Distinguishing statements for factor 2, sorting task 3 (and their loadings on other factors)

#	Statements	Factors				
		1	**2**	3	4	5
		rnk	**rnk**	rnk	rnk	rnk
2	It acts as a witness to creativity.	-1	**5**	-2	-5	0
33	It helps me function.	1	**5**	3	2	2
54	I can categorize it.	0	**5**	-3	0	-1
27	It represents a side of me.	2	**4**	2	1	-1
51	It's easy to use.	5	**4**	-2	1	2
4	It helps me forget.	-2	**3**	0	0	0
50	It represents quirks about me.	-1	**3**	5	-5	-2
8	It's something I modify myself.	1	**-3**	-1	0	-1
46	I would be upset if it were lost/deleted.	4	**-3**	0	2	0
26	It's nostalgia.	2	**-4**	2	4	-5
34	It keeps me connected.	3	**-4**	-1	-5	0
9	It reflects my personality.	1	**-4**	-1	3	-2
36	It represents a shared experience.	-2	**-5**	-4	-3	2
53	It has sentimental value.	2	**-5**	1	-3	5
1	It is evidence of my witnessing.	-5	**-5**	-5	-2	-2

The negatively ranked statements "It has sentimental value," (secondary) "Its nostalgia," (secondary) and "I would be upset if it were lost/deleted" (secondary) represent a disagreement with possession attachment. As many of the statements that link to attachment characteristics are ranked negatively on this Factor, the Factor is more defined by its disagreement with possession attachment than it is defined by the positively ranked statements.

5.5.4.3 Factor 3 (positive loading), "Represent identity"

Seven participants (7+, 0-) loaded onto Factor 3. Table 33 displays the demographics for participants who loaded onto this Factor. All age groups are represented on the Factor, as well as a roughly even sex ratio. Participants chose digital photos, music, communication or personal writing.

Table 33
Participants loading onto Factor 3, sorting task 3

participant #	age group	sex	digital possession
15	18-24	female	photos
24	18-24	female	music
20	38-47	female	personal writings
10	38-47	male	my music I have written and recorded
44	38-47	male	Photo Album
3	58-67	female	digital photos
37	58-67	male	email files

Table 34 displays the distinguishing statements for the Factor. "It represents quirks about me" (secondary), "It's something I want to hold onto" (secondary), and "It's a visual representation of a memory" (secondary) suggest that possessions can represent one's identity in the past and present.

Table 34
Distinguishing statements for factor 3, sorting task 3(and their loadings on other factors)

#	Statements	Factors				
		1	2	**3**	4	5
		rnk	rnk	**rnk**	rnk	rnk
50	It represents quirks about me.	-1	3	**5**	-5	-2
29	I maintain it in case I ever need it again.	2	0	**4**	-2	-2
30	It's a visual representation of a memory.	1	-1	**3**	-4	0
23	It's something I want to hold onto.	0	0	**3**	-1	1
42	It represents my experiences.	0	2	**-4**	-2	-1
17	It helps me achieve my goals.	0	1	**-5**	0	-2
25	It represents my family.	-2	0	**-5**	3	3

While no participants loaded negatively on this Factor, one of the lowest ranking statements: "It represents my family" (secondary) is linked with the same characteristic of self extension to possessions as the highest ranking statement ("It represents quirks

about me") (secondary), as they both suggest that digital possessions serve as representations. This suggests that there are different contexts (as represented by the statements) linked with characteristics of self extension and that they are highly individualistic.

Overall, this Factor represents that possessions can represent identity. However, context may play a factor in which elements of a digital possession defines identity.

5.5.4.4 Factor 4 (positive and negative loadings), "Remembering vs. evidence"

Nine participants (5+, 4-) loaded onto Factor 4. Table 35 displays the participants that loaded onto Factor 4. Bolded text indicates participants that negatively loaded onto the Factor. All age groups are represented, but twice as many females than males loaded onto the Factor. Participants chose digital photos, Facebook, work documents, a blog and a tax return as their digital possession.

Table 35
Participants loading on Factor 4, sorting task 3

participant #	age group	sex	digital possession
16	18-24	female	blog
46	18-24	male	Facebook information (profile info
19	38-47	female	Facebook
23	38-47	female	digital photos
34	38-47	male	2010 Tax return
32	38-47	male	Digital images/pictures of me and people around me.
6	58-67	female	digital photo collection
4	58-67	female	photos
8	58-67	female	procedural docs from work

Table 36 displays the distinguishing statements for the Factor. The highest ranking statements for the Factor: "It helps me remember" (secondary) and "It helps me

remember my childhood" (secondary) suggest that the digital possession contributes to a sense of identity, specifically through remembering. Although remembering can be thought of as a task and thus the statements could be used to accomplish a task, Belk (1990) found that remembering is associated with self extension to the past. "It's nostalgia," (secondary) suggests an emotional element coupled with remembering (Baker & Kennedy, 1994). The weakest positive ranking, "It reflects my personality" (secondary) suggests that the possession can represent identity.

Table 36
Distinguishing statements for Factor 4, sorting task 3 (and their loadings on other factors)

#	Statements	Factors				
		1	2	3	**4**	5
		rnk	rnk	rnk	**rnk**	rnk
21	It helps me remember.	2	2	0	**5**	0
45	It helps me remember my childhood.	-2	-2	2	**4**	0
26	It's nostalgia.	2	-4	2	**4**	-5
38	It's useful as a record.	-2	-4	-3	**4**	-5
9	It reflects my personality.	1	-4	-1	**3**	-2
53	It has sentimental value.	2	-5	1	**-3**	5
30	It's a visual representation of a memory.	1	-1	3	**-4**	0
32	It's something I want to leave behind for others after I die.	4	1	0	**-4**	1
24	It's for work/school, its professionally related.	2	-2	4	**-4**	5
34	It keeps me connected.	3	-4	-1	**-5**	0
50	It represents quirks about me.	-1	3	5	**-5**	-2
2	It acts as a witness to creativity.	-1	5	-2	**-5**	0

The negatively ranked statements, "It acts as a witness to creativity" (secondary) suggest evidence. "It's something I want to leave behind for others after I die" suggest purposes for maintaining. "It represents quirks about me" (secondary) suggests that the

possession represents identity. "It keeps me connected" (primary) and "It's for work/school, it's professionally related" (primary) suggest description and use.

As was found with previous Factors, negative and positive loadings can be characterized by similar statements that link to self extension to possessions and possession attachment. On the positive loadings, statements that contribute to a sense of identity through remembering rank highly, while "It's a visual representation of a memory" (secondary) ranks negatively, implying a subtle different between understanding a possession as a tool to aide memory and thus contributing to a sense of identity, versus viewing a digital possession as encapsulating a memory and thus maintaining a possession for such a purpose.

Overall, this Factor is defined by contributions to identity, an emotional relationship suggesting possession attachment, and purpose for maintaining for positive loadings. Negative loadings are defined by evidence, representing identity and description and use.

5.5.4.5 Factor 5 (positive loading), "Attachment and meaning"

Six participants (5+, 1-) loaded onto Factor 5. Table 37 displays the demographics for participants who loaded onto this Factor. Bolded text for Participant #2 represents a negative loading on the Factor. All age groups were represented on the Factor, with twice as many males as females. Most participants chose digital photos or music as their digital possession.

Table 37
Participants loading onto Factor 5, sorting task 3

participant #	age group	sex	digital possession
22	d	male	mps of me performing with my sala band
2	**d**	**male**	**my ac cappella groups webpage I maintain**
28	e	female	digital photos
35	e	male	Digital photos
11	f	female	financial records
17	f	male	photos

Table 38 displays the distinguishing statements for this Factor. "It has sentimental value" (secondary) and "It represents a time investment" (secondary) suggest an emotional relationship and a link to possession attachment. The next highest ranking statement, "It's important to me" (secondary) suggests that the possession is imbued with meaning. "It's aesthetically pleasing" (primary) describes the digital possession.

Table 38
Distinguishing statements for factor 5, sorting task 3

#	Statements	Factors				
		1	2	3	4	**5**
		rnk	rnk	rnk	rnk	**rnk**
53	It has sentimental value.	2	-5	1	-3	**5**
28	It's important to me.	3	2	0	-1	**4**
44	It's aesthetically pleasing.	-3	-2	0	1	**4**
49	It represents a time investment.	0	-2	-4	2	**3**
11	I share it with the public.	-1	0	-1	2	**-3**
52	I look at it/open it frequently.	-5	2	0	1	**-3**
60	There is no hard copy of it.	5	1	3	0	**-4**
47	I don't think of it as a possession.	3	1	1	-2	**-4**
41	It's accessible anywhere.	5	4	2	0	**-4**
20	It represents change in me.	-3	-2	1	-3	**-5**
26	It's nostalgia.	2	-4	2	4	**-5**

The negatively ranked statement "Its nostalgia" (secondary) suggests possession attachment, which contrasts with the positive ranking for "It has sentimental value" (secondary). While both statements are linked with possession attachment, the difference is that "Its nostalgia" connotes the past, while "It has sentimental value" could be referring to the past or present. Again, context may be an issue for some individuals when determining what digital possessions to maintain for a digital legacy. "I don't think of it as a possession" (primary) also ranks negatively on this Factor, supporting the proposed link between possession attachment and self extension to digital possessions.

Overall, this Factor represents an emotional relationship associated with possession attachment and descriptive characteristics of the possession.

5.5.4.6 Summary, sorting task 3

A summary of the characteristics for sorting task 3 is displayed in Table 39 below. Secondary value characteristics (self extension and attachment) were found in four of the five Factors. For some participants, an emotional connection to the possession appears more important than self extension to the possession, and could be useful in helping some individuals make maintaining decisions for this purpose. Description and Use was also found to be common characteristics of the digital possessions individuals desired to maintain for a digital legacy. According to Smith (2007), the public understands that "the value of content lies in it's use" for information collected by institutional repositories (p. 11). Smith argues that in institutional repositories, use of preserved content increases its value to society.

Table 39
Summary of characteristics for sorting task 3

Factor		Statement summary	Possessions level	Archival level
1	+	Description	Description and use	Primary
2	+	Disagreement with attachment	Attachment	Primary
3	+	Represents identity	Self extension	Secondary
4	+	Remembering aide	Self extension	Secondary
		Emotional relationship	Attachment	Primary
	-	Evidence	Self extension	Secondary
		Represents identity	Self extension	Secondary
		Describes use	Description and use	Primary
5	+	Emotional relationship	Attachment	Secondary
		Describes use	Description and use	Primary

Use, or value, can change over time. For example, the 1900 census was first of use as statistical data on demographics and it has increased in value because it is now also of use as a genealogical record. Archivists often consider secondary value when making appraisal decisions, depending on the appraisal method they utilize. Macroappraisal and functional analysis emphasize the roles and functions of the content creators over secondary value of archival material. Archivists use existing archival appraisal theories to determine value about an individual's or organization's content, mainly for the use of other people. While existing theories of archival appraisal are applicable to this study, the particular sorting task in this study is different because it asks the content creator to hypothetically determine value of their own digital possessions. Cunningham (1995) argues that archivists should work with creators of digital content so that the content is not lost due to continually evolving technology. Perhaps, what is needed is an appraisal theory that can be used by content creators, so that creators can better manage the digital

content they desire to maintain for a digital legacy and the digital content that represents them, that could someday be donated to an institutional archive.

5.5.5 A comparison between self extension to digital possessions and the desire to maintain digital possessions for a digital legacy

RQ 4 was designed to address whether the characteristics that define self extension to digital possessions *are the same* characteristics that define the desire to maintain digital possessions for a digital legacy. While many of the Q sample statements that were ranked highly for sorting tasks 1 and 2 were also ranked highly for sorting task 3, the sorting tasks demonstrate that self extension to digital possessions and the desire to maintain digital possessions vary across multiple Factors. While some Factors emphasize characteristics associated with attachment, some Factors emphasize factors associated with description and use. The difference between the Factors for sorting tasks 1 and 2 appears to be the ability of the participants who load onto the specific factor to perceive primary or secondary value in their digital possessions. If individuals perceived secondary value in their possessions, then they were able to perceive characteristics of self extension, attachment, or both in their digital possessions.

Previous research has found that individuals do not maintain their harddrives and webspace with much diligence (Marshall, 2008a; 2008b.) This finding suggests that when considering a digital legacy, most participants do consider a purpose for maintaining, rather than practicing benign neglect. This elevates digital possessions to which the self extends and digital possession that individuals desire to maintain for a digital legacy, above a sea of thousands of digital objects, and provides evidence that subtle selection of digital possessions do occur. Individuals utilize the characteristics of

primary and secondary values of their digital possessions to create boundaries for a digital legacy. This finding conflicts with findings from previous literature that suggest that maintaining everything in a personal web space, and searching amongst everything, is sufficient, at least when considering a digital legacy. Although storage is cheap and plentiful, selection still matters in the digital environment, when hypothetically defining a digital legacy.

Another common characteristics present in Factors for self extension to digital possessions and the desire to maintain digital possessions for a digital legacy was a description of use. As mentioned above, Smith (2007) contends that secondary use can determine the value of content in institutional repositories and thus, can influence preservation practices. In the personal digital environment, primary use appears to influence maintaining for a digital legacy. Coupled with the finding that participants understood that a digital legacy was for other people, it is possible that individuals believe that if a digital possession is useful *to them*, it would also be useful *to others*. A further exploration of individuals' understandings of primary and secondary use of digital possessions is needed to more fully comprehend the role of this finding.

In addition, this finding correlates with Barreau's (1995) and Kwasnik's (1989) findings that use was a key characteristic in how individuals organized their personal information on a computer desktop or (paper documents) in an office. Individuals may maintain information for the same reasons that they organize it.

The statement "I don't think of it as a possession," which ranked a +3 on Factor 1 applies to the findings from sorting task 2 that some participants had difficulty

conceiving of digital items as possessions, even though they could conceive of an emotional relationship with the items and that the items could represent their identity. This finding supports the suggestion that individuals may need to perceive characteristics of possession attachment in order to conceive of digital items as possessions, in order to make up some lack of "physicalness" missing from the digital environment.

VI. Discussion, implications, and limitations

Considering the data from the digital possession interviews and Q sorting tasks about digital possessions, several key findings emerged. Most participants acknowledged the concept of digital items as possessions. Individuals recognized these digital items as "theirs" even though they might not have legal ownership over the items. This is similar to Belk's (1987) findings that individuals need not own an item to consider it a possession: for example, several American participants considered the Statue of Liberty or Old Glory (the flag hanging in the Smithsonian atrium) "theirs" as Americans, even though they did not personally own it. In this sense, participants in this study considered the items in their Facebook profile "theirs" while simultaneously acknowledging that Facebook Inc. may retain ownership over these digital items.

While the digital possession interviews contextualized the concept of how individuals think of their digital possessions, the Q sorting tasks unpacked the concept to allow for more structure through ranking. The Q sample organized the interview statements at the archival level and then at the possession level, to impose structure onto the statements. This allowed the participants to express their opinions about digital possession in a hierarchical fashion, which allowed for quantitative results, ranking statements with scores from -5 to +5. Q method verified the qualitative interview data. This different approach to data largely defined by participants' thoughts and opinions allowed for another angle to address RQ2 and RQ3, and to address RQ4.

While the interview data suggests that individuals conceive of digital possessions as 1) providing evidence, 2) representing the individual's identity, 3) having value and, 4) providing a sense of bounded control, the Q sorting task results suggest that the self extends to digital possessions through a combination of characteristics associated with two archival concepts: primary and secondary value.

The interview data revealed salient characteristics of possession and self extension that were previously found by Furby (1978), Belk (1988) and Sivadas and Machleit (1994). The findings from the Q study reflect previous findings of Furby, Belk, and Sivadas and Machleit as well as Kleine and Baker (2004), Kwasnik (1989), Barreau (1995) and Barreau and Nardi (1995). While the data from this study of self extension to digital possessions demonstrates the previously found salient characteristics of the concept of physical possessions and self extension to physical possessions, participants' self extension to digital possessions also included salient characteristics associated with use of the digital items found by Kwasnick, Barreau, and, Barreau and Nardi as well as some of Kleine and Baker's characteristics of possession attachment. Possession attachment can be considered an extreme form of self extension to possessions because it includes all the salient characteristics of self extension to possessions, *as well as* an emotional connection with the possession and a personal history with the possession. In this sense, self extension to possessions and possession attachment exist on a spectrum, and self extension to digital possessions exists further on the extreme end of the spectrum, requiring elements of possession attachment for some individuals to recognize

the digital items as possessions that extend their identity, in they same manner that they recognize their physical items to be possessions.

Participant utterances during the Q sorting tasks suggest that for some participants, the novelty of digital items has yet to wear off. A participant in the older age group mentioned that he had spent more of his lifetime with physical items than digital items, so he considers the physical possessions to be of more value and to represent his identity more than digital possessions, due to that history. While this finding aligns with Kleine and Baker's (1994) characteristic of possession attachment that individuals have a personal history with the possession, it also suggests that for this participant, digital possessions are still unique, where as physical possessions are not.

It may also be possible that digital possessions are missing a characteristic that physical possessions have, which must be overcome, for individuals to recognize digital possessions along the same plane as physical possessions. What characteristic causes some participants to consider digital possessions vastly different from physical possessions, rather than just considering all items possessions? Furby's (1978) findings do not suggest that any element of "physicalness" saliently defines possessions, making this issue more of an enigma. Does physicalness matter? Is physicalness the missing element that causes some participants to hesitate to similarly categorize physical and digital possessions? Further, is this missing element of physicalness "made up" by the presence of characteristics of possession attachment? Future research should address these issues.

Sayre's (1994) study of evacuees of the 1991 Oakland residential fire explored involuntary disposition of physical possessions and how this involuntary disposition effected the self, if the individual has extended the self to possessions lost in the fire. This situation is mirrored in the digital world through a harddrive crash, which is likely a more common occurrence than a massive firestorm. Sayre found that participants who had lost possessions in the fire displayed a heightened sense of attachment to the post fire possessions. While many interview participants spoke of hypothetical loss and a prediction that the experience would be negative, no participants reflected on a loss and the implications for their identity. One participant was "banned" from Facebook for inappropriate behavior, at which he expressed frustration and anger, but little loss of self. While loss in the digital environment is an interesting area for future study, the lack of "physicalness" in the digital environment may lead to less intense feelings of loss than were experiences by Sayre's participants.

The concept of a digital legacy served as context to explore digital possessions and self extension to digital possessions. The concept of a digital legacy introduced the element of maintaining digital possessions for a purpose: for our lives and beyond. When asked, many participants expressed interest in maintaining digital possessions for a digital legacy and these digital possessions were maintained with other individuals in mind, usually family. Data from the interviews and the sorting tasks suggests that participants would like to engage in selection of digital possessions for a digital legacy, suggesting that Tan et al.'s (2007) suggestion to "keep everything" and search for what is needed strategy in personal information management does not apply to maintaining digital

possessions for a digital legacy. Several participants discussed the importance of the selection process and how others could learn about the individual's identity through the digital possessions that were selected. Further, the selection process relates to several findings from studies of the psychology of collecting (Belk, 1995): individuals desire to create boundaries in order to make sense of what they want to maintain.

The creation of boundaries has been studied in conjunction with collectors and collecting behavior, but less in relation to self extension to physical possessions. While studies define characteristics of self extension to physical possessions in specific contexts, little attention is paid to mental models and hypothetical boundaries created by individuals. Work on mental models associated with information search could be utilized to further study boundary creation in building a digital legacy, which could in turn impact the study of boundary creation and mental models associated with physical possessions.

Links between self extension to digital possessions, and a digital legacy have already been mentioned: when discussing digital possessions, participants expressed archival value, which was unfolded as primary value and secondary value. In addition, the salient characteristics of digital possessions corresponded with archival concepts, which are detailed in Table 40.

Table 40
Salient characteristics of digital possessions with corresponding archival concepts

Salient characteristics of digital possessions	**Archival concepts**
Provides evidence about the individual	Literary warrant
Represents the individual's identity	Macroappraisal
Recognized by the individual as having value	Archival value
Provides a sense of bounded control	Provenance

These findings suggest that some participants used "archival logic" when asked to describe their digital possessions and a hypothesized digital legacy. What are the implications when individuals think like archivists? That there is potential for individuals to learn a great deal about how to manage their personal archival collections from professional archivists who can provide instruction that corresponds with archival concepts. The key is to define how the archival concepts can be adapted from the institutional collection level to the personal collection level.

As study participants tended to perceive primary and/or secondary value in their digital possessions similar to the manner in which archivists use archival value to make acquisition and appraisal decisions, different appraisal theories that utilize these concepts of archival value can be deployed to teach individuals how to make maintaining decisions about their digital possessions and hopefully lessen the cognitive burden found to be typical of engagement in these maintaining decisions (Marshall 2008a; Marshall 2008b). Archivists can utilize a new theory to appraisal personal digital material, in which individuals are involved in making the maintaining decisions. Such an appraisal theory that involves the creator of the digital content has been needed since Cunningham first called for archivists to work with creators in 1995.

6.1 Limitations

For many participants in this study, the concept of a "digital possession" and a "digital legacy" were new. Some interview participants were challenged by trying to define a new term and came to the realization by the end of the interview that digital items could be considered possessions. Other participants quickly adopted the concept of

a digital possession and easily chatted about the digital items they considered theirs. Defining a digital legacy was easier for most participants, and many admitted that they had previously thought about maintain digital items during estate planning (especially participants in the 58-67 year old age group), but had thought about their digital legacy in a more haphazard manner, not formally with a label such as "digital legacy." Other participants described thinking thoughts such as "What if I die tomorrow? What happens to everything?," but these thoughts never led the participants to take actions concerning their digital legacy. Overall, this study's attempt to define and explore new areas may have been limited by participants' unfamiliarity with new terminology. After completing study participation, some participants said that they were going to think more about what digital items would be left for others after they died. If this is true, participation in this study may have altered how individuals maintain their digital possessions in the future.

Internal validity in Q method relies upon the rigor of the researcher conducting the Q method study and construction of the Q sample. In this study, steps were taken to base the Q sample on participant interviews and findings from relevant literature, not random statements. The fact that common interview statements often directly correlated with findings from previous studies of the motivations for maintaining personal archival collections demonstrates that the concepts are reliable and valid. The Q sample statements are individuals' thoughts and opinions, presented in a way that adds a structure, that allows for quantitative data analysis.

While common statements made by interview participants were used to develop the Q sample statements, not all issues discussed in the interviews were included in the Q

sample. Further, sorting of the Q sample reports *thoughts and beliefs* about digital possessions and a digital legacy, not *experiences* with digital possessions and a digital legacy. The fact that the concepts of digital possessions and a digital legacy were new to some participants could effect the reliability of the Q sample. Participants may not have developed a strong opinion about the issue, which could effect their rankings of the Q sample.

Different participant age samples were used to validate the Q sort loadings. Most Factors resulting from Q sorting tasks 1-3 included all three age groups and sexes, demonstrating that the Q sample applied widely across age and sex.

Schlinger's (1969) significance formula was used to determine which participants loaded onto which Factors. Schwinger was a student of Stephenson, the creator Q method, and this formula is held as rigorous in the Q method community. Another relevant issue in Q method is the creation of Factors. How many Factors should one analyze? According to Brown (1980), a new Factor should not be analyzed unless it accounts for at least half as much variance as the previous Factor. This rule was followed when determining the number of statements to analyze for each sorting task.

In addition, while every attempt was made to recruit an even gender ratio and three age groups representing life transitions, the Q sample is limited by the interview participants and their answers to the interview questions.

Concerning replicability, according to Brown (1980) a Q method sort with the same participants can be replicated with 85% consistency, up to a year later.

According to Brouer (1992/1993), "traditional validity has not been an issue in Q" since "there is no criterion for a person's point of view" (p. 3). However, Brouer tested this construct, by comparing the validity of a study after using Q Factor analysis and R Factor analysis. Brouer found that the Q Factor analysis results and R Factor analysis results demonstrated similarity, but found Q superior with respect to reliability.

VII. Conclusions and future directions

This exploratory study provides data regarding individuals' relationships with their personal digital information and how this relates to maintaining personal information. Personal digital information was explored using the concepts of digital possessions and self extension. Interviews and three Q sorting tasks were used to gather data to answer the following research questions:

RQ1. How do individuals define digital possessions?
RQ2. What characterizes self extension in digital environments?
RQ3. How do individuals characterize the digital possessions that they desire to maintain for a digital legacy?
RQ4. How do the characteristics of self extension in digital environments relate to the characteristics of digital possessions that individuals desire to maintain for a digital legacy?

Findings from this study suggest that individuals define digital possessions with four salient characteristics, which distinguish digital possessions from other digital items that might exist in an individual's Personal Space of Information (PSI). Digital possessions: 1) provide evidence about the individual, 2) represent the individual's identity, 3) are recognized by the individual as having value and, 4) provide a sense of bounded control (RQ 1). The four salient characteristics correspond to archival concepts, demonstrating that some participants used "archival logic" when considering their relationships to their digital possessions. Salient characteristics 1-3 mirror Furby's salient characteristics of physical possessions, demonstrating some overlap between the concept of physical and digital possession. However, salient characteristic 4, that digital

possessions provide a sense of bounded control, distinguishes the concept of possession in the physical and digital environment. Many digital items can present a sense of control, but are not actually controlled by the participant. Facebook is an example of the concept: while participants felt that they controlled Facebook elements such as photos, status updates, "likes," comments and possessions awarded through a game or application, participants also recognized that Facebook ultimately had complete control of their accounts. Thus, a major difference between physical and digital possessions is the sense of control participants can feel over possessions.

Self extension to digital possessions was found to occur for many participants. The characteristics that define self extension to digital possessions included Belk's salient characteristics of self extension to digital possessions *as well as* a concern for *use* of the digital possessions, and characteristics of possession attachment. The presence of characteristics traditionally associated with possession attachment, as well as a concern for use, build on the previous findings of self extension to physical possessions. This suggests that digital possessions are conceived of as distinct from physical possessions, and that the elements of use and possession attachment are invoked by individuals to make sense of the concept of digital possessions. It is unclear what causes this distinction between physical and digital possessions. However, considering the findings that a sense of control vs. a sense of bounded control differentiated physical and digital possessions, a weakened sense of control over digital possessions could account for the finding that characteristics of possession attachment appeared with characteristics of self extension to physical possessions.

Finally, participants conceived of a digital legacy as a collection of digital possessions made available to others after they were no longer living. Participants found the thought of constructing a digital legacy valuable and expressed that the construction of this collection of digital possessions could extend the participant's identity to others (RQ 3).

The concept of creating and maintaining a digital legacy was new for most participants. When presented with the concept, many participants stated they would like to maintain a digital legacy but had not engaged in the activity, as it was not a priority in their busy lives. This compliments Marshall's (2008a; 2008b) finding that individuals engaged in benign neglect of their digital items.

While Q sorting tasks 1 and 2 provided information about self extension to digital possessions, self extension to digital possessions did not perfectly correlate with the desire to maintain digital possessions for a digital legacy (RQ4). As such, Q sorting task 3 provided the most useful information for future research on constructing a digital legacy and the potential for the development of a new archival appraisal method for personal digital content.

Overall, some of the characteristics of self extension to digital possessions overlapped with the characteristics of the digital possessions that individuals desired to maintain for a digital legacy, but this overlap depended on the individual's understanding of self extension to digital possessions (RQ4). If participants perceived secondary value in their digital possessions, then they were likely to consider those secondary values important when describing the digital possession that they would most like to maintain

for a digital legacy. Therefore, the characteristics that define self extension would also be relevant for individuals when determining the characteristics of digital possessions to maintain for a digital legacy. However, if the participants did not perceive secondary values in their digital possessions, they were not likely to consider secondary values important when describing the characteristics of the digital possessions they would like to maintain for a digital legacy. Most participants perceived a mix of primary and secondary values in their digital possessions and t the possessions they most desired to maintain for a digital legacy. These characteristics helped participants create the boundaries that defined their digital legacies.

This study can be of use to scholars in personal information management and digital preservation. The study suggests that digital possessions are a type of personal information with specific characteristics that differentiate these digital objects from all other digital objects that exist in a personal digital environment. This finding allows personal information management scholars to compare different types of personal information, which has proven difficult in previous work. Further, researchers that study preservation practices can now begin to explore the concept of value as it applies to preservation.

The concept of a digital possession also allows individuals to gain an understanding about their personal digital information, which can be useful when defining preferences for maintaining the information. Previous findings suggest individuals easily grow overwhelmed with the volume of their personal digital information and seldom make maintaining decisions. The concept that digital

possessions provide characteristics that can be utilized when making maintaining decisions may lighten the cognitive load of engaging in maintaining decisions. Future research is needed to explore how individuals can utilize the concept of digital possessions in making maintaining decisions.

This study also explored self extension to possessions in a digital environment. While previous studies have explored self extension to physical possessions, few have explored self extension to digital possessions. Overall, many characteristics of self extension to physical possessions were found to apply to self extension to digital possessions. Interview findings and Q method findings suggest that other individuals play a large role in self extension to possessions, which is likely due to the ease with which digital possessions can be shared and displayed in a digital environment. This finding can be of use to consumer behaviorists who study self extension to possessions in marketing, but also to researchers who study social media and sharing in online spaces.

The Q method data suggests that self extension to digital possessions exists along a spectrum. While some individuals do not extend their selves to their possessions, other do, and to varying degrees. Findings that varying combinations of characteristics of self extension to possessions and characteristics of possession attachment demonstrate this spectrum. Possession attachment can be understood as an extreme form of self extension to possessions because in addition to self extension, it includes a personal history and an emotional relationship with the possession. While the statements that define one Factor may not be associated with self extension at one end of the spectrum, the other end of the

spectrum is defined by statements that may be associated with self extension and possession attachment.

When applying archival concepts to the three elements of the self extension to digital possessions spectrum, use can be considered a primary value while attachment can be considered a secondary value. In this sense, participants tend to assess their digital possessions according to a range of primary and secondary values, with different groups of participants falling at different places on the use spectrum, self extension characteristics spectrum, and attachment characteristics spectrum, as was displayed by many of the Q method Factors. While the Factors demonstrate that individuality does exist in management of digital possessions, this study limits the range of the individuality to a score/placement on three main elements.

This study found that some participants highly ranked maintaining characteristics that correspond to the methods of macroappraisal when defining digital possessions, and hypothetically constructing a digital legacy. These findings suggest that some participants utilize "archival logic" when thinking about maintaining their digital possessions and constructing a digital legacy. Archivists can exploit this logic by teaching and advising individuals about how to manage their personal digital collections. This role as teacher and advisor for the personal collector defines a new role for archivists in the digital age: as consultants for individuals. The rise of personal organizer as a profession lends credibility to a market for this kind of archival consultant service. Who better to advise individuals about how to maintain their personal digital collections, than archivists who are trained in archival concepts, which this study

demonstrates, is the logic already used by some individuals? Institutional archivists may also benefit from the outreach success this advising can bring, if the individuals they advise become future donors to individual collections.

The next question to answer is what archivists and archival consultants will use to teach and advise individuals about how to manage and maintain their personal digital collections. Previous studies have found that individuals find the process of engaging in maintaining decisions to be cognitively difficult (Marshall 2008a; Marshall 2008b). The three main elements of *use*, characteristics of *self extension* to physical possessions, and possession *attachment* characteristics can be utilized to create tools and exercises that archival professionals can utilize when working with creators of personal content and could ultimately lead to an appraisal method for personal digital material. In such an appraisal method, the creator is involved in making the appraisal decisions, with the guidance of a professional archivist or archival consultant, as is suggested above. Such an appraisal method would be useful to archivists working with creators who will eventually donate digital content to an institutional collection and has the potential to be useful for individuals who want to lessen the cognitive burden of making maintaining decisions when constructing a digital legacy. In order to accomplish this aim, future work should further explore use, existing characteristics of self extension to physical possessions, and possession attachment characteristics in conjunction with constructing a digital legacy.

This study explored beliefs and opinions about maintaining digital possessions for a digital legacy; the next steps would be to observe individuals constructing such a legacy

to gain feedback about their experiences. If these initial observations also suggest use, self extension characteristics, and attachment characteristics, then tools and exercises based on these three elements can be created for use in the digital legacy construction process to determine if the use of these tools ease the cognitive burden of constructing a digital legacy.

Finally, this study provides an in-depth example of the usefulness of Q method in the study of personal information management. Q method was useful for addressing the research question proposed at the onset of this study. This study asked question about an area in which many individuals might have had little experience: thinking of their digital content as possessions and maintain a digital possession for a digital legacy. In addition, little research has been done specifically on these topics. As a result, collecting data from participants about their thoughts and opinions (versus experiences) on these topics, first using interviews and then using Q method allowed for varied perspectives on this topic. Researchers who aim to conduct exploratory studies of individuals' thoughts and opinions about new concepts might considering using a combination of interviews and Q method to address their research questions.

While findings from this study suggest that individuals conceive of digital possessions differently than they conceive of physical possessions, a time may come when this distinction becomes weaker. As our world grows increasing digital, so too do many of our possessions, making the concept of a digital possession ordinary, rather than novel.

Appendices

Appendix A: Pre-screen questionnaire

Prescreen survey (Qualtrics)

SURVEY WELCOME PAGE

Consent form-see electronic consent form.

SURVEY PAGE 1

Use the following scale to indicate the extent to which you had each thought when you were deciding whether to throw something away **DURING THE PAST WEEK**. (If you did not try to discard anything in the past week, indicate how you would have felt if you had tried to discard.)

1	2	3	4	5	6	7
not at all			sometimes			very much

1.	I could not tolerate it if I were to get rid of this.	1	2	3	4	5	6	7
2.	Throwing this away means wasting a valuable opportunity.	1	2	3	4	5	6	7
3.	Throwing away this possession is like throwing away a part of me.	1	2	3	4	5	6	7
4.	Saving this means I don't' have to rely on my memory.	1	2	3	4	5	6	7
5.	It upsets me when someone throws something of mine away without my permission.	1	2	3	4	5	6	7
6.	Losing this possession is like losing a friend.	1	2	3	4	5	6	7
7.	If someone touches or uses this, I will lose it	1	2	3	4	5	6	7

	or lose track of it.							
8.	Throwing some things away would feel like abandoning a loved one.	1	2	3	4	5	6	7
9.	Throwing this away means losing a part of my life.	1	2	3	4	5	6	7
10.	I see my belongings as extensions of myself; they are part of who I am.	1	2	3	4	5	6	7
11.	I am responsible for the well-being of this possession	1	2	3	4	5	6	7
12.	If this possession may be of use to someone else, I am responsible for saving it for them.	1	2	3	4	5	6	7
13.	This possession is equivalent to the feelings I associate with it.	1	2	3	4	5	6	7
14.	My memory is so bad I must leave this in sight or I'll forget about it.	1	2	3	4	5	6	7
15.	I am responsible for finding a use for this possession.	1	2	3	4	5	6	7
16.	Throwing some things away would feel like part of me is dying.	1	2	3	4	5	6	7
17.	If I put this into a filing system, I'll forget about it completely.	1	2	3	4	5	6	7
18	I like to maintain sole control over my things.	1	2	3	4	5	6	7
19.	I'm ashamed when I don't have something like this when I need it.	1	2	3	4	5	6	7
20.	I must remember something about this, and I can't if I throw this away.	1	2	3	4	5	6	7
21.	If I discard this without extracting all the important information from it, I will lose something.	1	2	3	4	5	6	7
22.	This possession provides me with emotional comfort.	1	2	3	4	5	6	7
23.	I love some of my belongings the way I love some people.	1	2	3	4	5	6	7
24.	No one has the right to touch my possessions.	1	2	3	4	5	6	7

SURVEY PAGE 2

25. What is your sex?

Male Female

26. What is your age?

_____ years

27. Are you a faculty member, staff member or student at the School of Information and Library Science at UNC?

No Yes

28. In which part of the study are you interested in participating? (Please select one choice only)

Digital possession interview ONLY Sorting activity ONLY EITHER the digital possession interview OR the sorting activity

SURVEY PAGE 3

Thank you for completing the survey! Please enter your email address below and the researcher will contact you if you are eligible for the study.

Email address: _____

Appendix B: Observation and digital possession interview protocols

Observation directions:
After completing the consent form and collecting the incentive (if desired), the researcher will ask the participants to give the researcher a tour of their *personal information collections (PICs)*. A PIC is defined as activities that people do in relation to their personal spaces of information (Jones, 2008). This will be explained to participants as "Please show me/describe collections of items you include as part of your personal information. You may show me and describe digital possessions you feel comfortable sharing, do not feel obligated to show me anything you are uncomfortable sharing. Some examples of digital possessions may include digital photos, digital music, social media (Facebook), games, personal writing and/or professional writing. You can also include anything that you think tells me about who you are."
After completing the desktop tour, participants will be asked the following questions:

1. How would you define a digital possession?

2. What does the term "digital possession" mean to you?

3. What are some examples of your digital possessions? Can you tell me about them?

4. What are the characteristics of the possessions?

5. Which of these digital possessions do you share with other people?

6. Are there digital possessions that represent you? What are they? How do they represent you?

7. Are there digital possessions that represent you to other people? If so, what are they? Why do they represent you to other people?

8. Are there digital possessions that reinforce your identity back to you? If so, what are they? Why do they reinforce your identity to you?

9. Would you say that your digital possessions represent you in the past, present and future? How?

10. Are any of these possessions linked with specific life events or periods in your life? Is so which ones? Please tell me about the life event/life period.

11. Which possessions do you make an effort to maintain? Why?

12. How do you maintain these digital possessions?

13. What is maintaining for? (purpose)

14. How would you define a digital legacy?

15. Are you interested in maintaining digital items for a digital legacy? Why or why not?

16. After answering the questions above, does your definition of a digital possession change? If so, what is your new definition of a digital possession?

Appendix C: Code Dictionary

Accessibility: Discussion of the accessibility of information in digital environments, including the ability to access digital possessions via different sources, ie phone vs laptop vs desktop. Also includes availability of information in the cloud.

Achieve goals: discussion of how a digital possession has helped a participant achieve his/her a goal.

Aesthetics: mention of the aesthetic quality of a dp

Ages 58-67: participants in the 58-67 age range, (population C).

Ages 38-47: participants in the 38-47 age range, (population B).

Ages 18-24: participants in the 18-24 age range, (population A).

Amount of time: Mention of how the length of time a participant has possessed a dp.

A side of me(D): discussion of how a participant views digital possessions as representing a side or a part of themselves or a trait, rather than an entire self or trait.

Backup(D): discussion of backup-under hierarchy of maintaining behavior.

Communicate(D): Discussion of involvement of digital possessions with communication.

Created(D): mention of how a participant created specific digital possessions.

Connection to others(D, I): discussion of connecting with other people, including how digital possessions represent connections with other people.

Control(D,I): Discussion of the ability to control digital possessions. This links to Fuby's (1978) finding that the most salient characteristic of a physical possession is the ability to control it. Control involves *selection*, as in the sense that a participant can control which digital possessions to share, maintain, etc.

Definition of DP(D): the participant's response to being asked to define a digital possession and referring to this definition throughout the interview.

Deleting, discarding, loosing(D): Any discussion of deleting, discarding or loosing digital items, whether intentional or unintentional.

Distinctions(I): text describing the distinctions participants conceive of when describing digital possessions. For example, when participants make differentiations about different kinds of digital possessions.

Enduring availability(D): Any discussion of the lastingness of things on the internet, including the availability of information no longer considered current or projection of the availability of information no longer considered current and the implications of the issue. Also includes discussion of concerns about the privacy of personal information available on the internet.

Examples of DP(D): response to the question of "what are some examples of your digital possessions?." Also includes participant's reference to examples of digital possessions when answering other questions throughout the interview.

Expertise, knowledge(D): discussion of one's expertise or knowledge of something, including how digital possessions can represent expertise and/or knowledge.

Facebook(D)-any mention of Facebook.
\
Family(D): Any mention of family members.

Female(D): a female participant.

For evidence(D): Instance when a participant describes digital possessions as evidence of some kind or describes maintaining a digital possession for the purpose of evidence.

For reuse(D): Any discussion of reuse of a digital object, including the reasoning of maintaining digital possessions for future use.

Future(D): Discussion of the future and/or how digital possessions can represent the future and/or the individual in the future. Also includes references to "who I want to be" in the future.

Good light vs. bad light(D,I): Discussion of how a participant makes a judgment of how personal information to represent him/her in a good light, contrasted with a bad light.

History, Chronology(D): Discussion of a participant's *collective* history, including how digital possessions can represent a history or chronology. Not to be confused with my past-"my past" is more singular events," "my history" is more a summary or collection of past experiences.

It's mine(D,I): participant expressing ownership and/or describing digital possessions as belonging to him/her.

I want to hold onto it(D): Expression of how a participant wants to hold onto something, tangible or intangible, including, a memory, a feeling, a photo, a document, etc.

Life transition(D,I): discussion or mention of a life transition.

Maintaining behavior(I): discussion of organizing, maintaining or saving digital material.

Male(D): a male participant.

Misunderstand DP(I): Section of text in which a participant confuses a digital possession with a physical possession. For example, after being told that digital possessions can include "digital photos, digital music, social media like Facebook and/or personal writing," the participant would then describe a physical object such as a phone, laptop or dvr player.

Mood, feeling(D): Discussion of how a digital possession can represent a participant's mood or emotions.

Multiple copies(D): discussion of creating multiple copies as a method of preservation. Under hierarchy of maintaining behavior.

My Interests(D): discussion of a participant's personal and/or professional interests, including hobbies and careers. Includes a participant's interpretation that digital possessions can represent his/her interests.

My Past(D): discussion of a participant's past, including reference to past experiences, past feelings, childhood as well as the participant's interpretation that digital possessions that can represent the past in some way.

My thoughts(D): discussion of a digital possession can represent the participant's thoughts.

Personal/family archive(D): discussion of how digital possession can act like an archive.

Remembering(D): discussion of remembering and memories, how digital possessions assist remembering and recalling of memories and maintaining digital possessions for the purpose of remembering. Also includes mention of nostalgia.

Responsibility(I): When participants mention maintaining dps in conjunction with a responsibility.

Represents(D, I): heading for when participants begin to discuss how digital possessions are representative of something

Sharing(D): discussion of sharing (or intentionally not sharing) digital possessions. Includes participant's interpretations of what other individuals would like to be shared with them.

Skeptical(P): Participants that mention they are skeptical of the concept of a digital possession.

So I don't have to keep it in my head(D): mention of how maintaining a digital possession or keeping it secure makes a participant feel like s/he doesn't have to hold information that the possessions expresses in his/her head any longer.

Value(D): discussion of how digital possessions can represent value, monetary, sentimental, or other. Includes discussion of the meaning of digital possessions.

What's interesting to others(P): pattern of several participants mentioning how their digital possessions may or may not be interesting to others.

Appendix D: Factor Arrays, sorting tasks 1-3

Table A

Factor Array for sorting task 1

Q Sorting Task 1 Factor Arrays	#	1	2	3	4	5
It is evidence of my witnessing.	1	-4	-5	-5	0	4
It acts as a witness to creativity.	2	5	3	4	-5	-5
I maintain it to retain digital public samples.	3	-5	-4	2	4	-2
It helps me forget.	4	1	-3	3	4	3
It helps me fulfill a (perceived) duty.	5	0	2	-4	2	0
It's something I create.	6	0	-1	3	0	0
It is mine and no one else's.	7	-4	-4	3	2	1
It's something I modify myself.	8	1	1	-1	-5	2
It reflects my personality.	9	-1	1	-2	1	-2
It shows my background.	10	0	-3	1	2	-3
I share it with the public.	11	-1	-2	0	0	-3
It's a holistic representation of myself.	12	0	-2	4	0	0
It represents what I'm in to.	13	-2	4	-4	-2	-4
It represents my thoughts.	14	-3	-2	0	1	-1
It helps me communicate with people.	15	0	1	2	0	1
It represents who I am now.	16	0	0	1	-4	1
It helps me achieve my goals.	17	1	0	-2	2	-5
It represents a history/chronology.	18	-5	-3	0	-3	0
It helps me sort things out.	19	-1	-4	4	2	1
It represents change in me.	20	-1	3	0	-1	2
It helps me remember.	21	3	-1	-1	-2	-2
It's unique to me.	22	2	3	-1	-1	3
It's something I want to hold onto.	23	4	-2	3	3	2
It's for work/school, it's professionally related.	24	-1	4	1	-2	5
It represents my family.	25	5	1	-2	5	-3
It's nostalgia.	26	-5	5	5	-2	-3
It represents a side of me.	27	5	-5	-5	-3	5
It's important to me.	28	3	-2	5	3	2
I maintain it in case I ever need it again.	29	0	5	2	0	-2
It's a visual representation of a memory.	30	0	3	-2	1	0
I want it to be secure.	31	2	4	2	4	4
It's something I want to leave behind for others after I die.	32	0	1	-5	-2	-1
It helps me function.	33	2	0	4	1	4
It keeps me connected.	34	4	-3	-1	3	-2
It represents the best of me.	35	-2	1	1	-1	-2
It represents a shared experience.	36	2	2	1	-4	0
It allows me to reflect on things.	37	-2	-5	0	5	-5
It's useful as a record.	38	-3	0	2	-3	-2
I have an impulse to maintain it.	39	-2	-2	-2	-1	-1
I have control over it.	40	-1	-1	0	4	-1
It's accessible anywhere.	41	2	-1	-2	-5	3
It represents my experiences.	42	-2	2	-3	0	0
It gives me joy.	43	1	-1	2	-1	1
It's aesthetically pleasing.	44	-4	2	0	1	1
It helps me remember my childhood.	45	0	0	0	1	-1
I would be upset if it were lost/deleted.	46	-2	0	0	-4	1
I don't think of it as a possession.	47	3	1	-3	0	5
It's a time capsule of who I am.	48	3	-2	-1	1	0
It represents a time investment	49	2	5	-2	3	-4
It represents quirks about me.	50	-3	-1	-1	-3	2
It's easy to use.	51	1	-4	1	-2	4
I look at it/open it frequently.	52	4	4	-3	5	2
It has sentimental value.	53	-4	2	0	-1	-1
I can categorize it.	54	2	0	-1	-2	2
I've spent a lot of time with it.	55	-1	0	5	0	3
Other people wouldn't be interested in it.	56	4	0	2	-1	-4
It contains information about me.	57	-2	0	-4	0	-1
It gives me a sense of pride.	58	-3	2	1	2	-4
I wouldn't feel right deleting it.	59	1	2	-4	-4	0
There is no hard copy of it.	60	1	-1	-3	2	0

Table B
Factor array for sorting task 2

Q Sorting Task 1 Factor Arrays	#	1	2	3
It is evidence of my witnessing.	1	0	-5	-3
It acts as a witness to creativity.	2	-5	5	5
I maintain it to retain digital public samples.	3	-1	-2	-5
It helps me forget.	4	5	0	3
It helps me fulfill a (perceived) duty.	5	-2	-2	2
It's something I create.	6	1	2	1
It is mine and no one else's.	7	3	0	-4
It's something I modify myself.	8	-2	0	0
It reflects my personality.	9	1	1	0
It shows my background.	10	-1	-3	5
I share it with the public.	11	-1	1	-3
It's a holistic representation of myself.	12	2	-1	1
It represents what I'm in to.	13	2	-1	2
It represents my thoughts.	14	0	0	2
It helps me communicate with people.	15	3	4	-1
It represents who I am now.	16	-3	-3	0
It helps me achieve my goals.	17	5	0	-2
It represents a history/chronology.	18	-4	0	-1
It helps me sort things out.	19	-1	2	-1
It represents change in me.	20	4	-3	0
It helps me remember.	21	0	2	0
It's unique to me.	22	0	2	-3
It's something I want to hold onto.	23	-1	-4	1
It's for work/school, it's professionally related.	24	-3	3	3
It represents my family.	25	1	4	-2
It's nostalgia.	26	-3	-5	5
It represents a side of me.	27	3	-2	-5
It's important to me.	28	1	5	0
I maintain it in case I ever need it again.	29	-1	1	4
It's a visual representation of a memory.	30	-2	2	1
I want it to be secure.	31	4	4	-1
It's something I want to leave behind for others after I die.	32	-4	-3	-4
It helps me function.	33	-4	2	0
It keeps me connected.	34	0	-2	4
It represents the best of me.	35	-5	3	-4
It represents a shared experience.	36	-3	-4	-4
It allows me to reflect on things.	37	5	1	-2
It's useful as a record.	38	4	-2	2
I have an impulse to maintain it.	39	-2	-1	3
I have control over it.	40	0	0	-2
It's accessible anywhere.	41	-2	-1	3
It represents my experiences.	42	-2	3	2
It gives me joy.	43	2	-4	0
It's aesthetically pleasing.	44	1	-1	-3
It helps me remember my childhood.	45	0	1	1
I would be upset if it were lost/deleted.	46	2	0	-1
I don't think of it as a possession.	47	0	3	1
It's a time capsule of who I am.	48	-2	2	2
It represents a time investment	49	2	-1	4
It represents quirks about me.	50	1	-5	-2
It's easy to use.	51	-5	5	-5
I look at it/open it frequently.	52	3	0	-1
It has sentimental value.	53	-1	-4	1
I can categorize it.	54	2	4	4
I've spent a lot of time with it.	55	-4	1	0
Other people wouldn't be interested in it.	56	2	-2	-2
It contains information about me.	57	0	0	2
It gives me a sense of pride.	58	1	-1	-2
I wouldn't feel right deleting it.	59	4	1	0
There is no hard copy of it.	60	0	-2	-1

Table C

Factor arrays for sorting task 3

Q Sorting Task 1 Factor Arrays	#	1	2	3	4	5
It is evidence of my witnessing.	1	-5	-5	-5	-2	-2
It acts as a witness to creativity.	2	-1	5	-2	-5	0
I maintain it to retain digital public samples.	3	4	-3	5	5	-3
It helps me forget.	4	-2	3	0	0	0
It helps me fulfill a (perceived) duty.	5	-4	1	-3	-2	0
It's something I create.	6	-1	-1	1	3	2
It is mine and no one else's.	7	0	2	1	2	-2
It's something I modify myself.	8	1	-3	-1	0	-1
It reflects my personality.	9	1	-4	-1	3	-2
It shows my background.	10	-4	-2	0	-4	-1
I share it with the public.	11	-1	0	-1	2	-3
It's a holistic representation of myself.	12	0	3	4	4	4
It represents what I'm in to.	13	-1	-3	-2	-1	-3
It represents my thoughts.	14	-3	1	-3	-1	-2
It helps me communicate with people.	15	1	-1	2	-2	-1
It represents who I am now.	16	-4	0	-2	0	0
It helps me achieve my goals.	17	0	1	-5	0	-2
It represents a history/chronology.	18	3	-2	1	-1	4
It helps me sort things out.	19	0	-1	0	0	1
It represents change in me.	20	-3	-2	1	-3	-5
It helps me remember.	21	2	2	0	5	0
It's unique to me.	22	2	2	1	1	1
It's something I want to hold onto.	23	0	0	3	-1	1
It's for work/school, it's professionally related.	24	2	-2	4	-4	5
It represents my family.	25	-2	0	-5	3	3
It's nostalgia.	26	2	-4	2	4	-5
It represents a side of me.	27	2	4	2	1	-1
It's important to me.	28	3	2	0	-1	4
I maintain it in case I ever need it again.	29	2	0	4	-2	-2
It's a visual representation of a memory.	30	1	-1	3	-4	0
I want it to be secure.	31	0	0	-2	3	2
It's something I want to leave behind for others after I die.	32	4	1	0	-4	1
It helps me function.	33	1	5	3	2	2
It keeps me connected.	34	3	-4	-1	-5	0
It represents the best of me.	35	-3	2	4	0	5
It represents a shared experience.	36	-2	-5	-4	-3	2
It allows me to reflect on things.	37	0	4	-1	1	3
It's useful as a record.	38	-2	-4	-3	4	-5
I have an impulse to maintain it.	39	4	-1	2	0	-1
I have control over it.	40	-2	1	-2	-2	2
It's accessible anywhere.	41	5	4	2	0	-4
It represents my experiences.	42	0	2	-4	-2	-1
It gives me joy.	43	-1	-1	0	-1	1
It's aesthetically pleasing.	44	-3	-2	0	1	4
It helps me remember my childhood.	45	-2	-2	2	4	0
I would be upset if it were lost/deleted.	46	4	-3	0	2	0
I don't think of it as a possession.	47	3	1	1	-2	-4
It's a time capsule of who I am.	48	1	3	-1	2	1
It represents a time investment	49	0	-2	-4	2	3
It represents quirks about me.	50	-1	3	5	-5	-2
It's easy to use.	51	5	4	-2	1	2
I look at it/open it frequently.	52	-5	2	0	1	-3
It has sentimental value.	53	2	-5	1	-3	5
I can categorize it.	54	0	5	-3	0	-1
I've spent a lot of time with it.	55	1	0	-1	2	3
Other people wouldn't be interested in it.	56	-4	0	2	-1	1
It contains information about me.	57	-5	0	-2	1	0
It gives me a sense of pride.	58	-1	0	-4	-3	-4
I wouldn't feel right deleting it.	59	-2	-1	5	5	2
There is no hard copy of it.	60	5	1	3	0	-4

REFERENCES

Bailey, C. (1997). From the top down: The practice of macroappraisal. *Archivaria*, *43*, 89-128.

Baker, S. M., & Kennedy, P. (1994). Death by nostalgia: A diagnosis of context-specific cases. *Advances in Consumer Research*, *21*, 169-174.

Barreau, D., & Nardi, B. (1995). Finding and reminding: File organization from the desk- top. *SIGCHI Bulletin*, *27*(3), 7.

Barreau, D. (1995). Context as a Factor in personal information management systems. *Journal of the American Society for Information Science*, *36*, 27-39.

Belk, R. W. (1987). Identity and the relevance of market, personal and community possessions. In *Marketing and semiotics: New direction in the study of signs for sale* (pp. 151-164). Berlin, Germany: Walter de Gruyter & Co. Retrieved from http://books.google.com/books?hl=en&lr=lang_en&id=55aEwc69D34C&oi=fnd&pg=PR9&dq=Marketing+and+semiotics:+New+direction+in+the+study+of+signs+for+sale&ots=rMavaCZfTx&sig=MIy7T-Ai47cfpyiZIZgOjYdiY_g#v=onepage&q&f=false

Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research*, *15*, 139-168.

Belk, R. W. (1990). The role of possessions in constructing and maintaining a sense of the past. *Advances in Consumer Research*, *17*, 669-676.

Belk, R. W. (2010). Sharing. *Journal of Consumer Research*, *36*, 715-734. doi:10.1086/612649

Belk, R. W., & Austin, M. (1986). Organ donation willingness as a function of extended self and materialism. In *Advances in Health Care Research* (pp. 84-88). Presented at the Association for Health Care, Toldedo, OH: Association for Health Care.

Belk, R. W., Wallendorf, M., Sherry Jr., J. F., & Holbrook, M. B. (1991). Collecting in a consumer culture. in *Highways and buyways: Naturalistic research from the consumer behavior odyssey* (pp. 178-215). Provo, UT: Association for Consumer Research.

Block, J. (1956). A comparison of the forced and unforced Q-sorting procedures. *Educational and Psychological Measurement*, *16*, 481-493.

Boardman, R., & Sasse, A. (2004). Stuff goes into the computer and doesn't come out: A cross-tool study of personal information management. In *Proceedings of the SIGCHI conference on human Factors in computing systems* (pp. 583-590). Presented at the CHI '04, Vienna, Austria: ACM.

Booms, H. (1987). Society and the formation of a documentary heritage: Issues in the appraisal of archival sources, *24*, 69-107.

Brouer, M. (1992). Validity: Q vs. R. *Operant Subjectivity*, *16*, 1-17.

Brown, S. R. (1971). The forced-free distinction in Q technique. *Journal of Educational Measurement*, *8*(4), 283-287.

Brown, S. R. (1980). *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press.

Brown, S. R. (1992). On validity and replicability. *Operant Subjectivity*, *16*, 45-51.

Brown, S. R. (1993). A Primer on Q Methodology. *Operant Subjectivity*, *16*, 91-138.

Brown, S. R. (1997). The history and principles of Q methodology in psychology and the social sciences. Retrieved December 14, 2010, from http://facstaff.uww.edu/cottlec/QArchive/Bps.htm

Brown, S. R. (2002, June 16). Re: number of Q sort items. [electronic mailing list message]. Retrieved January 16, 2011 from https://listserv.kent.edu/cgi-bin/wa.exe?A2=Q-METHOD;KJ3EsQ;200206161726430400.

Carroll, E & Romano, J. (2010). *Your digital afterlife: When Facebook, Flickr and Twitter are your estate, what's your legacy?* Berkley, CA: New Riders.

Cohen, J. B. (1989). An overextended self? *Journal of Consumer Research*, *16*, 125-128. Cook, T. (1992). Mind over matter: Toward a new theory of archival appraisal. *The Archival imagination: Essays in Honour of Hugh Taylor* (pp. 38–70). Ottawa, Canada: Association of Canadian Archivists.

Cook, T. (1997). What is past is prologue: A history of archival ideas since 1898, and the future. *Archivaria*, *43*, 17–63.

Cottle, C. E., & McKeown, B. (1980). The forced-free distinction in Q technique: A note

on unused categories in the Q sort continuum. *Operant Participantivity*, *3*(2), 58-63.

Cox, R. J. (2008). *Personal archives and a new archival calling : Readings, reflections and ruminations*. Duluth, Minn.: Litwin Books.

Cunningham, A. (1999). Waiting for the Ghost Train: Strategies for Managing Personal Electronic Records before it's Too Late. *Archival Issues*, *24*(1), 55-64.

Cunningham, A. (1994). The archival management of personal records in electronic form: Some suggestions. *Archives and Manuscripts*, *22*(1), 94-105.

Csikszentmihalyi, M., & Rochberg-Halton, E. (1982). *The Meaning of Things: Domestic Symbols and the Self*. Cambridge, UK: Cambridge University.

Cutrell, E., Dumais, S., & Teevan, J. (2006). Searching to eliminate personal information management. *Communications of the ACM*, *49*(1), 58-64.

Czerwinski, M., Gage, D., Gemmell, J., Marshall, C., Perez-Quinones, M., & Skeels, M. (2006). Digital memories in an era of ubiquitous computing and abundant storage. *Communications of the ACM*, *49*(1), 44-50.

Dixon, J., & Street, J. (1975). The distinction between self and not-self in children and adolescents. *Journal of Genetic Psychology*, *127*, 157-162.

Durning, D. (2007). Q methodology. In *Encyclopedia of Public Administration and Public Policy* (second edition, pp. 1678-1681). CRC Press.

Frohlich, D., & Murphy, R. (2000). The memory box. *Personal Technologies*, *4*, 238-240.

Frost, R. O., & Gross, R. C. (1993). The hoarding of possessions. *Behaviour Research and Therapy*, *31*(4), 367-381.

Furby, L. (1978). Possession in humans: An exploratory study of it's meaning and motivation. *Social Behavior and Personality*, *6*(1), 49-65.

Furby, L. (1978). Possessions Toward a theory of their meaning and function throughout the life cycle. *Life-span Development and Behavior*, *1*, 297-336.

Gemmell, J., Bell, G., Lueder, R., Drucker, S., & Wong, C. (2002). MyLifeBits: Fulfilling the Memex vision. In *Proceedings of the tenth ACM international conference on Multimedia* (pp. 235-238). Presented at the ACM international conference on Multimedia, Juan-les-Pins, France: ACM.

Goffman, E. (1959). *The presentation of self in everyday life*. New York, NY: Anchor Books.

Goffman, E. (1961). *Asylums: Essays on the social situation of mental patients and other inmates*. Garden City, NY: Anchor Books.

Hogan, A. L. (2008). *Users' metaphoric interaction with the internet*. University of Bath, Bath, England.

Hyry, T., & Onuf, R. (1997). The personality of electronic records: The impact of new information technology on personal papers. *Archival Issues*, *22*(1), 37-44.

John, J. L., Rowland, I., Williams, P., & Dean, K. (2010). *Digital lives: Personal digital archives for the 21st century (Beta 2.0)*. London, UK: British Library.

Jones, W. (2008). *Keeping found things found: the study and practice of personal information management*. Boston: Morgan Kaufmann Publishers.

Kaye, J., Vertesi, J., Avery, S., Dafoe, A., David, S., Onaga, L., Rosero, I., et al. (2006). To have and to hold: Exploring the personal archive. In *Proceedings of the SIGCHI conference on human Factors in computing systems*. Presented at the Conference on human Factors in computing systems, Montreal, Quebec, Canada: ACM, 275-284.

Kerlinger, F. N. (1986). *Foundations of behavioral research* (3rd ed.). Fort Worth, Texas: Holt, Rinehart and Winston, Inc.

Kirk, D. S., & Banks, R. (2008). On the design of technology heirlooms. In *Proceedings of the international workshop on social interaction and mundane technologies*. Presented at the SIMTech, Cambridge, UK, 1-4.

Kirk, D. S., & Sellen, A. (2010). On human remains: Values and practice in the home archiving of cherished possessions. *ACM Transactions on Computer-Human Interaction*, *17*(3). doi:DOI 10.1145/1806923.1806924

Kwasnik, B. (1989). How a personal document's intended use or purpose affects it's classification in an office. *Proceedings of the 12th Annual International ACMSIGIR Conference on Research and Development in Information Retrieval* (Vol. 23, pp. 207-210). Presented at the SIGIR, Cambridge, MA: ACM.

Lansdale, M. (1988). The psychology of personal information management. *Applied Ergonomics*, *19*, 55-66.

Lee, Z., Lee, J., Lee, S., Park, H., & Kim, H. (2008). The effect of psychological ownership on the possession attachment and willingness to share the internet content. In *Proceedings of the 2008 IEEE ICMIT* (pp. 722-726). Presented at the 4th IEEE International Conference on Management of Innovation and Technology, Bangkok, Thailand: IEEE.

Lemme, B. H. (2006). *Development in Adulthood* (4th ed.). Boston, MA: Allyn and Bacon.

Levinson, D. J. (1990). A theory of life structure development in adulthood. In C. N. Alexander & E. J. Langer (Eds.), *Higher Stages of Human Development*. New York, NY: Oxford University Press.

Marshall, C. (2008a). Rethinking personal digital archiving part II: Implications for services, applications and institutions. *D-Lib Magazine*, *14*(3/4).

Marshall, C. (2008b). Rethinking personal digital archiving part I: Four challenges from the field. *D-Lib Magazine*, *14*(3/4).

Marshall, C. C. (2007). How people manage information over a lifetime. In *Personal Information Management* (pp. 57-75). Seattle, Washington: University of Washington Press.

Marshall, C. C., Bly, S., & Brun-Cottan, F. (2006). The long term fate of our digital belongings: Toward a service model for personal archives. In *Proceedings of Archiving 2006* (pp. 25-30). Presented at the Archiving 2006, Ottawa, Canada: Society for Imaging Science and Technology.

Marshall, C. C., & Jones, W. (2006). Keeping encountered information. *Communications of the ACM*, *49*(1), 66-67.

Mayer-Schönberger, V. (2009). *Delete: The virtue of forgetting in the digital age*. Princeton, NJ: Princeton University Press.

McKemmish, S. (1996). Evidence of me. *Archives and Manuscripts*, *24*(1), 28-45.

McKeown, B., & Thomas, D. (1988). *Q Methodology*. Quantitative Applications in the Social Sciences. Newbury Park: Sage.

McCrae, R. R., & Costa, P. T. (2003). *Personality in adulthood: A five-Factor theory perspective*. New York, NY: The Guilford Press.

Morgan, A. (1993). The evolving self in consumer behavior: Exploring possible selves. *Advances in Consumer Research*, *20*, 429-432.

Odom, W. (2008). Personal inventories: toward durable human-product relationships. *CHI '08 Extended Abstracts on Human Factors in Computing Systems* (pp. 3777-3782). Presented at the Conference on Human Factors in Computing Systems, Florence, Italy: ACM.

Paquet, L. (2000). Appraisal, acquisition and control of personal electronic records: From myth to reality. *Archives and Manuscripts*, *28*(2), 71-91.

Pertusa, A., Frost, R. O., Fullana, M., A., Samuels, J., Steketee, G., Tolin, D., Saxena, S., et al. (2010). Refining the diagnostic boundaries of compulsive hoarding: A critical review. *Clinical Psychology Review*, *30*, 371-386. doi:10.1016/j.cpr.2010.01.007

Petrelli, D., Van den Hoven, E. & Whittaker, S. (2009). Making history: The intentional capture of future memories. In *Conference on Human Factors in Computing Systems* (pp. 1723-1732). Presented at the CHI 09, New York, NY: ACM Press.

Prelinger, E. (1959). Extension and structure of the self. *Journal of Psychology*, *47*, 13-23. Samuels, H. W. (1986). Who controls the past? *American Archivist*, *49*(Spring), 109–124.

Samuels, H. W. (1992). *Varsity Letters: Documenting Modern Colleges and Universities*. Metuchen, NJ: The Society of American Archivists and the Scarecrow press.

Sayre, S. (1994). Possessions and identity crisis: Meaning and change for victims of the Oakland Firestorm. *Advances in Consumer Research*, *21*, 109-114.

Schau, H. J. (1998). Discourse of possessions: The metatheory of Russell W. Belk. *Advances in Consumer Research*, *25*, 37-45.

Schau, H. J., & Gilly, M. C. (2003). We are what we post? Self-presentation in personal web space. *Journal of Consumer Research*, *30*, 385-404.

Schellenberg, T. (1956). *Modern Archives*. Chicago, Il: University of Chicago Press.

Schlinger, M. J. (1969). Cues on Q technique. *Journal of Advertising Research*, *9*(3), 53-60.

Siddiqui, Shakeel, & Turley, D. (2006). Extending the self in a virtual world. *Advances in Consumer Research*, *33*, 647-648.

Sivadas, E., & Machleit, K. (1994). A scale to determine the extent of possession incorporation in the extended self. In *Marketing Theory and Applications* (Vol. 5, pp. 143-149). Presented at the 1994 American Marketing Association Winter Educator's Conference, St. Petersburg, FL: American Marketing Association.

Sivadas, E., & Senates, R. (1995). An examination of individual and possession-specific influences on the extended self and it's relation to attachment and satisfaction. *Advances in Consumer Research*, *22*, 406-412.

Smith, A. (2007). Valuing preservation. *Library Trends*, *56*(1), 4-25.

Solomon, M. R. (2002). The extended self. In *Consumer Behavior* (5th ed., p. 138). Upper Saddle River,
NJ: Prentice Hall.

Steketee, G., Frost, R., & Kyrios, M. (2003). Cognitive aspects of compulsive hoarding. *Cognitive Therapy and Research*, *27*(4), 463-479.

Stephenson Research Center & Logan, R. (Director). (1996). Workshop on Q methodology by Steven Brown, chapter 7. [Video cassette recording]. Available from http://www.qmethod.org/howto

Stevens, M. M., Abowd, G. D., Truong, K. N., & Vollmer, F. (2003). Getting into the living memory box: Family archives and holistic design. *Personal Ubiquitous Computing*, *7*, 210-216.

Tan, D., Berry, E., Czerwinski, M., Bell, G., Gemmell, J., Hodges, S., Kapur, N., et al. (2007). Save everything: supporting human memory with a personal digital lifetime store. In *Personal Information Management* (pp. 90-107). Seattle, Washington: University of Washington Press.

Thomas, S., & Martin, J. (2006). Using the papers of contemporary British politicians as a testbed for the preservation of digital personal archives. *Journal of the Society of Archivists*, *27*(1), 29-56. doi:10.1080/00039810600691254

Van Exel, J. (2005). *Q methodology: A sneak preview* (pp. 1-30). Rotterdam, the Netherlands: Vrije Universiteit, Department of Public Administration and Organisation Science.

Whittaker, S., & Hirschberg, J. (2001). The character, value and management of personal paper archives. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, *8*, 150-180.

Williams, P., John, J. L. & Rowlands, I. (2008). The personal curation of digital possessions: A lifecycle approach. *Aslib Proceeding,* 340-363.