SCENARIO-BASED DESIGN OF A DIGITAL REMINISCING SYSTEM
FOR OLDER ADULTS

A Dissertation in
Information Sciences and Technology

by

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ABSTRACT
Reminiscing – “the act or process of recalling the past (Butler, 1963, p. 66)” – is a core activity for any society. Research shows that the desire and tradition for reminisc-ing can be traced back to early civilizations where the elders of the community were responsible to know and share the history of their community (Butler, 1995; Cruikshank, 1990). However times have changed and the oral tradition of reminiscing has faded into an occasional telling of stories that are heard on special occasions. This points to a clear need for more opportunities to reminisce, and concepts from the field of Computer Mediated Communication (CMC) may help to re-enliven the customs of reminiscing about one’s personal or shared histories. For example many sites allow individuals to share photos (Flickr, Facebook, Photobucket), movies (YouTube), and small details of their daily lives (Facebook, Twitter). However, none of these systems were developed specifically for the support of reminiscence activities, nor do any of them cater to this type of sharing. Previous research has explored systems that allow children and elders to develop oral histories (J. B. Ellis & Bruckman, 2001); that enable community members to construct an online community history (Carroll, Convertino, Farooq, & Rosson, 2011; Carroll, et al., 2009); and that support creation of biographies on DVDs to assist elders with declining memories (K. L. Smith, Crete-Nishihata, Damianakis, Baecker, & Marziali, 2009). However there is still relatively little known about whether and how older adults might want to reminisce in a digital environment, particularly in an era when Web 2.0 has greatly expanded options for content generation and authoring. It is in this context that this study looks at means for digital reminiscing.

This research is motivated by two complementary research elements: an interest in the human-computer interaction (HCI) needs and preferences for old adult individuals, and a design research interest in digital tools for reminiscing. To address the unique needs and preferences of this population, I followed a scenario-based design approach to analyze design requirements,
develop design themes and corresponding prototypes; throughout I used claims analysis to evaluate the hypothetical impacts of key themes in the scenarios (Carroll, 2000, 2002).
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Chapter 1

Introduction and Motivation

Purpose of Research

Reminiscing – “the act or process of recalling the past (Butler, 1963, p. 66)” - is a core activity for any society. Research shows that the desire and custom for reminiscing can be traced back to early civilizations where the elders of the community were responsible to know and share the history of their community (Butler, 1995; Cruikshank, 1992). However, times have changed and the oral tradition of reminiscing has faded into an occasional telling of stories that are heard on special occasions. This raises a clear opportunity for investigating ways to better evoke and support reminiscing.

This research is motivated by two complementary research elements: an interest in the human-computer interaction (HCI) needs and preferences for older adult individuals, and a design research interest in digital tools for reminiscing. Previous research has explored systems that allow children and elders to develop oral histories (J. B. Ellis & Bruckman, 2001); that enable community members to construct an online community history (Carroll et al., 2009; Carroll, Convertino, Farooq, & Rosson, 2012); and the creation of biographies on DVDs to assist elders who have declining memories (K. L. Smith, Masashi Crete-Nishihata, Damianakis, Baecker, & Marziali, 2009). However there is still relatively little known about whether and how elders might want to reminisce digitally, particularly in an era when Web 2.0 technologies have greatly expanded options for content generation and authoring.

In the remainder of this document, I will borrow from Webster’s (1993) terminology and refer to reminiscing as the process of recalling memories from our personal past that is an
activity engaged in by adults of all ages at different points throughout their lives. Recalling earlier times can happen spontaneously or deliberately, privately or with other people, and may involve remembering both happy and sad episodes. That is, in the research presented here reminiscence is considered a mental and behavioral process of constructing some external or internal articulation; it is not the resulting articulation. The articulation can be verbal, textual or visual, or any combination of the three forms of representation; it may use any number of props – including none at all – to assist with recall or to produce a more vivid depiction of the event or experience. The resulting articulation will be referred to as a reminiscence event. I will use the term artifact to describe an object created by reminiscing and/or for the purpose of future reminiscing and personal legacy artifact to be any artifact that is personal in nature, created to encapsulate a life and constructed for the purpose of future reminiscing.

Thesis Statement and Research Questions

Current technologies for Computer Mediated Communication (CMC) are being recruited in a piecemeal fashion for reminiscing. Currently, sites exist that allow individuals to share pictures (Flickr, Facebook, Photobucket), movies (YouTube), and even details of their daily lives (Facebook, Twitter). However, none of these systems were developed specially for reminiscing nor do any of them currently cater to storytelling and history archiving. None of them were developed specifically with older adult populations in mind. But these sites do offer a glimpse into some of the complexities that will need to be addressed when creating a system for digital reminiscing, including attention to the users’ prior knowledge and experience with technology, and digital obsolescence concerns that may emerge when creating digital artifacts. Furthermore, while these sites support the uploading, sharing, and annotation of a variety of electronic media, none have been specifically developed to assist in conversion of physical media (e.g., old photos,
videotapes or other memorabilia) into a digital environment. For older adult individuals, much of their personal histories are currently archived using more traditional media; thus an important aspect of support needed by the digital system I am investigating will be to make the conversion of such media into digital form as seamless as possible.

With these considerations in mind, I propose the following thesis statement:

*A digital reminiscing system can serve as a life review tool that replicates how older adults are currently reminiscing while possibly strengthening family unity among older adult users, and serving as a tool for creating personal legacy artifacts for future generations.*

And the following general research question:

*RQ: How might we design ways for older adults to reminisce through digital means to preserve their history?*

To investigate this thesis and address the unique needs and preferences of this population, I followed a scenario-based design approach to analyze design requirements, develop design themes and corresponding prototypes; throughout I used claims analysis to evaluate the hypothetical impacts of key themes in the scenarios (Carroll, 2000, 2002). In preparation for this work, this high-level research question was elaborated as three more specific questions, each of which I planned to address through the scenario based design process.

*Q1a: How are older adults currently reminiscing?*

*Q1b: What technologies are older adults currently using?*

*Q2: What themes for a digital reminiscing tool can replicate, expand upon, and enhance the creation of personal legacy artifacts by older adults?*

*Q3: What are the benefits and drawbacks of the design themes proposed for the creation of digital personal legacy artifacts?*

More details about the research approach can be found in Chapter 3 of this document.
Research Contributions

The contributions of this research include:

1. An empirical characterization of how older adults currently reminisce, their motivations for doing so, and the design implications for how to translate these into and digital systems.

2. Empirical exploration of the value of the HMR with respect to older adults’ reminiscing experiences, resulting in a recommendation to elaborate the model.

3. Design principles, a conceptual design and associated screens that show how the proposed themes for a system that supports older adults’ creation of personal legacy artifacts.

4. Design rationale for such a system for the creation of personal legacy artifacts.

Dissertation Overview

The remainder of this dissertation is organized as follows. Chapter 2 provides a discussion of previous research focusing on reminiscing, older adults, and usability engineering. Chapter 3 outlines the scenario-based design research study that was conducted. Chapters 4 through 7 present the findings and discussion of the research. Finally Chapter 8 provides future directions of this work and concludes the dissertation.
Chapter 2

Related Work

In this chapter, I discuss published literature that is related to several key areas of reminiscing, summarize relevant studies of older adults as a user population, and introduce the methods of scenario-based usability engineering. In particular, I describe how my work builds on these areas and fits into the area of human computer interaction (HCI). This section serves as an overview of related work in the area.

Reminiscing

Butler (1963) was first to postulate the importance of reminiscing for older adult individuals. However, Butler argues against using the term “reminiscing” because of its psychological ties to aged individuals who are sometime viewed as being overly verbose and ‘living in the past’. Instead he proposes the concept of life review – “a naturally occurring, universal mental process characterized by the progressive return to consciousness of past experiences, and particularly, the resurgence of unresolved conflicts; simultaneously and normally, these revived experiences and conflicts can be surveyed and reintegrated (p. 66).” While acknowledging that life reviews include reminiscing and can happen at any age, he hypothesizes that such episodes become more likely when individuals realize that their own mortality is approaching. However there has been little evidence to support this basic assumption, specifically, no one has offered empirical evidence for the proposition that the life review process occurs as individuals realize their own mortality is near (Webster, Bohlmeijer, & Westerhof, 2010).
Since Butler’s seminal article (1963), reminiscing has become an important and expanding multidisciplinary research area (including topics and methods from gerontology, psychology, nursing, and education to name a few) with relevance to theory, research and practice (Haight, 1991). The field is however still struggling with the very issue that was at the forefront of Butler’s article, namely a clearly defined concept of reminiscing or life review (Bluck & Levine, 1998; Haber, 2006; Parker, 1995; Webster et al., 2010).

Currently reminiscing has no standard definition across the literature and more often than not each author uniquely defines the term: Table 2-1 documents a range of definitions offered. All the definitions build on the general dictionary definition proposed by Butler which at first glance is simple and straightforward, “the act or process of recalling the past (Butler, 1963, p. 66).” or his more nuanced definition of life review mentioned above. It is not until one starts to deconstruct and examine each word in the definition or the assumption behind the definition that the complexity arises: reminiscing may be viewed as an activity that is social (Bryant, Smart, & King, 2005) and self-descriptive (Faries & Hyman Jr., 1992), that takes many different forms (Fivush, 2008), is used for many different reasons (Li, Dey, & Forlizzi, 2010; S. B. Merriam, 1993), and is directed towards different types of audiences (Parker, 1995). More details about these complexities can be found in the next section of this document, Heuristic Model of Reminiscing.
Table 2-1. Definitions of Reminiscing

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<td>“The remembered past (Lieberman &amp; Falk, 1971)”</td>
<td>Builds on Butler’s initial definition by adding forms that reminiscing can take and that it can be individual or group.</td>
</tr>
<tr>
<td>“The recall to mind of a long-forgotten experience or fact or the process or practice of thinking or telling about past experiences (S. Merriam, 1980, p. 604)”</td>
<td>Add that reminiscing can be silent while also identifying activities are not part of the definition.</td>
</tr>
<tr>
<td>The recall of memories characterized as daydreaming, storytelling or nostalgia by oneself or with others (Haber, 2006).</td>
<td>A combination of previous definitions (Ballard, 1913; Brewer, 1988; Butler, 1963; Coleman, 1986; S. Merriam, 1980; Wong &amp; Watt, 1991) and taxonomies (Gerfo, 1980; Wong &amp; Watt, 1991) created with the goal of specificity and completeness.</td>
</tr>
<tr>
<td>Dwelling on the past, this retrospection can be both purposive and spontaneous and can be either oral or silent. However does not include remembering facts to make decisions or daydreaming about the future (Havighurst &amp; Glasser, 1972).</td>
<td></td>
</tr>
</tbody>
</table>

Adding to this complex playing field is that words such as life review, story telling and autobiography are often used as synonyms for reminiscing. In most literature the term ‘life review’ builds from Butler’s definition: “a naturally occurring, universal mental process characterized by the progressive return to consciousness of past experiences, and particularly, the resurgence of unresolved conflicts; simultaneously and normally, these revived experiences and conflicts can be surveyed and reintegrated (1963, p. 66).”
In addition to the general limitation of incomplete or alternative definitions of reminiscing, Webster, Bohlmeijer and Westerhof (2010) survey a body of literature that identifies a plethora of other limitations within research studying the reminiscence activity. For example, they cite conflicting reports as to the therapeutic properties of reminiscence, a lack of tested assessment instruments, poor experimental design, and insufficient theoretical research with most research making no attempts to develop or test theory at all (p. 530). The limitations dealing with theory development and experimental methods are particularly important for the current project as it intends to use empirical methods for studying reminiscing so as to build a framework for understanding and supporting reminiscence within a certain age group.

Reminiscing research takes place within multiple disciplines including: psychology, sociology, and gerontology, with each discipline adopting its own theoretical lens for studying the activity. Table 2-2 summarizes several example threads of research. Psychologists may use Erikson’s (1995) stages of development perspective; sociologists may choose presentation theory (Goffman, 1959); while gerontologists may rely on continuity theory (Atchley, 1989) for understanding reminiscing behavior. By no means is this an exhaustive list of disciplines engaged in reminiscing research or theories used to explain reminiscing; however these three disciplines reflect the largest number of researchers working in this area.
Table 2-2. Theories Used to Investigate Reminiscing

<table>
<thead>
<tr>
<th>Theory</th>
<th>Summary</th>
<th>Related Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial Development</td>
<td>Erikson describes 8 stages of life where an individual needs to face</td>
<td>(Baltes, 1987; Black &amp; Haight, 1992; Erikson, 1995)</td>
</tr>
<tr>
<td>Development Theory</td>
<td>a challenge at each stage and has to resolve the issue to move on to the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>next stage. Specifically the 8th stage of life relates to ego identity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>versus despair.</td>
<td></td>
</tr>
<tr>
<td>Presentation Theory</td>
<td>Individuals continually change performances depending on the audience</td>
<td>(Goffman, 1959)</td>
</tr>
<tr>
<td></td>
<td>and their reactions to manipulate the impressions that others make of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>them in order to maintain self-esteem.</td>
<td></td>
</tr>
<tr>
<td>Continuity Theory</td>
<td>Individuals transition through stages of life while needing to seek</td>
<td>(Atchley, 1989; Parker, 1995)</td>
</tr>
<tr>
<td></td>
<td>order and meaning by linking past events with current situations.</td>
<td></td>
</tr>
</tbody>
</table>

**Psychosocial Development Theory**

The Psychosocial Development Theory is primarily grounded in the work of Erik Erikson and his stages of psychosocial development (Erikson, 1995). Erikson focused on the developmental stages associated with childhood, adolescence and adulthood period of the human lifecycle within the eight he laid out. A core argument in Erikson’s theory is that people confront a major problem or hurdle during each life phase, and that this challenge must be accomplished or overcome before the individual can proceed to the next stage of development. These transitions eventually produce what he refers to as ego integrity during the last stage, typically achieved as individuals reflect on their lives and accept that they lived full lives. The eighth stage, “Wisdom” or “Ego Integrity vs. Despair”, refers to adults who are aged 65 and older, and is where an individual turns his or her focus inward towards the creation of Ego Integrity or the “basic acceptance of one’s life as having been inevitable, appropriate, and meaningful.” Erikson posits Despair as being the result of a faulty, incomplete, or otherwise failed integration and review of one’s life experiences. Overall, Erikson sees the failure or inability to integrate one’s life experiences as a source of regrets that lead to feelings of despair.
However, within the larger body of theory there are three main criticisms of Erikson’s Theory of Psychosocial Development. First, many theorists argue that Erikson fails to take into account the mitigating factors of cohort and culture (Cole, 1992; Pietikainen & Ihanus, 2003; Weiland, 1993). These factors would contribute by giving the theory a more universal appeal, for example by incorporating values that are not those of the traditional middle class values that Erikson held (Kushner, 1993). A second criticism of Erikson’s theory view centers on the highly limited pool for analysis that Erikson drew upon, namely his own life experiences and reflection (Kushner, 1993; Pietikainen & Ihanus, 2003; Thorson, 2000; Wallace, 1992). The final criticism of Erikson’s work arises from his placement of life review in the eighth stage of psychosocial development. Many critics point out that life review occurs repeatedly throughout an individual’s life cycle and in fact may be an important factor in successfully overcoming challenges of the previous life stages (Melia, 1999; Pietikainen & Ihanus, 2003; Weiland, 1993). In fact, Melia (1999) posits that life review must occur after each major change that occurs during the advanced years of life, in order for any type of ego integrity to be maintained.

**Self-Presentation Theory**

Self-Presentation theory is based on the notion that life is a series of performances, a metaphorical theater. In this theater metaphor, each individual is an actor as well as part of the audience for other actors, all of them performing simultaneously in the ‘play of life’. The ‘play’ is not scripted and does not have a director or stage hands either. The roles are fluid and dynamic creations that are always changing based on the environment, social roles, and expectations of the audience members as they receive feedback (Goffman, 1959). One key takeaway from Goffman’s self-presentation theory is that all interactions are negotiations between participants. These negotiations are set up as a binary relation where an actor conveys a particular message, through
the explicit message as well any unconscious messages embedded or implied, and an observer infers a message based on what the actor does.

Unlike Erikson’s focus on a passive and imposed reminiscing, Goffman (1959) sees reminiscing as one mechanism for creating and conveying an outward, focused self-presentation. This stands in opposition to the inward, self-defined review, which dominates much of life review or reminiscing theory. For example, through Erikson’s Psychosocial Development lens, reminiscing would be a private act that is engaged in as a way to come to terms with your life, such as one might accomplish via a journal entry or quiet contemplation. In contrast Goffman’s Self-Presentation lens implies that reminiscing is a public performance that is adapted for the current audience, such as an exuberant account of your college years at a bar or a shared family session that recalls memories of a recently past relative.

Within the dramatalurgical presentation of self, Goffman (1959) argues that individuals selectively choose their reminiscing from past and present event to manipulate other’s images of them in order to create an overall positive impression. Given the cultural value placed upon youth and the young within Western society, some researchers have speculated that this selective reminiscing may be a deliberate act meant to combat the social stigma placed upon aging and the elderly (Tarman, 1988).

**Continuity Theory**

The final theory looks upon individuals’ lives as not being separate stages through which one passes, but rather as a process of continual generation and review of experiences or events that are incorporated into an overarching life narrative (Parker, 1995). Continuity theory proposes that both internal and external continuity, and the application of familiar strategies in familiar arenas of life, are supported by individual preference and social norms and become more
important as people age. Internal continuity is an individual’s ability to remember experiences, preference, skills, and temperament; external continuity is the remembering of physical and social environments, role relationships and activities (Atchley, 1989).

Although Continuity Theory acknowledges developmental processes similar to Erikson’s (1995) stages of psychosocial development (e.g., childhood, adolescence, adulthood), its focus is not on overcoming challenges to move through the stages. Rather the central mechanism is milestone events like marriage, parenthood and retirement. Robert Atchley (1989) sees reminiscing as occurring between stages and creating a transitional point through which the previous experiences are reinterpreted and integrated into the continuing life story by the individual. This integration allows for the resolving of difficult psychological or social issues that have been left to develop or not addressed and brings order to a person’s memories by creating a narrative link between past experiences.

**Limitations of Existing Research on Reminiscence**

Reminiscing research has been criticized for not having produced a standard set of assessment instruments (Webster et al., 2010; Wong & Watt, 1991). Instead, attention has focused on specific aspects of the process. For example, Coleman (1986) has assessed the attitude the person associates with reminiscing (positive, negative, neutral, avoidance). Lieberman and Tobin (1983) considered more closely the individual’s reminiscence phase (avoiding reminiscing, currently involved in reminiscing, completed reminiscing). McMahon and Rhudick (1964) take a taxonomic approach, classifying three types of reminiscence: storytelling, life review, and defensive reminiscence. Gerfo (1980) also identifies three types: informative, evaluative and obsessives; these are similar to McMahon and Rhudick’s but use different terms and slightly different meanings. Wong and Watt (1991) have offered a taxonomy of reminiscing that is based
on qualitative narrative coding combined with quantitative interview results. They identified six
types of reminiscence: integrative, instrumental, transmissive, narrative, escapist, and obsessive.
Of the six types they find that only two, integrative and instrumental, are associated with
successful aging (for these researchers, successful aging means “higher than average ratings in
mental and physical health and adjustments as determined by an interviewer and a panel of
gerontological professionals “(Wong & Watt, 1991, p. 272)). Finally, Webster (1993) has created
a reminiscing function scale that identifies eight different uses for reminiscing: bitterness revival,
boredom reduction, conversation, death preparation, identity, intimacy maintenance, problem
solving, and teach/inform. However, none of these taxonomies or measurement instruments serve
as a comprehensive analysis of reminiscing.

Additionally, reminiscing research has been criticized as exhibiting poor experimental
design, lack of appropriate control groups, potential confounding variables, and homogeneous
participant characteristics as the main experimental design issues (Webster et al., 2010).

With these limitations in mind, one goal of the proposed research is to avoid the
confusion found in previous work so that the results do not become just another project that adds
to the smörgåsbord of reminiscing research. To address the concerns raised and to provide a solid
basis for my research I will adopt the *Heuristic Model of Reminiscing* (Webster et al., 2010). This
model was chosen because it was informed by previous research but also attempts to move
beyond the limited focus that researchers sometimes give to the overall process of reminiscing.

**Heuristic Model of Reminiscing**

The Heuristic Model of Reminiscing (HMR) offers a multidisciplinary perspective on the
reminiscing process (Webster et al., 2010). This process model begins with a consideration of
reminiscence triggers, proceeds through factors that affect the modes, moderators and functions of retrieved memories and concludes with the outcomes of the reminiscing event (see Figure 2-1).

Figure 2-1. Webster et al.’s (2010) Heuristic Model of Reminiscence

The HMR framework begins with a trigger (e.g., a specific sound, touch, or picture) that initiates a memory. A mode for interacting with a memory is next selected - almost instantaneously and not always through conscious decision; examples include the public activities of storytelling and the private activities of introspection. Sociocultural variables may lead different people to remember the same event with distinct contextual lenses. Additionally, moderators such as age, gender and personality influence reminiscing. People reminisce for many different reasons, and the HMR framework proposes eight functions: bitterness revival, boredom reduction, conversation, death preparation, identity, intimacy maintenance, problem solving and teaching/informing (Robitaille, Cappeliez, Coulombe, & Webster, 2010). Reminiscing may elicit positive or negative outcomes, for example increases in self-esteem, or conversely in anxiety.
Finally the model has a seventh component, *research outcomes*; this element is directed toward the reminiscing research field and is purely academic in nature, with the desire for more theory development as well as synergy among the researcher studies. The model is rather linear in nature however the authors do point out that the process of reminiscing is not sequential and each component is dynamically related to all others in some fashion, even though they do draw arrows going only one direction.

The Heuristic Model of Reminiscence can be seen as a synthesis of the general dictionary-based definition used by Butler (i.e., “the act or process of recalling the past”; (Butler, 1963, p. 66), with the alternate descriptions of reminiscing as a social (Bryant et al., 2005), self-descriptive (Faries & Hyman Jr., 1992) activity that takes many different forms (Fivush, 2008), is used for many different reasons (Li et al., 2010; S. B. Merriam, 1993), and is directed towards different types of audiences (Parker, 1995). Each of these facets of reminiscence are addressed in the model offered by Webster et al. (2010). The social nature of reminiscing and different audiences and forms falls under the *modes* and *context* components. The reasoning for the occurrences falls under functions, while the requirement to be self-descriptive encompasses the entire model.

Although the Heuristic Model of Reminiscence was developed largely to synthesize a mix of theoretical analyses and contributions across fields, I found its central components to be a useful guide for establishing the design requirements of this work. However the research presented not only explores reminiscing but also specifically investigates digital means of reminiscing. Therefore I will now turn to a review of literature concerning digital reminiscing systems.
HCI Research on Reminiscing

Working through the lens of the HMR framework, we can see that a number of systems for digital reminiscing have explored the role of triggers, for example in private reflection (c.f. Pensieve [(Peesapati et al., 2010)]), intergenerational conversation (c.f. Palaver Tree Online [(J. B. Ellis & Bruckman, 2001)]), or community memory (c.f. Nostalgia [(Carroll et al., 2009)]). In some cases these systems can also be viewed as exploring reminiscence functions, though typically the emphasis is on just one or a few of the functions proposed by the HMR framework.

Reminiscence Triggers

Reminiscence triggers can be spontaneous or intentional. Spontaneous triggers arrive through sensory input, such as smell, sounds, flavors, or fleeting images, or through associative memory activations. In contrast, intentional triggers are more deliberate, for instance a prompt concerning a particular event, object, or place. Familiar examples of intentional triggering are the Story Corps project (http://storycorps.org/), or any family gathering where a youngster asks to hear a favorite story one more time.

The Pensieve system sends textual prompts by email (Peesapati et al., 2010). It may rely on a generic question (“What were you doing when…?”); or, if users share social network information, it generates more specific probes related to their posts. Sonic Souvenirs explores the role of modality-specific prompts, using clips from audio recorded during a family holiday (Oleksik, Frohlich, Brown, & Sellen, 2008). These researchers found audio clips to be particularly effective triggers for mundane shared events, in contrast to photographs that capture “happy” moments (Frohlich, 2004a).
Photos are often used as reminiscence triggers. In SharePic, up to four people sit around a tabletop user interface to view photos that prompt oral stories (Apted, Kay, & Quigley, 2006). Using Nostalgia, town residents posted historical pictures of community sites that in turn evoked text-based storytelling (Carroll et al., 2009). These stories served as their own triggers, sparking new or expanded stories from others in the community.

**Reminiscing Functions**

The HMR framework also emphasizes the role of functions in the reminiscence process and we can likewise consider the design implications of supporting the functions proposed by the model. For example, a system designed to support teaching or learning requires a mechanism for sharing, but a system built for bitterness revival would likely ensure that the reminiscing remains private.

*Bitterness revival* refers to history that is emotionally charged, for instance events in which a person believes she has been treated unfairly. Not surprisingly, psychologists have often discussed this as a negative function of reminiscing, akin to holding a grudge (Robitaille et al., 2010). Example behaviors might be burning a set of photos and letters from an ex-lover, unfriending a social network contact, or gossiping about an enemy. Although bitterness revival could occur in general systems like Facebook, we have not found a system specifically designed to support this function.

In *boredom reduction*, remembering is used to fill free time or increase mental energy. This behavior may be as simple as writing in a journal, or as complex as creating a video montage. Any system that supports recording of memories can serve this function; for example, Harley and Fitzpatrick studied a user named Geriatric1927, who used YouTube as a way to engage in the “fascinating place” and produce content (Harley & Fitzpatrick, 2009). This
YouTube blogger became engaged with others who watched and commented on what he considered to be mundane stories of his life.

Conversation focuses on connecting and reconnecting with others through stories of the past. Examples include talking with strangers in public settings (coffee shops, gyms) or with a relative at a family reunion about long ago events. In contrast to boredom reduction, the goal of this function is to initiate or reinforce a connection with the memory receiver. For example, CIRCA (Astell et al., 2010) is a touch screen system developed to help cognitively impaired elders and their caregivers hold reminiscing conversations; one of its design goals is to reinforce fading memories. Nostalgia (Carroll et al., 2009) also enables the conversation function of reminiscing: a conversation is invited when a photograph is posted to the forum; it continues when related memories are evoked and shared.

Death preparation emerges when people facing their impending demise reflect on their past life, perhaps to make amends or find meaning. A growing body of HCI research has investigated end of life behaviors (Haight, 1991; Massimi & Baecker, 2010), but only one system has been proposed in support of death preparation. Using Blogging by the Dead (Hall, Bosevski, & Larkin, 2006), people would create reminiscences while still alive. After the author dies, the stories can be made available to loved ones. The concept is to offer a mechanism for saying goodbye, by leaving memory triggers or life lessons for later sharing.

Identity or problem solving refers to people reminiscing in order to better handle future experiences. For instance someone may share a memory of a previous event as a way to resolve tensions associated with an upcoming event, or review one’s life more broadly to see what has changed or remained the same (e.g., using before/after weight loss photo to decide whether to change one’s self-presentation). HCI research in this area has centered on digital capture of life experiences, or lifelogging. For example, MyLifeBits allows users to scan, document and organize a wide variety of content in their lives (Gemmell, Bell, & Lueder, 2006), also supporting
visualizations with maps and timelines. The visualizations can be used to trigger reminiscing, and users can link bits of content together to document meaningful events.

The HMR function of *intimacy maintenance* concerns memories about important people who are no longer near. Separation or loss may occur from death, relocation, or even busy schedules. The individual thus reminisces to keep memories about the missing others fresh. Examples include taking a few moments on a deceased mother’s birthday to reflect on her life, or calling an overseas relative to keep a connection alive. Recently digital bereavement has received attention in HCI, with some studies showing that the social networking profiles of the recently departed can serve as places to memorialize and remember (Brubaker & Hayes, 2011; Getty et al., 2011)

A few systems have been developed to assist specifically with bereavement. Blogging by the Dead (Hall et al., 2006) is one example: after users pass away, the stories they have posted act as triggers for loved ones’ intimacy maintenance. ThanatoFenestra (Uriu & Okude, 2010) is a digital altar designed to replicate a traditional Buddhist prayer altar. It displays digital photographs and includes a candle that family members can light when they pray and reflect on the deceased.

Finally, people engage the *teaching/informing* HMR function when they recall things to teach others, for instance remembering the “good old days” or reflecting on lessons learned from growing up in the great depression. Palaver Tree Online (J. B. Ellis & Bruckman, 2001) is an online community that bridges generation gaps by engaging children and the elderly in collaborative creation of oral histories. Using Serendipitous Family Stories, families can create stories and place them on the map for other to family members to find (Bentley & Chowdhury, 2010). Like Blogging by the Dead, the act of creating these stories is a reminiscing event, and the stories serve as reminiscing triggers to help other family members create more complete histories.
Older Adults

As the first of the baby boomer population, typically defined as America’s born between 1946 and 1964 (Easterlin, Macdonald, & Macunovich, 1990), are reaching the age of 65 this year, the population of older Americans is poised to dramatically increase over the next twenty years, growing from approximately 13% of the population to over 20% by 2030 (Federal Interagency Forum on Aging-Related Statistics, 2010). For the purposes of the current research the conventional definition of the older adults will be used: individuals 65 years of age or older (Orimo et al., 2006). However to assume that the aging population is a single coherent group of individuals is a mistake. Older adult individuals have a wide variety of knowledge and skills stemming from their careers, families, hobbies and other life experiences. This disparity is especially true when it comes to technology, and more specifically online sharing and communication technologies. Depending on education, career and other factors some individuals in this age group would be considered technology experts while others may never have used a computer, let alone been online. However, no matter their background, as individuals age their technology usage patterns will need to adapt, due to sensory (Czaja & Lee, 2008; Kline & Schieber, 1985; Schieber, Fozard, Gordon-Salant, & Weiffenbach, 1991), motor skill (Czaja & Lee, 2008; Rogers & Fisk, 2000), cognitive changes (Czaja & Lee, 2008; Park, 2000) and to the ever-changing online environment that in many (perhaps most) cases was not designed for them, and in fact might be experienced by many older adults as a foreign culture or language.

As humans age, sensory activities and processing change. Among the many changes that older adults experience, those occurring in the visual and auditory systems are often the most noticeable to the self and others.

Within the visual system, aging is associated with reductions in static and dynamic visual acuity and contrast sensitivity, making it increasingly difficult to do quite simple tasks such as
reading or adjusting to information presented at different depths. Additionally, a decrease in dark adaption, a decline in color sensitivity, and heightened susceptibility to problems with glare create greater difficulties in many everyday tasks, including necessary ones such as night driving and differentiation of objects from one another (Czaja & Lee, 2008; Kline & Schieber, 1985).

Declines in visual acuity often result in difficulty with visual search skills and success at detecting targets against a background (Kline & Schieber, 1985). Given the common requirement for simple visual search tasks such as this in computer-supported activities, such a decline can result in difficulty processing visual information on screens (Charness, Schumann, & Boritz, 1992). Such problems would be even worse for systems with poor visual design, for instance information displays that include cluttered visual images, backgrounds, or dim contrasts between task objects and background content. Further, the selection of screen elements often requires location and use of a pointing device that itself projects a very small image (e.g., a mouse pointer); older adults might perform such tasks more easily with pointing devices that have a larger visual representation like a light pen (Charness & Holley, 2001).

Along with sight, declining abilities in the auditory system create challenges for people as they age. While there is a decline in auditory functions after the age of twenty, and depending on preventative measures sometimes before, the largest measurable losses occur during ages 60 – 95 (Fozard, 1990). Older adults face a decline in sensitivity to pure tones, with particular problems in detecting the high frequency tones often created by computer systems (e.g., a feedback tone). Difficulty understanding speech, localizing sounds, and an increased sensitivity to loudness also complicate regular activities such as holding a conversation, listening to television, radio, or the phone or locating approaching dangers (Schieber et al., 1991). When coupled with the declines in eyesight, technological solutions designed for vision-impaired people in general may be less effective for older adults.
Beyond declines in human sensory systems, older adults may face additional physical complications due to the aging of their neuro-motor responses. Aged people often experience a slower response time, a decline in ability to maintain control over continuous movement, a loss of motor flexibility, and more frequent variable movement (Rogers & Fisk, 2000). Beyond these declines in motor functions there may be other problems that come from age-related diseases including arthritis and other chronic conditions (Czaja & Lee, 2008).

Finally, as individuals age their cognitive abilities decline, particularly their attentional processes, working memory, discourse comprehension, problem solving, reasoning, inference formation and interpretation, encoding and retrieval in memory (Park, 2000), and information processing speed (Czaja & Lee, 2008). For example, older adults tend to perform more poorly in multi-tasking events, such as driving a car and looking for street signs, than their younger counterparts, and as the difficulty of the tasks increases the magnitude of the disparity also increases. Therefore when designing systems for older adults it is critical to not require multi-tasking of important tasks (Fisk, Rogers, Charness, Czaja, & Sharit, 2009).

All of these age-related changes lead to increased difficulty for older adults who are attempting to operate or interact with modern computing systems. Mouse movements (double clicking, pointing, acquiring targets, movement) are more difficult due to their requirements of continuous movement and pressure and flexibility of the arm and wrist (Riviere & Thakor, 1996; M. W. Smith, Sharit, & Czaja, 1999; Walker, Millians, & Worden, 1996). While the use of different input devices, such as light pen (Charness & Holley, 2001) or touch pad (Murata & Iwase, 2005) can help to overcome some of these challenges, they still do not take into account all of the alterations to normal motor functions caused by the aging process.
HCI Research on Supporting Older Adults

HCI research regarding older adults has grown considerably over the past ten years. Generally research in this area falls into six broad areas: Adoption, affect, development, performance, psychosocial, and training. *Adoption* considers the availability and appropriation of technology; *affect* the emotional connections that individuals have with technology; *development* the creation and usability of applications; *performance* the speed and accuracy of task completion; *psychosocial* the emotions that may be associated with technology such as loneliness and depression; and finally *training* concerns approaches to helping older adults learn to use technology (Wagner, Hassanein, & Head, 2007).

Research on technology adoption by older adults has identified a number of factors that may influence older person’s use of computer-based technologies. Specifically, research has shown that an older person’s cognitive ability (Eastman & Iyer, 2005; L. Kelley, Roger W. Morrell, Denise C. Park, Christopher B. Mayhorn, 1999), physical mobility (McMellon & Schiffman, 2000), inherent interest in technology (L. Kelley, Roger W. Morrell, Denise C. Park, Christopher B. Mayhorn, 1999; Morrell, Mayhorn, & Bennett, 2000), knowledge about technology (Morrell et al., 2000), and anxiety toward technology (Cody, Dunn, Hoppin, & Wendt, 1999; Czaja et al., 2006), are all predictors of computer system adoption. Additionally, older adults sometimes must rely on others for access to technology (Cutler, Hendricks, & Guyer, 2003; Selwyn, Gorard, Furlong, & Madden, 2003), adding a further layer of indirection in their ability to use computing systems. Clearly, adoption of technology by this age group is a multifaceted problem; a population as diverse as the elderly cannot be considered as a single group who are either adopters or non-adopters.

Development research focuses on methods for developing technologies that may be more useful and usable by older adults. Specifically, such research considers how the physical and
mental changes that occur as a part of aging can be considered when developing new
technologies or when preparing guidelines for developing such software (Bitterman & Shalev,
2004; Charness & Holley, 2004; Czaja & Hiltz, 2005; Hawthorn, 2000; Morris, 1994; Zajicek,
2004). This research area has progressed through the study of particular problem domains, such
as health care (Becker, 2004) and e-learning (Stoltz-Loike, Morrell, & Loike, 2005), as well as
more generally in email systems (Dickinson, Newell, Smith, & Hill, 2005), and guidelines for
web development (Bitterman & Shalev, 2004; Charness & Holley, 2004; R. D. Ellis &
Kurniawan, 2000).

Software Systems for Older Adults

With respect to software systems that have been developed specifically for the older adult
users, a great deal of recent research has focused on assisting older persons to *age in place*, for
example building tools that assist with medical needs or allow other caregivers to monitor the
elder remotely. Table 2-3 contains a summary of some of these systems.
Table 2-3. Software Systems Tailored for Older Adults

<table>
<thead>
<tr>
<th>Type</th>
<th>Purpose</th>
<th>Example Research Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Health Care Concerns</td>
<td>Assist in the gathering of information and compliance with current prescribed treatments.</td>
<td>(Becker, 2004; Palen &amp; Aaløkke, 2006)</td>
</tr>
<tr>
<td>Family Monitoring</td>
<td>Allow family members to passively check in on older family members.</td>
<td>(Itoh, Miyajima, &amp; Watanabe, 2002; Mynatt, Rowan, Craighill, &amp; Jacobs, 2001; Plaisant, Clamage, Hutchinson, Bederson, &amp; Druin, 2006)</td>
</tr>
<tr>
<td>Peer Monitoring</td>
<td>Allow peers to passively check in on each other.</td>
<td>(Goffman, 1959; Riche &amp; Mackay, 2007, 2010)</td>
</tr>
<tr>
<td>Distant Play</td>
<td>Allow older family members to interact with younger members in playful ways.</td>
<td>(Davis, Skov, Stougaard, &amp; Vetere, 2007; Davis, Vetere, Francis, Gibbs, &amp; Howard, 2008; J. B. Ellis &amp; Bruckman, 2001; Khoo et al., 2006)</td>
</tr>
<tr>
<td>Reminiscing</td>
<td>Allow the elders to develop and share stories about their past or their communities past.</td>
<td>(Apted et al., 2006; Carroll et al., 2009; J. B. Ellis &amp; Bruckman, 2001; Gaver &amp; Dunne, 1999; Hofmeester, Dunne, Gaver, Susani, &amp; Pacenti, 1999; K. L. Smith et al., 2009)</td>
</tr>
</tbody>
</table>

With the explosion of Web 2.0, systems have been developed to allow individuals to document their entire life (Sellen et al., 2007) as well as being prompted to reminisce based on old posts to social networking sites (Cosley et al., 2009). For example, Pensive is a reminiscing system that prompts users with photos or status that they have previously posted to social networks (Cosley et al., 2009). However despite the rapid growth in content sharing applications, there is a need for more development in this field, particularly of systems designed with a focus on old adults who may not currently use the emerging technologies. Web 2.0 can provide old adults with a platform to create and share their stories in a new, achievable, fun, and creative way. Recently there has been a call from the HCI community to investigate current customs as well as digital reminiscing solutions (Cosley, Mulvenna, Schwanda, Peesapatı, & Wright, 2011) – my research can be viewed as responding to this call with respect to one specific user population that may have special needs for or benefits from the reminiscing process.
Usability Engineering

Usability engineering refers to systematic methods that support a user-centered and iterative approach to the development of interactive software systems (Kushniruk & Patel, 2004; Mayhew, 1999; Wania, Atwood, & McCain, 2006). A general feature of usability engineering methods is that users needs are evaluated and addressed throughout the development process (Cooper, Reimann, & Cronin, 2012; Hix & Hartson, 1993; Nielsen, 1994; Rosson, Carroll, Seals, & Lewis, 2002; Sharp, Rogers, & Preece, 2008). Usability engineering is a dynamic iterative process that typically focuses on three main phases of development: requirements analysis, design, and evaluation; note that the system’s requirements and the associated analysis and design activities for each step may change based on the users’ reactions to the emerging design (Carroll, 2000; Nielsen, 1994; Rosson & Carroll, 2008).

Requirements Analysis

Requirements analysis is used to understand the problem that a design team is considering, including current activities and users, and to define the goals and objectives of a project. To gain this understanding user observations of current work activities and settings may be conducted; information that is less rich but may be more generalizable can be gathered through surveys. These observations allow the design team to gain an understanding of the working environment, how the user interacts with the current system, and the users day-to-day experiences (Rosson & Carroll, 2008). Once the requirements are understood it is important to develop high-level design goals for the system to guide the development process, for example by assisting in prioritizing functionality (Nielsen, 1994) or used as a benchmark to determine if the system is meeting the needs of the user (W. M. Newman, 1997; W. Newman, 1994).
Design

Using the design goals as well as the observational work completed in the requirements phase the design team begins to envision a novel system. However, this does not mean that the system developers will immediately sit down and begin to build a system; they must first work to identify the activities and flow of work that that the system will be supporting. Hierarchical task analysis (Annett & Stanton, 2000; Mills, 2007) and scenario development (Goodwin, 2009; Rosson & Carroll, 2008) are two commonly accepted methods for describing and analyzing activities, as well as for envisioning novel forms of current activities. The system developer may then consider how the software should support these activities (including new types of activities not previously possible), and build prototypes of increasing complexity to investigate these design ideas. Along the way, one or more prototypes are typically given to users for formative feedback that can further direct design refinement.

Evaluation

Evaluations are an empirical way to study a system to determine if the goals and requirements for the system are being met (Cooper et al., 2012; Hix & Hartson, 1993; Nielsen, 1994; Sharp et al., 2008). Evaluations also provide feedback to the developer on what features are working and which as they work through prototypes and designs. Talk aloud (Hornbæk & Frøkjær, 2008; Nørgaard & Hornbæk, 2006), heuristic (Adebesin, Kotzé, & Gelderblom, 2010; de Kock, van Biljon, & Pretorius, 2009; Ssemugabi & de Villiers, 2007) and cognitive walkthrough (Blackmon, Kitajima, & Polson, 2003; Gabrielli, Mirabella, Kimani, & Catarci, 2005; Wharton, Rieman, Lewis, & Poison, 1994) can be used for evaluations (Hwang & Salvendy, 2010). More often than not, the type of feedback desired determines the type of evaluation conducted. For
example, early in the system development process the designers need formative evaluation results to understand what is working well and why. As the project comes to completion it may be important to gather data from one or more summative evaluation tests to determine to what extent the system has achieved its stated usability objectives.
Chapter 3

Research Approach

The research presented here has been conducted within the framework of scenario-based design (SBD). SBD is a usability engineering framework that centers on the creation, analysis, and evolution of user interaction scenarios to guide development (Carroll, 2000; Rosson & Carroll, 2002). The scenarios are descriptions of the users, their activity context, and how the users perform one or more tasks. Scenarios are usually presented as written narratives, but also can take the form of storyboards, videos, and prototypes (Carroll, 2002). The SBD framework was selected not only because scenarios are an effective representation for human-centered design (Rosson & Carroll, 2008), but also because stories are a simple method for illustrating and discussing usage possibilities with older adult individuals. Further, one product of the SBD process is a set of design rationale that analyzes and documents hypothesized consequences of central design themes; for this dissertation project, my goal was to develop not just a novel tool design but also a body of design rationale that connects the design concepts to existing literature or to empirical data gathered as part of the project.

Figure 3-1. Scenario Based Design Framework
The SBD framework emphasizes the gradual elaboration or transformation of people’s activities (represented as scenarios) using new ideas for the use of technology (See Figure 3-1). The process begins with a thorough understanding of current activities (which may be taking place with or without the assistance of technology). This understanding of the problem space is used to guide design -- thinking about new possibilities -- with inspiration also drawn from innovative design concepts, theoretical frameworks, or related technologies. Throughout the SBD process, the design rationale associated with a set of scenarios is documented through claims analysis, wherein key features of the activity are linked to hypothesized positive and negative consequences for the actors in the scenario (or in related scenarios). These claims also help to guide the design process, in that designers attempt to address the negative consequences while maintaining or building on the positive (Rosson & Carroll, 2002).

The work reported in this dissertation used a variation of SBD, in that it began with a field study that was extremely open-ended and exploratory, guided primarily by existing literature on reminiscing (e.g., the HMR Framework). That early work led to a design focus on personal legacy artifacts, and an SBD process was initiated to guide the design reasoning, as depicted in Figure 3-2. Because the early work raised many questions, including the appropriate scope or direction of the design work, I found myself spending considerable time in analyzing and understanding people’s needs or preferences for reminiscing and this became a bigger focus in the project. As a result, the SBD phases of detailed design, prototyping and user evaluation had a reduced emphasis. In the following sections, I explain each phase in detail and describe the research conducted to answer the questions.
Phase 1: How Are Older Adults Currently Reminiscing? What Technologies Are Older Adults Currently Using?

Before developing a system to support digital reminiscing, an understanding of how older adults were currently reminiscing, whether in a physical setting (e.g., scrapbooks, oral storytelling) and/or using digital tools of some sort (e.g., digital photos shared via email) was needed. Specifically, I wanted to understand what memories they are sharing, as well as with whom, why, when, where, and how the sharing is done. In parallel, I wanted to explore this age group’s design preferences and requirements for a digital reminiscing system. I used the HMR framework to organize an interview study of the memories older adults habitually share, while also probing design preferences and requirements for a digital reminiscing system.
The results were used to gain knowledge of how older adults are currently reminiscing; to focus the digital system toward personal legacy artifacts; to develop a root concept of digital personal legacy artifacts creation; to develop problem scenarios describing prototypical older adults engaging in reminiscing; and to analyze claims that hypothesize themes of current reminiscing customs that have important consequences, both positive and negative, for the scenario actor(s).

Phase 2: What Themes for a Digital Reminiscing Tool Can Replicate, Expand Upon, and Enhance the Creation of Personal Legacy Artifacts by Older Adults?

After the problem scenarios and claims documents were developed, the next step was to envision how the creation of personal legacy artifacts can be enhanced by technology. A set of activity design scenarios was created to envision new ways of creating personal legacy at a general level. In a tightly interleaved process of synthesis and analysis, these envisioned activity scenarios and claims along with metaphor and technology exploration were refined to convey a coherent overall design concept.

Next, instead of diving right in and developing a system, an already developed system that was related to my design interests was identified; I was able to conduct a field test of this system that allowed me to investigate some of my emerging design themes with an older adult population who were tasked with creating digital personal legacy artifact. The system, Project Greenwich, was chosen because it had design content related to many of the themes identified in my initial design thinking; it was also possible to use it for the creation of personal legacy artifacts, even though that is not the main goal of the system. Finally, working from the overall design concept and what I gleaned from the Project Greenwich field study, user interaction
scenarios and corresponding claims were developed to consider critical aspects of the users’ interaction with proposed themes.

Phase 3: What Are the Benefits and Drawbacks of the Design Themes Proposed for the Creation of Digital Personal Legacy Artifacts?

In SBD, design scenarios are developed at varying levels of detail, and any scenario can be seen as a kind of design “prototype”, even though early on in design a scenario is still developing and may offer very few details about the projected user experience. For instance an activity design scenario simply describes user goals and the basic functionality provided by a system to meet these goals. In contrast, a user interaction scenario may detail more specific aspects of the user’s experience – how individual visual or interaction design elements impact the user’s task or goals. A screen mockup or interactive system (e.g., a prototype) will provide even more detail regarding users’ experiences.

Throughout the process of successive elaboration through scenarios, the analysis of design rationale in the form of claims comprises a parallel analytic evaluation process, providing formative feedback into the design scenarios. Because SBD uses claims analysis for its design rationale, it helps the designer to anticipate both positive and negative consequences of design decisions as they are considered and as the design proceeds. In the end, empirical evaluations are used to investigate the results of the analytic evaluation; in my project the focus throughout has been primarily on formative analytic evaluation. The Project Greenwich activity did provide empirical observations about some of the design themes, but this was used largely as further guidance for the Scrap-E design.
Chapter 4

Investigating Reminiscing and Technology Used by Older Adults

This chapter presents an interview study conducted to understand how old adults are currently reminiscing. The study was exploratory in nature, guided by my initial open-ended research question concerning the reminiscence customs of older adults, regardless of how technology might play a role. The HMR framework was used as a general guide however, suggesting different aspects of the reminiscing process that might be useful to probe.

In the chapter, I first describe the interview study methods and the approach I took to data analysis, a mix of open coding and theory-based analysis. General characteristics of reminiscing themes that emerged from open coding of the interviews are presented next, followed by findings that are related to the HMR framework and findings tied to the creation and use of reminiscing artifacts. These reminiscence-focused findings are followed by what I learned about how older adults are currently using and viewing computer and information technology. Finally, based on these findings I offer a slightly updated version of HMR framework, along with my arguments for narrowing my subsequent research activities on the creation of personal legacy artifacts.

Interview Study Methods

I conducted 13 interviews with 14 older adults (all were 65 years or older; one interview was with a pair of older adults). The participants were recruited by placing flyers in the common area of a retirement community, on churches bulletin boards and in the lobby of a veteran’s medical office. Additionally, I attended a monthly community meeting at the retirement
community to recruit volunteers in person. The researcher knew none of the participants before the interviews were conducted.

The interviews were semi-structured; they were organized to evoke a discussion between the participant and researchers, rather than simple question and answer type. Most of the interviews (12 of 13) were conducted face-to-face; one was conducted over the phone. Most of the face-to-face interviews took place in the participant’s home (11 of 12); one was conducted at a local coffee shop. Finally most of the interviews were conducted individually; the last one was conducted between the interviewer and two participants who were married. Overall, 4 males and 10 female participants were interviewed, with ages ranging from 68 to 91 (average 80.6). A summary of each participant (identified using pseudonyms) can be found in Table 4-1.

Table 4-1. Details of Interview Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Participant Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbara</td>
<td>83</td>
<td>Artist, teacher and puzzle building. Has a strong family background and consciously tries to keep the connections. Widowed and lives a condo in a retirement community.</td>
</tr>
<tr>
<td>Betty</td>
<td>78</td>
<td>Writer. She worked as an educational book writer and decided that she wanted to do something lighter and started writing her own stories. She has self-published one books and is working on a second with stories about her life. She attends the local memoirs classes. She lives in a house with her daughter.</td>
</tr>
<tr>
<td>James</td>
<td>86</td>
<td>Service to community and country. He is a World War 2 disabled veteran. Enjoys talking about his military service. He became a widower recently and moved into a retirement community.</td>
</tr>
<tr>
<td>Jennifer</td>
<td>91</td>
<td>Books and Plant lover. She is a retired Librarian who enjoys physical books and clipping newspaper and magazine articles. She and her husband moved into their condo in the retirement community 20+ years ago. Her husband has since passed on.</td>
</tr>
<tr>
<td>John</td>
<td>68</td>
<td>Peaceful Activism and community engagement. He is a local minister who believes younger generations can learn a great deal from the older ones and by learning they will not repeat the same mistakes. He lives with his wife and children in a house.</td>
</tr>
<tr>
<td>Karen</td>
<td>80</td>
<td>Passionate writer. She has attended memoir classes twice a month for over 2 years. Her stories are mostly about family and life experiences. Retired teacher that lives with her husband in a retirement community.</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Background</td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
<td>------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Linda</td>
<td>72</td>
<td>Local community historian and self-appointed family historian. Feels that society and families are losing so much as generations past by. Recently moved from one complex in her retirement community to another because of her husband’s need to be closer to medical staff due to failing health.</td>
</tr>
<tr>
<td>Margaret</td>
<td>76</td>
<td>Self appointed family genealogist. She has been researching and writing about her ancestry for over 15 years. She is writing it all down for a book. She lives alone in a house.</td>
</tr>
<tr>
<td>Maria</td>
<td>84</td>
<td>Women’s rights leader and retirement community archivist. She is proud of her past but does not share it very often. She believes that records are important and keeps records for her retirement community. She is divorced and lives alone in a condo in a retirement community.</td>
</tr>
<tr>
<td>Michael &amp; Lisa</td>
<td>91,85</td>
<td>Family values and the good old days. They are a married couple and they enjoy spending time with family and looking back on their earlier lives. They live together in a house.</td>
</tr>
<tr>
<td>Patricia</td>
<td>86</td>
<td>Baker and a researcher of female classical music composers. She feels that she has had an ordinary life and does not have any stories about her past that anyone would care to hear. She is a widow and recently downsized from a condo to a room in a retirement community.</td>
</tr>
<tr>
<td>Robert</td>
<td>75</td>
<td>Hobbyist who is a retired businessman. He is well traveled because of his prior employment and still enjoys traveling. Since retirement he has also picked up miniature woodworking. He lives in a house with his partner.</td>
</tr>
<tr>
<td>Susan</td>
<td>73</td>
<td>Lives in the present. She is a retired schoolteacher and enjoying the active life she can lead now. She is not ready to sit down and think about the past. She lives with her partner in a house.</td>
</tr>
</tbody>
</table>

During the interview, participants were asked questions that were designed to elicit reminiscing events (e.g., “How did you end up living in this town?” or “You mentioned you were interested in <topic>, can you tell me what first got you started with it?”). They were also asked specifically about how they currently reminisce (e.g., “Where do you find yourself reminiscing, with whom, about what, and for what reason?”) as well as about technology use (e.g., “What are you comfortable doing on your computer? What does a typical day of computer use entail? What is the worst experience you have had while using the computer?”). The questions about reminiscing were created using the HMR framework as a guide and there was at least one question probing each of the categories in the model depicted in Figure 2-1. The complete semi-structured interview guide can be found in Appendix C.
Each interview lasted approximately one hour and was audio-recorded for transcription and analysis. Transcription was completed by the researcher, with the advantage that I was at every interview and could use my memory of the discussion to aid in interpretation of oral comments. Subsequently the transcribed interviews were analyzed using analytical induction, a mixture of deductive and inductive approaches (Epstein & Martin, 2005). First, eight deductive codes from the HMR framework (Reminiscing event, Prompted Trigger, Unprompted Trigger, Probe, Mode, Context/Moderator, Function, Outcome) were applied to the transcripts. Definitions and examples of these deductive codes can be found in Table 4-2 below. Note that because the interviews were intended to be experienced as open-ended discussions about reminiscing, I often introduced specific experience-related topics or followed up on previous comments. In this sense my own input became an important part of the discussion content, and when coding I was careful to code my own utterances as well as those of the interviewees, so that I would be able to see when and how I was introducing or potentially influencing what was said. In the table below, I have examples of responses triggered by my questions, typically the beginning of a Reminiscing Event. For example, a Reminiscing Event almost always followed a Prompted Trigger.

Table 4-2. Deductive Coding Dictionary

<table>
<thead>
<tr>
<th>Code</th>
<th>Term</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>R(topic)</td>
<td>Reminiscing Event (For the general topic of the event – see Table 4-4)</td>
<td>A reflection / story about the past. Can be one turn or many. Can involve both the participant and the researcher and can contain other codes embedded within it.</td>
<td>“I don’t regret the fact that I got sick. They have taken care of me very well and I loved every minute of it, really. I got some schooling out of it and then when I got done my dad had graduated from Penn State and he says what do you want to do, I said I might as well go under GI bill, it is not going to cost me anything so we went for two years and then I decided to switch to television engineering, so I switched with a buddy of mine, my girlfriend and his girlfriend were high school cheering, they went together so he was out there at that school in Chicago and they talked us into going out there so we spent two years in Chicago with a degree in</td>
</tr>
</tbody>
</table>
television engineering under Dr. Lee Forest, he invented the vacuum too.” – James, 86.
R(Health)

| PTrig | Prompted Trigger | Statement or question made by the interviewer to deliberately elicit some information | “What is a holiday like?” – Interviewer. PTrig
“Holidays can be difficult because my husband’s birthday would have been the 22nd of November, and his death was the 26th of November. That brings up Thanksgiving. He was very central and a very important figure in our lives. He came into my brother’s life when my brother was only 13. My husband was 18, which isn’t a whole lot older, but …” – Barbara, 83. R(Health) |
| UnTrig | Unprompted Trigger | Something that causes a person to share information about their past. Can be a probe or photo, event, a different reflection, or the identification of a specific person, place or event. Something other than an interviewer prompt. | “We were watching just recently a film on robots, and they’re trying to make them be able to react to humans. But you’re really not trying to do that. You’re getting your computers to react with humans. That’s very interesting. So the people like myself, who still look at the computer whether it’s friend or foe – you’re trying to make it. “ – Jennifer, 91. Hobby(Film) / UnTrig |
| Prob | Probe | The Interviewer asks a question to get more information or detail can be during the reminiscing event or outside of it. If the question starts a reminiscing event do not code it as Probe code it as PTrig | “Would something pique your interest enough to sit down at that computer?” – Interviewer. |
| Mode | Modes | Participant specifically mentions manners in which they reminisce. | “I talk to him (a college friend) on the phone every couple of months, go down there and see him” – Robert, 75. |
| Con | Context / Moderators | Participant specifically mentions demographic information about themselves or their family. (Culture, race, religion, sexual preference, age) | “I have three brothers.” – Robert, 75. |
| Fun | Function | The Participant specially mentions reason why someone engages in reminiscing | “They (transcribed interviews) are up there for people to learn about their neighbors and just -- a lot of the staff read them. If my husband were staying in Anthony, the nursing home there, they would bring them down and the staff would read them so they have something to talk about with the clients.” – Linda, 72 |
| Out | Outcome | Participant responds to / reflects on a past reminiscing event and talks about how they feel or acted based on the reminiscing. | “Yeah. In fact it gets painful because I see some of my classmates in poor health or you know it makes you kind of thankful for what you got so.” – Susan, 73. |
| Emer | Emerging | Any turn that seems interesting and does not fit into any of the categories | “I have one throwaway camera right now, but that (regularly taking pictures) went out about five years ago.” – Linda, 72. |
| Other | Other | Any turn that does not fall into any other of the categories and is mundane, can be general conversation, introductions anything that is not relevant to reminiscing or technology | “She (The dog) is spoiled, and thinks people like to see here. That’s what she calls her baby, and she never plays with it unless there’s company. She wants people to pay attention to here. Otherwise, she just sleeps.” – Barbara, 83. |

Following the deductive coding guided by HMR, the transcripts were re-examined in an open fashion and coded for emergent categories and themes. Initially, all utterances that were distinguished and coded during the deductive coding were examined more closely and coded. Once a new set of categories and themes has been developed from these focus segments, the entire corpus of interviews was re-examined using the new coding scheme. This resulted in a more expansive set of themes and categories describing how older adults currently reminisce, what technology they are currently using, and what design implications their comments implied. Definitions and examples of the resulting inductive codes can be found in Table 4-3 below.
Table 4-3. Inductive Coding Dictionary

<table>
<thead>
<tr>
<th>Code</th>
<th>Term</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Forms of Reminiscing</td>
<td>Participants mention the ways they reminisce.</td>
<td>“I hold on to stuff that might be pertinent to some of these engagement from the past. Photos, church newsletters.” – John, 68</td>
</tr>
<tr>
<td>Aud</td>
<td>Audience for Reminiscing</td>
<td>Participants mention who they reminisce with</td>
<td>“I find myself reminiscing with the UUF when I go on Sunday, we have a coffee after the service.” – Betty, 78.</td>
</tr>
<tr>
<td>Rel</td>
<td>Reluctance to Reminisce</td>
<td>Participants mention reasons why they avoid reminiscing</td>
<td>“Oh I think when I reminisce it is not usually way back. There wasn’t anything that interesting of my past as I would talk about.” – Patricia, 86</td>
</tr>
<tr>
<td>Age</td>
<td>Aging</td>
<td>Participants mention something regarding themselves relates to the aging process</td>
<td>“I’ve got so much arthritis in my hands, that my handwriting isn’t as legible.” – Barbara, 83.</td>
</tr>
<tr>
<td>Art</td>
<td>Artifacts</td>
<td>Participants mention something they have created or saved that has some memory or meaning attached to it</td>
<td>“I have a very valuable sampler that Emily A. Byrd did. My grandmother’s Civil War actual discharge and GAR huge beautiful certificate. Our family didn’t have much to save products. I have an aunt’s 1904 carnival glass thing she got at a little carnival.” – Linda, 72.</td>
</tr>
<tr>
<td>A: Cre</td>
<td>Artifact Creation</td>
<td>Participants mention an artifact they have created for the purpose of capturing a story or memory</td>
<td>“I started three (scrapbooks) and then we keep having grandchildren and I have three and a half.” – Susan, 73.</td>
</tr>
<tr>
<td>A: Mot</td>
<td>Motivation Artifact</td>
<td>Participants mention why they have created or keep an artifact or why they want to create artifact(s)</td>
<td>“I try to hold on to -- what I've tried to hold on to is stuff that might be pertinent to some of these engagements from the past.” – John, 68.</td>
</tr>
<tr>
<td>A: Org</td>
<td>Artifact Organization</td>
<td>Participants mention how the artifact is organized or stored</td>
<td>“They (Photos) are probably in a box under the desk” – Lisa, 85.</td>
</tr>
<tr>
<td>A: Aud</td>
<td>Artifact Audience</td>
<td>Participants mention whom the artifact is intended for and/or who will inherit the artifact</td>
<td>“My son has absolutely laid claim to them (set of letters)” – María, 84.</td>
</tr>
<tr>
<td>A: In Artifact Inheritance</td>
<td>Participants mention what happens to their stuff once they pass away or what plans they have to give certain things away before they pass</td>
<td>“My daughter is going to get stuck with everything. I’m a saver. At least they’re in files, and they’re all annotated so that she will know that it is” - Maria, 84.</td>
<td></td>
</tr>
<tr>
<td>T:Use Technology: Use</td>
<td>Participants mention what technology they used or what they did not use</td>
<td>“I would usually use it for writing letters. I did have an email account. I did do some email. That was at least five years ago. My printer ran out of ink, and I got another ink supply for it. It’s still in the bag. I’m sure it’s dried up solid.” - Michael, 91.</td>
<td></td>
</tr>
<tr>
<td>T:Com Technology: Comfort</td>
<td>Participants mention how they feel or how comfortable they are while using technology</td>
<td>“You know I can get help from so many of my grandchildren and some adults you know who are -- and I try not to because I truly can’t afford to go to the computer rescue place that does my work. But I have friends who can come and show me how to do this and it seems as though when you’re my age, we all have our specialties. And none of us are specialized in all the areas.” – Margaret, 76.</td>
<td></td>
</tr>
<tr>
<td>T:Mot Technology: Motivation</td>
<td>Participants give reason or rationale for why a technology is being used</td>
<td>“Well my husband died in 1998 and he left me a computer and I decided I better learn how to use it. This is not the one. This is a newer one. But that’s what started. That’s what started for me and I realized how much I hadn’t known and what I was missing.” – Patricia, 86.</td>
<td></td>
</tr>
<tr>
<td>T:Feat Technology: Features</td>
<td>Participants talk about the features of a technology used, or features wanted.</td>
<td>In regards to Facebook – “The uncertainty is probably getting rid of the stuff. I mean how do I delete it, all it says is it’s not deleted, it’s just hidden. Well how much can you hide and it’s just like my writing to somebody or happy birthday and it’s still there you know and it was last year or something like that.” – Susan, 73.</td>
<td></td>
</tr>
<tr>
<td>Other Other</td>
<td>Any turn that does not fall into any of the other categories and is mundane, can be general conversation, introductions anything that is not relevant to reminiscing or technology</td>
<td>“She (The dog) is spoiled, and thinks people like to see here. That’s what she calls her baby, and she never plays with it unless there’s company. She wants people to pay attention to here. Otherwise, she just sleeps.” – Barbara, 83.</td>
<td></td>
</tr>
</tbody>
</table>
Each turn in the interviews – by the researcher or the participant – could be coded in more than one category. For example, reminiscing events often spanned multiple conversation turns and the utterances with any given turn might include content related to artifacts, technology and reminiscing in general. The reliability of the coding dictionaries was validated for both the deductive and inductive coding dictionaries. This was accomplished by having another person code 25% of the interview corpus and compare their codes with the ones I generated. Using these data I was able to calculate that the inter-reliability of the deductive dictionary was 87% and the inductive coding was 82%.

In the next sections, the analysis of the interviews is presented, starting with the general characteristics of reminiscing, continuing connections of the interview content with the heuristic model of reminiscing framework, reminiscing artifacts, and technology used by older adults. Finally, I present and argue for my scoping decision regarding personal legacy artifacts, and show how my interview findings suggested a modified version of the HMR framework.

**General Characteristics of Reminiscing**

**Reminiscence Events**

The first pass of interview coding identified 114 reminiscing events – stories or comments that express details about the past. On average 8.8 reminiscing events took place per interview, with a range of 4-18. The topics of the older adults’ reminiscences varied from recounting memories of families and careers to sharing experiences with a range of hobbies they enjoyed. These topics fell into the eight general categories summarized in Table 4-4, which also summarizes the frequency of events classified in each category. These frequency counts are of course entirely a function of the individuals I interviewed and the conversations we had, so they
should be viewed simply as a rough characterization of the sorts of events this small sample was able and willing to share. Nonetheless, my observation of relatively higher counts for family and hobby have some face validity, in that these tend to be long-lived, pervasive and personally important elements of most people’s lives. Note also that the holiday category is likely inflated, because the interviews were conducted around the holiday season.

Table 4-4. Descriptions of Reminiscing Topics

<table>
<thead>
<tr>
<th>Category</th>
<th>Occurrences</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career</td>
<td>15</td>
<td>Events that discussed their occupation(s)</td>
</tr>
<tr>
<td>Civic Engagement</td>
<td>5</td>
<td>Events that discussed volunteering or other social activism (protesting)</td>
</tr>
<tr>
<td>Education</td>
<td>7</td>
<td>Events that discussed their education or experiences during their education</td>
</tr>
<tr>
<td>Family</td>
<td>39</td>
<td>Events that discussed their family</td>
</tr>
<tr>
<td>Health</td>
<td>3</td>
<td>Events that discussed their own or someone else’s health</td>
</tr>
<tr>
<td>Hobby</td>
<td>25</td>
<td>Events that discussed activities they participate in during their leisure time</td>
</tr>
<tr>
<td>Holiday</td>
<td>7</td>
<td>Events relating to any holiday</td>
</tr>
<tr>
<td>Life</td>
<td>13</td>
<td>Events relating to their life experiences that do not fit in any of the other categories - Mostly covered different places they lived and eras of their life</td>
</tr>
</tbody>
</table>

Looking across the different topics, we can see that family was the most common category with 39 unique events; and all but three participants (Barbara, Margaret, Robert) shared at least one family reminiscing event during the interview. Health was the least common topic with only three reminiscing events, each of which was from a unique participant. One possible explanation is that participants want to share or even celebrate events that had positive outcomes rather than negative outcomes. In the specific case of health, it may also be that such topics are relatively private and less likely to be shared in an interview with an unfamiliar other. Reminiscing outcomes are discussed in a subsequent section related to the HRM framework.

As a concrete example, one story that was classified as Career (Military) related an event that happened at sea on a navy vessel during World War 2: “I had a lot of interesting, just
different things that happened. Even on the ship you know, like we were out in the middle of the Pacific and somebody put salt water in our fresh water tank and we couldn’t take a shower, we couldn’t drink or have coffee for a whole week. They had to pump out the tanks and make new water; you know fresh water.” – James, 86. This particular event description continued for a number of turns, and seemed to prompt other memories from his time in the war. In this sense, the participants’ remembering activities often acted as triggers for further reminiscences, related either in time or some other aspect of the historical event’s context. This of course is just what conventional models of long-term memory and spreading activation would predict (Anderson, 2000). In the end, James shared four reminiscing events related to his career in the military during the interview. See Appendix D, for an example of one complete reminiscing event.

Table 4-5 provides another summary view of the reminiscing activities, listing each participant, the number of events shared, and the topics of these reminiscing events. This view helps us to see that while family events were most common overall, not all participants were equally focused on this as a topic: for instance, Karen was very focused on family during her interview, Margaret talked quite a bit about her genealogy hobby, and Jennifer shared reminiscences about many different aspects of her life. It is tempting to propose that women are more likely to reminisce about family, but with the small sample size, and the considerable variety even within the female participants, it is not possible to generalize in this way.
## Table 4-5. Reminiscing Topics by Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of Reminiscing Events</th>
<th>General Topics of Reminiscing Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbara</td>
<td>4</td>
<td>Education, Holiday, Hobby (Puzzles), Life</td>
</tr>
<tr>
<td>Betty</td>
<td>9</td>
<td>Life (2), Hobby (Travel) (2), Health, Family (2), Holiday, Hobby (Pet)</td>
</tr>
<tr>
<td>James</td>
<td>11</td>
<td>Career (Military) (4), Family (3), Education, Holiday, Civic Engagement, Health</td>
</tr>
<tr>
<td>Jennifer</td>
<td>8</td>
<td>Holidays (2), Family, Career (Librarian), Civil Engagement, Hobby (Gardening), Hobby (Films), Life (2)</td>
</tr>
<tr>
<td>John</td>
<td>8</td>
<td>Career (Pastor), Civil Engagement, Life (2), Hobby (Collecting), Family (3)</td>
</tr>
<tr>
<td>Karen</td>
<td>18</td>
<td>Career (Teacher) (2), Family (11), Education (2), Hobby (Travel), Holidays, Life</td>
</tr>
<tr>
<td>Linda</td>
<td>13</td>
<td>Career (Oral history), Family (7), Health, Life, Hobby (Scrapbooking) (3)</td>
</tr>
<tr>
<td>Margaret</td>
<td>6</td>
<td>Hobby (Family History) (6)</td>
</tr>
<tr>
<td>Maria</td>
<td>5</td>
<td>Civil Engagement, Family (3), Life</td>
</tr>
</tbody>
</table>
Forms of Reminiscing

Reminiscing can take many forms. My participants reported that most often they reminisce spontaneously in an oral fashion, with memories shared either in person or as part of a phone conversation. However when they are motivated to do more than just spontaneous reminiscing, they may spend time creating artifacts to be shared at a specific event, or created in a more general form to be used in multiple settings. These artifacts can be of many sorts: memoirs, scrapbooks, newspaper articles, books, family trees, and so on (see Figure 4-1 for several examples shared and photographed in participants’ homes). Often the objects are not specific stories but rather an assemblage of related memories or an aid that can be used to evoke or organize memory sharing at a later date (for example, leading to a reminiscence activity that has the function of intimacy maintenance).
Figure 4-1. Examples of Legacy Artifacts Created by the Participants

Figure 4-1a is an example of photographs being on display in a home. This particular set of photographs is of different landscapes that a participant observed while on different vacations around the world. The photographs that were chosen to display were not only chosen because they were deemed beautiful but also because of the memories that they invoke of the vacation they were taken on. Most participants had photographs somewhere around the house, with the most common subject of the photographs being family members. The photographs were not only found framed and displayed on wall but also were set on furniture or hung on the refrigerator.

Figure 4-1b and c show examples of printed materials being kept and valued for their content. b is a newspaper article that was written about a participant’s family. The participant had it framed and intends to hang it on the wall soon; the participant had just moved in when I visited.
The participant was very proud of the article and started to reminisce about the family and how the article came about as soon as the new article was remembered and mentioned. c is a page of a memorial day program that has meaning to the participant because he is pictured in the page and knows most of the other people pictured as well. Most of the participants made mention of keeping printed material as a way of remembering the event later on and that the materials were stored in a drawer or box somewhere. b was the only framed piece of printed material that was shared with me during the interviews.

Figure 4-1d shows only one page out of a large collection of scrapbook collections that the participant had put together. This particular scrapbook served as a family history book and had at least one page for each generation. The scrapbook not only included photographs but also handwritten letters, certificates and other heirlooms that were flat and easily placed within the book (for example, a piece of material from a personally significant dress). All of the participants mentioned possessing or creating some form of a scrapbook about their lives; if they had not created it themselves a partner or family member had. The main media in use seemed to be photographs; however as mentioned many other things are archived along with the photographs, with the only real restriction being that it needs to be a thin and flat shape.

Figure 4-1e is a page out of a personal memoir collection. This particular participant used a computer to type the memoirs but would then print the memoirs and store them in folders bound using a three-holed punch. Each story was about a different time in the participant’s life and varies quite a bit in length (e.g., a couple of paragraphs to 5-10 pages). A few of the participants were very enthusiastic about writing their personal memoirs. Two were in the process of self-publishing collections of their memoirs as books; others were simply loosely organizing or keeping their stories together. All of the participants who wrote memoirs did so using text only, none of them added photographs or other things to their written words.
Audience for Reminiscing

The participants reported that the stories they share take different forms depending on the audience. In particular, the details about the past that they choose to share vary according to the sensitivity of the topic as well as their personal relationship with the person(s) they are sharing with. The participants frequently reminisce with the people who live and participate in their own everyday context, perhaps living in the same community, or perhaps attending the same church or other community events. “Anyone who will listen. If they say, “You told me that already. I’m sick of hearing about your medical center.” It’s mostly over dinner. Something will come up, and “That reminds me of …” or “This is a funny story about my kids.” The other thing that happens here in a more formal way – I’m sure somebody has brought this up. Our oral history projects…” Maria, 84. For such audiences the reminiscing is usually spontaneous, oral, and tends to be less personally revealing.

However the participants also report reminiscing with old friends and family members when they are able to get together or communicate over a distance. In these cases the memories themselves are often shared experiences and significantly more detail will emerge. “I’ll decide to give my grandchildren a little story as a way of their being able to carry on the tradition or the memories or the remembrances of my life or my husband’s life or grandmother or mother. Just something for them to put in their memory banks so they can continue our family history” – Barbara, 83.

The audience is also determined by who the older adult thinks will want to hear the reminiscing. As Linda, 72, puts it “I don’t think anybody would care but my kids and my grandchildren” when reflecting on her reminiscing about her past. However Maria, 84, offers a contrasting view, commenting that she will share with “Anyone who will listen”, and Patricia, 86, falls somewhere in between, “Close friends, I guess”.

It is clear however that the intended audience of the reminiscence event does play an important role in the form and content of the reminiscing. By implication, these variations suggest that the same “memory” may need different forms of support when the sharing activity is directed at different audiences.

**Reluctances of Reminiscing**

When the older adults were asked what about themselves or their lives they would like to share with others, many said in a somewhat self-deprecating fashion that they have nothing to share, or that no one would want to listen to the experiences that they do have to share. “*There wasn’t anything that interesting of my past as I would talk about.*” – Patricia, 86. At first glance, this might imply that our project of investigating digital reminiscence support for older adults would not be filling a perceived need, despite the scholarly and scientific interest in reminiscence as a mechanism for life review.

However, with further probing all of the participants remembered and shared very interesting aspects of their lives that others would enjoy hearing or knowing about. This information was often related to family, community or historical events in the participant’s past life. After hearing such stories, I asked directly whether these memories would be of interest to others. At that point, many said that yes, it would be nice for the family or community in general or for people in the younger generation. In this case, the design implication is that at times older adults may be over modest about the value of their own memories, but when prompted to reflect may be able to see that they have experiences and observations worth sharing.
Relating Current Customs to the Heuristic Model of Reminiscing Framework

In the deductive coding pass on the interviews, I deliberately introduced codes related to the HMR framework, partly because I had used this same framework to guide the interview prompts. Thus it came as no surprise that much of the content could be tied to the major constructs of this framework. In the following, I comment on what I gleaned from my participants about triggers, mode, context, moderators, functions, and outcomes.

Triggers

Each reminiscing event identified was classified according to whether it was triggered by a deliberate prompt (e.g., from the researcher, making it non-spontaneous) or it emerged as a spontaneous memory offered by the participant. Recall that the interviews included specific probes concerning the triggers for reminiscence, and I often followed up a comment with an additional probe. Looking over the entire corpus, of the 114 reminiscing events, 43 were spontaneous in nature while the remaining 71 were triggered by prompt. Table 4-6 summarizes the number of each participant’s reminiscing events that were prompted or spontaneous.
Table 4-6. Breakdown of Triggered Reminiscing Events

<table>
<thead>
<tr>
<th>Name</th>
<th>Spontaneous Reminiscing Events</th>
<th>Prompted Reminiscing Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbara</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Betty</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>James</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Jennifer</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>John</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Karen</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Linda</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Margaret</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Maria</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Michael &amp; Lisa</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Patricia</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Robert</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Susan</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

Given the interview script and the general intention to promote discussion of memories, it is natural that prompted reminiscence was so common in the interviews. All but one of the participants (James) had an equal or greater number of prompted events versus spontaneous sharing. As can be seen in Appendix C, the participants were asked about different aspects of their lives, such as, “So you’re a puzzle builder?” and “How did you come to live here”. Prompts like these were deliberate invitations to share prior experiences related to this personal characteristic and experiences.

However, many spontaneous reminiscence events also occurred. These memories were often triggered by topics currently being discussed or simply because the participants remembered something they wanted to share with me. For example, after the conversation turned to his education background, John, 68, said, “Because what I’m thinking is, see for me, and it’s fascinating, the shaping of my life had so much to do with that year that I took out from college, which is about the age that my daughter is now. And you look, and I look at her, and I go like, wow, I mean, she could have an experience in the next year or two that would shape the rest of your life -- look what happened to me.” Although this memory was clearly triggered by the topic
of education, John chose to share this memory because of he wanted to reflect on what a dramatic effect his college experience had in shaping how he had lived his life, and how it is currently shaping his anticipation about his granddaughter’s life.

**What Participants Say About Triggers**

For the participants, reminiscing seemed to be seen as an activity that just occurred “in the moment,” as a planned element of a scheduled event, or somewhere in-between. When asked about what causes them to reminisce, most of the participants said that they most frequently reminisce in a spontaneous fashion, perhaps in response to a comment in a conversation, or if a song or event wakes up a forgotten memory. This is very consistent with the notion of triggered reminiscence and current understandings of long-term memory.

The participants also reported that their spontaneous reminiscing usually takes place in an oral medium, directed at whomever they are currently with. Participants did note that at times they would deliberately hold back a story, or parts of a story, due to concerns about appropriateness of audience or setting. A common setting for spontaneous reminiscing activities was reported to be meals, where informal discussions of current events or recent activities are common. For instance, Barbara, 83 said, “Mostly something will trigger a memory, and I’ll decide to give them a little story with it.”

As to what sorts of things serve as triggers, participants mentioned photos (Barbara, 83, describes he hope that a picture will trigger a question from her granddaughter and reminisce from her grandson and daughter - “For this youngest granddaughter, she really doesn’t know her grandfather because he died in 1993. She was only a couple years old then. There are pictures of him holding her. If she talks to her older brother or her mother, it’ll enable her to get some information); some particular topic being discussed that evokes a memory (Linda, 72, describes
“We sit down and somebody will say this afternoon I kept reading this thing about normal schools. What the heck is a normal school? And there were seven educators sitting at the table, but none of us attended a normal school. And we started talking about oh I remember when East Strasburg was a normal school. What made it a normal school versus an abnormal school? Someone bring up one word and it’ll kick off people’s memories”); a question being asked (“I’ve been in correspondence with one of my grandsons, and he’ll ask me questions about this or that or make a comment. So that triggers a whole memory stream. The last one was – we were sharing, and I told him about – he’s only lived in one place all his life, other than when he went to college. That’s very different from my life where I lived in many, many places. He made a comment on it, and that triggered all kinds of response from me about all of it.” – Barbara, 83); and even music (“I got a new car and it has got a Sirius on it so the 50’s of course. It brings back memories but my memories are not to my childhood. “ – Susan, 73).

The participants also described reminiscing during events that are planned well in advance, often with structures designed to evoke reminiscence. The examples they cited included class reunions, memorial services, anniversaries, and so on. When people attend such events they are already primed to reflect on the past. These events serve as a venue where people expect to gather and share their reflections on one or more topics.

Mode

Individuals reminisce privately by keeping journals, creating scrapbooks or silently reflecting. They reminisce in public by sharing their stories with another person or group of people. Because the investigation relied completely on interview data, all of the memories shared with me were public by definition, even if the participant was describing a story that had originally been shared with just one or a few individuals. However some participants did share
reflections about what and when to share memories with others. For example, Betty, 78 said with respect to sharing stories about her current life experiences with her family, “I would if I thought they were interested, but they probably wouldn’t be;’ and ‘They just aren’t interested in, well one son is kind of interested in writing, but not the others, they aren’t particularly interested in writing. They are very caring with me, but that doesn’t necessarily follow that they want to read every word I’ve written.” This decision to not share was not at all problematic for Betty and did not deter her from writing down her experiences for her own private reasons. Additionally, Linda, 72, brings up an interesting point about some memories that may never be shared publicly and probably would not be written down either, “You might not ever hear about the daughter-in-law who’s a disappointment.” These memories may be silently reflected on, or shared with a close confident, as a way of working through the emotions to come to a resolution.

When asked how the participants decide to reminisc in when in spontaneous settings, the participants described a two-phase process – some bit of information sparks a memory from the past, followed quickly by a decision whether to share it with the people they are with at the current time, hold the memory until a better time or place, or choose not share it at all.

Context

Information about the participants’ race, religion or sexual preference was not gathered. As a result I am not able to comment on the impacts of such factors on the reminiscence process. On occasion some context clues were mentioned by the participants, “I grew up in the depression, and we saved everything.” – Jennifer, 91, however not enough to make any conclusion about how context is related to reminiscing.
Moderators

The moderator of age is confounded in the study, as the focus of the study was considering only the reminiscing of older adults. There was variation by gender, in that there were 11 females and 4 males. I did not deliberately recruit more females than males; the imbalance in volunteers may simply reflect that females have more inherent interest in discussing reminiscence processes, or it may be a simpler result of more females in the population in this age range. However there was at least some evidence that women may carry more of a reminiscing role in a family, for example as mentioned by Robert, 75 about his female partner, “My partner likes to take pictures, and she makes scrapbooks out of those things, but it doesn't interest me. I see it, I experience it, what's next, where do we go next.” Betty, 78 also alluded to the role of reminiscing falling on her instead of her partner “So I like, what we liked was the kind of point and shoot and when we get home from a trip, we’d get our slides and merge the two cameras, the output from the two cameras and organize them chronologically. That was mostly my doing and he could have done it, but I wanted to do it and he didn’t care, so I’m mostly the one who did it” – Betty, 78.

More broadly, it seemed that interest and even ability to remember stories varied across individuals, with some of the participants more inclined to gather family history and look back over their lives but others like Jennifer, 91 commenting “I live pretty much in the present. I don’t necessarily think about what I did X number of years ago. Some people here can recall everything they ate, wore or said. That’s not my way”. 
Functions

Participants said they reminisced for many different reasons. Common examples included intimacy maintenance ("Keep in touch with people I care about." – Barbara, 83); teaching/informing ("Being an only child, not knowing my grandparents, I wanted my kids to have a foundation of who they were, who weren’t anybody, but they were totally Norwegian on their -- on my former husband’s side. We had very little background on them that we could pull up. But on my side even though we were poor New Jersey and Pennsylvania farmers, I wanted them to know who they were.” – Linda, 72); and problem solving ("It's really taking what happened before and what we think we got from it, and applying it to a present situation.” – John, 68.).

Outcomes

The outcomes for reminiscing varied according to both the function and the topic. Typically the outcome reported was positive and helped to pass the time, to remember the ‘good old days’ or to share knowledge with their reminiscence audience. However, participants shared a few darker outcomes as well. “In fact it gets painful because I see some of my classmates in poor health or you know it makes you kind of thankful for what you got so.” – Susan, 73. Some of the details shared suggest that these darker outcomes may be associated with dates and holiday, “Holidays can be difficult because my husband’s birthday would have been the 22nd of November, and his death was the 26th of November.” - Barbara, 83. These somewhat negative outcomes seemed to be ones that participants would prefer to avoid but they know that sometimes the activation of such memories is unavoidable.
Reminiscing Artifacts

In addition to the general and HMR framework findings there was a great deal of discourse about artifacts. Artifacts have emerged as an important aspect of reminiscences with older adults. As mentioned in the Forms of Reminiscening section above, artifacts are being collected and created by older adults as a way of reminiscing and a way for future reminiscing.

Artifact Creation

There was considerable discussion about artifacts, sometimes regarding the explicit creation of reminisces artifacts (scrapbooks, memoirs, oral histories), or at other times the conscious saving of existing objects (photos, newspapers, letters) that can later serve as artifacts of reminiscences.

Almost all of the participants had put together at least one instance of a scrapbook of their lives or the lives of a family member. The scrapbooks were often created after traveling, as a way to remember the experience, as Robert, 75 explains: “If we go on a trip and she wants to use stuff for scrapbooking, then we’ll go together, we’ll make glossies and she’ll take the ones she wants and put them in a book” “and they always come out when people arrive, you want to see our trip pictures?” However they were also put together to be a memory of the creators’ lives or the life of someone close to them - “12 scrapbooks, one for each grandchild and some of them go into their second and one of them got into a third book. One of our cabin and all the activities that have always gone on in our cabin. One of Dean’s and my life together. And one that I am still sort of massaging and I don’t know how I am going to handle the data is year by year, blow by blow account of my life and where I was. So and I had done my three children also.” – Linda, 72.
As John, 68 explains, it is not just the act of putting things into the order of a scrapbook that has meaning but also the process of collecting the materials as a way to remember or be remembered that causes him to seek and keep material things. “Mostly the paper-types of things. If there were -- you know, Coalition for the Homeless, Partnership for the Homeless, I was involved in those things. So, they would come out with studies or position papers or declarations or whatever -- tried to hold on to some of that. We had a very good -- I think she won awards -- photographer that I worked with for a few days that tried to do the photography documentary of homeless families in hotels. I have some of her pictures stashed away. So it's more keeping things in that sense. And some of that -- all of which needs to be organized, I suppose, but has to do with a personal journey. Then the rest of the stuff is just all over the map. I mean, it's like, hundreds of movie posters, political posters. I'm probably most fascinated by stuff that's kind of off. I mean, in other words, that because -- and I don't put it in the living room, but it's sort of like, I don't like things to be too -- dressing up stuff is not real, okay. And so, I don't think one should grovel in the stuff that doesn't connect, but it's all there.”

Finally, the retirement community that currently houses a majority of my participants had a custom of conducting oral history interviews of residents as they moved into the residence. “There is oral history interviews of more than a hundred and some people I would guess” “They are there for people to learn about their neighbors and stuff – a lot of the staff read them.” – Linda, 72. Unfortunately, this community process has been terminated, because of the time and manpower it took to transcribe the interviews.

Artifact Motivations

When asked why they engage in creation of reminiscence artifacts, the primary responses concerned the desire to leave something behind for future generations, as well as preserving the
knowledge that they have acquired over the years. Linda, 72 “I think we are losing so much and we’ve lost it over all this past generations. And it’s ridiculous with communications the way it is now that we need to be losing what we’re losing now. But the future generations do not see the value in the past.” Similarly Karen, 80 points out that sometimes time is more limited than you realize, “I finally got [my mother] to write about her life when she was visiting me. And I said well we’ll type it up and I thought, well she’ll do more next year. Well she died in the next year, well she was eighty-four, she wasn’t real young.” There is a sense that one should write down your life story before passing on, that something might be lost if things do not get recorded.

In addition to leaving something behind, many of the participants mentioned that they are motivated by the desire to collect their stories (“I just wanted to, wanted to collect some stories together and have them available and I didn’t make any money on them, but I didn’t really expect to. I gave them to some of my favorite friends, I gave them as gifts and a few people bought some” – Betty, 78); to bond and learn more about their families (“I come from a bent on reminiscing because I am an only child of older parents. I didn’t know my grandfathers. One grandmother was deaf and was the coldest women on earth. My other grandmother was wonderful and warm but she didn’t live close enough that I could be there all the time. And when my first husband went to Vietnam, I moved back to the area where my parents were and my dad was retiring and I could see that he needed something to do. So he and I just started a little family genealogy.” – Linda, 72); or simply because of the era they have grown up in (“I grew up in the depression, and we saved everything.” – Jennifer, 91).

However, it is worth noting that there were some participants that were not motivated to create artifacts because they never thought it was important (“I just never thought it was important, it was too much work. Why do it?” – Robert, 75) or they just feel they are not old enough yet to worry about that (“Yeah that’s for old people then I can understand why they might
want to do it but I can’t understand why my nephew Martin keeps sending this book called *Reminiscence.*” – Susan, 73).

Artifact Organization

When an artifact is crafted into a scrapbook or memoirs, the organization is rarely considered when using the artifact for reminiscence in the future. The organizer may have had some schema for the artifact’s creation, “I always do it when we come home from a trip, the first thing to do, back when we used the camera film, was to get the slides made... and I had a slide viewer to lay them out to throw away the duds and then organize them by number. They’re all numbered consecutively from our wedding pictures in nineteen fifty-two...” – Betty, 78. However this scheme seems to be more related to the activity just completed than to thoughts about how it might be used in the future.

Nonetheless there are a variety of strategies for organizing artifacts. Some of these are common strategies for organizing objects (e.g., saving in a drawer: “I have drawers full of letters, and they are all very carefully noted.” – Maria 84), while others are more specific to the type of memory being saved (e.g., a slide carousel that is ready for sharing even though it might not be viewed in the future (“We have slides, which we never look at, and I hate to part with them, especially if they have any of my children in them. But going through them and sorting them is a pain.” – Jennifer, 91). In general though, beyond the creation of scrapbooks that have a natural “paging through” organization, I heard very little about planning for the future use of an artifact or set of artifacts.
Artifact Audience

The most common audience for reminiscence artifacts is future generations, specifically grandchildren. For the participants who mentioned creating scrapbooks, most indicated that they were creating some of these for their grandchildren when they get older. “I started three scrapbooks and then we keep having grandchildren and I have three and a half.” “I had photo albums for both my children and I gave them back to them and after that I mean I figured they could take care of the rest of that.” – Susan, 73.

Occasionally, participants expressed a desire to simply create things for anyone, or even for no one at all. “I don’t know how many other (than friends and family) people would want to see the book.” - Karen, 80. Comments like this suggest that the artifact creation is done either because it is pleasurable in and of itself, or the creator wants to document some of his or her memories just in case they may be useful or pleasurable to others in the future.

Inheritance of Artifacts

Along with comments about a future or perhaps unknown audience comes the issue of who and when the artifacts going may be “passed on” to other individuals. As Maria, 84 expressed, “My daughter is going to get stuck with everything. I’m a saver. At least they’re in files, and they’re all annotated so that she will know that it is.” Part of my interviewees’ concern came from their knowledge of artifacts that they themselves have inherited from other family members and their judgments about whether and how unique or interesting they were. Linda, 72, explains “My mother labeled everything, and occasionally on pictures. Unfortunately my mother wrote across them as to who they were.” In her case, this labeling was very useful for identifying the person(s) in the photos but took away from the photos and the details that they portrayed.
Additionally, concerns over the media used for creating the artifacts were raised. Some participants told me that they were concerned that the younger generation will not take the time to read notebooks of stories or look through scrapbooks; even worse they may not even be able to view the slides and other media that they have saved, as different technologies become obsolete.

**Technology Used by Older Adults**

Because a primary motivation for my interview study was my interest in new technologies that could support reminiscing by older adults, I wanted to learn as much as possible about their current use of technology and any concerns that they might feel. Thus some of my interview prompts concerned their history and current experiences with technology, see Appendix C.

Although most of my participants were regular computer users, two had at one point tried using a computer but decided it was not for them; one had never even tried to use a computer. John, 68 states that “I think if I had the time, and I had really good training and not some, let’s fly by the seat of our pants and try something here. Trial and error – no. So, if conceivably, if there was a way to efficiently and effectively learning this stuff, then I might indeed go to the library and use the system that they have.”

For the participants who regularly used a computer, their primary uses include email, word processing, news, and checking obituaries. A few participants also mentioned playing games (cards, Sudoku and word puzzles) and looking for information about their hobbies.
Technology is Passing Them By

It was interesting to note that even participants who make regular use of computers still reported that they are unable to keep up with new technology as it appears: “I don’t think some people realize how traumatic it is – how isolated you can feel if you don’t know how to use an iPod or a cell phone. And they’re really cutting themselves off from so much. Even using the little that I do, I still feel as though there is a whole world out there that I don’t know anything about. It’s confusing, and it’s disturbing in a sense. It’s like a window on the world, what’s going on.” – Jennifer, 91.

Such comments are not surprising – many users feel that the pace of technology is too fast. However, this feeling may be particularly keen for this group of older adult users, in some cases (as for John, above) perhaps even getting in the way of trying anything at all. As Dorothy 78, summarized, “The technology of that is sort of beyond me. Some people do”.

Other participants reported obstacles related to the facilities and services that have been provided for them to learn about novel computer-based activities. Lisa, 85 points out - “[Computers] didn’t quite connect fully with me. Sometime I have to – It’s one of those things I have to do over and over again. I really couldn’t see myself in the back room, which is a small room, with a computer, working at that to get it.” Interestingly, in this case she focused on the perhaps isolating physical context of a small “back room”; it may be that offering a variety of self-study activities, or even mobile computing options that can be explored in a more sociable and comfortable lounge area would be more appealing than a specialized computer room.

Indeed other participants specifically mentioned their dislike of the physical experience they associate with using computers. Many participants have positioned their computer in a back room away from their living area and day-to-day activities. They did not want to be reliant on an object that will take them away from their living area. “I don’t like to sit [in front of the
“computer] forever you know.”— Susan, 73. “We don’t wanna sit in that chair in front of the computer. We wanna go sit in our big chair and put our feet up and read it.” – Linda, 72. Again these comments suggest that the form factor of a digital device may be very important to these individuals who have expectations for comfort in their everyday activities.

Simplicity is Key

Continuing the thread about technology challenges, participants often emphasized their desire for simplicity in the software they use. For example several stated that they do not like Facebook because it is too complex, and they do not understand what is going on or care to know the things being shared on it. They want something that is as simple as possible. “What would I do? Simple – The simplest I can make it. If you can give me a package that I can do something simple that I can write, talk and maybe use a video all in one package. And all I have to do is turn it on whether it’s you know, a camera on the computer and a mic with the computer, and this package has it all in one. If it has three or four steps, I don’t do it.” - Linda, 72

Fear of Putting Valuable Content “in there”

Trusting the computer and that the information they store in it will be preserved safely for them to use in the future also emerged as a theme. “I would like to be able to trust a computer.” – Maria, 84. “What I think so many people are afraid of, we’re afraid that we’re gonna lose whatever work we put in there. Oh, if I put this picture on this page, I’m gonna lose everything about little Sue from her birthday, baptism, birth you know. It’s a fear factor.” – Linda, 72. The idea that they work on creating an artifact for future generations and then it not being around next year let alone in 50 – 100 years is very frightening to them and a valid concern. I expect that a
more transparent system, one that gives significant feedback about the status and availability of
the content they submit will be critical in addressing this concern.

Physical Artifacts to Share

As a counterpart to uncertainty about the computer being a safe place to store their
reminiscence data, our participants also emphasized a preference for having a physical object to
show at the end of the process. They want a physical artifact both for themselves and to share
with others in a natural and familiar fashion (e.g., versus sharing a hyper-link). As Linda, 72 says
- “It could be shipped on a disk to their grandchildren, but for them they want the hard copy”. The
idea of creating and saving something that is only in digital form does not appeal to this user
population. Even when it comes to their own letters (created on computers) and email
correspondence many of these older adults still print out hardcopy versions for themselves rather
than organize them as files in folders on their computer.

Discussion: Toward Personal Legacy Artifacts

Reviewing the comments provided by my interview participants, I propose that the HMR
framework might be enhance by the addition of one construct – a Reminiscing Event – and
connecting that construct to a process that emphasizes the implicit cyclical nature of reminiscing.
As we have seen, the actual event of reminiscing is a complex one: a reminiscing event may take
many different forms; it may emerge differently depending on the audience it is intended for and
the timeframe in which it occurs. Importantly, reminiscing seems to be a cyclical process; one
story that is shared often triggers other related stories, such that multiple reminiscence events may
emerge together and influence their telling. Figure 4-2 shows how the HRM might look if it were updated to capture these observations.

![Diagram of the HRM Framework]

**Figure 4-2. Extending the HRM Framework**

Of course, not all reminiscing events are complex; some are quite straightforward, for example when the reminiscing event occurs in the present with a known audience who is present, and the sharing is conducted in an oral fashion. However, when the reminiscing event is not in the present, is planned for a future or even an unknown audience, or it is constructed in some special fashion, the process become more complicated. For example, if reminiscing takes place through a
construction process (i.e. making a scrapbook, assembling a family tree, writing a letter or email) the goals concerning its use, the likely audience or the time at which the sharing will occur can become muddled. The artifact construction process is itself a reminiscing event but there is also an additional event that may be anticipated when one or more audiences consumes the created artifact.

This future reminiscing event may happen almost instantaneously, for example if the artifact construction event is a written email or letter that is delivered to a known audience. It can also take place well in to the future, for example if the initial event is the construction of a scrapbook with the intended audience being a grandchild when they get older. This grandchild may or may not currently exist; there can be no certainty about them “receiving” the artifact at some future point. Future audiences will be born, grow up and evolve as time passes; the artifact creator cannot know in advance what these future audiences might value, what the world will be like and what they will want to know about the past.

To add to the complexity, other issues relating to the storage and format of the artifact become relevant: how has it been kept or preserved, and what does this imply about how it can be consumed? For physical artifacts this implies that the artifact must be stored somewhere safe and effective for preservation (i.e., dry, out of direct sunlight), and in a location that can be accessed when needed (i.e., not lost in a box in the attic). For digital artifacts there is a similar implication that the artifact has been safely and reliably stored (on a drive that is backed up, or a disk that is then kept safe), that it can be located when needed (not lost on media or a drive long since forgotten) and that it is accessible and usable (the format is still viewable on a current device).

Reminiscing events that occur in the present, where one result is to construct legacy artifacts that are intended for a future audience are complex, interesting, and common. Almost all of my interviewees participants mentioned that they constructed artifacts that were personal in nature and that were created as a way of leaving their story behind for the future. These are what I
have termed personal legacy artifacts. A reminiscing process that results in construction of an artifact for a future (known or unknown) audience stand to benefit a great deal from a digital system, as a system can assist the creator in a variety of ways shown to be important in my discussions with older adults: A system might help by triggering different memories, by guiding the creator to build a useful organization of the content, and more broadly and in the process of gathering and storing the content needed in the artifact. For these reasons, I have elected to focus on this type of reminiscing – a process that may involve many “turns” and that produces a personal legacy artifact – in the remainder of this dissertation project.

**Related Work: Personal Legacy Artifacts**

Given my narrowed focus on the creation and use of personal legacy artifacts as an aspect of reminiscing among elder adults, it is important to consider other research related to the creation and use of such artifacts. Indeed, HCI researchers have explored a variety of different approaches to the creation and use of personal legacy artifacts. However, as with reminiscing in general, much of this work has been aimed at the general problem and opportunity for recording personal experiences. Very little attention has been directed to how personal legacy artifacts might be created and authored by healthy older adults. Nonetheless, the example projects have investigated a number of approaches and issues that may be relevant to my design goals.

Research has explored the development of *Multimedia Biographies* (Damianakis, Crete-Nishihata, Smith, Baecker, & Marziali, 2010) for persons with Alzheimer’s Disease and mild cognitive impairment, or the chronicling of older adults’ stories as a side-effect of interaction in the moment [e.g. *SharePic* (Apted et al., 2006) and *Palaver Tree Online* (J. B. Ellis & Bruckman, 2001)], the inheritance of heirlooms as part of another’s legacy [*Timecard*, *BackupBox* and *Digital Slide Viewer* (Odom et al., 2012; Odom, Harper, Sellen, Kirk, & Banks, 2010)], the
development of an online family newspaper which is to be shared remotely to maintain social ties [e.g. *Family Newspaper* (Santana, Rodriguez, González, Castro, & Andrade, 2005)], automatic methods for the creation of artifacts [e.g. *My Life Photo Book* (Sandhaus, Baumgartner, Meyer, & Boll, 2010)], and the integration of different media into a single artifact [e.g. *MEMENTO* (West, Quigley, & Kay, 2007), *Time Capsules* (Petrelli, Van den Hoven, & Whittaker, 2009) and *Living Memory Box* (Stevens, Abowd, Truong, & Vollmer, 2003)].

None of these projects have sought to obtain an in-depth understanding of artifact creation by healthy older adults. Additionally, broader research (Lindley, 2012) indicates that the creation and processing of artifacts about the past is done with care; that it is neither to be taken for granted nor automated; and that the production of a standalone, accessible artifact that conveys a clear narrative should be the goal of any personal legacy artifact system. No such a system has yet to developed.

Nonetheless, design lessons can be gleamed from this previous research. For example, *Palaver Tree Online* – an online community that bridges generation gaps by engaging children and the elderly in collaborative creation of oral histories – supports my interview findings that older adults need to a tangible artifact. Specifically, Ellis and Beckmann (2001) found that the older adults felt out of the loop with the projects they were creating while they were telling their stories to the children. They wanted to see their reminiscences. A similar indication comes from the work of Odom (2012), where there was evidence of tension created when digital artifacts are created without a physical form. Additionally Odom (2012) points to a need for multiple representations of archives that can meet individual preferences and needs. I found similar evidence in my interview study, where I noted the prevalence of multiple types of memory related artifacts. Finally, *MEMENTO* (West et al., 2007) shows that photos are the most common trigger for memories; it expands on the notion of physical and digital design by its unique design of a scrapbook that has both physical and digital component.
Chapter 5

Scenario-Based Problem Analysis of Personal Legacy Artifacts

Once I had explored older adults’ reminiscing customs and settled on a design focus, I initiated a scenario-based design (SBD) process to continue my research project. The first phase of SBD involves developing a synthetic understanding of the individuals and traditions in the current situation, so that new design ideas can be integrated within this context. For my project, I drew primarily from my interview data to develop hypothetical stakeholders, problem scenarios and claims. However prior to developing these central representations, I created a root concept to document important starting concepts and constraints, and characterized the individuals involved in the setting using stakeholder analysis (Rosson & Carroll, 2002).

Root Concept and Stakeholder Analysis

Following the SBD framework, the initial analysis of requirements for the themes of a personal legacy artifact system comes in the form of a root concept (Table 5-1). The root concept table presents key aspects of a preliminary design vision, emphasizing its main objectives, rationale, and projected impacts on the most central stakeholder groups. A root concept can be seen as a “stake in the ground” that sets up the designer(s) for further analysis and elaboration of system requirements.
Table 5-1. Root Concept for Digital Personal Legacy Artifacts Creation

<table>
<thead>
<tr>
<th>Components</th>
<th>Contributions to the Root Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level vision</td>
<td>Themes for a digital reminiscing system that can serve as a life review tool that replicated current customs while possibly strengthening community ties, family unity and cultural connectedness among older adult users, and serving as a tool for creating personal legacy artifact for future generations</td>
</tr>
<tr>
<td>Basic rationale</td>
<td>A digital system will enable easier creation of personal legacy artifacts while also making them more accessible to younger generations</td>
</tr>
<tr>
<td>Stakeholder group:</td>
<td></td>
</tr>
<tr>
<td>Older Adult Creator</td>
<td>Digital means to creating artifacts about their lives.</td>
</tr>
<tr>
<td>Family Members &amp; Friends</td>
<td>A convenient way of giving feedback to the creator about the artifact and a physical and/or digital artifact to remember the older adult.</td>
</tr>
<tr>
<td>Future Family Members / Grandchildren</td>
<td>A physical and/or digital artifact created by a family member who may have passed away that can provide reminiscing triggers.</td>
</tr>
<tr>
<td>Starting assumptions</td>
<td>The initial focus design will focus on old adults and the creation of artifacts. The consumption of the legacy artifacts will be version 2.</td>
</tr>
</tbody>
</table>

As a complement to the specification of a root concept, the SBD framework recommends an analysis of the stakeholders and their relationships. This is conducted to understand the relationship among the primary interest groups in regards to the design concept – in this case, personal legacy artifacts. Figure 5-1 depicts such an analysis, showing the relations among stakeholders who might be impacted by the creation of personal legacy artifacts. As we can see, the older adults do not create their artifacts in isolation; friends and family advise them on what to include and help gather content, while their vision of grown grandchildren wanting to reminisce in the future serves to guide the overall story.
Table 5-2 presents another perspective on the stakeholder analysis, summarizing the likely tasks associated with each stakeholder group mentioned in the root concept, and giving further insight into the stakeholder relationships diagrammed in Table 5-1. These tasks represent a synthesis of what I learned from the interview participants. For example, they described their efforts to organize artifacts for future generations, but at the same time they mentioned the contributions of other types of individuals, such as family and friends. The vision of a grandchild or other younger family member enjoying the artifacts was an inspiration for their efforts, even though they expressed general uncertainty about whether the artifacts would be wanted or not.

Figure 5-1. Relations Among Stakeholders in the Creation of Personal Legacy Artifacts
Table 5-2. Tasks Carried Out by Stakeholders as Part of Personal Legacy Artifact Creation

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Legacy Artifact Creation Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older Adults</td>
<td>• Determine what events/stories to include in the artifact.</td>
</tr>
<tr>
<td></td>
<td>• Locate any physical and digital material they want to include</td>
</tr>
<tr>
<td></td>
<td>• Create the artifact to tell/trigger the memories that they want the future views to have</td>
</tr>
<tr>
<td></td>
<td>• Conduct research about family heritage</td>
</tr>
<tr>
<td>Current Family &amp; Friends</td>
<td>• Assist in locating and digitizing material</td>
</tr>
<tr>
<td></td>
<td>• Assist with ideas of what to include</td>
</tr>
<tr>
<td></td>
<td>• Assist in family research</td>
</tr>
<tr>
<td>Future Family Members / Grandchildren</td>
<td>• Act as the inspiration for the artifact</td>
</tr>
</tbody>
</table>

**Hypothetical Stakeholders, Problem Scenarios and Claims**

Working from the themes that emerged from the interviews, as well as the root concept and the stakeholder analysis I developed to capture the essence of my design concept, I constructed problem scenarios that portray how older adults are currently constructing personal legacy artifacts. Note that in the SBD framework, a “problem” scenario is not necessarily problematic; rather it is a story that conveys interesting aspects of the initial (problem) situation that should be considered as the design activity moves forward. Thus the problem scenarios presented here were developed to reveal aspects of the stakeholders and their activities that have implications for the design of a system for creating personal legacy artifacts. Table 5-3 introduces seven hypothetical stakeholders: four older adults, two adult children and a grandchild. These stakeholders are used as the actors in the problem scenarios. They were created to represent characteristics that I consider to be typical for their group, at least to the extent that my interviews included different personal characteristics. The details provided in each description are provided
to paint a more complete and detailed picture of the situation and actors who form the base for the problem scenarios.

Table 5-3. Hypothetical Stakeholders who will be the Actors in the Problem Scenarios

<table>
<thead>
<tr>
<th>Actor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Young</td>
<td>Is happily married to Gloria, enjoying his retirement. He is interested in living life as it and enjoying all the activities he could not do during his career. He and Gloria belong to many local groups that focus on activities, such as the local hiking club and theater society and they travel frequently. He feels that reminiscing and more specifically creating personal legacy artifacts is not for him and not important. Gloria will handle the bits of his life that should be included in artifacts; he has no time or desire of it. Jeff used technology throughout his career and is very comfortable with computers. He regularly uses office software to keep his personal finances, he used the internet to look up information about hobbies and events, and email to run mailing lists for a hobby organization that he is a member of and to keep in contact with friends.</td>
</tr>
<tr>
<td>Gloria Young</td>
<td>Is married to Jeff and is also enjoying retirement and doing many new activities with and without her partner. The most notable activity she does alone is attending monthly memoir club meeting where she writes stories about her and Jeff’s life together and she also is an avid scrapbooker. She got into scrapbooking when her only child (Michelle Yohannes) was born 37 years ago and has not stopped since. The memoir class is new and she has only been attending for 6 months but she has already written over 15 stories. Gloria can do some things with computers but overall feels that technology has long passed her by. She knows enough to be able to compose her memoirs using a word processor. She also sends emails to friends and family and occasionally reads the news online when they do not get out of the house to buy a newspaper.</td>
</tr>
<tr>
<td>Michelle Yohannes</td>
<td>Is an active thirty something that lives some distance from her parents (Jeff and Gloria Young). She has a high-powered career on the west coast and just recently had a child. With her parents on the east coast it is hard for them to keep up with what is going on with their grandchild so Michelle attempts to send them pictures at least once a week and see them on the next holiday.</td>
</tr>
<tr>
<td>Violet Yohannes</td>
<td>Is the newly born daughter of Michelle. She is 6 months old and the apple not only of her parents’ eyes but also her grandparents many miles away.</td>
</tr>
<tr>
<td>Steven Holmes</td>
<td>Is a widower who lives in the family house with his adult son Rick. Rick moved in 3 years back when Steven’s health took a turn for the worst and needed some assistant getting things done. Steven’s health has turned around and he is now once again enjoying retirement and his hobbies. He has recently gotten into genealogy and is something he does with Rick. Steven tired to use computer about 10 years ago because his children were pushing him to. He did not pick it up and felt that it would also break on it or he would break something. He gave it a shot for about a year and then decided to unplug it and never touch one again.</td>
</tr>
</tbody>
</table>
Rick Holmes is a newly engaged successful forty something who has always lived close to his parents; however he never imagined himself moving back into the family home. Rick currently has no children. He does want to have children though, and tends to spend evenings with his fiancée, his small group of close friends still in his hometown, or trying to find mutual hobbies for his father and himself. His mother died young and ever since then, Rick regrets never having talked with her about her life and heritage. This is why he pushed his father toward a hobby of genealogy.

Carolyn Aberly is a twice-divorced single retiree who enjoys spending time with good friends, including Gloria Young, and talking about the good old days. She has two children and five grandchildren and sees them on holidays, vacations and whenever she can. During her life she worked at a hospital and was very much a peace and women’s rights advocate. Through her advocacy she collected and produced many artifacts, content ranging from newspaper clippings to audio-recorded interviews with notable individuals. Approximately five years ago, she downsized from her family home to a small one-bedroom condo. Because of this she trimmed her collection of artifacts. She knew that there was value in what she had, so she donated some of her collection to the public library. She still has many artifacts stored in drawers and boxes around her condo; she hopes her daughter will take these on when she passes on. She has also been writing memoirs and attending a memoir class for the past two years. She has many stories stored in folders in her desk. Carolyn uses a computer for email, news, pictures of her grandchildren, and looking for movies to rent for her film club. She keeps the computer in a backroom nook of the condo and only uses it 10 to 15 minutes at a time, normally just once a day. She feels that when she is using the computer, even though she is catching up with friends or learning something, she is missing out on life and what is going on around her.

Table 5-4 contains three different problem scenarios, addressing each of the basic tasks sketched out in the earlier stakeholder analysis. Although there is not a one-for-one mapping of tasks with scenarios, I did use the earlier analysis as a guide to formulate the scenarios. The goal throughout was to explore many of the issues that had been raised in the earlier field study. For example, Linda, Maria, and Susan both created scrapbooks for their grandchildren about their lives, Margaret and her daughter work together to discover and record their family history, while Robert leaves the artifact creation to his partner, and John, Michael, and Lisa do not use computers.
1) Gloria Creates a Family Scrapbook

Gloria is a proud new grandmother to Violet, a 6-month-old happy and healthy baby girl. Gloria could not be happier, except that Violet lives on the other side of the country, so she doesn’t have as much time as she would like getting to know her. Violet’s mother Michelle is Gloria’s only child making Violet the first grandchild. Michelle sends pictures to her parents about once a week. Jeff looks and mentions how beautiful she is but then continues about his day. Gloria also enjoys the pictures, but now that she has been seeing them for six months, she has started thinking about the future and how Violet will get to know her grandparents in the next ten to twenty years while they will hopefully still be alive, but also once they are gone. Gloria has come to terms with the fact that they will likely live the remaining days of their life very far away from Violet and that any time they do spend together will be focused on the now and on creating new experiences. This means that Violet will never have the opportunity to learn about the events and stories that have colored Gloria and Jeff’s life together.

Gloria has often created scrapbooks of events and trips in her life. So, she decides that she will create one that covers the life of Jeff and herself, something that could be given to Violet in the future. Gloria has completed many scrapbooks to date but mostly of recent activities. In fact, her normal procedure for scrapbooking is to create a scrapbook as close to an event as possible, normally less than a week after the event. She is now faced with creating a scrapbook that spans a large amount of time and numerous events. She is overwhelmed by this and decides to drop the idea, at least for now. She rationalizes that the scrapbooks already created and Michelle’s memories of her own life will be enough for Violet to get to know her grandparents.

About a month later, Gloria is still disheartened that creating an ‘our life’ scrapbook seems so overwhelming and she does not think she can do it. But because it’s important to her, she decides to call Michelle and ask for her advice as to whether to try to create one or not. Michelle encourages her that she can do it and to think about it chronologically. After a long discussion and some much needed encouragement the phone call ends and Gloria once again takes up the goal of creating an ‘our life’ scrapbook. So, she gets out a piece of paper and starts to write events annotated by dates that were important to the lives of Jeff and herself. She starts with their birth dates and moves along to other key events and dates that come to mind.

Soon Gloria has a lengthy list. Referring to her list, she starts to go through her old scrapbooks, photo albums and other artifacts to gather material for the ‘our life’ book. She gathers a great deal of material and feels she is ready to start assembling the actual scrapbook. As she begins to design pages, she keeps thinking of Violet and what this book will mean to her. She also tries to imagine what Violet will be like in the future when viewing the book. Will the events within it be ones that Violet wants to know about? Will the book be good enough and valued as much as she is valuing it now? Will the book even exist?

When Gloria has completed all the pages and events she can with the material around the house she notices gaps on some pages; she is not sure that she has captured even the big events. Once again she calls Michelle to see what she thinks and if she has any material for the events that she has not been able to fill in. Gloria relates what events she has added to the book and what artifacts are used to depict them. As Michelle listens she remembers other events that she and asks her mom to add these. Michelle also tells her mother that she will send her a package with some artifacts, mostly photos for the events that need more and that she asks to be included.

After a few months, Gloria finishes the ‘our life’ scrapbook and is happy with the results. She puts it in a decorative box and wraps it up intending to give it to Michelle the next time they see each other, so that Michelle can pass it on to Violet, as she herself grows old.

<table>
<thead>
<tr>
<th>Table 5-4. Problem Scenarios Illustrating Personal Legacy Artifact Creation by Older Adults</th>
</tr>
</thead>
<tbody>
<tr>
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| Gloria is a proud new grandmother to Violet, a 6-month-old happy and healthy baby girl. Gloria could not be happier, except that Violet lives on the other side of the country, so she doesn’t have as much time as she would like getting to know her. Violet’s mother Michelle is Gloria’s only child making Violet the first grandchild. Michelle sends pictures to her parents about once a week. Jeff looks and mentions how beautiful she is but then continues about his day. Gloria also enjoys the pictures, but now that she has been seeing them for six months, she has started thinking about the future and how Violet will get to know her grandparents in the next ten to twenty years while they will hopefully still be alive, but also once they are gone. Gloria has come to terms with the fact that they will likely live the remaining days of their life very far away from Violet and that any time they do spend together will be focused on the now and on creating new experiences. This means that Violet will never have the opportunity to learn about the events and stories that have colored Gloria and Jeff’s life together.

Gloria has often created scrapbooks of events and trips in her life. So, she decides that she will create one that covers the life of Jeff and herself, something that could be given to Violet in the future. Gloria has completed many scrapbooks to date but mostly of recent activities. In fact, her normal procedure for scrapbooking is to create a scrapbook as close to an event as possible, normally less than a week after the event. She is now faced with creating a scrapbook that spans a large amount of time and numerous events. She is overwhelmed by this and decides to drop the idea, at least for now. She rationalizes that the scrapbooks already created and Michelle’s memories of her own life will be enough for Violet to get to know her grandparents.

About a month later, Gloria is still disheartened that creating an ‘our life’ scrapbook seems so overwhelming and she does not think she can do it. But because it’s important to her, she decides to call Michelle and ask for her advice as to whether to try to create one or not. Michelle encourages her that she can do it and to think about it chronologically. After a long discussion and some much needed encouragement the phone call ends and Gloria once again takes up the goal of creating an ‘our life’ scrapbook. So, she gets out a piece of paper and starts to write events annotated by dates that were important to the lives of Jeff and herself. She starts with their birth dates and moves along to other key events and dates that come to mind.

Soon Gloria has a lengthy list. Referring to her list, she starts to go through her old scrapbooks, photo albums and other artifacts to gather material for the ‘our life’ book. She gathers a great deal of material and feels she is ready to start assembling the actual scrapbook. As she begins to design pages, she keeps thinking of Violet and what this book will mean to her. She also tries to imagine what Violet will be like in the future when viewing the book. Will the events within it be ones that Violet wants to know about? Will the book be good enough and valued as much as she is valuing it now? Will the book even exist?

When Gloria has completed all the pages and events she can with the material around the house she notices gaps on some pages; she is not sure that she has captured even the big events. Once again she calls Michelle to see what she thinks and if she has any material for the events that she has not been able to fill in. Gloria relates what events she has added to the book and what artifacts are used to depict them. As Michelle listens she remembers other events that she and asks her mom to add these. Michelle also tells her mother that she will send her a package with some artifacts, mostly photos for the events that need more and that she asks to be included.

After a few months, Gloria finishes the ‘our life’ scrapbook and is happy with the results. She puts it in a decorative box and wraps it up intending to give it to Michelle the next time they see each other, so that Michelle can pass it on to Violet, as she herself grows old. |
2) Steven and Rick Create Their Family Tree

Rick lost his mother when he was 15, and since becoming an adult he has always regretted not paying more attention to her stories or asking her questions about her life and her family. He now finds himself living in his childhood home, helping his aging father Steven and realizing that his father may soon die as well. Rick does not want to make the same mistake he made with his mother, but he also knows that his dad is not one to talk about the past. Asking about his mother just brings his dad to tears most of the time. Rick also realizes that his future children will never know their grandmother and more than likely never met their grandfather as well.

This realization has weighed hard on Rick. He decided to do something that would give him a way of teaching his future children about their grandparents and where they came from. He knows his father is very intellectual and enjoys tracking down facts about things; since he can not persuade his father to tell stories about his past, he wonders if family genealogy research might be a good starting point for discussion. At least that way, Rich could learn something about his heritage. Maybe it will prompt Steven to open up some and tell the stories about his own life and Rick’s mother. Rick is so eager to try this so that the stories are not lost for future generations.

One weekend morning while have breakfast Steven asks Rick what he is going to do today. Rick replies that he is thinking of going to the local archive to find out about their past relatives. Rick made it sound as glorious as he could and made sure to also ask Steven if he would like to help. As Steven had nothing better to do, he agreed to join Rick in his quest. This was the first of many days spent searching out archives and any paper or electronic trail they could find about their ancestors. Over the course of the next six months they traced their ancestors back about 800 years, following the family trees for both Steven and his wife’s families. The result was a rather impressive family tree. They stored the tree and supporting information in a set of binders.

The process also drew Rick and Steven close; their bond was greater than it ever had been before. Steven felt that he was not a burden on Rick and that he could assist with activities even though he was quite old. Rick was finally comfortable asking the questions that he knew were hard for his father to answer.

3) Carolyn Compiles Her Memoirs

Carolyn lives alone and enjoys reliving the good old days with her friends. A few years ago she discovered a memoir class that meets once a month in the local community building; she decided to give it a try. She has been in love with this activity since that time, writing more than 40 stories, holding them all in folders in her desk. The only organization to the folders is that each folder contains the memoirs she wrote in order until the folder could not hold any more. About 50% of the stories are typed with the rest being hand written. All of the stories have notations on them as well, the notation come from when she is sharing the story with the memoir class.

Carolyn recently had lunch with Gloria after their monthly meetings and Gloria told her about a scrapbook she is putting together for her granddaughter. The story was interesting to Carolyn but scrapbooking was not something she was interested in. However, after going home and thinking about Gloria’s project, Carolyn started thinking about her memoirs folders and what would happen to them when she passed away. Would her children even know what to do with them? Would they even care to read them? Would they know how some of them connected to the artifacts in the drawers and the library back in her hometown?

As much as Carolyn loved thinking and writing about the good old days, she never really shared the stories with her family, because she did not believe that they would care to hear her go on and on about times passed. But after her chat with Gloria, she started to think that they might want to see what she had written. She decided that it would not be hard to gather up all the memoir folders and spend some time giving them an order and context. She started by going through her desk and finding all the folders, nine in total, and reviewing what each contained. She
could not believe how much she had written and how much she had improved as a writer over
time. The process of going through everything took some time as there was a lot of content. As
she read over the stories she found herself reminiscing privately about the events in the story
again or the time she shared it with her group.

Carolyn did not want to bother any of her children to help her organize her memoirs; she did
not even let them know she was doing such a thing, because she wanted it to be a surprise. She
realized that her hand written stories were not very legible and the typed ones were a mess as she
had written notes all over them, so decided she would type them again. She rationalized the time
it would take to type them with the fact that it was just getting to the coldest part of the year and
she could spend the time warm in her house.

It took Carolyn just over two months to type all the stories, partly because she found herself
editing them and adding new bits to them. Once she was done she had close to 40 stories about
different bits of her life. She now tried to see the bigger picture and a way to put all forty stories
together to tell coherent life story. She first tried a chronological order, as Gloria had mentioned
that was how her scrapbook was ordered. But that ordering did not seem to work; it seemed to
make them overly complicated, by going from one topic to another and then back to a topic
already covered. Then she tried to categorize the stories and soon found that categories seem to
work very well. Once she had sorted through all the stories she ended up with six different
categories that seemed to patch her life together.

She was thrilled when she finally found an order for her memoirs. She started printing all of
the entries and putting them back in folders that were now based on the categories. When she
finished she put them all back in her desk. But she was now very proud of her reminiscence
artifacts; when her children and then grandchildren inherit her belongings they will have an
organized collection of stories of her life.

As the scenarios were developed so was the analysis of the claims. A claim consists of a
feature of interest (whether related to a designed artifact or more generally an activity) followed
by a list of positive and negative consequences of that feature in use (e.g., as analyzed in one or
more scenarios). In the case of problem scenarios, the features often refer to important aspects of
the existing customs. The consequences are sometimes referred to as upsides and downsides and
the general concept of a claim is sometimes described as a tradeoff analysis. As part of the claims
reasoning, it is important to ask “what if” questions, so that the rationale is not limited to just one
or a few scenarios.
Table 5-5. Claims Analyzed While Developing the Problem Scenarios

<table>
<thead>
<tr>
<th>Personal Legacy Artifact Feature</th>
<th>Possible Pros (+) or Cons (-) of the Feature</th>
</tr>
</thead>
</table>
| The physical form of a personal legacy artifact… | + May render it unique and precious to its owner  
+ May include smell and patina that serve as triggers for reminiscing  
+ Eliminates any constraints concerning software compatibility for consumption  
- But, a physical object requires physical space  
- But, it may age and eventually disintegrate over time  
- But it is not easily replaced or duplicated |
| A single artifact comprised of many different objects… | + Can offer a rich and vivid experience to its consumers  
- But the components may not fit well within the artifact  
- But the objects themselves may break, deteriorate or become inconsumable |
| A legacy artifact that can take many forms… | + Lends itself to variety if the creator wants to make more than one  
- But, choice of form requires judgment and this may be difficult for the maker to determine |
| Organizational framework for artifact creation… | + Suggests an approach for collecting and organizing content  
- But a rich metaphor may lead to so many ideas that the creator becomes overwhelmed with choice |
| An artifact that is created to outlast the creator… | + Increases feelings of comfort concerning “lastingness” and potential impact of an artifact  
- But a long lived artifact may take a lot of time to create  
- But the eventual future audience may be unknown or uncertain to the creator |
| Building an artifact in a collaborative fashion… | + Increases the flexibility of who knows what or who can find the time to contribute something  
- But because an artifact may have a singular physical location, assistance during creation will require local access |

Table 5-5 displays the claims that were analyzed as a complement to the problem scenarios. Each claim consists of a feature that was explored in one or more of the scenarios, and associated with an analysis of possible positive and negative consequences; this analysis is lodged in interview studies I reported earlier.

The first claim explores the role of supporting both physical and digital versions of an artifact, something explored in the first scenarios and emphasized in the interview studies. The participants mentioned the importance of physical version of the artifacts as they view and cherish the physical and do not believe something digital can provide the same feelings and
memories. However, as the participants have had to downsize and have also inherited artifacts from past family members they did acknowledge that physical artifacts do have down sides, they take up space and can deteriorate over time.

The next three claims were analyzed using all of the scenarios, as each depicted a different type of artifact as it was being created, with different types of media being used. While each scenario presented a different organization and media for their artifact, the general content they include is similar. This leads to the upside pointing to one program being able to assist in the creation of all of them.

The claim dealing with longevity is the main reason the participants build their artifacts, they want them to be around after they are gone. They want the artifact to serve as their legacy. However, memories and physical artifacts do fade and as time goes by the meaning of the artifact and its content can change and or vanish.

Finally, the creation of artifacts is a time consuming process and the participants indicated that they do prefer to have some assistant. This is brought out in all of the scenarios in different ways. The collaboration is as simple as being there for when questions of what content to include and if it looks all right, to collaboration that includes someone assisting on research, content and creation. This brings up the need to either have the collaborator in the same room to view the artifact or trying to help remotely and not being able to see the artifact.
Chapter 6

Exploring the Design Space for Digital Reminiscence

In SBD, design ideas are shaped by many forces. First, most design projects have a core idea that motivates the work in the first place. In my project this was my general interest in supporting the reminiscing processes of older adults; later on the core concept was narrowed to focus on the support of personal legacy artifacts, as documented in the root concept. However, just as important as this core idea, the new ideas should be shaped by what is learned about the existing problem setting. In my case, that understanding was formed primarily through my interviews and discussions with older adults, as reported in Chapter 5. The problem scenarios and claims that came out of that process reflect both my increasing focus on legacy artifacts and the characteristics and customs of older adults during their reminiscence process.

To transition from these early representations to a novel design, I followed a three-pronged reasoning process. First I explored conceptual metaphors for reminiscing, as a way to open up the conceptual design space. Second, I considered the implications of existing technologies, i.e., assessing how they might be recruited to support the artifact creation process. Finally, I reasoned about the problem scenarios and claims to move toward a set of activity design scenarios that address similar goals but integrate the support of a digital system. At this point, the design exists in only a conceptual form – the more elaborate details concerning the user interface and corresponding user experience are considered and discussed in Chapter 7.

This chapter also presents a set of findings from a related project that I participated in during an internship. Although the activity was determined jointly by me and my internship supervisors, and covered research questions not germane to my dissertation, I was able to include and extract a number of useful lessons about the design themes that I was considering as part of
my activity design. In this sense, that project (hence Project Greenwich) served as a preliminary evaluation of core design ideas that contributed to the concrete scenarios and prototypes presented in Chapter 7.

**Design Metaphors**

The problem scenarios documented important aspects of how older adults are currently creating personal legacy artifacts. This process already has some digital components; for example the majority of the participants indicated that they take digital photos and print them for their collections; and that they are typing memoirs, letters, and stories and subsequently print them. However, their processes were very piecemeal with the overall concept and content coming together only when the physical artifacts are all assembled. To transform this process to a more comprehensive and focused artifact creation goal and into a digital domain, I first examined metaphors that might inspire online versions of current activities.

Table 6-1 presents metaphors that were established by reasoning about the objects and activities in the problem scenarios. Each metaphor is summarized in a simple fashion, but then expanded with respect to the analogical reasoning it inspires in the domain of personal legacy artifact creation. For instance the documentary metaphor connotes a fairly detailed and systematic story being told, generally in a sequential fashion. In contrast the correspondent metaphor shifts attention to the site of an event or activity, implying that material related to the event may be coming in “from afar”, and may be authored by someone other than the person creating the legacy artifact. The time travel metaphor emphasizes the dramatic change in context or simulated experience that can occur when evocative triggers are provided for a solitary or shared reminiscence activity.
Table 6-1. Real World Metaphors for Personal Legacy Artifact Objects and Activities

<table>
<thead>
<tr>
<th>Real World Metaphor</th>
<th>Implications for Personal Legacy Artifact Creation Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating a personal legacy artifact is like writing a documentary</td>
<td>• Material needs to be gathered and organized&lt;br&gt;• One coherent story that covers lots of aspects is to be told&lt;br&gt;• Time consuming process that can require assistance</td>
</tr>
<tr>
<td>Providing an older adult with event records that can serve as triggers is like being a correspondent</td>
<td>• Artifact in progress is available, allowing others to view, sharing comments and questions&lt;br&gt;• Critical missing details or content may be provided by others around the world</td>
</tr>
<tr>
<td>Researching family and person histories is like being a historian</td>
<td>• Gathering documents, pictures, and information on past relatives who may be dead&lt;br&gt;• Investigating related sources to determine who is pictured in photographs of the past&lt;br&gt;• Collecting and organizing material by type of content, year of creation, source, and so on</td>
</tr>
<tr>
<td>Viewing the artifact is like time traveling to the past</td>
<td>• Content can be accessed and viewed both now and in the future&lt;br&gt;• The “time travel” may be done in isolation or with a group</td>
</tr>
</tbody>
</table>

In addition to drawing conceptual metaphors from the real world, designers can reason from current technology, considering them as a sort of “digital metaphor”, but also working with the implications provided by different examples. Table 6-2, presents a summary of such an analysis, listing current technologies that might be useful in supporting digital reminiscence and examining the implications that such a technology might have for creating digital artifacts. For example, using the metaphor of online search for a genealogical activity suggests that the process happens somewhat like on Google, entering a search string and then evaluating what is returned. Thinking about a personal artifact as if it were a PowerPoint slide show suggests that it has its own start and end, perhaps including animation, different sorts of media combined and so on. Note that I am not assuming that any of these technology ideas will become part of the actual design; this brainstorming is intended simply to expand the design thinking.
Table 6-2. Ideas About Activity Design Suggested by Current Tools

<table>
<thead>
<tr>
<th>Technology Metaphor</th>
<th>Implications for Personal Legacy Artifact Creation Activities</th>
</tr>
</thead>
</table>
| Creating a personal legacy artifact is like creating a video | • Image components must be in digital form  
• Images may be complemented by music or voice tracks  
• The images and other media will be presented in an orderly fashion, perhaps including animation amongst different “takes” or “scenes” |
| Providing an older adult with triggers for events is like a question forum | • People may go to a list of prompts or triggers and respond to them  
• The content of the prompts is primarily text but may include links to other media  
• People’s reactions or comments on a trigger may also serve as triggers for other people |
| Researching family and personal histories is like searching | • Finding genealogical information is like entering a Google search string  
• The results of a search may be a list of items, where each needs to be investigated  
• It may be possible to share or email the results of a productive search |
| Viewing the artifact is like viewing a slide show or media presentation | • Display in an interacting and engaging way  
• Combine all the media forms into one story / show |

**Technology Exploration**

In parallel with the metaphor brainstorming about real world and technology concepts, an investigation of current technology was undertaken to see what software was out there, to determine what metaphors are currently in use, and what features are being implemented for related systems. I investigated systems that were developed for reminiscing in general as well as the creation of artifacts. This included a mix of research and commercial systems.

There are three main research groups that have focused on digital reminiscing – Georgia Tech, Cornell and Microsoft Research Cambridge’s (MSRC) Social-Digital Systems group. Each takes a unique perspective on reminiscing and therefore has been investigating digital systems with different goals. George Tech has developed two systems: iTell, a system to support the
creation of narrative stories using digital pictures for adult users (Landry & Guzdial, 2006) and Palaver Tree Online, an educational system that helps children work with elders to create community-focused oral histories (J. B. Ellis & Bruckman, 2001). Cornell has creating just one system, Pensieve; it focuses on triggering the user to reminisce based on content they have previous posted to the web (Peesapati et al., 2010).

Finally, MSRC has developed a variety of different systems with several different design focuses. One focus has been physical digital heirlooms where they have created a prototype call Digital Slide Viewer, a system that combines physical slides and storage box with digital content that can be accessed using the ‘viewer’ (Odom et al., 2012); Shoebox, a system that combines the physical storage of a box with digital element (Banks & Sellen, 2009); and Timecard, a device to display digital pictures chronologically (Odom et al., 2012). Additionally, they have explored several related technologies: SenseCam, a system that has the user wear a camera around their neck and incrementally takes pictures throughout the day (Sellen et al., 2007); Project Greenwich, a system to create chronological narratives, via timelines (Thiry, Lindley, Banks, & Regan, In Press); and Family Radio, built in collaboration with the University of Sheffield, which records and shares audio moments of time (Petrelli, Villar, Kalnikaite, Dib, & Whittaker, 2010).

With respect to commercial systems for reminiscing, 1000memories is a company that provides “digital shoeboxes” for users to store photos (“The New Shoebox For Your Old Photos | 1000memories,” n.d.). Ancestry.com provides users with the ability to research their genealogy and create family trees (“Genealogy, Family Trees & Family History Records at Ancestry.com,” n.d.). Facebook (“Facebook Timelines,” n.d.) and similar social media systems give users the ability to share content here and now as well as to reflect on the content over time.

This is only a representative sampling of the reminiscing systems, some older systems or systems with similar functions were not included. However, they do show vastly different
audiences, approaches and focuses for reminiscing systems. Table 6-3 decomposes each of these experimental systems farther to explore and contrast their different features.

Table 6-3. Exploration of Existing Digital Systems for Reminiscing

<table>
<thead>
<tr>
<th>System</th>
<th>End Product</th>
<th>Audience</th>
<th>Media</th>
<th>Metaphor</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTell</td>
<td>Compressive crafted narrative</td>
<td>Adults</td>
<td>Text</td>
<td>Storybook</td>
<td>Guided narrative creation</td>
</tr>
<tr>
<td>Palaver Tree</td>
<td>Historic narratives</td>
<td>Children, Elderly</td>
<td>Photos</td>
<td>Storybook</td>
<td>Form based entry, Discussion forum</td>
</tr>
<tr>
<td>Online</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pensieve</td>
<td>Reflective Journal entries</td>
<td>Anyone that has an online presence</td>
<td>Text</td>
<td>Journal</td>
<td>Email triggers, Add to journal via email, Blog based Journal</td>
</tr>
<tr>
<td>Digital Slide</td>
<td>Family Photo Album</td>
<td>Anyone</td>
<td>Photos</td>
<td>Slide Projector</td>
<td>Can store with other artifacts, Not depended on Computer</td>
</tr>
<tr>
<td>Viewer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoebox</td>
<td>Photo Archive</td>
<td>Anyone</td>
<td>Photos</td>
<td>Shoebox of photos</td>
<td>Can store on shelf or other display space, Not depended on Computer</td>
</tr>
<tr>
<td>Timecard</td>
<td>Chronological Photo display</td>
<td>Anyone</td>
<td>Photos</td>
<td>Timeline</td>
<td>Can store on shelf or other display space, Not depended on Computer</td>
</tr>
<tr>
<td>SenseCam</td>
<td>Photos of all aspects of life</td>
<td>Anyone</td>
<td>Photos</td>
<td>N/A</td>
<td>Constant collection, Do not have to think about capture</td>
</tr>
<tr>
<td>Project</td>
<td>Timeline photos and narratives</td>
<td>Anyone</td>
<td>Text</td>
<td>Timeline</td>
<td>Minimal, easy interface, Sharing, Ability to combine timelines</td>
</tr>
<tr>
<td>Greenwich</td>
<td></td>
<td></td>
<td>Photos, Wiki-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Radio</td>
<td>Audio Collect of event</td>
<td>Family</td>
<td>Audio</td>
<td>Radio</td>
<td>Audio capture, Physical device that looks like old radio</td>
</tr>
</tbody>
</table>
Working from the interview study, problem scenarios and claims, and the exploration of metaphors and existing system approaches, I identified ten high level themes as ideas that I wanted to explore in my ongoing design work. At this point, my understanding of these themes is largely conceptual, but I wanted to document these because much of the continuing design work will show my efforts to respond to these concepts. Below I list each theme and my current understanding of its underlying design rationale.

### Can be Created Away from a Traditional Computer

Older adult users are decidedly not computer-centric; they do not want to spend a lot of hours in front of it creating or organizing stories and other memories. On the other hand, at least some of the system support for creating or transforming personal content may require specialized devices like scanners, printers, or large displays. But it seems clear that this user population will want to access and work with their personal legacy artifacts from the comfort of their favorite...
living room chair, in the company of the friends they like to spend time with in a lounge or community center, or during visits with family members.

The implication is that the designed system must be accessible by not only the computer and the specialized input and output devices provided for content digitization or display, but also by other devices that are mobile and flexible with respect to usage settings – and that thus may also have a different set of functions for creating or displaying content. Supporting “context-embedded” creation or editing behaviors would also enable the creation to occur in “spurts”, when and where a memory is activated spontaneously or the user wants to share a previously created memory. It is important to remember that these older adult individuals – even though they are retired and often living in specialized housing – still have busy lives that engage them. They do not want to set their normal lives aside to focus on the creation of legacy artifacts.

**Usability Objectives that Address the Needs of Older Adults**

Usability is an important facet of any system design. However it is even more important when designing for an audience not comprised of frequent or expert users of technology. It is for this reason that usability needs to be considered up front and developed to inspire confidence and trust in the system and to insure the system is simple and not overwhelming to the users.

**Confidence and Trust**

Any digital personal legacy system must have the trust of its users – confidence that any content submitted will be safe-guarded and will always be available to the author and other individuals. Even though older users are likely to create physical products from their digital
authoring activities, they still need to be certain that what they put online (or in their own local storage) is stable and safe.

Several implications follow. One is to enhance the transparency of the digital content in its corresponding digital storage location, perhaps through use of a storage network or architecture diagram that can be queried to see the names of files, photos and so on. Conceptually salient information about the system’s backup services would also be useful, perhaps something as simple as a notation of the last date/time a file or set of files has been backed up and how. Convincing the users that they can always re-create physical versions of their digital creations can be an important incentive to transition to this style of memory creation and management.

**Simple**

This is a familiar desire expressed by participants, but what counts as simple must be carefully calibrated for older adult individuals. In other situations, we might propose to build a system to work within Facebook, or to work in a similar fashion, because this would make it simple to everyday users. But for this user group, such a strategy would fail.

Our participants told us that they do not use social networking sites or similar online communities because there is too much going on and they do not understand what everything is. Instead they prefer older and simpler communication channels like email and text documents, where they can understand what they are doing. The complexity of systems like Facebook also has led to uncertainty about where their communications or photos are “going”, and in particular about keeping such content safe and appropriately private. As a result the software we provide must be as simple and minimalistic as possible, offering only the most basic support for content creation and management.
Has Metaphors for Organization

As older adults set out to construct a personal legacy artifact they may be overwhelmed by the idea and not know where to begin or how to organize the end product. As stated before, a system will help with this by allowing the users to create individual objects without having to deal with the eventual big picture organization of the object. However, the organization can also help trigger other objects or stories that the user wants to include as well as to help the user take the first steps to get started with their personal legacy artifacts. The metaphors explored earlier, for example a set of specific prompts as in a discussion forum; might be used to guide users to start by sharing just small bits of their lives. As a result, they may be less overwhelmed with the process and the resulting product will be a more coherent account.

Can Take Many Forms

In addition to many different types of objects and media being used for a personal artifact, my participants also indicated many different ways of constructing their artifacts (notebooks, scrapbooks, file folders, items in drawers, etc.). This means that there is not just one format for creation; any system intended to assist in the creation of personal legacy artifacts should not assume that there is a single output solution for everyone.

One possibility is that the system will handle the entering of different objects the same way, no matter what the eventual form the artifact will take and then have modes (views) that the creator, and possibly the consumer, can choose to specify how they wish to display or consume the artifact. This would allow the creator the freedom when creating material (individual stories, moments) without being constrained or overwhelmed by the big picture, but also allow them to switch to the big picture view whenever they want to.
Hides Gaps and Negative Events

Most of the interview comments and reminiscing events focused on the typical sorts of memories that people share, positive experiences with activities or people in the past. But some participates also mentioned times when they refrain from reminiscing or from sharing a reminiscence, perhaps even editing the reminiscence because it may have an negative, sad, outcome or it may even be embarrassing or shameful to them. One person mentioned that she feels pain when learning about old friends who are poor health, suggesting that in some cases sharing can have negative consequences. Another mentioned that no matter what or how you ask, you may never learn about the shame that little Sue brought to the family.

It is not clear how to manage such concerns – would an older adult really choose not to include memories from ailing friends or a dead loved one in the artifact? Probably not. Yet there might be mechanisms for keeping potentially negative outcomes in the background, or at least alerting the person that a particular story might make them sad or upset. Additionally, if a user does choose to leave events out of the artifact, the final form of the artifact may need to be able to hide or minimize the gap so that a viewer is not drawn to the gap and encouraged to fill in missing pieces. On the authoring side, participants might choose to tag some stories as potentially distressing, giving the choice to the receiver.

Has Triggers to Start the Creation Process

Much of the prior work on software to support reminiscing, in general, has focused on triggering, either for private reflection (c.f. Peesapati et al’s Pensieve system (Landry & Guzdial, 2006)), intergenerational conversation (c.f. Ellis and Bruckman’s Palaver Tree Online (J. B. Ellis & Bruckman, 2001)), or community memory building (c.f. Carroll et al’s Nostalgia (Carroll et al.,
2009). These systems provide triggers that evoke construction of new digital content as “responses”, or present digital prompts to promote oral conversations. Throughout the study it was found that the older adult individuals had a tendency to downplay the value of their memories, unless they were part of a special event designed for such exchange. As a result, any system built for the creation of personal legacy artifacts should include as a basic theme, a set of prompts that trigger particular kinds of memories.

With respect to the type of triggers the system might provide, the interviews showed success with general prompts like asking about people’s early days, or motivations for living in their current town, or asking to hear more about personal interests like cooking or gardening. When people are positioned in the midst of their day-to-day context with prompts such as these, they may feel more comfortable just talking about “normal” things, which in turn may serve as self-prompts for related memories. An even richer prompt might be a simple metaphoric framework with templates that encourages the user to explore their life in different ways and tell their life story. This story could then serve as a prompting framework for other memories that they would like to include as part of their artifacts.

**Can Contain Many Different Types of Objects**

Throughout the interviews it was noted that the artifacts the participants created contained many different types of content objects: newspapers, typed stories, photos, official documents, etc. Therefore, a system for the creation of personal legacy artifacts should also be able to include a variety of objects as well. Additionally, with the artifact being digital in nature, the system should also be capable of including video and audio objects.

The addition of video and audio might create some tension when it comes to producing a physical end product. However, this concern might be addressed by including a DVD or other
media (Blu-ray, CD), as an option for the physical form. Another possibility would be to transcribe the audio and take stills of the video; this might minimize the possibility of digital obsolescence that could come by including digital media files.

**Created Collaboratively and / or Independently**

The desire to share information about one’s life and family or more generally about historic events during one’s life was prominent within the population of interviewees, particularly when they were envisioning an audience that included younger family members. This has two important implications. First, the software might use the younger generation as a motivator or trigger in eliciting memories (e.g., Showing a photo of a grandchild, along with a prompt such as “What parts of your life would you want <grandchild’s name> to know?”). Second, a multi-generation reminiscing context implies that the software should be designed to meet the concerns and appeal not only to older adults but also to users from these younger generations. For example, perhaps the tool should offer different templates or presentation styles that are expected to be appealing to different target audiences.

Additionally, the interviewees mentioned that they seek help and advice from their children when they are reminiscing and creating artifacts. Therefore the system needs to have the ability to share incomplete artifacts so that the older adults can receive feedback and triggers for more content from others.

**Exists Both Physically and Digitally**

Even though the goal is for a system for the creation of *digital* personal legacy artifacts, it is clear that it must have the ability to produce physical artifacts. In many interviews, there was a
preference for physical outputs, generally paper copies of stories, photos, and so on. Even when the participants type or create content on a computer they do not enjoy a sense of completion until it is printed out so that they can see and hold it.

One possibility is that the overall system design should imply throughout that the final finished product will be a physical artifact; or at the least a physical version will play a significant role in the finished product. This would mean that the person might decide in advance things like image size or resolution, in a way to produce a good physical versus a digital output. The final stage of creation would then be a physical output subtask.

At the same time, we should recognize the separate advantages of digital and physical products. Digital content requires little if any physical space (perhaps a piece of storage media), is portable, can support rich interactions, can be duplicated and shared, and in general does not decay. In contrast, physical things can be unique, precious, have a story associated with the item, and engage the senses. More generally, both classes of products need to be maintained, can be lost or forgotten, have guilt associated with them (I should be organizing the photos) and may need to be curated (Banks, 2011).

**Created to Outlast the Creator**

A digital personal legacy artifact would not be a very successful legacy artifact if it does not exist for a long period of time, for example outlasting its creator. Therefore, digital obsolescence is a looming concern that needs to be addressed. Creation of a physical artifact, as mentioned above, might be one way to prolong the existence of the artifact. However the digital creation has some value as well; the consumer may prefer to view the artifact in this fashion, so it should not be discarded even if and when a physical version is created.
Unfortunately, digital technologies are evolving so rapidly that even digital media created only a short time ago may become obsolete and impossible to view. Additionally, storage media is evolving rapidly; content stored less than ten years ago on floppy disk drives are no longer readable or accessible without access to special “historical” input devices. These issues are concerns and need to be addressed for any commercial system. However for the scope of this dissertation project, a physical product as well as the ability to store the digital artifact on media, or in the cloud will suffice.

Activity Scenarios and Claims

With the problem analysis and design exploration in place, the next step in SBD is to envision new ways that the stakeholders might create personal legacy artifacts, specifically with the help of novel technological solutions. I took this step by developing activity design scenarios and associated claims. These scenarios revisit the situations and stakeholders depicted in the problem scenarios, but now enhanced with design ideas culled through the processes reported earlier in this chapter. The claims analysis for these scenarios continues the general process of hypothesizing the upsides and downsides of the activities’ features, so as to continue the design reasoning and refinement process.
Gloria is interested in how she can create a scrapbook in a digital form instead of the traditional way she has always done them. She is curious if the process will be much different then the other scrapbooks she has created in the past and if technology will make the process easier. She hopes that the process will be more flexible, the pictures will not be “glued down”, and that she will be able to include more than just pictures and little bits of text. Gloria has been talking to Carolyn a great deal and is now thinking she wants to include some memoirs along with the traditional scrapbook items.

When Gloria opens the digital personal legacy system and chooses to create a new artifact, she finds that she can give her project a name, year, description and pick a layout. She is initially concerned because she does not know what layout to pick – she has never done this before! But after viewing the images of possible layouts she picks the Map layout; she knows that location will be a big aspect of her project because she and Violet live on opposite coasts. She now notices all the different media she can include and becomes very excited but also a little overwhelmed.

Gloria takes a deep breath and realizes that including the different media will allow Violet to get to know her not just through pictures and stories passed on in text, but by personalized audio and video of her. Violet will get to hear her and she her on video!

Gloria also figures out that she can use the camera of her mobile device to take pictures and create the video and audio files. She starts to dig out her old photos and gets to work, also deciding to try her hand with a video or two.

As Rick is looking over Steven’s notes for the family tree he realizes three things. Steven’s handwriting is not as good as it used to be; a lot of the information is stuff that they found in old records; and they have come up with more information than just the names, dates and relationships that is normally on a family tree. Rick sees this as an opportunity – now that he has attracted Steven into family tree research, perhaps he can also get his dad to use a computer. Rick runs out and buys a mobile device that he knows has a special piece of software for creating family trees. He gives it to Rick, showing him how to start up the family tree program he has installed, but not doing anything more. Rick knows he can not push his father into learning or trying something he does not want to do, so he is hoping that just leaving it there with no demo or explanation will pique Steve’s interest enough to try it. Steven is indeed curious about it once Rick leaves and decides to start up the system as Rick had shown him.

When Steven opens the program and selects create a new artifact, he sees a tree view that he can use for his project. He is very excited because this is just how he thinks about the information they have been collecting. Once on the tree edit screen, he notices that he can add more than just names and date and becomes even more excited because he has also noticed that they were gathering and organizing a lot more information than what is normally found on family trees. He enters family members he knows about, starting with himself. After a few generations, he looks over the tree itself to make sure that it is being display the way he envisioned it. He is satisfied and decides to go back to his own entry to see how he might expand it.

When he is satisfied with his work, Steven wants to share the artifact with Rick for feedback. Rick receives the family tree and is ecstatic since this means that Steven has been trying to use a computer. He starts looking at the creation and making comments to send back to his father as soon as he can. One of things Rick includes in his comments is step-by-step directions on how to create new videos using his new device. Using this shared project, he can now teach his dad to do all sorts of neat things with the digital device.
3) Carolyn Creates a Digital Memoir Book

Carolyn realizes that she has been typing all of her memoirs on the computer but then just printing them out and discarding the digital copy. She wonders if it would be better to keep the digital files all in one place. Also she has been talking to Gloria lately about her scrapbooking, and is very interested in adding pictures to her stories.

Carolyn finds herself excited but nervous about this idea. She talks to Gloria, who has already started her new digital scrapbook, and is convinced to give it a shot. Gloria tells her to choose the event view, because she has already explored the system and thinks it will be the one Carolyn would like. After the conversation Carolyn dives right in, she picks the event view and is greeted with a simple screen that asks her to provide an event title, year and description. She breathes a sigh of relief and thinks to herself, ‘I can do this.’

As Carolyn gets started, she notices that she does not type as well or as comfortably on the touch screen device and decides that she will need to get a real keyboard if she is going to do this. After talking to a sales clerk at a local store, she purchases one of the keyboards he recommends and he shows her how to set it up. She is soon able to type up her memoirs like she did with her desktop computer.

Once Carolyn finishes the memoirs that she wants to include in her first, book, she decided that she wanted a physical copy and is happy to see that the software can do this for her. She takes her mobile device to the locale FedEx and they assist her in printing her creation.

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The scenarios documented in Table 6-4 were inspired by the empirical data that was collected. Each of the scenarios is situated in a context containing different motivations for exploring digital creation of personal legacy artifacts. In addition, the scenarios convey different conceptions of the final personal legacy artifact. In the first scenario ‘Gloria creates a digital family photo book’, Gloria is motivated to investigate digital scrapbooks to see if they are easier to create and possibly could include more text narratives along with the pictures and other mementos. In the second scenario ‘Steve and Rick create a digital family tree’ Rick is motivated to not only get his father, Steve, to use technology but also by the idea of being able to store the information they are collecting in a form that is easy to share and access. Finally in ‘Carolyn creates a digital memoir book’ Carolyn is motivated by the success of her friend, Gloria, and that she already types her memoirs and it would be nice to add pictures and other items to the stories.
<table>
<thead>
<tr>
<th>Activity Design Feature</th>
<th>Possible Pros (+) or Cons (-) of the Feature</th>
</tr>
</thead>
</table>
| Creating artifacts in a digital form… | + Gives users confidence that they will not age with time  
+ Suggests flexibility in storage options, for example including backup copies  
+ Does not take up physical space  
- But a digital artifact may be experienced as less unique and precious  
- But the digital form must rely on software compatibility to be viewed or consumed |
| Supporting legacy artifact creation on a mobile device… | + Suggests to users that artifacts can be created anywhere  
+ Simplifies collection of real time content such as is available with a built in scanner, camera, audio, and video recorder  
+ Leverages the simple file system of mobile operating systems, reducing the need for navigation  
+ Encourages the experience of direct manipulation  
- But a small screen may present content in a way hard to see  
- But mobile devices have limited and poor support for typing  
- But users may need to purchase a new device |
| Offering users different ways of organizing the storyline or complex content… | + Suggests that different artifacts may be best created and displayed in different fashions  
+ Allows viewers the flexibility to restructure an artifact, so as to see it in a different format  
+ Accommodates individual differences among users, e.g. with respect to metaphors that make sense to them  
- But the multiple options may seem overwhelming to novices when first using the system |
| Supporting many types of media as elements… | + Suggests that the viewing of an artifact can be a rich experience  
+ Encourages creativity and experimentation on the part of the user, e.g. trying out different types of media  
- But, working with multiple media is more complex and time consuming that simply adding photos to a book  
- But, the resulting artifact may be quite complex, making it difficult to create and consume |
| Prompts that are brief and to the point… | + Helps even novice users easily understand what to do  
+ Keeps the display uncluttered and simple as an artifact is initially created  
- But more experienced users (e.g., younger generations) might feel it is too simple and find it boring to interact with |
| Offering options to print a copy of a digital artifact… | + Reassures older adults that they can create a familiar object to store and use as they always have  
+ Suggests that copies might be created for different people  
- But, the cost of printing a complex multimedia digital object may be high |
Table 6-5 presents the claims that were analyzed from the activity design scenarios. Each claim consists of a feature that was depicted in the activity design scenarios and a set of possible positive and negative consequences; the specific consequences listed are based on a combination of previous research and my empirical data. The first two claims capture the transition from physical to digital artifacts. The idea about creating artifacts digitally draws from the work of Odem et al. (2012) on digital heirlooms, and Banks’ (2011) work on the benefits and drawbacks of digital and physical things. At the same time, the need for this creation process to take place on a device other than the traditional computer initially came from initial interview studies inquiry into technology use. Finally, the benefits of direct manipulation that mobile devices bring for older adults is backed by a study by Hollinworth (2009).

The next two claims were analyzed using all of the scenarios, as each depicted a different type of artifact as it was being created, with different types of media being used. While each scenario presented a different organization and media for their artifact, the general content they include is similar. This leads to the upside pointing to one program being able to assist in the creation of all of them.

The final two claims also were analyzed by integrating across the three scenarios. As for the claim regarding a simple user interface, older adults are not as comfortable with technology as younger generations; this was the motivation for introducing Steve as an actor who is resistant to technology. Finally, the ability to print is a desideratum that was prevalent in the interviews; Banks (2011) also discusses the advantages and disadvantages of being able to create artifacts that have a physical form.

In the next section, I report on a project that was being conducted in parallel to my dissertation – Project Greenwich. Because I became involved in this project at just the time that I was narrowing my design scope and associated rationale, it had an important formative impact on my thinking. In fact, I was able to explore many of the same issues I had been wrestling with, but
now in the context of an actual operational prototype that could be the subject of an empirical study. In the following, I first briefly describe the system and study methods used, and then discuss what I learned with respect to the design themes of most interest in my dissertation work.

**Project Greenwich**

Project Greenwich is a website that allows users to create timelines for any subject that they want to present chronologically (see Figure 6-3 for an example). With Greenwich you can create a timeline of any subject (e.g., a lifespan of an individual, how a historical event evolved, or how a place changed), uploading photos to the site as well as drawing on other sources from across the web. You can then share that timeline with others to view, using Facebook, sending the link in an email or embedding it in a website. Project Greenwich also allows you to combine two timelines in order to juxtapose the events.

**Field Study Methods**

The field study described below was conducted with a larger set of goals than the ones I focus on here, namely investigation of design themes for a system that might allow older adults to create personal legacy artifacts. The larger study was investigating time and craft; with the focus of my internship investigating timelines as social and shareable objects. The Project Greenwich study has produced one publication to date (Thiry et al., In Press) regarding findings from the larger study. However, in this document I focus on just those aspects relevant to personal legacy creation.

Participants were recruited by responding to an advertisement that was placed in a magazine designed for older adults, in Cambridge, England. Project Greenwich (see description
below) was deployed in the homes of 8 older adults (6 females and 2 males, average age 71.13, minimum age 66, and maximum age 77) over the course of three months during the summer of 2012. Details of the participants are given in Table 6-6, pseudonyms are used. During this time, the participants were interviewed twice and participated in a focus group at the conclusion of the study. In these focus groups, the participants were divided into two groups, each having 4 participants (3 females and 1 male; note that group 1 originally had 5 participants but one dropped out of the study due to time constraints). All participants had personal computers connected to the Internet in their homes, had at least basic computer skills and were able to work with the tool once it had been demonstrated.

Table 6-6. Details of Field Study Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Group</th>
<th>Age</th>
<th>Participant Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cynthia</td>
<td>Clean Slate</td>
<td>73</td>
<td>Artist. Studied art throughout her live and is currently teaching a local art classes. Over the years she has compiled a rather large scrapbook of legal documents, photos and heirlooms of her family history. She moved to England 10 years ago from South Africa.</td>
</tr>
<tr>
<td>Dorothy</td>
<td>Clean Slate</td>
<td>77</td>
<td>Loss and Learning. Her husband recently died. She is motivated to learn new things and keep active as a way of dealing with the grief and also to keep her mind active. She enjoys medieval history.</td>
</tr>
<tr>
<td>Emily</td>
<td>Template</td>
<td>66</td>
<td>Family archivist. Her ex-husband is a genealogist and got her interested in family histories. She has also in heritage the family photo collects and feels the guilt that she should do something with it.</td>
</tr>
<tr>
<td>Mary</td>
<td>Template</td>
<td>69</td>
<td>Active family historian. She “doesn’t want to be that typical old person.” She spends her days as busy as she can, by staying close to family, attending local events and researcher her family.</td>
</tr>
<tr>
<td>Megan</td>
<td>Template</td>
<td>75</td>
<td>Travel and Research. She has traveled the world, however has always called England home. She was a clinical psychologist before retirement and is still has a great interest in social research.</td>
</tr>
<tr>
<td>Nancy</td>
<td>Clean Slate</td>
<td>64</td>
<td>Logical nomad. She has moved house quite a few times however always in England. She worked as a programmer before retiring and holds to the very logical order of things.</td>
</tr>
<tr>
<td>Thomas</td>
<td>Template</td>
<td>74</td>
<td>Professor. Retired however still an active researcher of history. Because of his profession he is very interested in</td>
</tr>
</tbody>
</table>
For the first home visit, I visited the participants’ home to gain an understanding of their motivations for wanting to create a timeline and to demonstrate how to use Greenwich on their computer. The complete visit guide can be found at Appendix E. The first group of participants were not shown any example timelines in the system or given any templates to start with; I will be referring to them as the ‘Clean Slate’ group. In contrast the second group was shown two example timelines and was given three templates to start from; these are the ‘Scaffold’ group. The participants were given approximately three weeks to complete the task of creating a timeline of their choice; after that time I returned to discuss with them how they had used the tool and what effects the tool had on their ability to create timelines. For the Clean Slate group, I asked what might have helped them start their creation; for the Scaffold group I asked how the templates were used. The complete guide for the second visit can be found at Appendix F. Finally after both groups had been visited two times, all of the participants were invited to attend a focus group (i.e., all together) to discuss the overall use of the tool, the templates and the use of a timeline for reflecting on their past, the complete focus group guide can be at Appendix G. Six participants attended the focus group; these included all four people from the Clean Slate group and two (one male, one female) from the Scaffold group. All the participants were given a £50 gift for their time.

All of the home visits and the focus group were recorded. I listened to each recording multiple times, creating a partial transcription, but with an eye towards the ten design themes that I had been considering (described earlier). This analysis took place after each set of visits and helped to inform subsequent visits, enabling me to hone in on emerging themes.
Templates

The Clean Slate group started using Greenwich approximately one month before the Scaffold group in order to incorporate findings from their experiences into the development of the templates for the Scaffold group. During the Clean Slate interviews the participants were asked a series of questions regarding what would have helped them create their timelines. When asked what would have helped make your timeline, all the participants indicated that example timelines would be a good way of starting their own personal timeline, giving them ideas of what to include and see how other people structured things. However at the same time they expressed hesitation with this idea, thinking that examples might have led their creation in a different direction.

When asked to think more generally about personal timelines and what key events they would expect everyone’s timeline to contain, the participants indicated things like birth, marriage, birth of children, death of parents, or personal key events. When ask if templates would be useful in the creation of their timelines and if so what would be the content of the templates, the participants all agreed that templates would be helpful for others, specifically if they did not know what they wanted to create or needed something to prompt their memories. To follow this up participants were asked what these templates would include. The participants all indicated that they would include the personal key events mentioned above as well as national key events such as England winning the football world cup, the Queen’s Jubilees, and the war.

Figure 6-1. Templates Used in Field Study
Using this information, three templates were designed (Key Events in My Life, My Timeline, and Key Historic Events) for the Scaffold group, making them available as they created their timelines (see Figure 6-1). The ‘Key Events in My Life’ timeline (Figure 6-2) includes 45 items that are intended to serve as prompts for the user. The items include such things as birth, graduation, wedding, the birth of a child and other personal key events as well as prompts about the less grand events, such as best subject in school, a family holiday and career choices. The items included in this timeline were informed by suggestions from the Clean Slate group as well as literature focused on memoir writing and the prompts they suggest to their readers to get started. Specifically we used “Keeping family stories alive: discovering and recording the stories and reflections of a lifetime” (Rosenbluth, 1997) and “Legacy: a step-by-step guide to writing personal history” (Spence, 1997). As can be seen in the overview figure, ‘My Timeline’ is a blank timeline; the only prompt that it provides is its title.

Figure 6-2. Key Events in My Life
Finally, the ‘Key Historic Events’ timeline (Figure 6-3) includes 68 items of events that have happened over the past 100 years in England. The events were chosen from three popular online lists (“BBC - History - British History in depth: British History Timeline,”, “CHRONOLOGY: Key events in the life of the British queen - Monsters and Critics,”, “Major events and milestones during the Queen’s reign - Telegraph,”) that outline key events in British history.

![Figure 6-3. Project Greenwich – Key Historic Events](image)

**Project Greenwich Implementation and Evaluation**

To connect the activities of Project Greenwich to my dissertation project, I conceptualized the participant’s timelines as a personal legacy artifact. In the analysis reported here, I focused on how the older adults in the study approached the process of creating a personal timeline, the motivations behind the creation, and how the features of the software were used and viewed. Throughout I referred to the ten design themes described earlier, to tie my observations from Project Greenwich to my ongoing design work on personal legacy artifacts. In Table 6-7 I
have listed these ten themes and how they map to functionality within Project Greenwich. Not all
the themes have an analog in this side project, but I was able to explore many of the themes prior
to creating the more detailed design for my dissertation project. In the following sections, I
summarize what I learned, with particular focus on the design features of interest.

Table 6-7. Mapping of Personal Legacy Artifact Design Themes to Project Greenwich

<table>
<thead>
<tr>
<th>Theme</th>
<th>Implementation Within Project Greenwich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be created away from a traditional computer</td>
<td>A website and accessible only via traditional computers during the testing.</td>
</tr>
<tr>
<td>Usability objectives that address the needs of older adults</td>
<td>Confidence: saves users work as they go Trust: developed by a well known company Simple and intuitive: the over all design and functionally was examined to see how the user interacted with the system.</td>
</tr>
<tr>
<td>Has metaphors for organization</td>
<td>Uses a timeline metaphor as a way of providing organization for the creation of artifacts.</td>
</tr>
<tr>
<td>Can take many forms</td>
<td>Only produces timelines.</td>
</tr>
<tr>
<td>Hides gaps and negative events</td>
<td>A linear timeline with no way of hiding gaps within events.</td>
</tr>
<tr>
<td>Has triggers to start the creation process</td>
<td>My life story, key events in my life, and key historic events were created to test what types of triggers help with the creation process</td>
</tr>
<tr>
<td>Can contain many different types of objects</td>
<td>Timeline could include many events and each event could include a title, start and end dates, a textual description, a photo, and / or a Wikipedia article blub and link</td>
</tr>
<tr>
<td>Created collaboratively and / or independently</td>
<td>Timelines can be shared with others and juxtaposed with other timelines</td>
</tr>
<tr>
<td>Exists both physically and digitally</td>
<td>Timelines have only a digital existence.</td>
</tr>
<tr>
<td>Created to outlast the creator</td>
<td>The artifacts are digital and saved to server, so to the extent the server lasts, so does timeline.</td>
</tr>
</tbody>
</table>

**Personal Legacy Artifact Creation**

**Motivation for Creating**

The participants’ motivation for creating personal legacy artifacts as timelines included:
wanting something to work on that keeps their mind active, wanting to create something that can
be given to grandchildren, and a sense of obligation to create something from the photos and old records that they had inherited. Walter, 71, described his procrastination at starting the creation of his life story – “I have been putting it off and putting it off for a long while, it seems like an enormous task for someone as old as me. You have a long way to go back for someone as old as me. (Chuckle) I am thinking, oh do I really want to do this, but then if there is a special tool that might help in the process and might give me the structure. Umm. That could well be what gives me the kick start I need and then I can tack things onto it and build it out from there. So that is really what got me interested in it.” Emily, 66, talks about the obligation she feels, to do something with everything she has – “As people have died in the family I have acquired them (photos), and I am the holder of them, so I feel a certain amount of, well I am the holder so there is a responsibly there to look after them. But every time I look at them I think ‘oh this is such an enormous task and feel very daunted’, I think something like this will help me focus. As time goes on you realize that there is not much time left and you have got to do it now or not at all.”

The Timelines They Created

Participants created a total of 334 items over 11 timelines. Each participant made a personal timeline (Cynthia created two on this topic, saying that having only one led to a timeline that was overly cluttered). The remaining two timelines were on the more general topics of ‘Medieval Kings of England’ and ‘Kate Atkinson Novels’. The timelines spanned an average of 123 years, ranging from 23 (Nancy’s ‘Kate Atkinson novels’) to 312 years (Mary’s ‘My Timeline’).

Most of the participants’ activity occurred during the three weeks between Home Visits 1 and 2. The exception was Dorothy, who decided to do a new timeline after Home Visit 2. It is worth noting that, while the Clean Slate group made more timelines in total (7 vs. 4), the
Template group created marginally more items (169 vs. 159). Thus, although the Clean Slate group had longer to work on their timelines, the average number of items created per participant was similar across the two groups (39.75 for the Clean Slate group; 42.25 for the Template group).

Table 6-8. Timeline Activities of Individual Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Group</th>
<th>Age</th>
<th>Timelines (Number of Items)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cynthia</td>
<td>Clean Slate</td>
<td>73</td>
<td>The Cynthia’s Art (39); The Cynthia’s Art (15)</td>
</tr>
<tr>
<td>Dorothy</td>
<td>Clean Slate</td>
<td>77</td>
<td>Dorothy (17); Medieval Kings of England (16)</td>
</tr>
<tr>
<td>Emily</td>
<td>Template</td>
<td>66</td>
<td>Grandmother (51)</td>
</tr>
<tr>
<td>Mary</td>
<td>Template</td>
<td>69</td>
<td>My Timeline (75)</td>
</tr>
<tr>
<td>Megan</td>
<td>Template</td>
<td>75</td>
<td>My Timeline (5)</td>
</tr>
<tr>
<td>Nancy</td>
<td>Clean Slate</td>
<td>64</td>
<td>My Houses (32); Kate Atkinson Novels (11)</td>
</tr>
<tr>
<td>Thomas</td>
<td>Template</td>
<td>74</td>
<td>My Timeline (38)</td>
</tr>
<tr>
<td>Walter</td>
<td>Clean Slate</td>
<td>71</td>
<td>WSLife (29)</td>
</tr>
</tbody>
</table>

What the Timelines Included

As participants started their timeline construction process, they tended to start with key events in their lives – “It was mostly highlights of what is important to me as a person, but then I also have to put it in a way that it is something useful for anybody looking. Because all of us have a different way of how we tackled life and how we overcame problems and all that sort of thing” – Cynthia, 73. They also debated on where the timeline should start -- their birth or before their birth. Emily, 66, decided on the latter – “It has to start before I was born; there are so many significant events. There was World War 2, my father was blown up by a v2 bomb, it didn’t kill him but left him disabled, that had a huge impact on my mother and my brother who was 3 years older, he was born during the war and I was born just after 1946. So that is sort of pre-me.” Finally, they also let the items they happened to have dictate what to include – “it was really
decided by what the information I had rather than deciding what to do and looking for the information. So going on the photos I had, which I still have loads, which would be quite a job to go through everything and record everything. So that was the basis that I made my decision on. I know some people enjoy reminiscing but I don’t particularly. There are lots of bits that I think I don’t want to think about that part of my, it is really picking out photographs from a particular period instead of an event” – Megan, 75.

Can be Created Away from a Traditional Computer

Project Greenwich is a web application that can be viewed in a browser on mobile devices; however during the field study all the participants used their home computer. Mary, 69, did note that “It is very much, something to do in the winter when you are stuck at home and want to do something.” This seems to imply an activity that takes place only when one is unable to get out of the house; this gives some support to the notion that older adults do not want to be tied to a computer to create the artifacts.

Usability Objectives that Address the Needs of Older Adults

All the participants used the tool with success after the initial visit explaining how the software works. Cynthia, 73 stated ‘I am quite happy with this (the software)’ and Dorothy, 77, mirrored these sentiments with ‘I am quite happy with this.’ Overall, the participants seemed to understand how to create timelines and items on their timelines with little guidance, suggesting that this application was experienced as simple. Project Greenwich did not inspire the confidence and trust participants desired, they were worried about the longevity of their creations.
Has Metaphors for Organization

Project Greenwich used a timeline metaphor for organization. Additionally, as part of the interviews and focus group the participants were asked about other ways they envisioned the information being organized. The timeline did help organize the participants organize their artifacts. Thomas, 77, explains the process he took in creating – “I suppose there are key dates in ones life history, so the task is to identify the key dates and then you might wonder to either side to fill in some of the details of it. We do search for the day you got married, and whatever event. You identify the significant ones and then thicken it out a bit on either side.”

However the participants did mention some issues with using a timeline for organization, with the biggest being not know the date of all the events. “The year is often known, but not within the year. Could it not be, a question of obviously 1935 or whatever, but question marks for the days and you could put it in the middle of the year I suppose on the timeline? Not the first of January, I would be inclined to put it in the middle of the year” – Thomas, 77. There seemed to be a strong desire that if a date was given it should be correct - “I want to get it right, this business with the dates when you don’t know the month and the day is driving me mad. It just doesn’t work when you get farther back, especially people that would be going right back into history, an act of parliament the repeal of the Conwell everyone should know the year, I don’t know the year is 18 something, but if you want to put that on here I don’t think it is easy to find out the day and the month that the law is made and you just want to put on the year and you can’t do this. …. I have to put a note on there, approximate date, if I don’t know the month and day and this seems a bit cumbersome.” – Nancy, 64.

Time is only one way that life stories can be organized. The participants mentioned events as the way that they organize their lives. Events can, and often are, placed in chronological order, but the precise date of the events may not be known or even important. “We don’t
remember days we remember moments” – Nancy, 64. “I am tending to work from events and not the timeline. I am thinking what significant things happened in my life and when was that. What it does do is gives me that sort of organization, as I recall things and write them up they automatically drop into the right spot. The timeline is not driving me it is the events. ‘The big events’” – Walter, 71.

In addition to events, locations came up multiple times as another way of organization. “I could have put my house geographically. And see it as a map and where I moved around the country. Across, up and down and back and that way, and I have been in several places twice as well” – Nancy, 64. “Place is as important a part of reminiscing as time. The focus is put inevitably on time, but everyone inevitably talks about the east end of London, Essex and so forth. And we associated very strongly with particular places and times in our lives. If you can somehow build that in, it’s a difficult one” – Thomas, 74.

Another interesting idea put forth during the interviews was that of a patchwork quilt as a way of organizing ones life. “There are so many facets, I have lived in different places, I have had different careers, you know it’s been quite interesting. I always look at my life as a patchwork quilt where the bits relate to each other. If I could make a patchwork quilt of my life it would be that bit over there, and this bit over here and together they form a lovely pattern but they don’t necessarily relate to each other.” – Megan, 75.

Can Take Many Forms

Project Greenwich only produced timelines; the material could not be displayed in other forms. The participants did express interest in other displays; blogs and books were the most common. They thought that a blog or a book would be good alternate views because timelines are
visually focused on the pictures and the book or blog could be more focused on the text and the rich details of the story.

**Hides Gaps and Negative Events**

Timelines by nature are very linear and regularized; however people’s lives do not tend to have this structure. There are times when nothing happens and there are times when a lot of things happen. Additionally there are times when things do happen, but we might not want to remember or share those times. These issues came up multiple times during the process of creating timeline. Cynthia and Nancy decided to not include things - “I managed to get to a certain point but you will notice that there is a big gap between a certain date and a certain date. That I still got to fill in or something but when I go back to that period I find that there are a lot of tears. So I am trying to get over that, I must overcome it. ... It is not complete yet, I still need to get the courage. I do want to put something in there because it looks incomplete the way it is.” – Cynthia, 73. “I didn’t put the bad ones on, again thinking of the daughters. ... if it was a bad one, like I was miserable here or this was a mistake, I thought that’s not something that is able to be seen more.” – Nancy, 64. Megan, 75 would be willing to record some of these more painful things but does not know how – “I don’t think anything should be forgotten because it is part of who I am, but short of putting my divorce, I lost 2 children, it is part of who I am but I wouldn’t know how to record that. It is painful things, possibly record it but I wouldn’t know how to record it so it didn’t sound too morbid.”
Has Triggers to Start the Creation Process

As previously mentioned in this chapter, the idea of creating personal legacy artifacts can be very overwhelming and if sufficiently overwhelmed, people may simply not do it. Additionally, a digital system can seem complex and unmanageable once an individual does decide to create an artifact, for example as he or she tries to figure out what to include. As Megan, 75 stated “I sit down and try to review my entire life, and it is quite difficult once you get to be a certain age, or at any age, but you know, oh my goodness me, it is just daunting going back over so many decades.” It is for this reason that triggers are needed.

The three templates, previously described, were used to test the usefulness of triggers as a means for creating personal legacy artifacts. Interestingly, all four participants in the Scaffold group chose to build their timeline from the blank, ‘My timeline’. Their reasoning varied from “I like it blank, I don’t think you can generalize my life with anyone else’s. Well anyone else life for that matter” – Dorothy, 77; to “They (the other 2 templates) don’t talk to me directly, if you know what I mean, new items are of interest, but honestly I do not want to include them.” – Mary, 69.

However, even though the participants chose the blank timeline for their creations, the other templates did seem to trigger ideas for their own – “They gave me ideas, which I followed up in different ways” – Mary, 69; and “they certainly do trigger moments, little things like that, the ration book. Triggers for me having a Mars bar a week, I use to cut it up into seven pieces.” – Walter, 71. The use of the templates to generate ideas was helpful but in a sense perhaps too helpful, as Nancy, 64, points out – “I found I just sat with it and reminisced (when looking at key events in history), I remember that, oh yes. You know. But I found that when I started putting my own things in, it got terribly cluttered.”
Can Contain Many Different Types of Objects

The timelines comprised 30 items on average, ranging from five (Megan’s ‘My Timeline’) to 75 (Mary’s ‘My Timeline’). The items themselves also varied in terms of the amount of content that they encompassed. Items had a title and year by necessity, but 278 (83%) also included a picture and 285 (85%) had a description. The descriptions had an average length of 42 words, ranging from 1 to 1371. While it might be expected that the visual form of the timeline encouraged the uploading of images, the large proportion of items with a description points to the importance of being able to include text as well. Descriptions varied from simple explanations of who or what was shown, to the relating of personal memories about particular occasions, to the telling of stories that were sought out in order to convey particular information. The longest description, in Walter’s timeline, had in fact been copied from the web. This was an account of what it was like to live in London during the Blitz, told from the perspective of a man who had been 11 years old at the time. Walter himself had been only six months old during the Blitz, and could not remember it himself.

Of the images, 245 were uploaded from participants’ own computers while the remaining 33 were links to pictures already online. Images included photos and scans of newspaper clippings, but also content that was created or deliberately sourced during the making of the timeline. For example, Nancy downloaded maps of some of the locations where she had lived for her ‘My Houses’ timeline, especially when she did not have an alternative image. Similarly, Dorothy included images, such as of the cover of the novel ‘Gone with the Wind’, when she wanted to describe life events for which she had no visual counterpart; the book was published during the year in question.

31 items were imported using Wikipedia, and in most cases provided contextual information. For example, Mary added a Wikipedia article about the hometown of her mother, to
go alongside another item and explain the significance of the town. Walter added articles about historic moments that he found particularly memorable, such as the first moon landing.

Project Greenwich is very image based as Thomas, 74 points out - “It was extremely image based, and I would like to see it incorporate not only images but text that doesn’t have images. Because the stuff I want to talk about, it is difficult to find really good photos and there is lots of significant gaps in the timeline because I couldn’t find an appropriate image,” and as Dorothy, 77 pointed out, photographs were not as easy to come by when she was younger - “If you decided to do your own life stock, with my age group you don’t get many photographs. You would have to do photographs of areas or things that happened during that time. As a child during the war you didn’t have cameras. My photographs started with my first wedding, 55. I didn’t have photographs before then.” Thus the participants had to improvise to include images for events they may not have a photograph of. To over come this Walter mentioned he would include his birth certificate for the item about his birth, however he never got around to scanning it. Nancy included maps of locations if she didn’t have a picture of the place she was interested in talking about. Dorothy decided to use popular book covers that were released the same year as events she added.

Created Collaborative and / or Independently

As the participants created their artifacts, they didn’t do so in a bubble, they asked their adult children or others for help with the process. This help came in a few different forms: confirmation of content, generation new ideas, and help with gather material to include. “I have made my wife and son able to look at it, because their children are still to young to look at it, I think they have had a look at it but it doesn’t mean much to them. But I wanted the parents to see what I was putting in and to tell me whether they were happy with what I am doing, and whether
there were things that occurred to them that hadn’t occurred to me. So I have had some feedback, for instance, on my one you may have seen the red London bus, the routemaster, I am sort of one of these crazy people who is actually interested in buses, I know that is sad but there we are and trains, I am hopeless really. But anyway, they looked at it and they found themselves a link to some ladies in London who are using their bus pass, using every single route in London and writing a blog on it. They sent that to me as a link because they thought I would be interested in it. And I mildly, I am not mad enough to do that. I am mildly interested, they even produced a chart showing everything bridge across the Thames and telling you which bus routes use those bridges. They are really into. They are just sort of saying here we spotted this you might find it useful, either to add it on or that I might just find it useful” – Walter, 71.

As much as the participants want feedback on what they are creating they expressed that they do not want others adding to their timeline or changing them; they felt that no matter whether it was correct or not it was their timeline and story. “If you are going through your life, every instance or nearly every instance has been shared with somebody. If I discuss certain instances with my sister, we were both at a certain instance at a certain time but we both have completely different ideas of what happened. Completely different. But I am always right!” – Dorothy, 77.

**Exists Both Physically and Digitally**

As the participants created their timelines, it became apparent that a physical representation of the timeline was needed for the older adults to feel they had indeed created something; they could also then give the physical manifestation to someone. As Walter, 71, puts it – “Well it would be a physical present to give them, to say all those years ago you gave me a book, well this is the modern version of a book. That is what I have in mind anyway”. The idea of
just sending a URL as the gift was not viewed as acceptable. The participants also brought up concerns about digital obsolescence because the timeline they were creating was created as a personal legacy artifact that they wish to be around and viewable for many years to come.

**Created to Outlast the Creator**

Project Greenwich is an online tool and the participants brought up concerns about whether their timelines would be available in the future. “If we are doing this for future generations, how long is it going to stay online?” – Nancy, 64; and “The interesting question is certainly will they still be readable in 100 years in terms of the technology changing so rapidly, but that is a different issue. How in 50 – 100 years time is these sort of things going to be readable?” – Thomas, 74. This desire to have something digital and available well into the future is one that any software for creating legacy artifacts needs to address.

Project Greenwich is an acceptable tool for older adults to use to create personal legacy artifacts. However, the tool was not designed specifically for older adults, or to create personal legacy artifacts; it has a more general focus and user population. The creation of personal legacy artifact by older adults is just one of many things that uses can create. Overall, the only theme that was not probed was the ability to create away from a traditional computer. Even though some of the themes proposed are not implemented Project Greenwich, the older adults in the study, did express some concerns and desire for the themes that were missing, for example being able to have a physical copy of the final artifact, desire for other metaphors to be included, and that templates for timelines did not work.
Chapter 7

Designing User Interactions for a Digital Reminiscence System

This chapter builds on the design themes, activity designs and claims, and the field study of Project Greenwich, elaborating the design concept to include details of the proposed user interaction. These details are introduced via the user interaction scenarios and claims that represent a continuing refinement of the ideas presented earlier. Embedded within the user interaction scenarios, I also illustrate a more concrete version of the design ideas – namely, the interactive system concept I have named Scrap-E – in the form of screen mockups created with Balsamiq’s Mockups, a rapid wireframing tool (http://www.balsamiq.com). Finally I provide a summative discussion of the design’s strengths and weaknesses, by returning to the set of 10 design themes that have guided my design work and commenting on whether and how I have been able to address these themes.

User Interaction Scenarios

User interaction design is the most elaborate phase of scenario-based development. The goal is to represent the tasks and objects that the user will perceive, interpret and make sense out of by presenting details about what they will see and how they will interact with the proposed software (Rosson & Carroll, 2002). These details should include both expected user input and the system’s responses. The resulting user interaction design scenarios serve as a partial specification for the implementation of an actual software system. The claims analyzed at this point are useful in documenting the design rationale for these more detailed design decisions, as well as in
documenting a set of expectations about how specific user interaction features might support or interfere with users’ experience when using the envisioned system. 

Note that I assume that all of the hypothetical author-stakeholders will use the same digital system (Scrap-E) to create their personal legacy artifacts. The name Scrap-E, is a play on the concept of an electronic scrapbook. I have intentionally elaborated different aspects of my proposed design in the following scenarios, for example considering the creation process using different starting templates and working through some of the details related to sharing with family members. The three design scenarios are presented in their more elaborated form one by one, each also illustrated by screens mocked up with the Balsamiq Mockups tool to convey important aspects of the user experience at that point in the scenario Table 7-1 presents the first user interaction scenario and associated design sketches. See Appendix H for larger images of the Scrap-E mockups.

Scenario 1 and Discussion

Table 7-1. User Interaction Scenario Illustrating Use of the Map Metaphor

1) Gloria Creates a Scrapbook and Gives it to Michelle to Hold Until Violet is Older

Gloria clicks on the Scrap-E icon on her iPad. In response she is presented with a logo image <which is yet to be determined>, and the following text:

“Welcome to Scrap-E! Your place to create memory and stories to share with family and friends.
To get started, Click on ‘New Artifact’ at the bottom of the screen, or if you have already started an artifact click on ‘My Artifacts’ to continue your work.
An Artifact is simply the term used to describe the things you can create. Each artifact can have many events, people and locations associated with it. As well as different types of media.”

Figure 7-1. Welcome Screen
The screen also displays two icons at the bottom: New Artifact, My Artifacts. See Figure 7-1.

Following the instructions she clicks on the ‘New Artifact’ icon on the bottom of the screen. She now is presented with a screen asking her for basic information about the artifact project, including Artifact Title, Description, Start Year, and Initial Organization. She titles her project “The Young’s,” then types in a brief description. She decides to use her wedding date with Jeff as the starting date, because after all that’s when their story begins! She is intrigued by the different organizations indicated by the photo images arrayed below; she flips through the photos, looking at each to envision how it might suit her project. She decides on the Map view, because she knows location will be a big aspect of what she wants to share, simply because she lives in Florida which is on the opposite side of the country than her granddaughter Violet who lives in California. Then she hits the Create icon at the bottom of the screen, see Table 7-2.

Gloria now sees that her project title “The Young’s” is on the top of the screen. There is a map on the left of the screen, currently zoomed into the area where she is now located. She assumes that the system is using its position sensing to keep track of where she is. She also notices text at the top of the screen instructing her on how to create a new event – ‘to create a new event tap on ‘New Event’, see Figure 7-3. She follows the instructions and clicks on the New Event button.

She now notices that the instructions have been replaces by a form inviting her to create her first event, with a Title, Date, Location and Description (see Figure 7-4), as well as icons on the bottom that suggest possibilities for adding people, video, audio and photos and more events see Figure 7-5. She guesses that each event will have a title and that it can also contain a date, description, location, people, videos, audio and photos. At first she is rather overwhelmed by all the options, but after the initial shock becomes very excited to try all the different types of content.
She clicks on the Add Video button and it takes her to her iPad’s camera tool, where as usual she can choose to create a new video or select a video from her current camera roll. She decides to pick the video taken at her anniversary party on the beach – the same one that they were married on – last month with Jeff. After she finds it, she clicks Select and OK and is returned to the Scrap-E screen she left. However now there is a thumbnail image showing the beginning of the video and the familiar triangle “play” button on the right part of the screen under the description, see Figure 7-6. Gloria now adds a title, date, the location the event took place and description for the event to go with the video. When she added the location she noticed that the map centered on that location and now has a marker at that point.

She next decides to add the people who attended the party. She clicks on the Add People icon and a little window appears showing her contact list, plus a button to add a New person not in her contact list. She goes through and checks off and adds all the people who attended and are already in her contact list. Then she realizes that she is missing Jeff’s friend, Kevin, because he is not in her contacts and she really doesn’t need him to be. She clicks the button to add a person not in contacts and the window changes to a simple form that asks for name, birth and death date. She sees that it also has buttons for adding parents and children, but she doesn’t know anything else about Kevin, so she only she enters his name and hits OK, see Figure 7-7.

Gloria is once again back at the event screen and now notices that on the bottom right there are images, that match the ones in her contact list, for all of the people that attended the party except Robert, who shows up as a silhouette, see Figure 7-8.

Figure 7-9 shows the completed 47th Wedding Anniversary Event, still in edit mode.

Gloria continues to work adding events and media and has been putting many hours into creating this artifact for Violet. As Gloria added other events with locations, Gloria
noticed that the map was getting more markers and that each marker could be clicked on to bring up the event that had taken place there. The past week as been extra busy because Gloria knows she is going to visit her daughter’s family on Monday and wants to have something complete to give her for Violet as she grows up. She wants to create an actual artifact to act like a scrapbook that Michelle and Violet can look through together over time, and perhaps she can go through with Violet at some point in the future. Eventually Gloria has everything the way she wants it and is ready to print (publish) her creation.

To do this, Gloria navigates to the My Artifacts page; see Figure 7-10, and hits the Print button at the bottom. From there the program prompts her to see if she wants to print to a printer or save to a file. Gloria selects File, because she wants to take the scrapbook to be printed on special paper and bound. Scrap-E saves the artifact as a pdf on the iPad. Gloria knows that she can send herself an email with the file attached to get the file over to her desktop computer. Once she is at her desktop computer she opens her email client and saves the file to her desktop. She now calls her daughter, Michelle, to ask her where and how to get the file printed. Michelle talks her thru the process of going onto the FedEx website and uploading the file, selecting what type of printing she desires and what location she will pick it up from. Michelle also lets Gloria know that next time she can just go to the FedEx website from the iPad and upload any other creations that way. Gloria thanks Michelle and waiting for the email letting her know her book is ready for pick up. After a few hours she receives the email and heads down to the local FedEx and picks it up. She loves the book and takes it home to wrap it up for the flight to the west coast.

If Scrap-E is implemented for actual use, it will be created as a cross-platform and device-independent system that can address users’ existing habits and preferences as well as
provide them with the ability to create and access their artifacts away from the home computer. However, to simplify the initial sketching of Scrap-E, I have narrowed the focus to the iPad and Apple’s associated IOS platform, as this is the most common mobile platform to date. As of February 2012 the adoption rate of laptops was 32%, e-readers was 11% and tablet devices was at 8% for Americans aged 65 and older (Zickuhr & Madden, 2012). This is only going to grow as more devices become available and their cost decreases. I elected not to elaborate the scenarios as a web application (which could also be used on a mobile device) because such applications cannot leverage the simplified file system and components on mobile devices. Looking back, a Windows 8-style tile system might have been a better choice as it is designed to operate with both tablets and traditional computers (laptops and desktops). However because most users, and especially older adults have not adopted this new operating system, I did not consider it for this initial design work.

The basic interface of Scrap-E was sketched with an eye towards usability and to be minimalist and simple. I envisioned that older adult users should be able to open Scrap-E and start creating their personal legacy artifacts without being overwhelmed by the system or needing to refer to an instruction manual. The welcome screen shown when the application is opened has only a simple logo, some introductory text, and the option of creating a new artifact (by clicking the ‘New Artifact’ icon at the bottom) or accessing the artifact(s) that they have already created (by clicking the ‘My Artifacts’ icon at the bottom).

Each artifact is made of up many events, and each event can include many different types of media. The process of creating a new artifact and of adding objects to an existing artifact is designed to be similar. Although users have the ability to add different types of media to an event, when they first create and edit they will only see fields for title, date and description.

During the creation of the artifact, and at anytime during viewing of the artifact, the user will be able to choose from multiple metaphors to organize their artifacts, help trigger memories
about what to include, and tell their stories. Currently Scrap-E offers five such metaphors: a timeline (with and without pre-scheduled units of time), tree, map, and diary. The scenarios elaborated in this chapter illustrate the use of the map (Gloria – Scenario 1), the tree (Steven – Scenario 2) and the timeline (Carolyn – Scenario 3).

The line and timeline metaphors are similar, but the line is presented without any dates; the user simply specifies the relative position of events on the line. The map metaphor was elaborated in the above scenario, while the tree and timeline metaphors will be used in the following. The diary metaphor, represented by the event view, is not illustrated in a scenario, but roughly it displays the events in reserve order from how they were created. The most recently created event will be displayed first. Users can choose to build their artifacts using any of these views. Users can change what metaphor they are viewing by tapping on the view button at the top left of the screen and selecting the view they would like. The view that was last used to edit an artifact will be saved and selected by default the next time it is opened.

Because the interface supports multiple metaphors it allows creators and consumers to view the material in many different ways. Therefore the design theme that guided me to offer multiple metaphors for organization simultaneously addresses the design theme of artifacts that can take many forms for both creation and consumption.

Additionally, as seen during the field study the metaphor itself might be enough to trigger the creator to remember things to include. However in addition to the organization metaphors, if users choose to create a ‘New Artifact’, the simple process of giving the artifact a name, description and start year should help trigger memories. The initial organization prompt has images of complete artifacts using all the different metaphors the user can choose from can also trigger memories.

Once users complete the ‘New Artifact’ screen they will see an initial edit screen based on their selection. The edit screen includes icons across the bottom for all the different media that
can be included. The icons can also serve as reminiscing triggers because the user may start to think about what types of content they have collected or could create; this in turn might prompt them to add something that they would have not thought to include originally. For example in Gloria’s scenario, she had not thought about including a video on initially but after seeing an Add Video option, clicking on it and being taken to her current video collection, she decided to include the video of she and her husband dancing at the party.

My research indicated that some older adults would like to also have a physical version of the completed artifacts; thus the digital creation must also be made physical. In my design, the physical rendition is envisioned as a book. The book will start out with all the events displayed in the current view in use by the digital artifact; from there it will print each individual event as a page, using multiple pages if the items are large. The printed version of events will include the title, description, date, a list of the people (including a picture), locations (include a map), along with any pictures that have been included and the description of the pictures.

When users choose to print a book, the application will create a PDF file that can be printed to create their books; this PDF file serves as yet another instance of their artifact to share, for example being able to send it as an attachment to recipients who do not have the Scrap-E application. The video and audio will not be included because there is no way to easily transcribe the material automatically. In addition to printing a book, the user can choose to create a movie file of their artifact and save it anywhere for safekeeping. The video file will once again start with the default view and then click on each item or scroll through (if the default is event) displaying the media contained in the event including all audio and video.

The physical book and saved media files are what the user will be leaving as their legacy along with the artifact created within the application. As we have seen, the IOS platform tends to change rapidly; applications come and go. Therefore it is the physical entity and potentially the audio and video that will most likely be saved and passed along to future generations. The video
file and PDF may need to be updated as years go by; however it is much easier to update to a new video or PDF format than it is to find an old IOS version so that something can be displayed.

**Scenario 2 and Discussion**

Building on the design concepts in the first scenario and drawing from the earlier work on problem and activity scenarios, the next scenario explores the use of a different organizing template as well as some of the implications that flow from the observation that many of the older adults I spoke to – particularly the males – were not very experienced at creating personal legacy artifacts nor in using technology for any type of creative endeavor.

Table 7-2. User Interaction Scenario Illustrating Use of Family Tree Metaphor

<table>
<thead>
<tr>
<th>2) Steven Builds His Family Tree and Gets Feedback from Rick</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Rick leaves Steven with the iPad that has the Scrap-E application on it, Steven becomes very curious to try it out and see if it will help them on their shared project. He opens the case to the iPad, hits the button on the bottom for it to turn on as Rick had coached him, then taps on the Scrap-E icon, as Rick showed him earlier during his tutorial on the basic use of the iPad. After he taps the icon he sees a welcome screen with the Scrap-E logo and instructions to click on one of the icons at bottom of the screen. He knows he hasn’t created anything yet and decides to click on the ‘New Artifact’ button. He now sees a screen asking for information about what he wants to create. Remembering how Rick showed him to type stuff, he taps one of the labeled fields and sees the keyboard appear, see Figure 7-11 Error! Reference source not found. He starts to type in information: first he gives his project a name, ‘The Holmes Family’ and then he adds a little description. He pauses a few moments at the Start Year question because he isn’t sure what date to choose, the year they have gone back to with their current work or where</td>
</tr>
</tbody>
</table>

Figure 7-11. New Artifact with Keyboard
they eventually want to end up. He decides on the oldest year they have researched, hoping he can change this in the future if they track down more stuff. Then Steven uses his finger to flip through all the different organization choices for the project. Because he and Rick have always discussed their shared project as a family tree, he chooses the Tree organization. Once complete he clicks on the Create button.

Steven now is presented with a screen that has the title ‘The Holmes Family’, a single box with a silhouette of a person and some text, see Figure 7-12. He decides to click on the silhouette. He know see that the text has gone away, the silhouette is highlighted and there is a form that he assumes he will use to enter information about the person. Steven decides to start with himself, so he fills in his name and birth date, leaves the death date blank (he is still alive!), Figure 7-13. He wants to add a picture to the entry as well but he is not sure how to do this.

He looks around for a minute or two but sees nothing promising. So he decides to call Rick, who answers his phone and explains to his dad that if he taps on the silhouette twice, he will be prompted to add a picture. He tells Steven that he has already created digital versions of all the pictures they have collected in the iPad’s photo stream so that Steven could use them with Scrap-E, see Figure 7-14. Rick stays on the phone with Steven to talk him through the process of going to the photo stream, browsing the photos and selecting one: Steven’s selected picture is added. Steven also asks about adding connections among people, and Rick explains how to use the Add Parent, and Add Child buttons, as well as the Add New Person and Add New Event button at the bottom. As part of this explanation Rick guides Steven to add him (Rick) to the tree, using the Add Child icon. After Steven clicks that button he notices that his photo has moved up and is now connected to one that is below him who is shown as his child, see Figure 7-15. At that point, a metaphorical light bulb activates in Steven’s head and he is now ready to expand the family
tree: All he has to do is say who is child and who is parent and Scrap-E will do the rest!

He quickly gets off the phone with Rick so that he can continue. He continues adding family members with their names, birth dates, photos and so on for about 20 minutes, then decides to come back to the tree tomorrow. In the meantime he plans to spend time browsing all the photos Rick has created for him, to see how many of his relatives he has pictures for.

The next day Steven is ready to enter more information and wants to experiment with events as well; he remembers that Rick mentioned events when he was first showing him the Scrap-E application. He opens the iPad and clicks on Scrap-E. This time when he clicks on the My Artifacts button he sees a list that contains “The Holmes Family” project he has started. He opens it and sees the Tree-View he had been completing. At this point he adds the rest of the known family members.

As he is entering other family members he remembers the initial text saying something about events and also Rick mentioning the New Event icon at the bottom. He ponders this idea while entering the rest of the known family members. Once he finishes entering the family he decides to try to add an event. He clicks on the New Event icon and notices the tree now gets compressed to the top half of the screen and he has places to enter a title, a year, description and people who were there. There are also icons on the bottom to add a location, photos, and videos, see Figure 7-16.

Steven continues to add content for a few more days, until he decides he wants to share it with his son to get some feedback. He is unsure how to do this, but knows that Rick has told him he can, so he again gives Rick a call. Rick takes him step by step through the process. Clicking on My Artifacts, he is able to find the Share button is. This leads to a screen listing all his artifacts (just the one at this point) and a prompt to specify with whom he wants to share, Figure 7-17. Rick has Steven click on the “The Holmes Family” artifact and use his contact list to find his entry. Steven does this to select Rick, and
clicks the Share button. Almost immediately Rick sees a notification arrive on his own iPad, and lets his father know he has successfully shared the family tree. Rick and Steven end their conversation and Rick picks up his tablet. When he clicks on the notification he is taken into the Scrap-E application where he is presented with the family tree artifact that his father has created. Rick spends some time clicking on the different family members displayed on the tree and exploring the events Steven has added. As he is exploring the entries his father put in about him, he is reminded of the fishing trip they took when he was younger. He clicks on the Add Note button at the bottom and a Post-it note comes up on the screen. Typing into this he adds the text, “1983 fishing trip at Lake Erie” and drags it over to his name on the tree. He continues exploring and once he is finished he closes the application, see Figure 7-18. He waits about five minutes to make sure the comments have been stored to the cloud, then gives his father a call to make sure that he knows what the notification is telling him and how to respond to it on his end. They have a nice reminiscing conversation about the fishing trip.

Use of a mobile platform will not only permit the users to create their artifacts anywhere, it also guides the design of user input options to a direct manipulation style (touch screen); this has been shown to be desirable for older adults (Hollinworth, 2009). However, the smaller keyboard can pose an issue. If necessary, IOS devices are Bluetooth enabled and a full size keyboard can be used (see Carolyn’s scenario).

The tree metaphor switches the focus from events to people. Personal information is collected and stored in the other organization metaphors but it is not necessarily the focal point. This shift in focus will server as more than just a subtle trigger for other people and events to
include, if the artifact is family focused. The view requires hierarchical connections to be made; the individuals may not always be family members, but currently the Scrap-E terminology is directed that way.

The artifacts can be shared with others either during the creation process, or after the artifact is finished. On the ‘My Artifacts’ screen, there is a Share icon at the bottom. Once users click Share, they can select the artifact to be shared and the contact(s) with whom they would like to share, and once again click the Share icon, now the only icon on the bottom. Once the Share button is clicked, the contact(s) that were select will receive notification via email, as well as through their own copy of the Scrap-E application if they have it installed with notifications on. The artifact will not be editable to the user; however they will be able to view the shared artifact and can add comments that will be sent back to the owner.

This non-editable view mode is different from the edit mode in that the information is for display only and the viewer cannot expand or delete what is there. The bottom half of the screen is where the information for a selected event is displayed. The user can select any person, in the tree view, by clicking on the thumbnail image of the person they want more information on; then they can click on any of the events listed under that person to view the event. The user can also search for events by click on the search icon at the bottom of the screen.

Even though it has not been called out in the scenarios explicitly, Steven and Rick’s scenario does touch on the issue of where the artifact is stored. Trusting that the time and energy the older adults put into the artifact will not be lost is due to technical issues was seen to be an important usability theme. To inspire confidence and trust that the artifact that is being created will not disappear or be lost due to hardware or software issues, Scrap-E stores the artifact both locally on the mobile device, on the users traditional computer (if one exists), and in the cloud (when a network connection is available). Scrap-E will automatically save artifacts anytime a new item is added, when three minutes have transpired, or when Scrap-E is closed. This automatic
backup permits the users to concentrate on the creation of the artifact and not concern themselves with remembering to save things.

**Scenario 3 and Discussion**

The third scenario introduces yet another organizing metaphor, the diary view, which may be most appropriate when users are thinking about their life story, or as Carolyn thinks about it, her personal memoirs.

Table 7-3. User Interaction Scenario Illustrating the Timeline Metaphor

<table>
<thead>
<tr>
<th>3) Carolyn Creates a Personal Legacy Artifact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carolyn picks up her mobile device and goes to the app store to look for Scrap-E, the program that Gloria has been talking about and has convinced her to use. She finds the application and installs it. Once it is installed, Carolyn clicks on the Scrap-E icon. In response she is presented with a welcome screen, see Figure 7-1. Carolyn clicks on “New Artifact”, because she knows she does not have any artifacts already created; she just installed the application. She now sees a screen with fill-in fields that is asking her for a Title, Start Year, Description and Initial Organization. For Initial Organization, she guesses that she should browse and select from a set of small pictures; these icons appear to be suggesting different ways the artifact can look. One of the pictures is of something that looks like a timeline, and she thinks that might suit her needs. Using the mobile device’s touch keyboard, she types in the fields requested and selects the timeline icon. She finds the typing to be challenging on this small device and has to backspace several times to correct key press errors. Carolyn is now presented with a timeline. At the left is the start of the timeline, labeled with the year she entered; at the right is the year 2020; she wonders what will happen if she’s still alive in 2020 and has more to say!</td>
</tr>
</tbody>
</table>
At the top she sees text reading 'Tap on the line where you would like to create a new event or tap on ‘New Event’’, Figure 7-19. Because she just got back from a trip to Mexico, she decides to work on this first while it’s fresh in her mind. She clicks on the timeline at a point where she thinks 2009 would be. A box appears below the timeline, with a line drawn to the year position in the line. The box contains three prompts: Title, Date (which already shows the year as 2009) and Description. Carolyn also notices that along the bottom border of the box there are buttons for adding people, video, audio, photo and location.

Carolyn decides to call her event Trip to Mexico; she adds a month and day to the date field and types in a description of her trip, see Figure 7-20. After this, Carolyn goes back to her bedroom to find the pictures for the trip. She returns to the mobile device and clicks the Add Photo button. Her device’s camera view appears; she lays down the first of her photos and snaps a picture of it. As always, the picture appears and she has the chance to say whether it’s OK or not. She clicks OK and is taken back to her Scrap-E timeline; her new picture is now displayed on the right hand side under the timeline. A small version of the photo is also now on the timeline item as well, and there is an option to add a description to the photo that was added.

Carolyn continues to add more pictures. As she adds more and more pictures, each picture gets added to the cover flow - a feature that apple developed to display and move through images. The top image in shows how cover flow is represented in the designs, while the bottom of the image shows how it will look once implemented with a set of random pictures - display of pictures, see Figure 7-21 in the lower right hand portion of the screen. After a while she has enough photos, so she decides to add the location and people who were there. She clicks the Add People button, and her contact list pops up. She goes through it to select the people who were with her on vacation. She remembers a new friend who she met during the trip and takes this
opportunity to add her to her contact list before adding her to the event. When she is done adding people, she clicks OK to finish that piece; each person now is displayed with their picture from her contact list on the left hand side of the screen. As for the map, Carolyn clicks on the Add Location button and is taken to a Google map, where she repositions and zooms the map until she can find the place she visited, see Figure 7-22. Note currently each event can only be associated with one location.

Carolyn continues adding events for a few hours the same way she added this one, and then decides to take a break and come back later, see Figure 7-23. When she does return to Scrap-E, she now selects ‘My Artifacts’ and then is able to select the Mexico Trip story she was working on.

Figure 7-23. My Life Story Timeline

The third scenario’s organizational metaphor is a ‘Timeline,’ meaning that all the events that are created will be displayed on the timeline in the middle of screen, with a line connecting each event to the timeline at the date specified and a picture that has been designated the timeline picture displayed above. Once again, for each event created the user will be prompted for only a minimal amount of information based on the organization view they have selected. For example, for the timeline organization once the user taps to create an event they will be prompted for a title, date and description for an event, with the title always being the only required items. Other items are important based on the view, for example dates for the timeline view. If an event is created without a date it hovers above the timeline with no line connecting it to the timeline, until it is edited and given a data.

Of the five proposed organization views, only the timeline view has the potential to show gaps and cause negative reminiscing. Showing gaps is not always bad, as users could have simply forgot to add events for things during that time and the exposing of the gap will trigger them to do so. However sometimes it can be just the opposite, the user is completely aware of the gap they
have left and they have no desire to put something into the gap because they do not want to share or remember events and if the gap continues to be present it will just call attention to that part of their life not only as they create the artifact but as others view it as well. To eliminate this issue the user will have the ability to change the dates on the line from fixed equally chunked segments drawn algorithmically so that the events currently on the timeline are evenly presented over the entire timeline. This will permit the user to leave out parts of their lives that they do not want to share, and not have to be faced with either creating the sad, undesirable events but initially it will keep the triggering mechanized of showing the gaps.

For the three views depicted in the scenarios as well as the others, when media objects are added, they appear in default locations based on the current view. For the video, audio and photo additions, the user will have the option to use a file that already exists or to create a new object. Photos are not limited to traditional photos; if a user wants to include a certificate they can use the built-in camera to take a picture of the certificate and include it that way. People are able to be added using the contact list on the mobile device or entering the information and selecting a picture for them within Scrap-E. Locations will use the default map program and allow the user to search for the exact location they want on the map, using an address, point of reference or by zooming on the map and adding a drop pin.

**User Interaction Claims Analysis**

As for the problem and activity scenarios, the user interaction scenarios and mockups were analyzed with respect to their implicit upsides and downsides, represented as claims. Table 7-4 displays these claims analyzed as a complement to the user interaction design proposals. Each claim consists of a feature that was explored in one or more of the scenarios, again associated
with an analysis of possible positive and negative consequences; the analysis draws from related
research as well as the two empirical studies I reported earlier.

The first claim explores the role of supporting both physical and digital versions of an
artifact, something explored in all of the scenarios and underscored in the two empirical studies.
The importance of physical versions also draws from the work of Odem et al. (2012) work on
digital heirlooms and Banks’ (2011) work on the benefits and drawbacks of digital and physical
objects. However, while acknowledging the importance of providing this functionality, the
specific mechanism chosen to serve the need can be seen to have some possible negative impacts
as well. Nonetheless, because of the centrality of printing, this tradeoff is a good one to make and
users would likely only need one printing experience to be comfortable with this option.

Table 7-4. Claims Analyzed from the User Interaction Scenarios

<table>
<thead>
<tr>
<th>User Interaction Design Feature</th>
<th>Possible Pros (+) or Cons (-) of the Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning a “Print” button on the initial screen of the application…</td>
<td>+ Highlights the pervasive role of creating physical versions of the digital contents</td>
</tr>
<tr>
<td></td>
<td>- But it may encourage too much reliance on an “old” format for reminiscing</td>
</tr>
<tr>
<td></td>
<td>- But people who are in the process of creating a legacy artifact may forget this option and worry about</td>
</tr>
<tr>
<td></td>
<td>whether they can create a physical form</td>
</tr>
<tr>
<td>Supporting a reminiscing application on a portable tablet or similar small mobile device…</td>
<td>+ Encourages users to interact with their reminiscing content anywhere and anytime</td>
</tr>
<tr>
<td></td>
<td>+ Simplifies interactions with the file system, e.g. relative to a personal computer with a standard</td>
</tr>
<tr>
<td></td>
<td>operating system</td>
</tr>
<tr>
<td></td>
<td>- But these devices typically have a small screen, limiting the richness of display designs</td>
</tr>
<tr>
<td></td>
<td>- But these devices typically integrate a touch screen with virtual keyboards that may be difficult to use</td>
</tr>
<tr>
<td>Integrating the application with a mobile device’s built-in camera system or other basic</td>
<td>+ Leverages user’s familiarity with the camera from other activities</td>
</tr>
<tr>
<td>services…</td>
<td>+ Simplifies the support for scanning, photo-taking and audio/video recording</td>
</tr>
<tr>
<td></td>
<td>- But if users are not familiar with these other services they may become lost or confused</td>
</tr>
<tr>
<td></td>
<td>- But the look and feel of the resident tools may be quite different from the application</td>
</tr>
</tbody>
</table>
Offering several metaphors and associated methods for organizing reminiscence content…

| + Encourages users to consider how each artifact might be best created and displayed  
| + May suggest to creators that they can alternate amongst organizations for differing effects  
| - But the variation in selection may be overwhelming to novice users  
| - But only a limited number of metaphors can be offered, and some creators may not find a match  

A set of “Add” buttons that lists a number of different media types…

| + Suggests artifact enrichment goals to creators, for example adding people as well as photos to an event  
| - But may lead to a more extensive or tedious process that simply adding physical items to a book  
| - Can be overwhelming to create and consume  

Positioning a “Share” button on the initial page of the application…

| + Provides a fast and convenient path to sharing one or more artifacts across location  
| - But does not suggest what might happen if and when an artifact is shared (e.g., whether it is editable, whether comments can be added)  
| - But the author may not know whether the person receiving the artifact has the software needed to view it (i.e., the same application)  

The second claim is an elaboration of an earlier claim analyzed during activity design, exploring the user interaction implications of supporting the application on a mobile device. I knew that it was important to emphasize mobile interaction because of my interviews with older adults, who did not want to go into a “back room” to create, edit or review their artifacts. Yet at the same time, this design decision raises issues for the type of user interaction scenarios I can design, for example limiting the screen resolution. In the case of older adults, this seems like a potentially beneficial “forcing function” in that I also found that simplicity is an important design objective for this user population. A small touch screen restricts what can be supported and almost requires a relatively small and simple interaction dialog. The third claim is related to this, in that by integrating with the “regular” functions of a mobile device (e.g., camera, scanner), the reminiscence application can have a simpler design in itself. The downside is that I have to now assume that these older adult users are already familiar with those services, or that they can easily figure out how to use them when they “crop up” during their reminiscence efforts.
The claim concerning different metaphors builds on the study that I did in the Greenwich Project. We observed the comfort with timelines, but at the same time my first interview study indicated a need for different kinds of organizations, from memoirs to family trees. Offering all of these at once is somewhat risky, in that it may be seen as overwhelming, but again seems like a reasonable tradeoff to accept given the variety of artifacts I learned about from the older adults. The analysis of the different types of media to be added has a similar character – it suggests the goals that seem to mirror what people want to do in the real world, even though it also makes the initial experience more complex.

The sharing function is another of the central design objectives for reminiscing; if creators cannot share what they have, then much of their motivation will be lost. Printing and sharing are very similar in this, both offering options for making the artifact available to others. Both are analyzed here as central options that are highlighted on the first screen; this seems appropriate given their general importance. In the case of sharing an artifact however, there are many questions that may be evoked in response to this option, for instance the creator may not realize (or just not know) that the recipient must also have a copy of the software she used.
Chapter 8
Contributions, Future Work and Conclusion

Contributions through the Dissertation

As a way of summarizing the contributions of this dissertation, I will now return to the ten design themes presented and provide a summative review of work conducted and lessons drawn throughout my dissertation project for each. In each case I begin with what was learned in the exploratory interview study and Project Greenwich study and then move on to consider how each was explored in the activity and user interaction design scenarios and their associated design rationale analysis.

Table 8-1. Contributions within the Realm of Anytime-Anywhere Creations

<table>
<thead>
<tr>
<th>Can be Created Away from a Traditional Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adult users and their homes are not computer-centric</td>
</tr>
<tr>
<td>• Content creation and conversion will need to take place to construct digital artifacts</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Users took digital pictures of physical photos or artifact, then transferred to computers, or used a scanner</td>
</tr>
<tr>
<td>• Users sought help from others if their context did not have technical support available</td>
</tr>
</tbody>
</table>

The activity design scenarios and rationale analysis investigated these issues:
| The use of a mobile device and existing printing protocols in familiar settings |
| The potential support of family members when options or interactions are overwhelming |

The user interaction design scenarios and rationale analysis investigated these issues:
| Ways to leverage the built-in services of an iPad-like device (e.g., camera, scanning) |
| The simplicity of file systems and user interfaces typical in mobile devices |
| The user interaction costs of using a small touchscreen interaction style |

Older adult users are decidedly not computer-centric; they do not want to spend a lot of hours in front of it creating or organizing stories and other memories. On the other hand, at least some of the system support for creating or transforming personal content may require specialized
devices like scanners, printers, or large displays. It is not reasonable to expect them to create personal legacy artifacts using time-consuming methods that rely on a computer that is not central to their lives, or to set up and use peripheral components like scanners. Working with this knowledge the prototype activity design scenarios and user interaction scenarios explored the use of ISO application to create the personal legacy artifacts. Acknowledging that there is possibly costs to the older adult to both purchase an ISO device and accessories (such as a full size keyboard) if needed, and the small size of the screen might cause issues, there are still many benefits to such an implementation. ISO and other mobile devices do not expose the file system to the average user and have built in cameras for both pictures and videos. Taking advantage of these features means that older adults can create content and not have to be concern with where it is on the file system. The mobile device will know the location and the application will be aware of the media as well. Additionally mobile devices use direct manipulation for interaction and this has been shown to be desirable for older adults (Hollinworth, 2009).

Table 8-2. Contributions within the Realm of Old Adult-Oriented Usability Concerns

<table>
<thead>
<tr>
<th>Usability Objectives that Address the Needs of Older Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adults users do not trust that digital things will not be lost or destroyed</td>
</tr>
<tr>
<td>• Older adults prefer interfaces that are as simple as possible</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Users worried whether their creations would be around in many years from now</td>
</tr>
<tr>
<td>• Users were able to create and work with timelines after a basic demonstration</td>
</tr>
<tr>
<td>• Participants preferred a blank timeline over a pre-populated frame with possible triggers</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Printing as a mechanism for creating feelings of longevity and trust</td>
</tr>
<tr>
<td>• Tradeoffs in providing enough but not too many features at any given time</td>
</tr>
<tr>
<td>• Expectations for artifact use in the future rather than now</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Guidance from the system versus trusted others, e.g. friends or family members</td>
</tr>
<tr>
<td>• Positioning and support for mechanisms that support sharing or printing</td>
</tr>
<tr>
<td>• Simplification of text and system options on the display at any given time</td>
</tr>
<tr>
<td>• User interaction costs of viewing, typing and selecting from a small screen</td>
</tr>
</tbody>
</table>
Usability is an always an important facet of system design, however when the systems audience is not one that is comprised of frequent or expert users then it becomes even more important. Older adults’ technology knowledge and skill vary based on their life experiences, just like any other age segment of the population. However none of them are digital natives and no matter how comfortable and knowledgeable about technology they are they still do not have the same leave of acceptance and trust that younger generations exhibit. Therefore it important that any system directed towards older adults provide assurances that they are not wasting time and energy creating something that will disappear or be lost if something happens to the device. Additionally, the number of features and how these features are presented needs to be considered carefully. The studies conducted as part of the dissertation showed that older adults preferred systems that have a simple, no-clutter look and feel, as well as providing brief directions when needed. I assume that rather than referring to a manual the older adult will prefer to reach out to a family member of friend for support.

Table 8-3. Contributions within the Realm of Organizational Metaphors

<table>
<thead>
<tr>
<th>Has Metaphors for Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Current personal legacy artifacts are organized by time, by person, in the order of remembering, or are an unordered set</td>
</tr>
<tr>
<td>• The goal of creating a personal legacy artifact can overwhelming and may be postponed indefinitely because of this feeling</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Users were able to use a timeline for organization but had interest in other options</td>
</tr>
<tr>
<td>• Users often could not remember exact dates of events</td>
</tr>
<tr>
<td>• A timeline organization helped users to manage the complexity of artifact creation</td>
</tr>
<tr>
<td>• The timeline triggered memories by conveying holes or gaps in time</td>
</tr>
<tr>
<td>• Not all users think about their lives as linearly organized by time</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Several different organizing rubrics drawing from the interviews and field study</td>
</tr>
<tr>
<td>• Mapping of different metaphors to different user characteristics and use contexts</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Options for displaying, accessing, and moving amongst multiple organizations</td>
</tr>
<tr>
<td>• Simple visualizations that convey the basis of an organization</td>
</tr>
<tr>
<td>• Elements within an organizational scheme that might serve as triggers</td>
</tr>
</tbody>
</table>
When older adults create personal legacy artifacts, an early hurdle they must overcome is to conceptualize what the artifact will be and how to organize it. Many older adults never get over this hurdle, because in the process of answering these questions they conclude that it will be too hard or require too much effort to collect and organize what they have in mind. The publishing industry has offered a variety of “memory books” to encourage older adults to start recording their lives but even these can seem overwhelming to the older adults. It is important that any digital tool for creation of personal legacy artifacts provide ways of surpassing the “start up” hurdle, for example offering each user some simple choices and associated first steps for thinking about their life, and thereby making legacy creation less overwhelming.

Table 8-4. Contributions within the Realm of Personal Legacy Artifact Form and Format

<table>
<thead>
<tr>
<th>Can Take Many Forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adults create and maintain scrapbooks, notebooks, slide carousels, file folders, items in drawers, and many other types of objects</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Users wanted others to view and interact with their artifacts in forms other than a digital timeline (e.g., a book where each event appears as a page)</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Concerns about sharing digital files that depend on the source software</td>
</tr>
<tr>
<td>• The complications for sharing in multiple ways when multiple media are included</td>
</tr>
<tr>
<td>• Potential cost and process for converting from one form to another</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• A simple mechanism for selecting a format but also swapping formats (metaphors)</td>
</tr>
<tr>
<td>• The visual appearance of each form and its translation to a printable form</td>
</tr>
<tr>
<td>• How considering something in one form (e.g., event) may trigger memories that would not have otherwise occurred (e.g., family tree)</td>
</tr>
<tr>
<td>• Options for the consumers of an artifact to make contributions (e.g., comments)</td>
</tr>
</tbody>
</table>

In addition to providing different ways to organization and getting started with the creation process for personal legacy artifacts, there is also a need for the final product to take different forms. Not every older adult wants to create a scrapbook, memoirs or anything else, each will have different preferences. Giving users different options as to how the initial artifact is
organized and then also being able to change to other organizations is a very powerful feature. Embedding a single concept of an event that includes both information about both time and people participating was an important enabler of this degree of flexibility. The assumption that a person mentioned in the event might have a child or parent feature was also important, enabling visualization of a family tree organization for any such connected individuals; the downside of course is that many people entries will not be related to family trees, but the background emphasis on these relations seems reasonable in the context of a personal legacy artifact tool. By supporting the changing of organizations, the tool suggests it as a possibility, and when users try this out, the result may help to trigger other memories that lead to a richer experience for either the creator or the viewer.

Table 8-5. Contributions within the Realm of Sensitive or Incomplete Memories

<table>
<thead>
<tr>
<th></th>
<th>Hides Gaps and Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
<td></td>
</tr>
<tr>
<td>• Older adults shy away from reminiscing about negative or painful events</td>
<td></td>
</tr>
<tr>
<td>• Sometime family secrets need to (or will) be kept as secrets</td>
<td></td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
<td></td>
</tr>
<tr>
<td>• Timelines highlighted empty phases, causing users to think about those times</td>
<td></td>
</tr>
<tr>
<td>• The timeline tends to imply that all time periods are equal and that events should be spaced out evenly over time</td>
<td></td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
<td></td>
</tr>
<tr>
<td>• User reactions to and possibilities for addressing perceived gaps in a life story</td>
<td></td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
<td></td>
</tr>
<tr>
<td>• A timeline view that does expose gaps that may have either positive or negative impact</td>
<td></td>
</tr>
<tr>
<td>• Diary or line views that can be used to order events regardless of time between them</td>
<td></td>
</tr>
</tbody>
</table>

Reminiscing is often thought about as looking back at the good old days. However depending on the trigger and circumstances negative and sad reminiscing can happen. With the focus of reminiscing on creating personal legacy artifact there is a desire to keep the reminiscing and content included in the artifact positive. I do not know many people who would choose to create a sad or unpleasant element within a personal legacy artifact. All of the organizational
metaphors allow users to pick just the events and stories they want to include. However we noted a timeline implemented in linear format may highlight time periods that not no content. A user may have simply forgotten to include this part of his or her life; if this is the case the timeline may server as a trigger to retrieve additional memories. However a user may instead have intentionally avoided some time period; although my scenario did not introduce this, the mockup design included a simpler line organization that could be used to order and organize events without call time to “empty” periods. The diary metaphor also can help to address such issues, in that it has a simpler event basis for its organization.

Table 8-6. Contributions within the Realm of Reminiscence Triggering

<table>
<thead>
<tr>
<th>has triggers to start the creation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adults tend to downplay the value or importance of their memories</td>
</tr>
<tr>
<td>• A reminiscing episode can trigger other memories and reminiscing events</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• The timeline visualization triggered memories by highlighting missing content and encouraging a time-based retrieval process</td>
</tr>
<tr>
<td>• Artifact naming (e.g., ‘My Life Story’) may serve as a general trigger</td>
</tr>
<tr>
<td>• When offered many triggers (e.g., as templates) the users were overwhelmed and lost focus, partly because so much triggering took place</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Designing system prompts that might serve as triggers</td>
</tr>
<tr>
<td>• Maintaining persistent access to alternate organizations as triggers</td>
</tr>
<tr>
<td>• The constant availability of differing media that suggest different types of content</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• The implications of a set of buttons that begin with “Add”</td>
</tr>
<tr>
<td>• Attractive and evocative visualizations and interactions for different metaphors (e.g., the cover flow for selection, the affordances of a timeline, map, etc.)</td>
</tr>
</tbody>
</table>

Triggering is the starting point of reminiscing and any system is designed to support the creation of legacy artifacts needs to offer mechanisms for triggering reminiscing. I assume that an older adult would not have invested in a system like Scrap-E unless he or has already decided to create a personal legacy artifact (or in the case of Steven, has been working on a project of this sort with a relative). On starting up the tool, they may not know what they will build, but they
have already recognized their desire to create something about their lives. From here the system needs to help them start the process of creation as well as to inspire them to sustain the process once they begin. Organizational metaphors can help trigger memories in a general sense (e.g., retrieval by time); simple prompts, or even an event title and description can also evoke new memories, as can searching (physically or by memory) for different types of media. However too many prompts can cause old adults to become overwhelmed.

Table 8-7. Contributions within the Realm of Differing Media for Reminiscence

<table>
<thead>
<tr>
<th>Can Contain Many Different Types of Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adults created artifacts using many different kinds of objects, e.g., photos, letters, official documents, newspaper clippings</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Even though initially it seemed that only photos and text could be added to timelines, users had ideas for creating images or maps, books and other types of content</td>
</tr>
<tr>
<td>• Users mentioned that combining images with text was engaging and speculated that these mixed media artifacts would also engage their audience</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Creativity and experimentation with different types of media</td>
</tr>
<tr>
<td>• The user experience when viewing and interacting with an artifact</td>
</tr>
<tr>
<td>• The costs of specialized tools needed to create or edit different types of objects</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• The benefits of existing familiarity with media like photos or videos</td>
</tr>
<tr>
<td>• The advantages of having built-in tools for working with different media, but at the same time the expectation that older users would be comfortable with these tools</td>
</tr>
<tr>
<td>• Concerns about integrating different media in a final product</td>
</tr>
</tbody>
</table>

Personal legacy artifacts may include many different types of objects; by moving the process into the digital world, it is possible that even more options can be available (e.g., it may be simpler to embed video). Different people value and keep different types of things and it is these things that make individual artifacts unique. The digital personal legacy tool I have envisioned offers many advantages with respect to media type; users can opt to include video and audio along with text and photos, and this can add a richness that might have never been considered or attempted in a physical setting. For example, the user can take pictures or scan
things to create images of anything other objects that they want to include; they can label and
describe the pictures as needed, while also editing further if and when more details are
discovered. Additionally, including more media and different media makes the consumption of
the artifact more engaging.

Table 8-8. Contributions within the Realm of Sharing and Collaboration

<table>
<thead>
<tr>
<th>Created Collaborative and / or Independently</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adults seek help and advice from adult children when creating artifacts</td>
</tr>
<tr>
<td>• Older adults have a desire to share their experiences and leave something behind when they are gone</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Users shared their timeline with adult children and siblings for advice on what to include as well as for more general sharing purposes</td>
</tr>
<tr>
<td>• Users did not want anyone else able to change their creations; these products were their stories and should not be ‘corrected’</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Options for gaining input, approval and confirmation of contents from others</td>
</tr>
<tr>
<td>• The use of different sharing and collaboration methods</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Seeking and receiving digital feedback, e.g. in the form of comment objects, including the role of such feedback as triggers</td>
</tr>
<tr>
<td>• Clarifying ownership of the content by providing edit and view-only modes</td>
</tr>
<tr>
<td>• Assumptions about software available during collaborations</td>
</tr>
</tbody>
</table>

Older adults not only want to create personal legacy artifacts, but also they want to share them as well. This sharing may take place after the artifact is created but may also occur while it is being created. Older adults may reach out to their adult children or other close friends to view an artifact in progress and give feedback on the contents, check to see if the content is interesting, if they are missing anything, or help with construction or content. Construction within a digital system should mean that the older adults can share their creations (at any stage) with anyone who can receive a digital file, so that they are not limited to a shared physical location. However, the goal of receiving feedback is quite different than a willingness of have the creation edited by another individual. The older adults expressed a strong sense of ownership of their creations and
did not want anyone else to change things without their permission. Because different people may remember events differently, and the goal of personal legacy artifacts is not to build an accurate account but rather to capture a person’s experiences, it is important to allow for such protections.

Table 8-9. Contributions within the Realm of Bridging the Physical and Digital

<table>
<thead>
<tr>
<th>Exists Both Physically and Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interview study with older adults revealed:</td>
</tr>
<tr>
<td>• Older adults want physical artifacts; they do not experience completion until they can hold their creations</td>
</tr>
<tr>
<td>• A physical artifact can take on meaning beyond the simple contents it contains</td>
</tr>
<tr>
<td>Further discoveries in the Project Greenwich study included:</td>
</tr>
<tr>
<td>• Users did not feel that a link is something to “give” or that it can represent the meaning that a book or other physical thing does</td>
</tr>
<tr>
<td>• Users wanted a physical copy of their project as a gift to give</td>
</tr>
<tr>
<td>• Users believe a physical object would be more engaging to their audience as they age</td>
</tr>
<tr>
<td>• Users felt that a digital artifact does not have the same value as a physical copy</td>
</tr>
<tr>
<td>The activity design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Options for printing an artifact once created, including costs and complications</td>
</tr>
<tr>
<td>The user interaction design scenarios and rationale analysis investigated these issues:</td>
</tr>
<tr>
<td>• Positioning a Print option in a central and salient location</td>
</tr>
</tbody>
</table>

In general older adults are not as trusting of technology as younger generations; in my interviews and field study, the older adults also expressed a desire for physical objects as part of their reminiscing activities. This implied the need for a physical rendition of digital personal legacy artifacts. This need is also tied to older adults experience with heirlooms that they have inherited, the physicality of the heirloom as meaning and significance as much as the content and they do not feel that a file or a link will have the same meaning. Additionally, there is a sense of completion that comes out of being able to print a creation and they desire this feeling. The advantages and disadvantages of physical versus digital artifacts are still emerging and there will always be tradeoffs. However my results convinced me that at least for this generation of older adults, it is critical to provide a physical end product.
Table 8-10. Contributions within the Realm of Artifact Durability

<table>
<thead>
<tr>
<th>Contributions within the Realm of Artifact Durability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Created to Outlast the Creator</td>
</tr>
</tbody>
</table>

The interview study with older adults revealed:
- Older adults want to leave their stories and knowledge for future generations
- Older adults understand that digital things are dynamic and changeable; what they create today may not be accessible in the future
- Older adults have inherited treasured objects from their ancestors; they know that these objects take up space and can be a burden on the recipient

Further discoveries in the Project Greenwich study included:
- Users questioned whether their creations would be around in 5 – 100 years from now
- Users trusted that a physical copy would endure over the years
- When someone spends a lot of time creating an artifact, it is very important be confident that it will be around when the intended audience wants to use it

The activity design scenarios and rationale analysis investigated these issues:
- The experience and expectations associated with creating and handing off a physical version of a digital production

The user interaction design scenarios and rationale analysis investigated these issues:
- Concerns that a digital file requires special software for viewing that may or may not be available

A digital personal legacy artifact would not be very successful as a legacy if it does not exist for a long period of time. Digital file system formats are in flux and we have yet to demonstrate mechanisms for digital storage media (with their associated “reader” tools) to outlast paper. This reinforces the previous point about needing a physical outcome for the artifact as well as ways of keep and preserving the digital artifact. Older adults are going put time, energy and emotion into their creations; they must be confident that the end product will be around when their grandchildren or other audience is able to enjoy it.

**Implications for Digital Personal Legacy Artifact System Design**

Another contribution of the work completed in this dissertation can be seen in its implications for the design of digital personal legacy artifact systems. In the following, I have articulated and organized these considerations using three themes: healthy older adults, reminiscing and personal legacy artifacts.
Healthy Older Adults

Consideration of users and their needs is the primary focus for any human-centered design research. However when designing for an audience not comprised of frequent or expert users of technology the needs of the user need to be highlighted and addressed even more seriously, so as to inspire confidence and trust in the system and to insure the system is simple and not overwhelming to the users. The older adult population is one that is often thought of in regards to their limitations (e.g cognitive ability (Eastman & Iyer, 2005; L. Kelley, Roger W. Morrell, Denise C. Park, Christopher B. Mayhorn, 1999), physical mobility (McMellon & Schiffman, 2000)). However as my research has shown, the profile of older adults is more than a set of limitations; as a population they can provide insight into systems being designed not only for them but also for a general audiences. Designers should not ignore the limitations imposed by the aging process, but at the same time these constraints should not be allowed to hinder creativity and innovation.

In regards to the limitations of older adults, research has shown mouse movements (double clicking, pointing, acquiring targets, movement) become more difficult due to their requirements of continuous movement and pressure and flexibility of the arm and wrist (Riviere & Thakor, 1996; M. W. Smith et al., 1999; Walker et al., 1996). While the use of different input devices, such as light pen (Charness & Holley, 2001) or touch pad (Murata & Iwase, 2005) can help to overcome some of these challenges, they still do not take into account all of the alterations to normal motor functions caused by the aging process. Additionally, all users have preferences for input devices, some prefer mice while others touch pads. Scrap-E overcomes this limitation by the use of a touch screen device that also has the option to connect traditional keyboard and mouse or any other input device needed. However, this is just one-way of overcoming the decline of movement with aging, another maybe using voice or a yet to be developed input device.
However, other research has shown that older adults do use technology, though they are most likely to adopt it if they perceive a benefit from using it (Melenhorst, Rogers, & Caylor, 2001). This result contributes to my observation that older adults are using systems that have not been designed for them – email, word processing, games and more specifically Project Greenwich – often because they have a desire to learn new things in general, but more specifically because they want to create personal legacy artifacts for future generations in a way that future generations will relate to them. Furthermore, the majority of the participants showed a preference for technology-based authoring, emphasizing that they find it easier to type than write and that this produces a more legible result.

**Reminiscing**

I have used the HMR framework, extended to include the concept of reminiscing events and an associated cyclical reminisces construction process (Discussion: Toward Personal Legacy Artifacts section at the end of Chapter 4 for more details) as an aid in interpreting my findings and design directions. Thus another contribution is the extended HMR, which provides future researchers with a model for understanding the complex process of reminiscing. There will be no single interactive system that can support all aspects of reminiscing nor should there be; reminiscing is a complex process and focus and priority has to be chosen and given to aspects of the HMR framework. Previous systems have focused on reminiscence triggering by different means, for example email (c.f. Pensieve ([Peesapati et al., 2010])), and/or a specific function of reminiscing for example in private reflection (c.f. Pensieve ([Peesapati et al., 2010])), Teach / Inform (c.f. Palaver Tree Online ([J. B. Ellis & Bruckman, 2001])), conversation – (c.f. Nostalgia ([Carroll et al., 2009])). Scrap-E prioritizes the moderator of age, healthy older adults, and the
function of death preparation. It facilitates the creation of personal legacy artifacts through the
triggers provided by different organizational metaphors (e.g., time, people, places).

There is still a need to examine other aspects of reminiscing so as to expand the context
of reminiscence support systems. One such aspect in need of investigation is reminiscing that has
negative outcomes. Interestingly, the work presented here pointed to a desire to avoid such
events; one result was a design theme focused on ‘hide gaps and negative events’. However this
does not imply that all systems should follow this theme and focus on “Hallmark Moments”—the
happy, cheerful variations of reminiscing (Frohlich, 2004b). Remembering is not always pleasant;
it can be painful or traumatic. But sometimes the painful histories are the ones most in need of
preservation (especially when considering community memory preservation). War memorials,
holocaust museums, and tours of places where tragedy has occurred are real world examples of
how important it can be to preserve (and resolve) such memories. In future work we hope to
examine the dynamic impact of these more “pointed” reminiscence systems.

**Personal Legacy Artifacts**

The idea of an audience can become ambiguous when building personal legacy artifacts.
Typically such an artifact is being created to be consumed at an unknown future time and by one
or more people who will have aged, grown and changed between the time of artifact creation and
consumption (in some cases they may not even be alive when the creation happens). However
even though the idea of audience may be unclear it will necessarily influence the choice of
content to include in a personal legacy artifact. This idea is line with prior work (Lindley, 2012;
Oleksik et al., 2008) where participants sought to produce a family-oriented artifact. Personal
legacy artifacts are not simple amalgamations of a lifetime of events, but are a representation of a
carefully constructed narrative in which authors choose what to include and not include. In this
way personal legacy artifacts are unlike life capture systems, where the goal is ‘got to catch em all’, such as Facebook Timelines (“Facebook Timelines,”) and SenseCam (Sellen et al., 2007), systems that have been designed to capture every aspect of one’s life.

The goal of explicitly authoring an account of the past is something that should not be overlooked, perhaps especially with regard to older adults. However, designing to support authorship is complex in this context. I observed some tension between conveying a narrative that is appropriate for family and authoring a timeline that is felt to be authentic, with participants omitting content that might compromise the idea of ‘family’ or come across as morbid, but also noting that these details were an important part of who they were. This suggests a design opportunity related to the support of fine-grained access control, i.e. for different events and aspects of the artifacts, so that the artifacts can be tailored for different audiences. Furthermore, the fact that artifacts are at times produced for grandchildren to view in the future seems to present an opportunity to design for the gradual revealing of additional layers of information. Perhaps as the intended audience matures, they become “old enough” to view more sensitive content, whilst also retaining material that they might engage with in the present.

A richer, but more challenging, opportunity lies in drawing on the process of creation itself and conveying this in the finished artifact. In the same way that Rosner and Ryokai (2010) note that the finished garments their participants made revealed something of the technical craft of knitting, so personal legacy artifacts could be designed to convey something of the process of their making. One way in which this could be accomplished could be to make visible the order in which content is produced, which seems to be capture to some extent which items are felt to be important and unambiguous. Adding meta-comments to content as it is created could also be an interesting option to explore, e.g. noting that something was added even though it might not be understood the same way by everyone in the future, or perhaps adding a bit of explanation for why a particular photo was chosen to illustrate an experience.
Ultimately, it should be our goal as a community to develop systems that meet the needs of the users we are developing for as well as creating the outcomes for the function we are attempting to provoke.

**Future Work**

While the current research goals were to understand how older adults reminisce and to develop a system design concept that could assist in reminiscing – specifically the creation of personal legacy artifacts – the research reported here is clearly not the end of work to be done in this design domain. My design concept (Scrap-E) still needs to be developed as an actual system; it needs to be tested iteratively with older adults to ensure that its features are performing as intended; it needs to be generalized to work on all popular mobile devices (not just an iPad) as well as desktop or laptop computers. Further, as documented by the design rationale for the design scenarios, almost all of my design features come with upsides and downsides. My current position, which is the one I mocked up in the screen designs, is that the upsides will outweigh the downsides, but I recognize that an entire set of new issues are likely to surface with more direct user involvement. Once the system is developed and tested by older adults for the creation of legacy artifacts, the sharing and consumption of the artifacts can be investigated. This investigation can and should include multiple generations of users.

**Conclusion**

Designing systems for reminiscing is still a relatively young area of study within HCI, with definitions and research interests still being defined. Reminiscing has been defined as anything between the simple recall of specific past events (Butler, 1963, p. 66) and the more
open-ended process of making meaning about the past (Webster et al., 2010). Design research focusing on the recall of past events has resulted in the creation of lifelogging systems that enable users to capture life events seamlessly (Sellen & Whittaker, 2010); one example is SenseCam (Hodges et al., 2006; Sellen et al., 2007). Others systems focus on supporting review and capture of key elements (Li et al., 2010) such as Pensieve (Peesapati et al., 2010). Yet other systems, as in my research, focus on the creation of narratives as a way to make meaning and support future reminiscing (Lindley, 2012). While systems designed for other goals can also foster reminiscing (Lindley et al., 2009). Each research and design focus supports reminiscing in different ways and more work is needed to understand the benefits and drawbacks of each focus as well as the interplay between them.

In addition to serving as a design concept for the creation of a personal legacy artifact tool in the future, Scrap-E is unique in that its focus throughout has been on older adults creating artifacts and having ownership of the same. Most reminiscing systems have focused on the collaboration that might surround remembering experiences (Cosley, Sosik, Schultz, Peesapati, & Lee, 2012); very little attention has been paid to the autobiographical nature of reminiscing (Conway & Pleydell-Pearce, 2000). The autobiographical life story is the exact focus of Scrap-E.

My research represents an exploration into how older adults reminisce and create personal legacy artifacts. I followed the SBD framework to gradually uncover, explore, and reflect on my design concerns. To address the first research question of how older adults currently reminisce, an exploratory interview study was conducted with older adults in the community. Older adults were found to reminisce not only in a spontaneous fashion or at planned events, but also to have a strong desire to create personal artifacts for future family generations that tell their life stories. The older adults expect that by telling their stories the future generations will gain knowledge of family history and learn from the events of their lives. Because the older adults have a strong desire to create personal legacy artifacts but at the same time feel overwhelmed by
the prospects of creating such an extensive artifact, I chose to narrow my focus on the creation of personal legacy artifacts.

Using the knowledge gained from the interview study, scenarios and claims were developed to address the second research question: What themes for a digital reminiscing tool can replicate, expand upon, and enhance the creation of personal legacy artifacts by older adults? The scenarios and claims analysis led to ten proposed themes that should be included in a personal reminiscing system. To answer the final question: what are the benefits and drawbacks of the interface themes proposed for the creation of digital personal legacy artifacts, a field study with older adults was conducted to evaluate the ten proposed themes. The field study used a software tool, Project Greenwich, which was already created and could be appropriated for the use of creating personal legacy artifacts by older adults. The findings of this study were combined with the analytic evaluation provided through the design rationale. Together these evaluation results were used to elaborate the activity designs into user interaction scenarios and a set of screen mockups (Scrap-E). Summing up, I can return to the questions that originally motivated my dissertation project:

**RQ: How might we design ways for older adults to reminisce through digital means to preserve their history?**

This central research question was broken down into 3 smaller questions, each of which was addressed so as to inform the design of a system and add to the research community.

**Q1a: How are older adults currently reminiscing?**

My findings were broken down into three categories: general characteristic of reminiscing, relating current customs to the HRM framework, and their creation and use of reminiscing artifacts. Each of these offers insight into how older adults are currently reminiscing.

In general, I found that reminiscing by this population takes many different forms, includes a variety of different topics and has a variety of audiences. The most common topic for
old adults to reminisce about is their family and they do so either orally or by creating artifacts (scrapbooks, memoirs, letters). The audience varied considerably, sometimes even involving recipients who were simply convenient. However what was shared did depend on the audience: older adults will share some reminiscing events with anyone who will listen; other reminisces will only be shared with a specific audience; and finally some will not be shared at all.

Along with providing an understanding of how older adults in this study are currently reminiscing, this work is one of the first empirical studies to explore the applicability of Webster’s heuristic model of reminiscing (Webster et al., 2010). Through this process I concluded that the model should be expanded to include the construct of a reminiscing event; that is the piece of narrative or reference that ties the experience to something in the past. This construct played a major organizing role in my analysis of interviews and field data and in the design thinking that led to Scrap-E. In concert with this, I have proposed that a cyclic process be integrated into the model, recognizing that one reminiscence event is often the trigger for another. Expanding the HMR in this way should help to provide clarity and completeness. More broadly, by integrating life-span psychology literature into the HCI conversation on reminiscing, my dissertation project offers a set of concepts and relations to HCI researchers interested in studying and designing support for reminiscing.

Finally, my interviews and field data reinforced the prevalence of specific kinds of reminiscence goals, namely creating artifacts that are personal in nature and created as a way of leaving one’s “life story” behind for future generations. The artifact construction process itself acts as a reminiscing event but this construction process also may generate a sort of “anticipatory” event, that is what the older adult expects to happen when one or more persons consumes the created artifact. This future event may be expected to occur well in to the future, for example in the case of a scrapbook constructed for a grandchild when they get older. This grandchild may or may not currently exist; there can be no certainty about them “receiving” the
artifact at some future point. Future audiences will be born, grow up and evolve as time passes; the artifact creator cannot know in advance what these future audiences might value, what the world will be like and what they will want to know about the past. Nonetheless this future anticipatory event can serve as a powerful motivator for current reminiscence activities.

*Q1b: What technologies are older adults currently using?*

The investigation of technology not only provided a foundation for the design requirements for Scrap-E but also can be used for the foundation of any other system that is focused on the older adult population. The older adult participants were generally found to be current users of computers, but at different levels of expertise. Their primary uses for computers include email, word processing, news, and checking obituaries. However the computer is not a central part of their daily lives and is only used when there is a task that the older adult wants to complete. Even then the older adults think of the computer as a device that they can use quickly but then get back to daily activities. Additionally, older adults feel like technology is passing them by; they see technologies being used by others that is confusing and seems not to have been designed for them.

*Q2: What themes for a digital reminiscing tool can replicate, expand upon, and enhance the creation of personal legacy artifacts by older adults?*

As an intermediate product, I developed ten design themes that were subsequently explored and evaluated through both SBD and the Greenwich Project field study. The themes were developed based on the interview study, problem scenarios and claims, and the exploration of metaphors and existing technology. Each theme takes into consideration at least one, if not all, of the overarching topics of this dissertation: an older adult population, their reminiscing activities or preference, and the creation of artifacts for future generations.

*Q3: What are the benefits and drawbacks of the interface themes proposed for the creation of digital personal legacy artifacts?*
As summarized earlier in this chapter each theme was evaluated using SBD. As a result these themes and their drawbacks and benefits can serve as guidance for other designers and researchers work on reminiscing and technology for older adults. By exploring the use of mobile devices for the creation of personal legacy artifacts by older adults, I argued that the system would benefit from being able to leverage the built-in services of the device (e.g., camera, scanning) and the simplicity of file systems and user interfaces typical in mobile devices, even though these benefits come with the user interaction costs of using a small touchscreen interaction style.

By exploring multiple metaphors for organization, creation, and viewing of the personal legacy artifacts the user benefits in that something in one form (e.g., an event) may trigger memories that would not have otherwise occurred (e.g., family tree); the artifact consumers have an ability to make contributions (e.g., comments); and users are provided a simple mechanism for selecting a format but also swapping formats (metaphors). However this flexibility comes with the potential cost and process for converting from one form to another.

In regards to including different media objects in the personal legacy artifacts, there are many advantages of having built-in tools for working with different media, but at the same time I have raised a general concern about whether older users will already be comfortable with these tools, as well as the logistics for integrating the different media in a final (printed) product were considered. Finally, when investigating the need for the created artifacts to outlast the creation and be accessible for many generations to come there are concerns with experience and expectations associated with creating and handing off a physical version of a digital production and that a digital file requires special software for viewing that may or may not be available. However these concerns seem to be offset by the benefits that digital objects do not take up space and do not deteriorate like physical objects. Because the creation process provides a salient option
to create a physical object along with the digital object, the older adults’ use of the designed system can leverage the advantages of both physical and digital objects.

To close, my dissertation project has contributed to research by providing:

- An empirical characterization of how the older adults current reminiscing, their motivations for doing so, and the design implications for how to translate these into and digital systems.
- Empirical exploration of the value of the HMR with respect to older adults’ reminiscing experiences, resulting in a recommendation to elaborate the model.
- Design principles, a conceptual design and associated screens that show how the proposed themes for a system that supports older adults’ creation of personal legacy artifacts.
- Design rationale for such a system for the creation of personal legacy artifacts.

My research results represent just the start of work on reminiscing by older adults and on the development of digital tools to support this process. However I have taken significant steps towards understanding how the creation of narratives by older adults can serve as both a way to make meaning out of one’s life experiences and also support the future reminiscing activities of friends and family members.


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Appendix A

IRB Approval Letter

Date: October 03, 2011
From: The Office for Research Protections - FWA#: FWA00001534
       Stephanie L. Krout, Compliance Coordinator
To: Elizabeth A. Thiry
Re: Determination of Exemption

IRB Protocol ID: 37472
Follow-up Date: September 21, 2016
Title of Protocol: Scenario-Based Design of a Digital Reminiscing System for the Elderly

The Office for Research Protections (ORP) has received and reviewed the above referenced eSubmission application. It has been determined that your research is exempt from IRB initial and ongoing review, as currently described in the application. You may begin your research. The category within the federal regulations under which your research is exempt is:

45 CFR 46.101(b)(2) Research involving the use of educational tests [cognitive, diagnostic, aptitude, achievement], survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects’ responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects’ financial standing, employability, or reputation.

Given that the IRB is not involved in the initial and ongoing review of this research, it is the investigator’s responsibility to review IRB Policy III “Exempt Review Process and Determination” which outlines:

- What it means to be exempt and how determinations are made
- What changes to the research protocol are and are not required to be reported to the ORP
- Ongoing actions post-exemption determination including addressing problems and complaints, reporting closed research to the ORP and research audits
- What occurs at the time of follow-up

Please do not hesitate to contact the Office for Research Protections (ORP) if you have any questions or concerns. Thank you for your continued efforts in protecting human participants in research.

This correspondence should be maintained with your research records.
Appendix B

IRB Consent Form

Informed Consent Form for Social Science Research
The Pennsylvania State University

Title of Project: Scenario-Based Design of a Digital Reminiscing System for the Elderly

Principal Investigator: Elizabeth A Thiry
316C Information Sciences & Technology Building
University Park, PA 16802
(724) 815-0176, exn152@psu.edu

Advisor: Dr. Mary Beth Rosson
330D Information Sciences & Technology Building
University Park, PA 16802
(814) 863-2478

1. Purpose of the Study: The purpose of this research study is to explore how adults reminisce and to develop a digital system to reminiscence on.

2. Procedures to be Followed: You will be asked to participate in a 60 minute interview in your home. During this interview, you will discuss how you currently reminisce as well as be asked to reminisce about a topic of your choice. After this time you may be asked to participate in follow up phone interviews or home visits to help in the design process for a digital online system. These follow up visits can include being asked more questions regarding how you reminisce, being asked to read scenarios of reminiscing events and ask for feedback, and/or being asked to try the system out at various points in its development and give feedback on the tool. At any time during the process, you will be allowed to opt out and terminate your participation.

3. Benefits: You might learn more about yourself by participating in this study. You might have a better understanding of your reminiscing habits. This research might provide a better understanding of how older adults reminisce. This information could help provide design rational for creating a digital reminiscing tool.

4. Duration: The initial interview will take about 60 minutes to participate in the interview. Follow up visits will last anywhere from 5 to 60 minutes.

5. Statement of Confidentiality: Your participation in this research is confidential. The interview will be digitally voice recorded to assist the researcher in compiling and analyzing data. The audio-records will be stored in a secure password-protected computer. Your email address that I use to schedule your session will be replaced with a randomly assigned code during data analysis and reporting. All the recorded data will be destroyed 3 years following the study completion, or by 2017. Your identity will not be disclosed to the public in any form. The analysis of the data will identify general trends and patterns only; nothing that you say in your interview will be quoted directly in any publications or presentations. The confidentiality of your comments will be held to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by third parties.

6. Right to Ask Questions: Please contact Elizabeth Thiry at (724) 815-0176 (exn152@psu.edu) with questions, complaints or concerns about this research. You can also call this number if you feel this study has harmed you. If you have any questions, concerns, problems about your rights as a research participant or would like to offer input, please contact The Pennsylvania State University’s Office for Research Protections (ORP) at (814) 865-1775. The ORP cannot answer questions about research procedures. Questions about research procedures can be answered by the research team.

7. Voluntary Participation: Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.
If you are 18 or older, if you have read the information contained in this document, and if you consent to participate in this research study and to the terms above, please first give your permission to audio-recorder, then sign your name and indicate the date below.

You will be given a copy of this form to keep for your records.

Do you authorize us to audio-record your interview? Please circle one:  
YES  NO

Do you authorize us to take pictures during the interview? Please circle one:  
YES  NO

Please place your initial in front of the statement(s) for which you provide permission(s):

May the researcher(s) retain the recordings for future use in presentations at conferences:

_____ I do not give permission for my recordings to be presented at conferences.
_____ I give permission for my recordings to be presented at conferences.

May the researcher(s) retain the recordings for education and training of future researchers/practitioners:

_____ I do not give permission for my recording to be used for education and training purposes.
_____ I give permission for my recordings to be used for education and training purposes.

May the researcher(s) retain the photographs for future use in presentations at conferences:

_____ I do not give permission for my recordings to be presented at conferences.
_____ I give permission for my recordings to be presented at conferences.

May the researcher(s) retain the photographs for education and training of future researchers/practitioners:

_____ I do not give permission for my recording to be used for education and training purposes.
_____ I give permission for my recordings to be used for education and training purposes.

May the researcher(s) have your permission to share data that was obtained from this research for future research? Please circle one:  
YES  NO

___________________  ______________________  ______________________
Participant Signature  Print Name  Date

___________________  ______________________
Investigator Signature  Date
Appendix C

Semi-Structured Interview Guide

Use these questions as a loose guide to structure your interview. It is OK to go out of order or to ask questions that aren’t on this list. You do not need to ask a particular question on the list if your interview subject answered it through a previous question. Also, if you hear something interesting that is not covered by the guide, follow up on it!

OPENERS
Opening prompts:
- Introduce myself
- Gather as much information as I can
- Laptop helps me organize things for you
- Also it is helpful to record
- If at any point you are uncomfortable please let me know

I am interested in everything you have to say about these topics, so feel free to say whatever comes to mind. I will begin by getting some general information, followed by more focused discussion of some specific situations.

Main Questions:

1. What things in this room have the most memories attached to them?
2. When have you found yourself sharing experiences with others? How?
3. Some people feel they want to share their experiences while others choose to leave things behind them.
   a. What influences this decision process for you?
   b. Who would you want to share things with?
   c. Would it be important to choose
4. Name 3 critical turning points that define you as a person?
5. When you are reflecting on the past, how do you go about this? For example is it always talking to someone or do you write things down, use other material. (create something, can you show me)
6. How do you feel after reflecting on the past?

Now I am going to ask about your use of technology

TECHNOLOGY
7. How comfortable are you surfing the web?
8. What is your favorite thing to do online?
9. What do you usually do when you go online?
10. What is the worst experience you have had online?
11. What is the best experience you have had online?
12. Have you ever shared photo’s, either through email or other online service? (How did you go about doing this?)
13. Have you ever used online technology to share stories? (Which, how did you use them, where you satisfied with it?)
14. What features would you like to see in an online system to reflect on your past?

Demographics
15. In what year were you born? _____
16. Indicate your highest level of education
17. What is your Marital Status?
18. How many siblings did you grow up with?
19. How many children did you raise?
20. How many grandchildren do you have?
21. What, if any, is your religious preference?

CLOSING
22. Is there anything that you thought of that you did not have a chance to talk about?
23. Do you have any questions for me?
24. Can you recommend anyone that also might be interested in this topic that I can contact to also participate?

USEFUL PROMPTS
• Tell me more about ….
• You mentioned X. Can you explain that a bit more?
• What else? Don’t worry if it is right. Just tell me what comes to mind
• Can you explain why _____?
• Why do you think so?
• You seem a bit [hesitant/unsure/reluctant]. What were you thinking about?
Appendix D

Reminiscing Event: Career (Military) – James, 86

This segment was all categories as one event since it was dealing with memories about being on the ship and was a continual story. The event was started spontaneously after talking about an interview James had completed with a few high school students a few years ago.

James: I had a lot of interesting just different things that happened. Even on the ship you know like we were out in the middle of the pacific and somebody put salt water in our fresh water tank and we couldn’t take a shower, we couldn’t drink or have coffee for a whole week. They had to pump out the tanks and make new water; you know fresh water.

Interviewer: What were you drinking?

James: I forget, we had some kind of liquid it was in a bottle or something, I forget what it was but we couldn’t, you can’t drink salt water, you can’t take a shower, you would curl up and...

Interviewer: Oh yeah, you’d just be salty, oh.

James: That would be terrible.

James: Then we took out to Pearl Harbor and a lot of guys just drank beer all the way over there. In fact a couple weeks ago at my ship reunion I said that the guy he was the helmsman, he is the one that was on the wheel you know up on the bridge and I was always on the bridge to, I said Dick did you have, his name is Dick West. I said did you, how much beer did you have stashed away in your locker, he said I had two lockers that I stuffed full of beer.

James: We took the beer out to Pearl Harbor so, so I guess, I don’t know what they did with it but after we unloaded the beer, they sent us back to San Diego, that’s six days.

Interviewer: Okay.
James: Honolulu to San Diego, we don’t know why we went there. I think they must have loaded something for the war but we didn’t know. We had liberty for a half a day and the other half of the ship had liberty for the other half a day and we left back to Pearl Harbor and so as soon as we got back there, they said join the Pacific fleet and we went to Iwo Jima you heard of that.

Interviewer: No.

James: Iwo Jima, that’s where they did the atomic bomb later.

Interviewer: Okay.

James: Yeah that’s a little island out toward the Philippines and we just anchored there and refueled over night to an oil tanker. Woke up the next morning and I wasn’t married then, woke up the next morning and there was a ship on the other side of that same oil tanker refueling and it was my girlfriends brothers ship.

Interviewer: Wow, small world.

James: Yeah.

Interviewer: Small world, so when you were coming back from like Hawaii to San Diego before you joined the fleet, what did you do on the boat at that time like what did you do on your free time that was six days, like what was a normal day for you?

James: Goof off, if I wasn’t on duty on the radar, we just goofed off; we were always behind the bridge on a deck. We weren’t allowed to play cards but the people we took over to Guam played poker, cards all the way over.

Interviewer: But you guys weren’t allowed?

James: We weren’t allowed. Not while the army guys and the marines were on board.

Interviewer: Why was that?

James: Otherwise, I don’t know.

Interviewer: Okay.
James: It was hard gambling.

Interviewer: Okay.

James: And that was just as well with me, I am not a gambler.

Interviewer: So like throwing a football around or?

James: No, we didn’t have a football, we had duties every once in a while they’d call us to duty and my duty was on the bridge.

Interviewer: Right.

James: Some of them we had to go, we had, we had I don’t know if you can see in here, we had right back here there was a five inch gun, you can’t see it.

Interviewer: Okay.

James: We had twin 40 millimeters and twin 20’s on both sides. And I wasn’t assigned to those, I was assigned to the bridge, they called for it you have to go where you were assigned and so and I was always up on the bridge and behind the bridge we goofed off in the back when we weren’t on duty.

Interviewer: Like what is goofing off for that, like for me goofing off would be, we would be playing on our phones or something, just talking?

James: Talking and…And every once in a while, I wasn’t on one of the gun crews but they’d get the gun crews on the one and a plane that flew by told us the target, sleeve and they shoot at it.

Interviewer: Wow.

James: We shot the plane down, one plane, first one and I have never been up on a bridge. The admiral sent a message, aim higher. We rescued the pilot though and after that then they were automatic what they called drones; the plane with no pilot.

Interviewer: Yeah, that was actually a practice drill what you guys were doing so there wasn’t like a why are you shooting at this flag, okay.
James: No, no, no it was a practice drill. They were just trying to hit that target.

Interviewer: So the first one is the one you shot down.

James: We shot down but we rescued the pilot. Different things like that, we had a young guy here, he was a deck hand and back here on the fan pallets quite a ways down to the water you know this guy was Jones from Virginia, West Virginia or some place, he was a hillbilly. Somebody said Jones, get me a bucket of water, he was a deck hand so he got a bucket and he tied a rope on the handle and threw it over the fan tell here and when that bucket hit the water…

Interviewer: He went right with it.

James: He did a swan dive and I was on the bridge and say man overboard.

Interviewer: So how did you get him back on?

James: Well when we heard that man overboard, the skipper gave the orders to go turn around and go get him, so we did and he never did that again but that’s what we did, we goofed off.

Interviewer: Okay, that gives me an idea, that really does.

James: Yeah it does, we were never threatened with subs or anything of course most of the time we were in the Pacific, the only time in the Atlantic was for Norfolk down to the Panama Canal. That was interesting.

Interviewer: How was traveling in the canal?

James: Canal is very slow, is interesting, we could watch slowly like in the middle of the canal there is a lake, you go through that lake and then into some more of the canal and it was interesting, I think it took us like two or three days.

Interviewer: Wow.
James: To go through there, that was interesting. Of course we weren’t in the Atlantic and that’s where most of the subs were. The Pacific, there weren’t to many, we never were threatened.

Interviewer: Probably a good thing.

James: Yeah.

James: Yeah at least we survived and actually no body ever fired at us. The battleships fired over us and that was amazing. Like I said I didn’t sleep for three days all that bombarding.

Interviewer: Did anybody sleep or?

James: I am sure some of them did but not many.

Interviewer: Okay.

James: So because I was right on the bridge and I was closer to those 16 inch shells.

Interviewer: I don’t think I would’ve slept either.

James: No, it wasn’t scary or anything.

Interviewer: No, just watching them is all, like I would just sat there and watched.

James: Yeah, you can see the shells going over and at a half-mile you see stuff blowing up on Guam you know see the observation towers, sailing up in the air since the shells hit.
Appendix E

Field Study: 1st Home Visit Guide

CONSENT FORMED SIGNED AND AUDIO RECORDER TURNED ON.

Project Greenwich is a tool that allows users to create timelines. A timeline is a way to display and thing about a list of events in chronological order.

Goal 1: Understand why the participant was motivated by Greenwich

Why were you interested in this project?

- What attracted you to our advert? [maybe take a copy with you to jog their memories – it’s in the share drive]
- What drew you toward the (personal / national) topic?

For personal:

- Do you do anything like this already? What? (Prompt: this could be family trees, scrapbooks, photo albums, memoir writing, etc.) How do you go about this? Do you use technology as part of this? What materials or resources do you use for this? Do you do research to find them, or do you just use your own or family memorabilia? Do you expect use some of these same resources could be useful when building a timeline about your personal history? What else might you use?
  - If tried to do something but given up, why…
  - If don’t do anything like this, why not…
- What do you hope to get out of building a timeline about your personal history? Do you think you will learn anything new? Would you wish to share it with anyone? Who? Would you wish anyone else to be involved? Who?
- What resources do you expect to use? (Prompt: photos, diaries, letters, scrapbooks, souvenirs.) Are any of these online? Do any of these belong to others, e.g. do your family store photos online?

For events of national / cultural significance:

- Do you do anything like this already? What? (Prompt: this could be research about local or national history, writing, or other history projects.) How do you go about this? Do you use technology as part of this? What materials or resources do you use for this?
  - If tried to do something but given up, why…
  - If don’t do anything like this, why not…
- What do you hope to get out of building a timeline about national and cultural events? Do you think you will learn anything new? Would you wish to share it with anyone? Who? Would you wish anyone else to be involved? Who?
What resources do you expect to use? (Prompt: own memorabilia, Wikipedia, research on the web more generally.) Other resources, libraries etc.

**Goal 2: Understand how the participants view the creation process**

**Give them a blank piece of paper and ask them to start sketching the timeline they want to create.**

Say something like: Before I show you the tool, I’d like to understand what you think a timeline might look like. So I’d like to ask you to do a rough outline of a timeline of your personal history / of national and cultural events during your lifetime. I’m interested to know what you think is important to include at the outset, and what form this would take. This is just a way to get going, and you obviously don’t have to include everything, but I’m interested in what an outline would look like if you could include whatever you want.

There are no right or wrong answers here; you can be as creative as you like and include whatever you wish. If possible, I’d like you to think aloud and tell me what you’re doing as you go.

**Note:** note that the important thing here is to use the timeline sketch as a vehicle for talk - if they are uncomfortable doing the sketch you could still ask the questions.

**Ask questions about what they are doing and why.**

- If you had to start a timeline from scratch, how would you begin? (this is quite tricky – so the prompts may also be used to guide them if they get completely stuck)

**For personal:**

- Are there phases of your life that can be represented on a timeline? What are these? (Only prompt if stuck, e.g. places where you lived, jobs you did…)
- Are there more general background events or passages of time that would help you structure a timeline, e.g. cultural decades like the sixties, recessions, periods of growth?
- Are there special occasions and defining moments that are important to include? What are these?
- Are there recurring events that you would want to include?
- Is it important to also include details about the everyday, or mundane? What type of details?
- Here you’re relying on memory – how do you think this would be different if you were creating a timeline using your photos or other memorabilia?

**For events of national / cultural importance:**

- Are there important phases of history that are important to include? What are these? (Could be cultural decades, e.g. the sixties, recessions, periods of growth, strikes)
- Are there special occasions and defining moments that are important to include? What might these be?
• Are there recurring events that you would want to include?
• Is it important to also include details about the everyday, or mundane? What type of details?
• Here you’re relying on memory – how do you think this would be different if you were creating a timeline whilst undertaking research or using memorabilia?

Goal 3: Get them logged into the system and introduction on how to use the system.

GIVE THE PARTICIPANT THE HOW TO GUIDE AND WALK THEM THROUGH THE PROCESS, EXPLAINING THINGS ALONG THE WAY.

Do you have a Facebook account?
• Logon to Project Greenwich

Set up – Facebook / Hotmail accounts as needed.
• The first time you log on you will be presented with a dialog box asking you to accept the conditions that Facebook will share some of your data with Project Greenwich. This sharing is just your email address and also gives you the ability to share your timelines on Facebook. However the posting to Facebook is not done automatically and only done if you click on the share icon within the timeline.

Do you have any pictures on your computer?
• Upload image from their hard drive

Have you ever used Wikipedia before?
• Use an image from Wikipedia

Have you ever used the internet to find a picture of something?
• Use an image from a different random URL.

Do you have any concerns about using Greenwich?
• Leave them with a quick cheat sheet of how to use Greenwich and my contact information.

Now that you’ve seen what the tool looks like, how do you think you will go about developing your timeline?
• How might this be different to the outline we just talked about?
Appendix F

Field Study: 2nd Home Visit Guide

Appx. 3 weeks after getting started with Greenwich

**AUDIO RECORDER TURNED ON.**

**Goal 1: How was the process of creating the timeline**

*How did things go over the last few weeks?*
- Can you show me what you have completed?
  - How did you begin? Why did you choose to start in this way?
  - Have you shifted at all from your initial expectations?

*How did you decide what to include?*
- Are you focusing on particular aspects of the past? Why did you choose these?
- What content have you included and where did it come from?
- What have you considered most important to include? Why?
- Did this content have shape the process of building the timeline? How?

*What do you imagine the timeline as a whole will look like when it is complete?*
- What do you plan to do next?

*Has the form of the timeline influenced what you would want to include? (e.g. more visual content)*

*How much of the content that you want to include is in digital format?*
  - How has this influenced what you have included or plan to include?
    - Have you had to digitize film, slides or other media?
    - Have you created any content specifically for your timeline? Do you intend to do so?
    - Is there anything that you would like to include but don’t think you will be able to do so?

*What other timelines have you thought about creating?*

**Goal 2: What constraints did the metaphor of the timeline have**

*Does having content on a timeline change the way you think about it?*
• Is the way that time is represented here in keeping with your own memory of events? Or does it make you think differently about the past?
• Has structuring content along a timeline led to any new insights or reflections?

Is organizing content by time helpful when telling a story? Is there a particular story you want to tell here?
• Special / everyday

What issues did you have regarding adding items to the timeline?
• Was their items you didn’t add because you didn’t know where they would fit?

Goal 3: Ideas about sharing and combining of timelines

Is there anyone that you would like to share the timeline with?
Are you putting it together with a particular audience in mind?
• Has this affected the content that you include?
• Do you think having the content on a timeline will make it more accessible or of more interest?
• How does structuring your content on a timeline affect the way you talk about it with others?
• Would it be interesting to combine your own timeline with others? (give examples, e.g. with someone of your own generation, with your children or grandchildren, with general timelines to give a backdrop to your own personal history)

Thinking about a personal timeline what key events would you think that everyone that created one would want to make sure to include?
• Do you think might be useful to juxtapose? Like what?
• Would this have prompted memories?
• Helped with the creation of yours?

Thinking about a more national / cultural timeline of your life what key events, things would you think should be included?
• Do you think might be useful to juxtapose? Like what?
• Would this have prompted memories?
• Helped with the creation of yours?

Goal 4a (Scaffold Group): Scaffolding Implementation

Which if any of the template timelines did you look at?
• Was it helpful / useful to have it
• Did anything on this timeline put you off this timeline
• Did you change images make the items your own

If they have not used or looked at the templates why?
• Strong ideas?
Were the templates helpful?

Goal 4: Scaffolding Ideas

What would have helped make your timeline?
- Examples?
- Overlay of historic events in the country
- Prompts?

Would access to other timelines be useful when making your own?
- To serve as inspiration or framing…

If we were to design a frame to help you create your timeline, what would this have on it?
- E.g. key events, questions, phases of life, national events…

Goal 5: Introduce Sharing and Combining Timelines

Share other participant’s timelines with them
- Get feedback, what do they think, did seeing something remind them of something they wanted on there.

Show how to combine
- Would this be useful?
- What would you use it for?

Show how to share.
- Facebook
- Email link
Appendix G

Field Study: Focus Group Guide

Introduction – 15 mins

• Welcome
  o Get drinks
  o Consent signed
  o Name tents put up.

• Why we have invited you to Microsoft...
  o We’ve been doing some research on timelines. All of you have created at least one timeline already. We are interested in what your motivations were in creating these timelines, how you went about doing it, and getting some ideas of how we could create better or different tools for this.

• Introductions
  o Before we get going it would be nice if we could quickly introduce ourselves, so if we go round the group in turn and perhaps you could each tell us who you are and a little bit about yourself by sharing what you have already created using Project Greenwich. We can pull up your timelines if you wish to share them, but don’t feel that you have to do this.
    ▪ Do you feel like your timelines are finished?

prompt: “A detailed biography does not necessarily make a good story” – 15 mins

• Now that we have all heard about the timelines that everyone has created so far, I would like to move the discussion more towards the process everyone took to create the timelines and what you would like to do with them.

• This quote illustrates some of the topics I’d like to think about.

• Were you aiming to create a detailed biography when you were building your timeline?
  o What was your motivation for doing this?
  o Do you think the form of the timeline supports this?
  o Does it have any limitations?

• Did you want to tell a story when you were building your timeline?
  o Did you have a particular audience in mind?
    ▪ Have they seen it?
    ▪ If so, what did they think?
    ▪ If not, why not?
  o Have you shown it to anyone else?
- Why did you share it?
- What was the reaction?
  - Did you want your story to reflect a view from a particular point in time?
    - If you had created a timeline 20 years ago, do you think you would have thought of different things as being important?
- Did you have any other goals? For example, did you want to learn more about the past?
  - Did creating a timeline provide new insights into the past, or make you see it differently?
  - Would you have liked to organise content on the timeline more flexibly than simply by sequence, e.g. by showing that certain items are related to each other? Perhaps one event led to another?
- Did any of you create more than one timeline?
  - Why?
  - Did you combine these? Why? Did this lead to any new insights?

**Prompt: “We don’t remember days, we remember moments” – 10 mins**

- Now that we’ve talked a bit about your motivations for creating and perhaps sharing your timelines, I’d like to talk a bit more about the form of the timeline itself.
- This quote illustrates one of the difficulties in looking back to the past and trying to remember when things happened. I’m interested to know if you experienced this type of difficulty when putting content on your timeline, and if you were able to overcome it.
  - How did you begin the process of putting content on the timeline?
  - Did you use any sources to gather information, or do any research?
  - Did you rely on memory?
  - How else did you determine the dates?
  - Were there any occasions when you couldn’t determine a date? What did you do then?
  - Would any other resources have been useful to you when you were creating your timeline?

**Prompt: Show Prompts Template – 10 mins**

- When some of you started this project, you just had a blank timeline to work with. For two of you, who were part of the second group, we provided some timelines to see if they would help you think back on your lives and get going with building a timelines.
- One of these was a timeline with questions on it to ask about various personal experiences. These were taken from guides to writing memoirs. (Show timeline)
  - For those of you who had access to this, did you find that it gave you any ideas of what to put on your timelines? In what way?
  - Did it jog any memories?
• For those that didn’t have access to this, do you think you would have found it useful? In what way?

• Do you think an example framework to help you jog your memories through questions is a good idea in general?
  o What kind of triggers would you want on this?
  o Are there any problems with this approach?

**Prompt: Show Historic Template – 15 mins**

• We also created a historic timeline. (Show timeline) This one shows key historic events that had happened over the past 100 years or so. You could build on top of this or just use it for inspiration.
  o For those of you who had access to this, did you find that it gave you any ideas of what to put on your timelines? In what way?
  o Did it jog any memories?
  o Did it help you assign dates to your own memories, for example by working out when other key events happened?
  o Did it give you ideas more generally about what a timeline might look like?
  o For those that didn’t have access to this, do you think you would have found it useful? In what way?

• Do you think an example framework to help you jog your memories with general content is a good idea in general?
  o What kind of triggers would you want on this?

• Do you think an example framework to help you date your own content in line with general content is a good idea in general?
  o What kind of anchor points would you want on this?

• Are there any problems with this approach?

**Prompt: Show Richard’s Granddad’s Timeline – 15 mins**

• These timelines were intended to act as frameworks, to help you build your own timeline. But it might also be of interest for you to be able to create your own frameworks as a way of making your timelines somehow richer.

• This timeline is an example that one of our designers built. On it you can see a lower layer, which shows the places where he lived and some of the jobs he did.
  o Would being able to build your own framework have been helpful when you were building your timeline?
    ▪ Why?
    ▪ What would you put on it?
  o Do you think this type of thing would be useful when you’re showing your timeline to others?
    ▪ Why?
Would having this kind of framework help overcome some of the problem of dating content?
- Could you even imagine a timeline with a personalised frame instead of specific dates? What do you think of this idea?
  - What would you have on the frame?

Prompt: Show Richard’s Granddad’s Timeline with the General History – 10 mins

- Another idea would be able to compare your timelines with those of other people or even standard timelines as a way of better telling a story.
- In this example, the timeline is combined with one created with general history events.
  - What do you think of being able to do this type of thing?
    - Would this type of juxtaposition help provide a context for your own timeline?
    - What type of thing would you want on these standard timelines?
  - Another possibility would be able to compare your own timeline with that of particular other people. These might be family, friends, or other people who are building timelines using the website.
    - Would this be of interest?
    - Who would you like to compare your timeline with? Why?
- Do you think this type of feature could help you learn about your own past, or see it differently?

Prompt: Show Richard’s Granddad’s Timeline With Richard’s Own – 10 mins

- Another possibility would be to pivot by details other than just by date. For example, you could compare your own timeline with that of another person, by your birthdates, rather than actual dates.
  - Does this idea appeal?
  - Who would you like to compare your timeline with? Why?

Prompt: “History doesn’t repeat itself, but it rhymes” – 20 mins

- This last quote raises the question of something we have been taking for granted, that a timeline, as a linear form, is a useful way of thinking about the past. We’ve talked a little about taking time off the timeline, and using other frames to organize content, but here we’d like to think some more about how useful the timeline metaphor is for creating artifacts to help you convey a story, reminisce, or reflect upon the past.
  - First of all, did you find the timeline to be a useful metaphor for organizing your content?
  - A timeline conveys a life story using a straightforward beginning-middle-end framework.
Would you want to highlight particular items?

Would you want to highlight different relationships?
  • E.g. causal, rather than temporal, relationships?
  • E.g. thematic relationships?

Is time significant in the story that you want to tell?

Is time significant in helping you reminisce or reflect upon the past?

○ A timeline has all times represented equally. Would you want to be able to expand sections of your timeline where you had more content, or contract those where you had little?
  • Do you feel it is important that your timeline looks even? Why? Did this change the way you included content on it?
  • Did you find that you had gaps, or uneven content? Was this problematic?
  • We’ve talked a bit about layering timelines, but would you like to be able to join up different timelines, e.g. childhood, young adulthood, parenthood, retirement etc.
    • Do these all belong on the same timeline?
Appendix H

Scrap-E Screen Designs

Figure H-1. Welcome Screen
Figure H-2. Create New Artifact

Figure H-3. Initial Map Organization
Figure H-4. Map Organization Event Edit

Figure H-5. Map Organization All Media
Figure H-6. My Artifacts

Figure H-7. New Artifact with Keyboard
Figure H-8. Initial Tree Organization

Figure H-9. Initial Tree Organization
Figure H-10. Camera with Photo Stream

Figure H-11. Tree with Parent and Child
Figure H-12. Tree Event

Figure H-13. Sharing
Figure H-14. Commenting

Figure H-15. Initial Timeline Organization
Figure H-16. Timeline Event Creation

Figure H-17. My Life Story Timeline
VITA
Elizabeth Thiry

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The Pennsylvania State University, University Park, PA, USA
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