Digital Dying in Personal Information Management

Towards Thanatosensitive Information Management

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Submitted in partial fulfillment of the requirements for the degree of Master in Multimedia at the Department of Electronic Engineering and Computers of the Faculty of Engineering of the University of Porto, July 2011

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Dedicated, in memoriam,
to my father, Borislav Marek,
who passed away on 20th April, 2007

Abstract

This work explores the application of the concept of thanatosensitivity over personal information management in order to reduce impact on the bereaved after an individual's death. Our objectives are to contribute to the academic cross-disciplinary discussion on the following interwoven topics: personal information management, online personal identity, thanatosensitivity, digital death and digital afterlife. We aim to develop a new topic, *thanatosensitive information management* (TIM), and to create a web-based platform which would provide a safe environment to consult and exchange the information about TIM and that would be accessible and understandable by a broader public. Our current technology rarely acknowledges death, and the amount of the literature on the subject is limited. We mapped the current situation in form of a website to present our findings to the audience.

Resumo

Este trabalho explora a aplicação da thanatosensibilidade na gestão de dados pessoais, para reduzir o impacto do luto após a morte de alguém próximo. Temos como objectivo contibuir para a discussão académica interdisciplinar, estabelecendo ligações entre os seguintes conceitos: gestão de dados pessoais, identidade pessoal online, thanatosensibilidade, morte digital e vida digital pós-mortem. Pretendemos criar um novo tópico, *Gestão de Informação Thanosensível* (GIT), e desenvolver uma plataforma web segura que permita troca de informação e a disponibilize de uma forma clara ao público. A tecnologia actual é alheia à morte, e a literatura sobre a matéria limitada. Fizemos uma recolha sobre a situação presente e apresentamos os resultados sob a forma de um website disponível para consulta.

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List of Acronyms

CSS	Cascading Style Sheets
ECPA	Electronic Communications Privacy Act
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IM	Instant Messaging
IP	Internet Protocol
P3P	Privacy Preferences Platform
PDA	Personal Digital Assistant
PHP	PHP Hypertext Preprocessor
PIC	Personal Information Collection
PIM	Personal Information Management
PSI	Personal Space of Information
PUT	Personal Unifying Taxonomy
S3	Simple Storage Service
SMS	Short Message Service
SXSW	South by Southwest Festival and Conference
TCP	Transmission Control Protocol
TIM	Thanatosensitive Information Management
TOS	Terms of Service
URL	Uniform Resource Identifier
W3C	World Wide Web Consortium
W3, WWW	World Wide Web
WWDC	World Wide Developers Conference

1

Introduction

We act today according to assumptions we make about tomorrow.
If we're optimistic, we buy stocks or even a lottery ticket. If we're pessimistic, maybe we buy bonds or consider joining a survivalist community somewhere in a remote part of Montana.
(JONES 2008, 389)

1.1 Background

Our interest for death, its implications and application in life and digital technology emerged from the personal experience of the death of a relative. Since 2008 we have studied and examined a number of scientific articles, popular literature and a wide range of available services, that face in any way the issue of death. Our first work in this field was entitled "Get Ready to Die" and was developed as the final project for bachelor degree at the Faculty of Art and Design of the University J. E. Purkyně in Ústí and Labem, Czech Republic. The aim was to create a web-based application that would enable its users to store their personal information and assets, which, in case of their death, would be relevant for a retrieval by the bereaved.

Our initial project lost its purpose with the emergence of the first services related to digital estate planning in 2009[1]. Nonetheless, our involvement in the investigation of this field continues. Over time, we have encountered several attempts directed to the public audience that have tried to promote the use of multimedia tools for communication of the topics mentioned above. For example, the blog *thedigitalbeyond.com* by Evan Carroll and John Romano regularly publishes articles about digital existence and what happens to it after one dies. A number of websites enable digital estate planning, the creation of online obituaries and the like. The website *thetalesofpim.org* attempts to create a platform for exchanging experiences related to personal information management strategies. More examples will be provided as we further on discuss them.

The aforementioned blogs and websites are often aimed at a specialized audience and their presentation is mostly user-unfriendly. Even though dedicated services are available, they focus mainly on the digital estate planning or help to the bereaved. We didn't find any comfortable place where a user could find practical information regarding general procedures of what we call *thanatosensitive information management*. From our informal discussions held throughout the research period, we conclude that people are generally concerned about solving their issues while alive. They are willing to use the online death-related services, but they lack the knowledge about their existence. We believe that there is a possibility to create strategies that would improve the life of an individual while making the process of bereavement easier as a byproduct.

1.2 Objectives

With our research background in mind, we identify two main objectives for our work. We want to [1] Contribute to academic cross-disciplinary discussion on interwoven topics of personal information management, online personal identity, thanatosensitivity, digital death and digital afterlife, by constructing a new topic of *thanatosensitive information management (TIM)*, and

1 The very first documented project in the field of digital death was *FinalThoughts.com*. It was created by Michael Krim in 1999, about five years before *thefacebook.com* (the first version of *Facebook*) would be created. The service allowed post-humous messaging via email. It was discontinued because, back then, there would not be enough public interest for this kind of service (Carroll and Romano 2011).

[2] Create a web-based platform, providing a safe environment to consult and exchange the information about the TIM, that would be accessible and understandable by a broader public.

1.3 Disclaimer

In chapter 1, we provide a theoretic overview of the information necessary to establish the topic of thanatosensitive information management. This information was collected throughout our research. The objective was to provide a stable basis to enable discussion about the TIM, rather than to explore each of these topics in depth. It is not our intention to develop them into their wide ranging consequences. We focus on the present, rather than past or future. The issues being explored in this work change at fast pace and the information becomes easily outdated. In the research body we try to emphasize general conclusions over the concrete applications of it. However, these may appear later on in the practical part of this project. At last, while our work focuses on the impact of digital information in our personal worlds, it is impossible to separate physical and digital aspects of our lives, hence both are mentioned, where necessary.

2

Towards Thanatosensitive Information Management

Who was the first active internet user who passed away?

2.1 A Life Lived in the Digital Era

Technology pervades our cultures and the digital is increasingly, and inescapably, intersecting with our lives, transforming our way of living (Massimi et al. 2010). A study presented by the Pew Research Center (Taylor and Keeter 2010) shows that people born after 1928 are mostly positive about the impact of the new technologies on their lives. People think that the digital technology makes their lives easier, it brings people closer to their friends and family and allows them to use their time more efficiently. However, the way in which people interact with the new technology varies (e.g., the interaction between a child and a computer is very different from the interaction of a senior citizen and a computer). These differences are better understood in the generational context. In this work we adopt the terminology commonly used in literature: [1] *The Greatest Generation* (born before 1928) is the one that fought and won World War II, [2] *The Silent Generation* (1928–1945) was born during the Great Depression and World War II and their label refers to their conformist and civic instincts, [3] *The Baby Boomers* (1946–1964) were born between World War II and the year when the birth-control pill came to the market, [4] Generation X (1965–1980) is often depicted as the savvy and entrepreneurial loners, they are the last ones to truly remember the time before computers and mobile phones, [5] *The Millennials* (1981–1999) is the first generation that would come of age in the new millennium, while [6] *The Digital Natives* (born after 2000) generation replaces the Millennials and refers to those being born after the turn of the millennium.

Where groups of people once shared a single computer, now several computers are used, often exclusively, by a single person (Weiser 1996). Computers are becoming ubiquitous[2] and very likely a single computer is accompanied by several other digital technology gadgets. According to statistics, everyone owns a device that can text, email and browse the Web and our lives are more and more lived online (Carroll and Romano 2011, 3). Devices, such as smartphones, allow us to multitask[3] and perform many of our daily duties on the move[4]. We can get use of every burst of creative energy we might have whenever and wherever we are (e.g., a dad watching his son's football game at the stadium while taking care of his emails). However, this can sometimes be counterproductive or downright rude (e.g., answering phone calls at the

2 *Ubiquitous computing (ubicomp)* is the practice of making computers so common and accessible that users are no longer aware of their physical presence. An example of ubiquitous computing can be the increasingly common access points that provide us with broadband connection to the Internet.

3 To multitask means to alternate our attention between two or more activities over the same period of time.

4 The technology that enables this kind of interaction is called mobile computing. It is a term that describes our ability to use un-tethered technology in general. It means that our technology is not physically connected, or in remote or mobile environments.

theatre) (Jones 2008). Most of what we do is increasingly web-based or mediated by the Web[5] (e.g., shopping, selling, socializing, working, etc.) (Jones 2008, 352). This technology brings a lot of improvements, but it also causes many problems. We spend precious time learning how to use and maintain our various devices, instead of spending time with friends, family, or even alone. The need to be constantly connected produces a series of psychiatric disorders (e.g., disconnectivity anxiety (Taylor 2009), sleeping disorder, etc.).

Technology develops very fast. We can learn to use new devices, but developing new behaviors to use them efficiently takes more time[6]. On the cover of the book by Clay Shirky *Here Comes Everybody* (2009) we read "Revolution doesn't happen when society adopts new technologies, it happens when society adopts new behaviors." But we did not invent new types of artifacts. While the technology itself enables new forms of information (e.g., email messages, SMS messages, web pages, etc.), we appropriate the ways in which we create, experience, share and pass on media (Carroll and Romano 2011, 14). The digital representation of photos, home videos, love letters and others is largely replacing physical objects. The digital convergence for informational things in our lives has two points. On one side stand ubiquitous devices, on the other side is the Web, driven by hardware advances (e.g., increasing bandwidth, storage capacity, etc.) and its basic ability to connect, nearly instantaneously, person to person and person to information (Jones 2008, 348). While the technologies are new (e.g., PCs, mobile phones, etc.), many conceptual issues (e.g., authorship, privacy, security, curation, storage, longevity, etc.) associated to this shift have been previously unpacked, examined and problematized by the humanities (Massimi and Charise 2009, 4).

2.2 Death, Mortality and Dying

Our day-to-day living is driven by digital technology but this technology is built upon the basic human experiences—we are born, we live and we die. Death[7] is the most significant for our work, but also the most occulted[8] from our lives. The interest in *afterlife* has been a foundational concept of human history and for making sense of life (e.g., Lazarus and Jesus's rebirth in the Bible,

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5 In informal discussions, the Web is frequently used interchangeably with the Internet (e.g., I've found this information on the Internet), but they are not quite the same. The Internet is a global data communication network, composed by academic, commercial and government networks, connected over international telecommunication backbones (e.g., electronic, wireless and optical networking technologies) and routed using Internet Protocol Suite (TCP/IP). The Internet carries a vast range of information resources and provides an infrastructure for a variety of services (e.g., World Wide Web, electronic mail, telephone service based on Voice over Internet Protocol). The World Wide Web (commonly abbreviated as WWW, W3 or the Web) is the most commonly used resource of the Internet. It is a collection of interlinked hypertext documents (these may contain text, images, videos and other multimedia and we navigate between them using hyperlinks) residing on computers called web servers and rendered in programs called web browsers. These documents are transported over the Internet via Hyper Text Transport Protocol (http).

6 Erik Brynjolfsson, an MIT Sloan professor of digital business interviewed by *Digits* (Hickins 2011), gives an example. When cars were first introduced, they created tens of thousands of highway deaths per year until people learned more about best practices like stop lights, etc., but this did not mean that people would stop using cars. Brynjolfsson alerts for awareness, but at the same time encourages the use of technologies.

7 Massimi points to work developed by Sigmund Freud, where he argues that human life is defined not only by the desire for *life*, but also by a *death drive* that encompasses the fact of death, destruction, and non-existence. Freud suggests that "[t]he aim of all life is death" (Massimi and Charise 2009).

8 However, as well as many other taboos, death remains a matter of anecdotes (Young, Parkes and Laungani 2004), fascinations, art and design (Massimi et al. 2011).

the Phoenix in ancient mythologies) (Massimi et al. 2011). Even though our educational system prepares us to give birth to a child since preschool, the practices concerning death are frequently unusual and hidden (Massimi and Charise 2009).

For most of Western history, dying occurred in bed, at home, surrounded by family, and had a given structure defined by the cultural rituals (Odom et al. 2009). The rules of society are however changing. Nowadays, people generally do not know much about their rituals anymore and the help of a specialist might be needed, especially when it comes to dying. Religion, that used to introduce social obligations and provide guidance for rituals, is loosing power. Therefore, society is loosing its basic principles of security[9] (Young, Parkes and Laungani 2004). During the World Wars, dying occurred within the context of the war and on the battlefield, far away from home (Bendle 2001; quoted in Massimi et al. 2010). After the World Wars, dying became medicalized and occurred primarily in hospitals, where the individual's subjectivity and humanity are oppressed for the sake of institutional efficiency (Massimi et al. 2010). Due to medical care improvements, most of the people living in the Western world reach very high ages (Young, Parkes and Laungani 2004). Modern society is returning to the agrarian custom of dying at home (as opposed to dying on the battlefield or at the hospital, which seems to be characteristic for most of the 20th century). As dying becomes more visible, a new need for expression, dignity, and acknowledgment arises (Walter 1994; quoted in Massimi and Baecker 2010).

Examining anthropologic, sociologic and psychologic studies gives us important basics for a better understanding of the conceptual and practical issues surrounding death, computing and human experience. Comparing to other areas of technological research, studies concerning death and mortality are rarely amenable for laboratory study and fieldwork in this area incurs into considerable ethical and cultural concerns (Massimi and Charise 2009). In relation to digital life we talk about: [1] *Death,* which has a singular and temporally constrained occurrence. It can be defined in biological context as the end of capacity for action and any affair subsequent to it is inconsequential (Young, Parkes and Laungani 2004). Alternatively, it can be viewed in social context as the moment when all socially active attributes of a person permanently cease to be operative. This happens after the person is already regarded as dead (Sudnow 1967; quoted in Odom et al. 2010). [2] *Mortality* is the condition of being mortal or subject to death, which has the duration of the entire life-span of all the people (Massimi and Charise 2009). [3] *The End of Life* means "the period of a person's life-span where there is an irreversible, downward progression in health and where biological death is imminent" (Massimi et al. 2011).

Death has implications beyond the individual's life-span and personal control. In our work, we start by dividing of the population according to one's status towards death, as suggested by Massimi et al. (2011): [1] *The Living*, [2] *The Dying*, [3] *The Bereaved*, and [4] *The Dead*. These will be described more in depth further on throughout this work.

The Living group is defined by the condition of mortality, which influences how people perceive themselves and how they choose to live their lives. Normally, people would start to draft a will around middle age or when other significant life events prevail upon them (e.g., the birth of a child, progression in career, etc.) in order to ensure the continuation and success of the progeny and close people. The living have also begun to plan out what should happen to their data,

9 The 20th century brought personal freedom that permitted a free choice of religion. As we gain tolerance, we lose respect for the sacred and drop many of the rituals that used to be part of our lives before (Young, Parkes and Laungani 2004).

as meaningful information is increasingly stored in digital form, across multiple disks, accounts and devices. The issues of mortality, however, are often confined and rarely addressed publicly.

The Dying group refers to individuals who received a clear prognosis or are in circumstances that indicate an imminent death. A limited timeframe for action often prompts people to take care of their individual, spiritual and interpersonal issues (e.g., simplifying daily activity, asking for forgiveness, waiting for forgiveness and relinquishing dreams). They may also possess a limited ability to interact with other people or technologies, because of unmet biological and emotional needs (e.g., pain, breathing problems, fatigue, depression, anxiety, loneliness, etc.). These conditions may be exacerbated by psychological or environmental factors (e.g., isolation from friends and family as a result of hospitalization or confinement to a retirement home). It seems obvious that some tools could be developed to enable the dying to take care of their issues at their own pace.

The Bereaved as a group can be loosely defined as the social network of people connected to someone who died. The discussions and research on the bereaved commonly focus on understanding reactions to grief, mourning, remembrance and inheritance. We identify a key difference against the previous three groups. The bereavement is not an explicit developmental period of the life-span but rather a reaction to the death of a close person. As a part of the bereavement process, members of this group have to understand, organize and retrieve personal artifacts and important pieces from the large datasets of life-logging information of the deceased. In some cases the experience of bereavement may prompt action to take care of their own belongings.

The Dead is a group established for its implications insofar as the living use the technology to take care of the dead's issues and to continue to remember (or forget) them. The available personal technologies enable actions to be perpetrated beyond the biological life-span. We should take into consideration the concerns and wishes of the deceased for determining how data should be stored or destroyed and how user profiles might change following their death (e.g., on *Facebook*, *Twitter* and other social networks).

2.3 Bereavement

The death of a close person can disrupt the social cohesiveness of our lives. Even our most familiar practices, routines and interactions (from cleaning to paying bills) can become unsettled (Massimi and Baecker 2010). The bereavement is often fraught with a range of very real, complex and emotional difficulties on individual and societal levels (Hertz 2004; quoted in Massimi et al. 2010). The bereaved family members have to contend with a series of emotionally charged and stressful circumstances (e.g., hold memorial services, inter the body, communicate the news to far-flung friends and family, distribute the possessions of the estate, etc.), while undergoing their own personal grieving process (Massimi and Baecker 2010). The bereavement is easier in an environment where everybody agrees upon which death-related practices are appropriate. The individuals living in places where their original culture is being doubted, or where death, regret, spirituality and related rituals can be comprehended in more than one way, are often subject to elevated personal fragility and may be caught in the *limb of regret*[10] (Young, Parkes and Laungani 2004).

10 According to Kubler-Ross et al. (2005; quoted in Odom et al. 2010), an average person is able to re-establish a sense of emotional balance after six to twelve months, but in extreme cases it may endure for longer periods of time.

Clearly, technology can provide (often invisible) emotional, functional and informational support for the bereavement. Unfortunately on the other hand, the support for personal practices surrounding one's death is currently seldom designed specifically for this purpose. For the time being, most of the tools are being repurposed by the bereaved users, or those providing them with support (e.g., hospital clinicians or therapists), according to their needs. Similarly to the physical places, the virtual environment allows the bereaved a place to mourn, commemorate, and reflect (e.g., online ceremonies in the virtual online world of the game *World of Warcraft*, photo sharing on *Flickr*, discussions about dying on *Craiglist*, reminiscing on *Facebook* memorial pages or online obituaries such as *1000memories*, etc.) (Massimi and Charise 2009; Massimi and Baecker 2010). The ability of the digital tools to comfort, confront, connect and convey the message 'I am mourning too', along the years following the death, is especially useful for the bereaved who live in distant places but must offer their support to one another (Massimi and Baecker 2010).

In the early stage of bereavement (immediately after the death occurs), people use digital technologies to seek information online, to complete administrative tasks (e.g., comparing funeral homes, looking for tax declarations, etc.), to create multimedia presentations to be used during memorial services, to send private messages to the deceased's email account, to call or text their mobile phones[11] and so on. Technology is also increasingly used by funeral homes and cemeteries to augment traditional ceremonies (e.g., with virtual condolence books, *PowerPoint* slide deck photos of the deceased, etc.) (Massimi and Baecker 2010; Massimi et al. 2011; Odom et al. 2010). Among the less immediate activities performed by bereaved in the digital age, belong the digitizing and repacking of the deceased's assets for distribution among family members, searching for genealogical or biographical information about the deceased (Massimi and Baecker 2010), using digital picture frames at home, reminiscing in emails to relatives (Massimi and Baecker 2010; Odom et al. 2010), etc.

2.4 Thanatosensitivity

A study held by Massimi and Baecker (2010) shows that "problems with technology inheritance are currently minimal for older adults who die" and points toward the conclusion that "these problems will be more profound for future generations." Yet, we may have to face these problems much earlier than we have thought. Even though the digital technology seems to be generally embraced by the Millennials and younger, according to the *New York Times* (Wortham 2010) people over 65 are now adopting *Facebook* at a faster pace than any other age group. These users also have the highest mortality rate. As the technology becomes ubiquitous, the devices become more personal and individualized and they are increasingly more difficult to be deciphered by others in the event of death. Our current technologies do not effectively acknowledge (or engage with) the inevitable death of their users (Massimi and Charise 2009), and the legal systems struggle to keep track. In our current situation it remains unclear how to effectively deal with the digital assets and who exactly owns which of them (individuals or corporations) (Lachut 2009).

11 The amount of emails, calls and texts to the deceased falls only when people start to feel that they have said enough through these familiar forms of communication (Odom et al. 2010).

Thanatology[12] is a multidisciplinary study of death and has been around since mid-20th century, when the increasing interest in the end of life emerged in medicine, social work and psychology. *Thanatosensitivity* was first mentioned by Massimi and Charise in 2009 (6) and defined as "a novel, humanistically-grounded approach to HCI research and design that recognizes and actively engages with the facts of mortality, dying, and death in the creation of interactive systems." In the context of thanatosensitivity, we can identify two most common approaches to regard the dead. Massimi and Charise treat the dead as a subset of users who must be designed for, as a category that eventually all users will belong to, while Brubaker (2010) sees the dead as a case of extreme users who, in the specificity of their technological needs, offer broader implications for the design for the living as well. For our work, we find Brubaker's approach more appropriate.

Thanatosensitivity was defined in the context of the field of Human-Computer Interaction, but we believe that this concept can become useful in other areas of human activity as well. In our work, we focus on its application within *personal information management*. We believe that the development and conscious adoption of the strategies and methods, based on the thanatosensitive principles, can reduce the negative impact of death on the bereaved.

2.5 Creating Personal Identity

From the moment when we are born, until our death, our personal identity is being developed. Defining the meaning of the term 'personal identity' is rather difficult as it is related to other aspects of the self (e.g., self-concept, self-esteem and self-expression). We include several explanations, in order to give an idea of what a personal identity is. Massimi and Baecker (2008) define personal identity as "the overarching narrative of an individual's entire life, including the past, present, and future". The Oxford Advanced Learner's Dictionary (2000) describes identity as "who or what somebody/something is", or "the characteristics, feelings or beliefs that distinguish people from others". Personal identity can be also described in a more practical way as "the sum of our relationships, interests and beliefs" (Paul-Choudhury 2011). Our personal identity mediates our representation in the outer world (Kirk and Banks 2008). Even though the experience in the physical and digital worlds differs, the information that we record about ourselves, in both of them, serves to same purpose. In the late 1950s Erving Goffman believed that we project our identities differently depending on the audience (1959; quoted in Carroll and Romano 2011, 48). Nowadays, the trend of dedicated social networking sites (e.g., *LinkedIn*) and the newly emerging social platforms with a fine-grained privacy policies enabled on publishing (e.g., *Google+*), make the projecting of our identities in different ways to different audiences incredibly easy.

The creation, storage, and retrieval of our personal identity is influenced on a daily basis by the relationships with other people, especially with family members (Massimi and Baecker 2008) and by the presence and use of the items that surround us. Collecting artifacts occupies a considerable amount of time in our lives. However our current consumer culture develops objects for replacement. They obsolesce very quickly and we change them very frequently. Particularly if we consider digital tools and artifacts, we have come to assume that we purchase these with a

12 The word comes from the Greek mythological figure *Thanatos*, who is often referred to for his ever-present orientation toward death and mortality.

view to replace them within just a few years, because they will have better styling and new features and their capacity will diminish relatively to the latest offerings available. Despite this, our digital objects and artifacts are constituent elements of who we are, at least for the time being (Kirk and Banks 2008).

Understanding the components of one's personal identity can help us deal with or relate to death and remember the deceased as they were throughout their lives (e.g., via multimedia biography). Our memory is fragile (Manohar and Rogers 2010) and tends to remember the individuals as experienced prior to their death, often influenced by the specific circumstances (e.g., illness, age-related cognitive decline, personal relationships, etc.). The set of personal objects and information can come to mediate our experiences of remembrance, to affect the ways in which we recall the deceased, to represent familial history and heritage[13] and to serve for reflection on our intentions of how we might wish to be remembered by others and even people we have never met, such as our great-great-great-grandchildren (Massimi and Baecker 2008; Kirk and Banks 2008).

The digital content is increasingly present among the *things* that form our identity. Our digital content is not created in isolation. It is connected to others within a content ecosystem (Carroll and Romano 2011). We curate, to some extent, the information available about ourselves online. We belong to many different social networks (e.g., we publish information on a blog, a website, *Facebook*, *LinkedIn*, we have email, etc.). The wall posts left by friends on our user profile or page contribute as much to our identity as the proper profile attributes created by us. While *Facebook* currently tries to aggregate as much information about ourselves as possible, it seems that the trend is shifting in direction to smaller, more specific social websites (Werdmuller, Cook and Sandvig 2011). The Web could be a better place if we were part of it, rather than being a layer on top of some company's database. Christian Sandvig suggests that our current schizophrenia could be eliminated if we had a single panel to manage all the layers of our identity which we project online, rather than managing several separate identities (2011). After its decease, the personal identity of the dead continues present in the social practices and third-party (often family member or spouse) features as constitutive of the primary user's identity. They may decide to remove the content, but in most cases it takes on a new life (Brubaker and Vertesi 2010).

2.6 Digital Artifacts in Our Lives

Clearly many artifacts, traditionally physical (e.g., the photographs), are becoming digital and, as they do, their amount increases exponentially (Massimi et al. 2011). Physical and digital artifacts have many characteristics in common (e.g., both need to be curated and taken care of for over time). But the way in which we interact with them differs according to their distinct properties. The physical artifacts may be fragile. Even thought they show their age and might break over time, they degrade gradually and may last for centuries. They are scarce or unique. They take up physical space and exist in only one place at a time. Typically a physical artifact is in possession of a single person. In order to be given or transferred to another person, it has to be physically moved. Digital artifacts are both fragile, since they can be easily deleted, and resilient, as they can be theoretically preserved forever. However, they require electricity, special attention for the proper format support and a device to read and display the data. The devices storing

13 People commonly pass down key artifacts they deem reflective of their own lives as well as those constituting social bonds with friends and family (Massimi et al. 2011).

digital media have to be replaced periodically, as their lifetime is measured at best in decades. The digital artifacts are not tangible and they have no physicality. They require minimal physical space, but their quantity may be overwhelming[14], as they can exist in an infinite number of copies and devices[15]. The same digital artifact can be owned by many people. The digital artifacts are easily sent to others over networks (Carroll and Romano 2011, 16).

The physical artifacts survive through time. They can create a strong connection to (and help us remember) the past, since they were part of it. The things we own today can become exponentially more valuable to others (e.g., family, friends, or even historians) since they have been part of someone else's life[16]. The future generations will probably have less attachment to physical objects, since they have not been actively engaged in the process of their creation. Our personal ideas of value are both contextual and temporal, changing with the situation and time. In order to enable the digital objects to create a connection, we have to add metadata providing additional information that is not obvious. The value of both physical and digital artifacts depends on the connection we establish with them, rather than on the way in which they were created (Carroll and Romano 2011). If the attachment to an object is only based on the way it expresses our lifestyle, the object becomes vulnerable to be replaced by any other with the same characteristics (Verbeek 2005; quoted in Odom et al. 2009). The objects gain value as we find more time to look at them and as we start to rely on them to resurrect our own fading memories of the people and events from long ago (Jones 2008, 166).

Odom et al. (2009) describe four general types of relationships that appear directly correlated with the strength of attachment to an object: [1] *Engagement* is the relation between the owner and the object, created upon the physical involvement during its use; [2] *Histories* create a relationship based on the ability of the materials to preserve personal histories or other memories, either by explicitly showing physical signs of use, or implicitly by the virtue of its persistence over time; [3] *Augmentation* is a relationship where an object has been reused, renewed, modified, altered or otherwise made to be a part of something beyond its original intended use and, as such, becomes a symbol of the resourcefulness and (or) the creative expression of its owner; [4] *Perceived durability* is a relation based on regarding an object as long-lasting, either in terms of function, longevity or both.

For a better understanding of how our connection with an object works, Odom et al. (2009) identify the durability of an object as the most important characteristic. The durability helps us decide why to preserve some things and get rid of others. They refer to a three-element framework, established by Verbeek (2005; quoted in Odom et al. 2009). This framework consists of [1] Function, [2] Symbolism and [3] Material Qualities. This framework is intended as sound rather than complete, since many other notions could be included.

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14 Since the emergence of tools like *Facebook*, *Flickr* and *YouTube*, an increasing amount of content is stored in the cloud. In 2008, *Google* reported that it was processing 20 petabytes of user-generated content every day. *YouTube* reported that 24 hours of video are uploaded to their servers every minute. Radicati Group projected that an average of 247 billion emails is sent per day (Carroll and Romano 2011).

15 We have already mentioned photographs as an example. They were previously taken in small numbers and printed on paper. Now they are taken in large numbers and some of them might never be physically reproduced, or even viewed, during the original owners' lifetime.

16 Even though the object can gain value for being part of someone else's life, secondhand stores are filled with objects that are bereft of their meaning. In many respects, they are failed heirlooms. Some of one's most treasured possessions can very easily become worthless (Carroll and Romano 2011).

A function is what an object does. In general, an object's function is more prone to obsolescence in the presence of new technologies than its symbolism or material qualities. However, it seems that decidedly single-purpose objects are able to endure while they maintain an engagement or a strong relation to one's personal history, or if they can be used in a new way, or simply still work in a perceived durable way.

Symbolism is what an object means. The meaning of an object is harder to predict than the way in which it is likely to be used, the endurance of its function, or the life-span of its material qualities. Symbolism arising from personal history, as a byproduct of the use over time, or from augmentation reflecting back on its owner, can create a high strength of attachment. The meaning, sometimes lost, is almost always changed in the transfer to another owner.

Material Qualities are what an object is made of and its broader sensual appeal. Certain materials inspire durability (e.g., wood, metal, precious stones, etc.). The perceived quality of the materials in an object causes a high strength of attachment. Verbeek gives a special importance to the material qualities, over symbolism and function, for its ability to explain and predict the durability of relationships between people and things.

2.7 Dealing with Personal Information

We process large quantities of information every day. A big part of this information is related to a specific person, usually us. In this chapter we will look further on the different kinds of information and personal information and also on the ways in which we interact with them. The set of activities we employ in order to deal with our personal information, and one of the main topics explored in this work, is called *personal information management*, often referred to as *PIM*. Prior to introducing PIM, we will give an overview of the most important terms related to this discussion: [1] Information, [2] Personal Information, [3] Information Item, [4] Personal Space of Information (PSI), [5] Personal Unifying Taxonomy (PUT).

2.7.1 Information

Information is an overloaded term, with uses that range from the physical (information as a document or some other *thing*) to the abstract (information as a means of reducing uncertainty). Buckland (1991) provides an analysis, illustrating that the word *information* alternately denotes a process (the act of informing), a result (a state of being informed or the knowledge imparted), or an object (such as a document that contains and communicates information). In reaction to the definitional inclusiveness of information and the many senses in which the word is used, Buckland concludes that "We are unable to say confidently of anything that it could not be information" (1991, 356). Information has certain properties, not inherent in most other things (e.g., an office table), it can be easily copied, transformed and distributed. Digital information, especially, is malleable and we are likely to judge it to be the same across these transformations[17]. Information may be expressed in various ways (e.g., as spoken comments from a friend, as a billboard seen on the way to work, or via any number of information items including documents, email messages, web pages and handwritten notes) (Jones 2008, 61).

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17 A tutorial on how to build a nest box can start on paper, be scanned onto computer, converted to text and sent by email, but we still can build the nest box following this tutorial.

Information can be used by and impact us in different perspectives, we hence present a selection made by Jones (2008, 29-30): [1] *Information is what we process to understand our world*. Our intelligence comes from our ability to process the raw information, received through our senses (in sights, sounds, touches, tastes and smells), into concepts, patterns and implications. Information helps us to understand, predict and even control outcomes in the worlds that matter to us. [2] *Information is what is contained in documents, email messages, web pages, MP3 files, photographs (digital and paper-based), videos, etc.* [3] *Information is what can be stored, retrieved, copied, transformed and distributed*. As an alternate perspective on *information as a thing*, it can be defined by what we can do with it. [4] *Information is how other worlds—past, present and future, possible and pretend—are represented to us.* It can help us to imagine what the world was like in the past century, how people live in Mongolia, or our summer vacation. [5] *Information is how we are represented to the outer world*. Information portrays our medical history, our financial status, our purchasing patterns and even our airplane seating preferences. Information in the outer world may no longer reflect *us* today, as we face information persistence[18]. Updating or correcting this information can be, in some cases, nearly impossible. [6] *Information is what we use to get things done*. We send emails to make reservations, fill in forms to order things, write reports to influence people, etc. [7] *Information is an extension of us*. Information can persist in printed documents and, now, on personal websites, blogs and the like, to serve as an extension of ourselves. [8] *Information is a drain of a person's money, energy, attention and time.* Advertisements convince us to buy things. Email messages can distract us and take up all our time and energy. Even small changes (e.g., the red squiggly line under a misspelled word inside a document we are writing) can distract. [9] *Information is what we can use to have things our way.* Information and information technologies can work as a cushion to free us from the immediate demands of our environment, so that we can set our own timetable of work and play.

2.7.2 Personal Information

Personal Information is a designation for information that relates in any way to a person and, in the end, contributes to the creation of personal identity. Jones (2008, 34) defines six senses of personal information: [1] Information controlled and (or) owned by *me*, [2] Information about *me*, that others may have or want, [3] Information directed toward *me*, [4] Information sent (or posted, or provided) by *me*, [5] Information already experienced by *me* and [6] Information potentially relevant (useful) to *me*. Personal information has a life cycle, we move it within (or out of) our *personal space of information*[19], according to our current needs (e.g., we may place an information into a project, or an archival folder).

Information controlled and (or) owned by me is the information a person keeps, directly or indirectly, for personal use. Although information is, at least nominally, under the person's control, the rights of ownership for portions of this information are sometimes in dispute. This kind of information has to be protected against break-ins, vandalism (e.g., in the form of computer viruses that may corrupt personal data), theft, snooping and outright takeover, etc. Examples include email messages in our email accounts, files on our computer's hard drive and so on.

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18 Information persistence may be a problem even if we exercise initial control over what information we share and with whom. The information we share when we are young, or when we provide incorrect input, might show up at inopportune occasions after a long time.

19 This will be explained further in the part 2.7.4 *Personal Space of Information*.

Information about me, that others may have or want is information about a person but available to, and possibly controlled by, others. With this information we face issues such as who sees it, under what circumstances, how to correct or update it and how long it stays. Examples include credit or medical history, web-browsing patterns, records of library books checked out, etc.

Information directed toward me is information that may not be personally relevant by itself, but its intended impacts certainly are personal. It is a big source of distraction, since it does not warn us that it will appear. The related issues deal with the protection of *us* and our resources. Examples include phone calls, drop-ins, TV ads, web ads, and pop-ups.

Information sent (or posted, or provided) by me. We wish to have control at least over who sees our information and when. We also try to find out whether the message went through. Examples include the information we send in emails, post to a blog or a personal website, publish in a report or an article, etc.

Information already experienced by me refers to the information we consult, but normally do not consume entirely in one or even several readings. This information is overlapping with the first category, as it is owned, and or controlled, by us. We might want to keep some of this information private (e.g., we don't want web *cookies* to provide the websites with information about us). An important challenge is to support its re-finding. Examples include web pages that remain on the Web, books that remain in a library, TV and radio programs that remain somewhere in *broadcast ether*, etc.

Information potentially relevant (useful) to me cuts across the previous five senses to include subsets of information *out there* that we have experienced already and, also, new information we have never seen before. We filter what we would or wouldn't ourselves (or our family) like to see (e.g., offensive material on the Web). This kind of information is easier to be managed in the physical world. The information *out there* can potentially disappear entirely, at any time, without a prior notice.

We collect (keep or discard) our personal information for its different value across the different supports (paper and digital), which is determined, similarly to all other artifacts, by the established relationships and the information durability. The relationships in the context of personal information are relative to the intentions of the sender, the method of delivery and the current state of a recipient's knowledge. We can divide personal information into four categories according to their value: [1] Precious, irreplaceable information, [2] Extremely difficult to replace information, [3] Reference collections and [4] Working information. (Jones 2008, 160, 166, 174).

Precious, irreplaceable information is a category of personal information that we maintain for now and for later. It includes pictures, videos and letters we have of (or by) our family and friends. For some of us, this category may include working notes recording some occasional flash of insight. For later we may maintain precious and irreplaceable information, such as scrapbooks (paper or digital) with mementos of our lives' events.

Extremely difficult to replace information is a category of personal information which includes legal documents, such as the title to the house or automobile, deeds of sale, birth certificates and alike. For some people it also includes the information to establish priority on patent claims or the information relating to completed projects. We maintain information items belonging to this category even if they are seldom accessed, or available from the Web or other external resources. The cost of maintenance is outweighed by the effort needed to locate the information elsewhere as prompted, or the possibility of it to disappear from pub-

lic stores (e.g., the Web). We keep this kind of information in non-digital form, not just (or necessarily) for ourselves, but also for those who survive us. We maintain, for now and for later, the same kind of information, though the reasons for it may shift. For example, people may want to maintain information associated with projects, completed years and years ago, as *for the record* protection in case of legal disputes. They may want to keep the plans of the construction project they did in their house a decade ago, to be available as a reference for the next remodelling.

Reference collections is a category that has often more value in its composition and organization, rather than in the individual items themselves. People assemble reference collections of photographs (whether created by them or portraying them), illustrations, music, articles, recipes, and even jokes. Reference collections may be used repeatedly for various reasons (to cook a meal, get in a better mood, cheer up a friend). The individual items in a collection are often easily replaced (sometimes with a simple visit to the Web). But the memory of what went into the collection doesn't disappear so easily. This category may be seen as transitional in the temporal perspective. It is primarily maintained for reference at present, but may be consulted after a long period of time as well.

Working information is a category which includes information exclusively maintained for now. It includes collections of information for projects we are currently working on, reference information (e.g., the phone numbers of an address book, email addresses, account credentials, etc.) that we need to have at hand to get our work done. We can make copies of it (e.g., to a thumb drive, or external hard disk) so it can be present wherever we are. The important factors for working information are visibility (e.g., to see everything at once can help us to see that given task depends critically on the outcome of previous task), accessibility and preservation of the current state (e.g., the *Resume* feature of *Mac OSX Lion* helps us to preserve our work environment even if we restart our computer).

2.7.3 Information Item

An *information item* is a packaging that represents an information and can contain other information items. If we think about the Buckland's concept of *information-as-thing*, what probably comes first to our mind is a document.

> A printed book is a document. A page of hand-writing is a document. A diagram is a document. A map is a document. If a map is a document, why should not a three-dimensional contour map also be a document? Why should not a globe also be considered a document since it is, after all, a physical description of something? (1991, 354)

Information-as-thing gives us something tangible that can be manipulated. The form of an information item is determined by the tools and applications that support these operations, in the same way as the digital data derives from the type of devices we use or own. Examples of information items include paper documents, electronic documents, digital photographs, digital music, digital film and other files, email messages, web pages and references (e.g., shortcuts, aliases) to any of the above (Jones 2008, 37).

In this context we also speak about [1] *Information semi-item* which is the kind of information item that does not let us perform all of the operations (e.g., a web page can be saved, but not

copy/pasted or moved), [2] *Statements* which are embedded in the information items (e.g., a web page, email message, document or the entry for a person in a contact-management database) but rarely are information items themselves to be retrieved on their own, and [3] *Other objects* that can occasionally bear information, however they are not information items per se (e.g., depending on how much we leave the door open, we communicate whether we should or should not be bothered) (Jones 2008, 38).

2.7.4 Personal Space of Information

Personal Space of Information (PSI) is unique and refers to all informational artifacts related to a person. PSI includes personal information in each of its six senses as referred above, but includes also various tools and other objects (virtual and visible) affecting the information flow. PSI affects the way we view and interact with the world(s) we inhabit and our access to information (especially as mediated by the Web), thus giving us an astonishing reach to *realities* (both real and virtual) far removed from our current time and place[20]. PSI influences the way in which we are seen, categorized and treated by others. Our PSIs are large and mostly unexplored, with uncertain boundaries and big areas of overlap (with PSIs of other people and organizations). Our PSI is external to us and we can pretty much detach from it by moving somewhere else to a different context. Our control over our PSI is partly illusory (e.g., we can erase an email message from our computer, but may stay on the server). Rather than trying to have control over the entire PSI, we should focus on organizing smaller portions of it. (Jones 2008)

PSI is commonly subdivided into [1] Regions and [2] Personal Information Collections.

The regions can be distinguished by frequency of access: a [1] *Hot (immediate) region* contains the information in active use, which is generally accessed at least once a day, a [2] *Warm (working) region* contains the information on hold for use in a particular task or project which is active, and a [3] *Cold (no longer in active use) region* contains consciously archived information (Jones 2008, 50).

The personal information collection (PIC) is a personally curated[21] subset of a PSI. We consider two important kinds of PICs: [1] *Reference collections* which contain items that are selected for repeated use but with no specific use in mind (e.g., the books of a personal library or dinner recipes downloaded from the Web), and [2] *Project collections* where all the items relate to a particular project[22] that we are trying to complete (e.g., a collection of all email correspondence addressed to the organization of a friend's surprise birthday party, the web bookmarks we might gather relating to a summer vacation which we are planning) (Jones 2008, 47).

2.7.5 Personal Unifying Taxonomy

Personal Unifying Taxonomy (PUT) is each person's unique and customized *classification scheme*. A PUT reflects various activities, people and areas of interest in a person's life—past, present and future. Implicit to this term is the notion that there are associated external representation and rules

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20 Examples can be found in the section 2.7.1 *Information*, under the perspective [4].

21 Created and managed with a conscious effort to select and organize the information included.

22 In the context of PIM, the term *project* is often used interchangeably with *task*, however it is useful and important to make a distinction between them. A task is something we can put on a to-do-list and can normally be completed within a single sitting. A project is made up of any number of tasks and sub-projects and can last for weeks or months. For a project to be successfully completed, many or most of its components must be completed in the right order and time (Jones 2008).

for its application which can be consistently followed. A PUT is often hierarchical, but not necessarily so. It may be a single, top level of categories representing the key roles, projects and areas of interest. With small extensions a PUT can be used to classify and organize a person's information regardless of its form (e.g., email, e-documents and paper documents can have the same top-level structure, but subfolders may be used to provide additional, fine-grained organization for e-documents). People can apply PUT or portions of it to achieve some measure of consistency across the different information organizations. PUT's rules of application are supposed to be easy to learn and communicate and should be easily and consistently followed. Using PUT simplifies the decisions of keeping it, because we immediately know where to file our information and it eliminates situations such as leaving information in a random place, until there is too much clutter, or deleting it, because we do not know where to file it. PUT can be very helpful when collaborating on a project with someone else, because it allows all the people to follow the same patterns (Jones 2008, 383).

2.7.6 Personal Information Management

Personal information management (PIM) is essentially about taking charge of the information in our lives. Personal information management is inevitably a part of our lives. We all do it, but most likely don't think about it very much. PIM enables us to use information (digital and paper-based) over time in order to keep ourselves on track to fulfill our life's goals, roles and responsibilities. Jones also provides a more formal definition:

> Personal information management (PIM) refers to both the practice and the study of the activities a person performs in order to acquire or create, store, organize, maintain, retrieve, use and distribute the information needed to meet life's many goals (everyday and long-term, work-related and not) and to fulfill life's many roles and responsibilities (as parent, spouse, friend, employee, community member, etc.). PIM places special emphasis on the organization and maintenance of personal information collections in which information items, such as paper documents, electronic documents, email messages, web references, handwritten notes, etc., are stored for later use and repeated re-use (Jones 2008, 5).

PIM as an area has been scattered and studied by many different scientific fields such as cognitive psychology, human-computer interaction, database management, artificial intelligence, information and knowledge management, information retrieval, and information science (Jones 2008, 12).

Personal information management is unique (Jones 2008, 236), subjective, its activities are context-sensitive and happening everywhere[23] (Diehl 2009). We should regard each PIM as a *work-in-progress*, which reflects the person's personality, cognitive abilities, age group (e.g., teens, college students, elderly people), experience, training, various roles at work and elsewhere, available tools, available spaces, special circumstances (e.g., life-threatening illness) and so on. Even people who have a great deal in common with respect to profession, education and computing platform, show great variation in their practices of PIM (Jones 2008, 236). The information use and the information management are interwoven. The boundaries are blurred especially for digital information. Separating the two means to risk missing important opportunities for a synergy between and integration of different activities (Jones 2008, 19). PIM may involve

23 The activities happen across many tools, applications and information forms, as well as in different time and location.

other people (e.g., while sharing responsibilities of maintenance or collaboration on a project). Even though nowadays it is difficult to imagine a PIM practice without a computer, PIM considers our personal information in all its various forms, including paper (Jones 2008, 70).

The ideal PIM requires that we always have the right information in the right place, in the right form and in the right amount. In reality, normally none of these occurs and the tools supposed to help us make the task even worse. The technology and tool development, for all their promise, invariably create new problems and sometimes exacerbate the old ones (Jones 2008, 6).

PIM serves to project our control where we can and to make allowances for regions we can't control. Our resources differ depending on circumstances and are limited. Information itself is rarely a precious asset, but managing information is a more *tangible*—thus easier—way to have control over other—actually valuable—resources, such as time, money, energy and attention. Too often, the use of these resources seems to be controlled by our information world, instead of us. Sometimes the management of information is about removing and forgetting, rather than saving and remembering. Old information left lying around can distract and get in the way as we try to attend to current information for current tasks (Jones 2008). Further on Jones refers to Kaye et al., who observe that sometimes "archives were meant for storage, but not necessarily for retrieval: putting things away and into the right place was much more important in this type of archive than ever retrieving items again" (Kaye et al. 2006; quoted in Jones 2008, 174).

When talking about PIM, we have to consider *efficiency*, *effectiveness* and *satisfaction*. An organizational scheme can be effective at organizing information for later use, but still be inefficient for the demands it places on a person's time to keep and organize it. The error rates and accuracy are relevant to the discussion of effectiveness. If we frequently fail, our effectiveness obviously goes down. Satisfaction is an inherently more subjective measure than either the effectiveness or efficiency. The strategy which has proven effective and efficient for Edgar may still be deeply unsatisfying to Ana. An elaborate scheme of organization that is extremely time-demanding to learn before it can be used, may fail for the simple reason that we never find the time to do so (Jones 2008, 218–219).

2.7.7 PIM activities

The PIM activities are an effort to establish, use and maintain a *mapping* between a piece of information and a need.

The need can be expressed in several ways, it may originate in a person (e.g., who recalls that he or she needs to make a plane reservation for an upcoming trip) or in a request from someone else (e.g., as a question made by a colleague that we met in the hallway). The needs themselves are evoked by an information item and they depend on the importance of the task we are accomplishing (Jones 2008, 60).

Only small portions of the mapping, the connection between need and information, have an observable external representation. The mapping is done partly in our heads and partly in external organizational structures and supporting tools. Large portions of it are only potential, not realized in either external or internal form. Various kinds of *meta-level activities* are critical to the creation, maintenance and use of the mapping (Jones 2008, 61). The nature of mapping is affected by several factors. [1] *Schemes of PIM organization* that guide the naming of the information items and their organization into folders by various tags, properties and value, or by a combination of these. [2] *Tools of PIM* that include all

kinds of personal devices we use (e.g., computers, telephones, PDAs, etc.), their operating systems, different software applications which run on these devices (e.g., word processors, web browsers, etc.) and their specific facilities and features (e.g., smart folders, search, etc.). The tools do not need to be digital. For paper-based information we consider as tools objects such as a paper clip or a stapler. [3] *Strategies of PIM* tie together one or several schemes of organization, tools, and various aspects of a person's daily environment, including predictable flows of information (e.g., through websites, routes to and from work, etc.). A strategy can be seen as a plan for successful action, based on the rationality and interdependence of the moves of other people. Strategies may be partially, but are rarely fully, articulated by their practitioners and carry different levels of satisfaction (Jones 2008, 215).

People seek in the effort to meet a need. While digital information items may occupy a virtual space, such space cannot yet compete with the richness of physical spaces. Similarly, we can search for digital information using computer-based tools in ways that we cannot use in the search for physical objects. The failures in finding an object have the same weight regardless of their nature—digital or physical. A lot of our daily events is about deciding what we will do with the information we have. Without putting some effort into keeping information, at least to note its existence and relevance to projects in our lives, we may forget even to look for this information later. A bad organization can be worse than no organization at all. The information we keep in a wrong way may prove useless when the need arises later on (Jones 2008).

Jones (2008) defines three major groups of PIM activities: [1] Keeping, [2] Finding/Re-finding, and [3] Meta-level activities. Keeping and finding consume most of our time during an ordinary day. Meta-level activities (*meta* can have the meaning of *beyond*, *about*, or *after*) are frequently postponed for later and are seldom urgent.

2.7.7.1 Keeping

Keeping can be described as the decisions made and actions taken to relate the current information (at hand or under consideration) to the anticipated needs. These decisions can include: [1] Ignore, this has no relevance to me, [2] Ignore, I can get back to this later (by asking a friend, searching the Web, or some other act of finding), and [3] Keep this in a special place or way, so that I can be sure to use this information later (Jones 2008, 125).

Keeping addresses issues such as where and how to keep our information, on which device and in what form. Failures we may experience when trying to find an information, may actually originate in failures of keeping. Keeping and organizing are often used interchangeably and, indeed, one can prompt the other. Both of them involve a strategy, as well as actions and structures. But important distinctions are made between these two kinds of activities. While keeping focuses on an item, organizing focuses overall on a collection of information and it is the first activity we will consider as meta-level in connection with PIM. Keeping is what we do while placing a document into a folder. We may keep information in order to re-use, or simply for memorizing purposes. People show large variation in their habits of keeping and organizing. The variations partly reflect informational circumstance and need. Some of us may decide to keep everything, others to keep nothing. Some of us may organize our information, others may not. It is difficult to understand the practice of keeping and organizing, even our own, without some assessment of strategy behind the observable actions and visible structures (Jones 2008).

Keeping is a multistep activity and can fail at any step. Keeping has many facets leading to its completion. These facets reflect uncertainty concerning the information itself and the need(s) to which the information will be applied (e.g., is the information needed now or later or not at all, where is/will be the information needed, on what device and in what form, should it be filed away or left in a pile, etc.). Keeping may even trigger the act of finding. The challenges of keeping and organizing, multiply with the increase in number of information items and forms to be managed. Information fragmentation also complicates the decision of keeping. We store the information necessary to fulfill our anticipated needs, but we have to consider the inherent information device, organization and form, as well as the time and place, of our future need. We should concentrate more to "Put it where we think we will need it again later" (Jones 2008, 129).

A significant part of the keeping concerns is related to the future. There are three basic approaches to keeping for the future. We can [1] Keep everything, [2] Keep nothing, or [3] Keep automatically. No matter what we choose, there is always a good percentage of wrong choices. We might keep useless, or fail to keep useful, information.

The keep everything concept takes advantage of the quick development of the technologies of storage and search. Storage capacities are increasing and their price continues to drop, while the cost of access continues to rise, as the information we want becomes diluted in other we don't need. There is no evidence that human capacity to attend increases as well (Jones 2008, 134) and only less than 10 percent (133) of the information kept by us is ever accessed again. Search can help us pinpoint the information we need, no matter how big is the amount of information through which we are looking. Placing the information into folders can cause difficulty in finding, as can also the creation of different folders with a similar purpose. The items placed in a small number of piles have high visibility and accessibility, however our ability to manage piles of information is limited. When we have the information in sight, we are reminded of things and we see relationships that we might otherwise forget. But if we keep the items in sight, we can miss them anyway, as we can learn to ignore what we see constantly. Keeping the information visible can also lead to distraction from other tasks (e.g., the constant checking of our email). The major problem, when keeping everything, is our lack of the advanced information literacy to effectively anticipate whether the information is going to be needed in the future. Without this knowledge it is extremely difficult to get rid of anything.

Keeping nothing presupposes that everything we need is located on the Web or in the organizational intranets anyway, so we do not have to bother keeping the information on our side at all. However, most of us still need (want) to keep and organize selected collections of our personal information. This concept has more use in entrepreneurial environment, where storing data on an intranet, which is constantly accessible, with a logical project (subproject) folder organization, proves to be useful. Yet, we cannot expect that the intranet information would be *labeled* in terms as we need for our personal life projects. We cannot find what we forget to look for. Even if the repository is well structured, we might need some reference stored locally, to remember to look for a particular item (Jones 2008, 135).

Keeping automatically depends on the ability of our future computer to recognize and keep the information we need (e.g., based on our past interactions with this information and our future plans). Although by using a fully automated system of classification, without *manual* processing of incoming information, we may feel that we are loosing control, or that we are completely unaware of which information enters our PSI (Jones 2008).

2.7.7.2 Finding

Finding is defined by Jones (2008, 82) as follows:

> Information finding is an ongoing, minute-by-minute interaction with a large and growing PSI, involving not only the needed information but also the information, organizing constructs and tool support that are encountered and used along the way to this needed information and then back again to the situation prompting the need for this information. Needed information is found following paths through the PSI. Found information and the process of finding extend and further integrate the PSI.

In other words we can say that finding provides the connection between, and moves from, need to information. Similarly to keeping it is a multistep process of recall (verbal, temporal, or spacial) and recognition with the possibility of stumbling at each step. If we retrieve the desired information, we either use it in a situation that prompted its retrieval, or we keep it for later. If not, we repeat the steps as needed. The steps can iterate to progressively narrow down the search. For successful finding we first have to recall something about the information we need. We miss many opportunities to re-find and re-use information, because we do not remember to look for it. Even a simple look-up takes time and takes us away from the context of our current task. It is easier to find the information (and more tools and support are available for this purpose), than to return back to the original context where the information found has to be applied (Jones 2008).

We mostly perform the finding activities, throughout our regular days, to accomplish our current tasks, rather than seeking to learn something new or to fill gaps in our knowledge. We can subdivide our finding activities into four groups: [1] Re-finding information we have under control and we have seen before, [2] Re-finding information on the Web that we have seen before, but is not under our control, [3] Finding new information that has not been seen before and is not controlled by us and [4] Finding new information that we have under our control, but it is still new to us.

Re-finding information we have under control and we have seen before. We keep a piece of information, and sometimes create it in the first place, as a general reference to which we return repeatedly (e.g., articles, contacts, or a spreadsheet with passwords). We may consume this information entirely, partially (e.g., we may read an email message or a document with the intention to read it more thoroughly later), or not ever use it at all. The search tools can help, especially if these are integrative and enable search across multiple information forms and within different environments (e.g., text editors, file systems). Auto-complete and fill ins can help us to re-use smaller pieces of working information, while other tools can help us to automate tagging and grouping of information items by task and effort.

Re-finding information on the Web that we have seen before, but is not under our control. Most common methods for returning to known web information include clicking through hyperlinks from a familiar starting point, such as a web portal or home page, or a repeated search that completes a partially typed web address or keyword, where completion is drawn from the web addresses for the pages previously visited. Very likely, the next page we will consult on the Web is a page we have already accessed at some point in the past (Jones 2008, 84).

Finding new information that has not been seen before and is not controlled by us. A strong personal component is present even in our efforts to find new information we have never experienced before from a public store. Our access to new information might be lead by any information possibly kept in our PSI (e.g., outline or to-do list, query we maintain in our PSI as a

bookmark). We should situate our newly found information immediately, in relation to our already existing information.

Finding new information that we have under control, but is still new to us. Since the amount of information we control increases with the growth of the storage capacities of the devices we own, it is quite frequent to find new information among the information we already possess. Paying attention to information we already have can be useful to our current or new needs, but if our information is badly organized, looking for it can become a nuisance (Jones 2008).

As with any PIM related activity, users apply multiple methods and techniques when it comes to finding. Decisions on which of them to use presupposes a larger context in which other techniques and methods, involving other mixtures of recall and recognition, have already been applied. The most salient methods are: [1] Dialog and [2] Wayfinding.

Dialog can be characterized as an interactive process of negotiation with an information system. The dialog occurs mostly with the search engines. We may not always know, or be able to express, the information we need to find, which turns out as the biggest challenge in order to use this method.

Wayfinding can be described as a process in which a person's knowledge changes through interactions with the information retrieved, leading, in turn, to a reassessment of the information need. This method can yield useful information we didn't expect and wouldn't have asked for. The advantage of wayfinding is that it gives us a sense of location and context (especially a sense of starting point, a sense of destination and the ability to get from starting point to the destination and back again). For example, while clicking through the folder hierarchy of our filing system in order to retrieve a document, we gain (besides the document itself), along the way to the desired item, a familiarity with the folder organization. We may also encounter other documents or folders that we would not have noticed if we jumped directly to the document.

There is a variety of techniques for wayfinding that have been described in several studies mentioned by Jones (2008, 94). The most important are [1] Browsing, [2] Linking, [3] Directed Search, [4] Location-based finding, [5] Teleporting and [6] Orienteering[24].

Browsing is driven by recognition. We browse when we do not have a clear idea of what we are looking for, when we do not recall much (e.g., keywords, content words, properties) that could help us to narrow down the scope of our search, or when the field is so rich in relevant information that it becomes pointless to further narrow the scope of the finding effort (e.g., we browse through publications that are directly related to our profession or interest area, in PSI we might browse the items in active use as primary means of access).

Linking is powered mainly by recall and is used when we have a full reference (a link) to what we are looking for (e.g., we know that a book is located in a specific place). The hyperlink on a web page also points directly to the information specified via URL and provides a *jumping* mechanism that enables us to go directly to the information wanted. We follow links when the amount of information is extremely large and the proportion of relevant content extremely low. We may rely more on links while accessing the cold regions in our PSI.

Directed search applies where search expressions can be more or less specific. We enter a keyword and receive a result listing that can be scanned for the desired item (e.g., full-text search supported on the Web). Since directed search can occupy a full range of intermediate positions

24 A study mentioned by Jones (2008) speculates that highly tech savvy people prefer to use orienteering, even when they know exactly what they are looking for, because it gives them better sense of location and context.

between the extremes of browsing and linking, it ranges from an activity mostly involving recall to an activity mostly involving recognition.

Location-based finding is often used to return to certain information on our personal computer. We take a guess of a location (e.g., the computer's desktop or a particular drive or directory) and then scan within that location in order to recognize the desired file. The process is repeated as needed (e.g., in order to move through a hierarchy of folders to a desired file).

Teleporting emphasizes recall. Recognition based scanning is minimal. We try to jump directly to the information we seek, either by specifying the exact address of the desired information item or the search string that can be matched only by the sought item.

Orienteering as a technique involves iterative, stepwise progression toward the desired information, in which recognition and recall both play an important role, as in the so-called sport discipline. First we recall, then we recognize and then recall again. Orienteering is a popular technique used to find information on personal computers, as well as on the Web. Orienteering can include direct searches, but these are localized and represent small steps in the finding effort, rather than large leaps (e.g., we might use orienteering while looking for a web page by jumping to a website with a site-specific search for the desired web page).

2.7.7.3 Meta-Level Activities

Meta-level activities focus on mapping and connect finding and keeping activities. They are: [1] Organizing, [2] Maintaining, [3] Managing Privacy and Flow, [4] Measuring and Evaluating, [5] Making Sense (Jones 2008).

When using paper filing cabinets to keep our information, we are forced to take basic decisions about what to keep or toss (or archive in less accessible storage). These decisions often prompt meta-level considerations of entire personal information collections. We once made similar decisions of maintenance and organization for our digital PICs as prompted. Nowadays, we are freed from the need to make time-consuming and difficult decisions concerning what to keep and what to delete or archive. However, the so-called *old magazine effect* (Jones 2008, 158) emerges, when an old information item, that has never been used, becomes difficult to discard, because its uses are momentarily, at the point of decision, much more salient (literally more visible) than the ongoing costs of keeping the item.

An ideal of PIM implies that meta-level activities would help us to see more clearly where we are, where we want to be and how to get there. They should help us to achieve our goals faster, with greater comfort and in the way that we want, rather than following the way suggested by our tools and support.

Meta-level activities can easily become part of our daily routines, essentially in three ways. [1] *Incidental,* as most of the measurements needed to evaluate our PIM practice can be collected automatically as a byproduct of our daily use of information, when provided with the proper tool support. [2] *Incremental,* since a meta-level activity is easier to be performed in smaller parts over time, rather than doing everything at once. [3] *Integrative,* because we are more likely to do our meta-level activities when integrated to other activities we would do anyway and perhaps even enjoy (e.g., we can organize our folder with information about our vacation while planning for the trip).

2.7.7.3.1 Organizing

Organizing is making decisions (e.g., how the items and collections should be named, what set of properties make sense for, and help to distinguish, the items in a collection from one another,

how the items within the collections should be grouped into piles or folders), taking action in the selection and implementation of a scheme to relate the information items in a collection to anticipated needs (Jones 2008, 125). The tight connection that these two activities have and also our attitudes towards them have already been discussed in the division 2.7.7.1 *Keeping*.

In a typical day, if organizing and re-organizing happens at all, it is after more immediate and more urgent activities of keeping and finding are completed, which often means not at all. We should only organize the important information that would save our time and energy and leave the rest. We should focus on the planning of a project and let the information flow, because it is easier than focusing on the organization of the information itself. We can start by creating topics and subtopics and reorganize the folders in a way that makes sense throughout the project, or start by creating notes and links to other information and creating folders afterwards. Collections can also be created by grouping items or references (e.g., shortcuts and aliases), that are surely going to be needed together, by tags or folders. The collections work best *flat* (with a simple hierarchy) and organized by properties. More complex hierarchies can lead to problems in case we do not know where to look first. Especially if the content belongs to several topic folders, it can easily cause a multiplication of the information and make version control extremely difficult. We can still maintain folders with a more complex hierarchy, but pointing with aliases to the folder with all of the contents. We are more likely to remember (less likely to forget) information which we have processed into a folder (or tagged), according to an organization that makes sense for an anticipated use. An organization, as a representation of the anticipated use, helps us to assemble the items needed to complete a task. When the subfolders represent the task to be done, it is very likely that they already contain all the respective information within themselves. Also, we have to make sure that what is organized in collections, files and folders, is labeled with descriptive names[25] in a way that is easy to be recognized. Tags and labels may be based on the task that the grouped items share in common. Folders named *stuff* may be only holding bins with little consistency, or coherence, among the items they contain. But other folders may reflect our enduring areas of interest, or correspond to goals we would like to achieve and actually be consistent and coherent. Applying the naming convention is faster and easier than filling in the metadata. Sometimes the name becomes useful as a reference in conversation, or it can provide a summary of the content located within a folder. Another useful approach that can help us with our organizing structures may be to take advantage of websites' structures. Even though many of them are self-promotional and offer little content and useful structure, others provide both. Structure is often explicitly represented through bullets, numbers, headings and internal hyperlinks and we can re-appropriate these for our own purposes (Jones 2008, 356).

All the collections and folders we have discussed so far are subject to hand-curation, but the content can be organized automatically into a virtual (smart) folder. The virtual folder has an associated definition that can be used as a search query. Its content, in fact, is a search result, returned by such query. We can still force an item to go to this folder (e.g., by assigning it a unique keyword that is included in the definitional query associated with the folder). The biggest issue of this organizing approach is that we are not particularly good at creating clear definitions. We might know what should go to the folder only if we see the concrete item (Jones 2008, 315).

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25 We find an interesting example of the naming convention at *Google*. The company gives names of confections in alphabetical order to the versions of their Android mobile operating system (e.g., cupcake, doughnut, éclair, frozen yogurt, gingerbread, honeycomb, ice cream sandwich) (Manjoo 2011).

2.7.7.3.2 Maintaining

Maintaining deals with information kept by us and by others. Maintaining is very close to organizing, as both share the objective to develop a PIC.

> Information maintaining (or just maintaining) includes all decisions and actions relating to the composition and preservation of personal information collections. Decisions include what kind of new items go into a collection, how information in the collection is stored (where? in what formats? in what kind of storage? backed up how?) and when older items leave the collection (e.g., are deleted or archived) (Jones 2008, 156).

If our tactic for managing information is trained with simple circumstances, we are more likely to keep up when it gets more difficult. Maintaining activities address issues such as: [1] Data protection and backup, [2] Cleanup (if not for storage, for attention), [3] Synchronization, update and correction, [4] Legacy format support, or [5] Future proofing.

Data protection and backup. Often, we don't think about backup until a trigger event takes place (e.g., a hard drive crash, the loss of a cellphone, an accidental deletion of the memory card of our digital camera, a serious corruption of our data). Such event can be terribly disruptive if the data is not backed-up (even if we only speak about a few days). We can back up our information onto physical media (e.g., CD, DVD, tapes), but making the backup takes time. We have to store it in a safe place and exchange the media every now and then, since they degrade. A backup by itself protects us only against a device failure, but not against robbery or fire. Paper documents might also be very difficult to replace. Extremely difficult to replace information might be placed in a safe deposit box at a bank or, if left at home, at least placed in a fire-resistant box.

Cleanup (if not for storage, then for attention). The regions of our PSI need a periodical cleanup. Our information has to be either deleted or transferred to another region. We have to maintain our *attentional surfaces* (e.g., our physical desktop, the inbox, our personal or someone else's website we visit regularly, top-level views of folders and files in a region like 'My Documents', the notes held up by magnets on our refrigerator door) that we are exposed to every day for a certain amount of time. They need to be cleared of old things in order to retain their power. Some attentional surfaces are renewed without our intervention (e.g., our email inbox is refreshed as the new messages come in and the old ones are pushed out of our view).

Synchronization, update and correction. This is particularly an issue for people who use several different devices. Yet, it remains an issue even for those who only use a single computer, because our working information changes very often. As mentioned in the part *2.7.7.3.1 Organizing*, while keeping several versions of a single file, updating and correcting everything can get very painful. Our information has to be synchronized between the services we use on the Web and our various devices, but checking for duplicates or close matches to a document might be a task better done on the Web, rather than on our side.

Legacy format support. As technologies evolve, the formats of our information become outdated. Sometimes even a minor change can seriously alter the condition of the stored content. Unlike the archiving of paper-based information, we must not only think about the information itself, but also about the means for its retrieval, display and manipulation. If we don't take action soon, our content might be lost forever, even if it is still physically in our possession. We might hope that at least major libraries maintain tools for the conversion of that formats and interpretation. We can also expect that existent backup services will provide format assurance by automatic conversion of our information into newer, still supported, formats.

Future proofing. For future-proof maintaining we have to consider, besides the information format, the version control, context and shift from wayfinding to search retrieval. The direct search will most likely return several options for our search query and the additional information needed to determine the correct item (or correct version) fades with our memories. The references leading to this information can be deleted.

Several approaches and support tools can help us to maintain our information (Jones 2008, 162): [1] We don't have to maintain everything by ourselves, [2] Portable hard-drives, [3] Web-based backup services, or [4] Visualize to understand.

We don't have to maintain everything by ourselves. For instance, in households, parents frequently share responsibilities, as one of them maintains the medical records of their children, the other takes care of the photographs and videos for the family. In workgroups similar subdivision occurs. Maintaining information that we know others have is unnecessary, because we can always ask for it. A side effect of this approach may be that we might provide the others with more information about ourselves and our intentions that we would like them to have (e.g., a question may provide another person with information on what project we are working on).

Portable hard-drives. The popularization of portable computers simplified maintaining for many of us, since we can move around with our information seamlessly. Some people don't even walk around with their laptops, instead they use a portable hard drive (or alike) to carry around their working information. The cell phones that we have with us all the time also present a possibility for carrying around our data.

Web-based backup services. An alternative to the *local* backups is the *cloud*[26], which enables us to have our information everywhere, as far as we have a connection to the Internet. These backups can happen automatically and regularly (they can be conveniently scheduled to take place while we sleep or exist as an ongoing, incremental background process, while we are connected to the Internet). The cloud backups don't have issues with longevity in the sense of device degradation (the information is continually copied to newer devices), but we cannot anticipate for how long the service provider will stay on the market. Many people use email services as an alternative to the web-based backup[27]. However, we may be reluctant to entrust our personal information (e.g., tax records, personal photographs) to the cloud. The cloud storage of sensitive and personal information in work-related spaces is not recommended, because we may become vulnerable (e.g., to identity theft, as someone else might masquerade as us without detection for a long period of time).

Visualize to understand. A visualization can help us to realize what information we have, where it is stored, in what form, how much of we have and how often we access it, while deciding what to archive or move out of the way.

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26 The cloud storage is the most confusing buzz word in the past decade. Cloud storage is expected to be free while it is still payed, even thought cheap (1GB on Amazon S3 costs about $2/year) and easy to use, while there are so many options that it gets extremely difficult. The users of the cloud storage don't actually know where their data is. A new trend of cloud to cloud backup was born. User behavior is the biggest limitation for cloud storage's growth, since we should use cloud storage responsibly by considering the volume of data, 4T, for example, would take 2.6 years to be uploaded. It is actually interesting that for every 100 videos watched online there is only one uploaded. With every new product or service we acquire, we are encouraged to plug it into our computer and perform cloud related tasks, as soon as we get home with it (Putterman 2011).

27 This attitude is explored in the section 2.7.8.1 *Email*.

2.7.7.3.3 Managing Privacy and Information Flow

Managing Privacy and Information Flow is a meta-level activity which serves to protect us and our resources, as well as to manage the information we project about ourselves. Privacy and flow of information can be seen in the *beyond/about* perspective, which deals with the policies that apply to our data, or in the *after* perspective, because for most of us dealing with privacy and information flow is not the primary goal. We tend to postpone this activity since it is not clear what is the best way to take care of the related issues. We need to adopt effective and sustainable strategies of handling our privacy and information flow.

For the purposes of managing privacy and information flow we can subdivide the six senses of personal information in two groups, depending on whether we are the senders or receivers of this information: [1] Outflow, and [2] Inflow.

The *outflow* contains information controlled and/or owned by me, information about me that others may have or may want, information sent (or posted, or provided) by me and information already experienced by me. We manage our outflow for privacy and power. The best way to control information about us, that is *out there*, is to prevent it getting out in the first place. But the simple fact of living gives the information to others and the digital tools change the extent to which this information can reach. The information can be recorded, stored, transmitted and then retrieved by nearly anyone, anywhere, at any time. Very often we have to make instant decisions on information we are willing to provide. Many times we don't understand clearly the implications of clicking *yes* or *no* to questions that computer programs or other services ask us. We are vulnerable when answering questions prompted by services (e.g., while shopping), because many times they have very little to do with what we are actually doing. We just *Agree* to the presented legal binding contracts because they are unreadable and we lack other options. Even the privacy fundamentalists often get caught by this kind of questions. Since keeping information about people is cheap, an ever-increasing amount of information is maintained (including our credit history, medical, academic and tax records, purchase decisions, employment histories and so on), often of barely no importance and without any specific purpose. As the devices to record information digitally are becoming ubiquitous, we may be recorded in many places without even noticing (e.g., we may appear on a photograph on *Google maps* because we were randomly passing by). Improving technologies, related to search and data-mining, make the processing of large quantities of digital information easier. These technologies can even help us even to fight our personal battles with information outflow. An important remark to be made is that we never know the full context in which we act online (Jones 2008, 188). The amount of information about us, retrieved by simply *googling* our name, can be striking. We may discover information we don't have any idea that is publicly accessible. Since vast amounts of information can be stored cheaply and indefinitely in a web-accessible form for global access, this information may lie on the Internet without anybody noticing (e.g., a casual email can turn up in court years later). In cases that present us with evident benefits, we are willing to take a risk and make our information available (e.g., we prefer to pay with a credit card, rather than to carry around cash and we don't mind that a record about our transaction is made). Several services able to track our information outflow are emerging (e.g., *Singly*). To manage our outflow we have to employ our privacy policies, which will be discussed further in the sections *2.9.2 Privacy and Security Issues* and *3.2.2.4 Managing Privacy and Security*.

The *inflow* consists of information directed towards me and information potentially relevant (useful) to me. We manage our inflow for concentration and productivity, for having time for what we want and for our sanity. Only the legislation can stop people from directing the information toward us. We can only control what grabs our time and attention. In modern communication, only a fraction of all the information directed to us gets through and it is not always the most important. We often get distracted by sights and sounds that have nothing to do with the task at hand. We are more likely to notice an old object that is on the periphery of our vision and starts moving than a new static one. This *skill* used to be of survival value for our ancestors, but is nowadays exploited by people working in the media[28], as their main objective is to capture our attention and keep it. The signs of a breakdown in our inflow become evident when we start loosing the sense of having control over the files in our computer or the email messages in the inbox. We don't have to wait for support tools to be created, because even though they can help significantly to improve the speed and quality of our work, they can be also disruptive. The most important step towards the inflow management is to only enable the necessary channels of information. It is easier to manage a channel, rather than the individual items themselves.

The most common approach for managing privacy and information flow is *Satisficing*. This term was described by Herbert Simon (1957; quoted in Jones 2008, 200), one of the most influential social scientists of the 20th century, who contributed to psychology, sociology and economics as well as many other areas. He argued that rather than optimizing[29], we tend to use satisficing in our decisions. We go with the first possible solution that meets the minimum level of requisites[30]. This approach is sometimes supported, or substituted, by *triage* or *sampling*. Triage means to sort the candidates into *no*, *yes*, and *maybe* categories. Sampling requires to gather a set of information with an established limit within the amount of the information that has to be collected. The limits are required especially in the situations where the criteria for selection are not well understood ahead of time and there is a reason to believe that the sample might be unbiased and unrepresentative as a whole.

2.7.7.3.4 Measuring and Evaluating

Measuring and Evaluating activities serve to support a conscious decision-making regarding our PIM practices. These activities represent the two steps we take when deciding whether to change and what to change in our PIM practice. Measuring (data collecting) deals with the raw information, while evaluating (deciding) serves to make comparisons and assign values. In order to properly evaluate a PIM strategy, a scheme of organization, or a supporting tool, its impact on several PIM activities must be measured. We have to explore the ways to take for each measurement and come up with relevant units (e.g., the time we spend on a task or a project is

28 Studies show that the time between camera cuts in TV is decreasing, but they also show that we might be nearing breakdown to apprehend the message in a video if the cuts are too short (Jones 2008).

29 Optimizing is an approach for decision making that looks for the best or most effective solution. Generally we need to start with a sample of options to be able to choose from and then optimize within.

30 This behavior was studied on professionals dealing constantly with high level of time-pressure, stress, vague goals and limited information. Apparently, they do not compare any options, they take the first reasonably looking solution that came to their mind and perform a quick mental test. If any solution doesn't show up, they have their plans of action that still can be followed (Krug 2006).

relevant to us, but not to our tools) for the current goal and the various roles we seek to fulfill. It is very difficult to measure and accurately estimate the demands of a new project or role, when we are working as fast as we can to complete our work. An item may be kept for an anticipated use over a long period of time after the initial act of keeping (as certainly happens with photographs and videos), but we can't truly asses the effectiveness, nor can we evaluate the utility of the strategies, schemes and tools involved in keeping without knowing whether the item was eventually retrieved with success. Any decision we make, even to postpone or to not decide, is itself a decision. After taking the decision, our situation never stays the same (e.g., if we stick with our status quo and others successfully upgrade to a newer solution, we fall behind). Sticking with our status quo or deciding not to decide can carry its own problems, as measured by missed opportunities or preventable failures. We still have to consider the cost of *miss* or *false positive*. If our preferences change, we have to look more closely at the alternatives and the values assigned to their relevant costs in resources, gain in benefits, the variability of these and the relevance to the six senses of personal information and PIM activities. Measuring can be extremely important for our motivation. If we see a visible progress on our goals, we are encouraged to continue (Jones 2008, 233).

In the ideal PIM, we might hope to derive an expected value for each of the alternatives that matter in all the measurements, reflecting their relative value to us. But we can rarely reduce our choices to expected values (one per choice), so that all we have to do is to pick the highest value. This is especially problematic when the information is expressed in probabilities. In the real world, the information may be inaccurate or highly variable, and often missing, for many important measures.

The three most important factors that influence evaluation are: [1] Framing, [2] Situation, and [3] Sampling.

Framing is important for the evaluation rating, since whether the alternatives are specified or not and how makes a big difference. If evaluating in isolation, the ratings are significantly higher than if evaluated in a context full of alternatives. When choices are framed in terms of relative loss, we are more likely to take a riskier option (an option with greater variability in outcome), rather than accept such loss. But when choices are framed in terms of a relative gain, we are more likely to take certain gain over a riskier option that could leave us with nothing (Jones 2008, 228).

Situation is important, because the evaluation can only be efficient when made in a real environment, considering real situations, including the status quo option (e.g., we should consider a purchase in the environment where we would use the item, rather than at a store).

Sampling is necessary too. We have to try out the alternatives, if not actually, at least in our mind. We should consider our choices during several days, or over some predetermined period of time and under different situations of information management and use. The evaluation should be made at different points in time, because the same question (e.g., the new tool or not) may yield different answers, we may even recall different things about how we do our things under various circumstances.

2.7.7.3.5 Making Sense

Making sense is a meta-level activity that can be discussed both as outcome (now things make sense) and activity. Jones (2008, 246) provides many possible views on making sense, as men-

tioned in respective literature. We can see making sense as an activity that arises when we face new problems, or unfamiliar situations (when we change our place in the world or when the world around us changes) or when the old ones resurface, anywhere our current knowledge proves to be insufficient. We can see making sense as an activity that involves finding the basic structure in a seemingly unstructured situation. We can see making sense as an activity with cognitive and social dimensions, that has informational, communicational and computational aspects. Making sense can also be viewed as the motivated, conscious effort to understand connections (among people, places and events) in order to anticipate their trajectories and act effectively. Making sense as an activity can be seen as a professional task for researchers, designers or intelligence analysts. Making sense engages the natural inclination of humans to understand the world around them, to discover its patterns, unlock its secrets and appreciate its beauty. Sometimes making sense is the same as understanding. In some cases things can make sense without much effort. Other times things can also make sense only after a considerable amount of activity to clarify what's actually needed. Making sense can involve interminable discussions about what things are called and a constant reshuffling of meaning as different constituencies (different language use groups) to set the terms of discussion.

Making sense is, or should be, an integral part of all other PIM activities, including those to keep, find, organize, maintain, manage information flow and measure and evaluate. But making sense can also yield an outcome for other PIM activities (e.g., we might organize information items based on a superficial consideration of properties such as format and associated application, or we can organize regarding similarities, differences and interconnections among the items in a collection, or as a mixture of both). Making sense is better done in a broader perspective. It is better to make sense of a collection of information rather than a single item. We mostly do other PIM activities because we have to. We find because we need information and we keep because we know we will need it later. We maintain, organize and manage the information flow because these activities, not withstanding their immediate cost, produce later benefit (or avoid even greater costs). Making sense is perhaps the only PIM activity that, once successfully completed, is inherently rewarding in a way that pays for itself (for its costs in time and other resources) and independently of a later, anticipated reward. We each reach our own insights and make our own discoveries.

Making sense as a PIM activity has several characteristics (Jones 2008, 250): [1] Breadth of focus, [2] Depth of focus, [3] Our senses are involved, and [4] Manipulation is involved.

Breadth of focus means that focus is often on a collection of information or needs as a whole. An item (e.g., a suggestion, a plan, a new tool, etc.) is assessed in the larger and richer context of its containing collection, situational conditions and constraints, goals and priorities, roles and responsibilities (e.g., the need to make plane reservations is assessed in a larger context of other needs as shortest flight time or flying from the nearest airport).

Depth of focus, in relation to making sense, means understanding underlying relationships or bringing up underlying structures that may be obscured by superficial similarities and differences (e.g., we may understand from our calendar that we need to get ready for a scheduled meeting, but we may also have to understand if going to the meeting really makes sense for what we need to achieve).

Our senses are involved. We quite literally try to make sense of things by trying to find hidden patterns, anticipated outcomes and alternatives (e.g., choices in travel itinerary) as realistically as possible. We try to imagine through our senses how things will be.

Manipulation is involved. Making sense of things can be hands-on as when we shuffle, order, stack and group paper note cards or the paper documents on a desktop. Our manipulation of digital information items is mediated by our tools.

We identify two principal methods that can help us to make sense of our information (Jones 2008, 263-266): [1] Affinity diagramming and [2] Mind-mapping. These methods are increasingly supported for digital as well as paper-based information. Computer-based tools support scaling in ways that paper-based tools cannot. Our efforts to make sense should not be driven by strict adherence to any method or form of representation. All of the methods have value in different circumstances and even in combination. But a tool as simple as a table is often the best way to compare and contrast the items in a reference or project collection.

Affinity diagramming is a multistep, bottom-up process for making sense of things. We create a large number of small, easily manipulated information items (e.g., cards) where each of them expresses a single idea. We place all of them on display, so that they can all be viewed at a single glance. We relate these items to each other and cluster them in small groups. We create headers or summaries for these clusters. We can repeat these steps as necessary. We look for patterns and structure that might help us to make sense of the whole.

Mind-mapping as a method for making sense works in a top-down direction. Its essential aim is to do a *divide-and-conquer* decomposition of a high-level goal or concept into constituent pieces, which can then be further divided into smaller pieces and so on. Essentially we create a hierarchy, similar to an outline, in a two dimensional space (e.g., on a whiteboard or on a computer display), but the ability to expand in a two dimensional space engages the visual side of our brains in ways that traditional outlines cannot.

2.7.8 PIM Tools

An ideal PIM supposes that anything recalled about a sought information item can be used for its retrieval. This help can come through search, tagging support and auto-completion. Yet, these tools produce their own problems with recall and recognition, especially if they are provided with wrong information from the beginning. Many of the tools that are supposed to help us are designed in a way that makes it seem like its creators built them upon the assumption that their use is our primary purpose. A tool that makes keeping easier has little value, if the items kept go into a black hole and we cannot (or forget how to) retrieve them later. Even well-intentioned tools to help us plan and structure our information can be much more of a burden than a benefit (e.g., we can create reminders, but they can be due at inopportune times and dismissing them can be very difficult, especially if additional ones are created automatically).

Many of the tools providing filing methods prove to be used in addition to, rather than instead of, the means of organizing our information. These tools should be able to help us without imposing overly formal, restrictive systems that further complicate our PIM efforts (e.g., hyperlink appearance helps us to situate our interactions with information and facilitates its subsequent use, social networking websites can help us to organize our data as a byproduct, however we should still be able to easily maintain control over it). Since new products are simply new ways to meet the same old needs, when looking for a new tool to support our PIM efforts, we need to have a clear idea of which problems we are trying to solve, how well we want to do it and what solution we are looking for. We should measure and evaluate whether the possible change is worth the effort and monitor if the change we

adopted actually met our expectations. Without our participation, the market is not going to identify new problems by itself.

We will look closer at [1] Email and [2] Search, as two examples of PIM tools.

2.7.8.1 Email

Email's origins date nearly 40 years ago[31]. Its representation in the early 1970s looked quite similar to a basic text message sent on the Internet today. Email can be understood in two ways––as interaction and technology (which enables a very useful mode of communication).

Email as interaction is the best solution for communication between people separated spatially, with asynchronous temporal availability, when we don't want an interactive conversation even if we are just a few feet away, or when we want to record our conversation[32]. While having the convenience of responding at the time and place of choice, a failure to answer can hold on other people and cause serious delays and lead to uncompleted tasks and unmet obligations. We can break up our email interaction into four steps (Jones 2008, 280): [1] *Allocating attention,* involving the consideration whether to look at the email now, later or never, [2] *Deciding actions,* involving the decision whether a quick response is necessary, or a delayed response, or no response at all, [3] *Managing tasks,* involving understanding for which tasks is an email relevant, how to relate to and how to remember the email later on, and [4] *Organizing messages and message folders* as the last step.

Email is used flexibly in ways that go far beyond its basic support for sending messages. Email is used for task management (e.g., an email can initiate a task, the thread of subsequent responses can serve to document the progress of this task), document management (e.g., the exchange of a collaboratively authored document provides a natural means of versioning) and contact management (e.g., we may look through old messages to find a person's email address, a phone number, or even the name of a spouse). Self-directed email messages can work as a sort of diary entries to record memories before they fade, they can include reminders of tasks still to be done, they can serve as a backup for documents attached to messages and provide an easier way to transfer them. On the other hand, since email wasn't specifically designed to support any of these activities, it may not do any of them particularly well. The plan to send an email seldom emerges fully formed in our heads. Instead the information need, and our expression of it, are often guided by the information item currently under consideration.

If we are biased toward taking action, we inevitably end up attending to email messages that turn out to have no importance in our lives. If the threshold for taking action is set too high, we are certain to ignore or overlook messages that turn out to be important after all. To avoid failure when using email we must do the following four activities (Jones 2008, 281): [1] *Remember to retrieve* even if we use flags, tags and reminders, we might forget about messages, as they become so numerous that we stop to attend or use them as a basis for remembering, [2] *Recall an associated information* to the event of sending or receiving an email (e.g., a date, people, the subject, etc.) for a direct search or to sort search results, [3] *Recognize the*

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31 The history of modern email services goes back to the ARPANET, the ancestor of the Internet. The first standards for encoding email messages were proposed as early as 1973 (Wikipedia 2011).

32 If all people are online at the same time and if a short, highly interactive burst of conversation is needed to resolve an issue, then *Instant Messaging* (IM) might be the best way to do it. For needs of even richer communication channel or if only one party is online, we might want to place a phone call. If one party of the conversation is, e.g., in a meeting, an SMS to confirm or promise to get in touch later might be the best.

message to be retrieved (e.g., the failure can be caused by a misleading subject), [4] *Repeat the process* when task-related messages, important for the decision, are scattered across *inbox*, *sent mail* and other folders.

We experience information overload from the sheer volume of incoming email and its high percentage of *spam*. Many of these unwanted, unsolicited emails (ranging from annoying or irrelevant to offensive or outright dangerous) remain in our *inbox* even after we apply aggressive email filters. These filters inevitably risk sorting legitimate email into the email *junk* folder. Some of these *spam* messages are outright attempts to attack our computers or to trick us into giving away our private information[33]. We also receive an enormous amount of what could be called *semi-spam* even from our trusted contacts (e.g., announcements for talks, meetings, conferences and workshops we cannot or don't want to attend, etc.). From the user perspective, email costs no money[34] and can be used in an unrestricted way to send as many messages as we like to as many people as we want to reach, so the amount of emails is higher than the mail we receive through post.

Email information is fragmented in a way that makes it difficult to keep track of (and retrieve) it. Thinking that the information is at least *in there somewhere* might be only a false reassurance. The information may stay recorded somewhere on the server, but we might no more have access to it. The individual messages of an email conversation are exchanged over a period of days or weeks and getting the current version of the information, or constructing a bigger picture for a conversation's progress and its conclusions, is even harder when such information is updated in a *by the way* inclusion to an email message with a different subject line and when the email message does not carry along the sequence of preceding messages to provide context[35]. A subject line may go unchanged long after it ceases to represent the current topic of the conversation, as we often pick up an old email message to begin an entirely new conversation involving the same people, without bothering to change the subject line. A *Reply All* gives us a good starting list of intended recipients. We may often underestimate the extent to which the interpretation of email information depends on supplemental information in our own heads, that was strong at the time of the email conversation, but fades with time. Even though *inboxes* can generally be seen from multiple computers, at least via a basic web interface, if we move an email to a separate folder, it might not always be accessible elsewhere.

Independently of all the problems we may face regarding the email, it can be a useful tool to manage our information flow. The *out of office* messages can become handy in our efforts to manage inflow, outflow and the expectations of the people who send us emails. On the outflow side, we can select and control the email recipients from whom we are willing to receive communication. We may include *confidential* messages that ask the recipient not to distribute the message more widely. Some email applications even support the delayed sending of messages. On the inflow side we may subscribe or unsubscribe to distribution lists to control the amount and

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33 One of the popular techniques used for this purpose is called *Phishing*. An email sent by someone, pretending to be sent by a legitimate company, leads the user through a link to a seamless fake page, where the user provides personal data. This technique doesn't apply only to the online world (Jones 2008).

34 We'll further discuss the associated costs of online identifiers and namespaces in the section about personal identification online, but the expenses may also involve costs of the server.

35 *Mac OS X Lion* email application introduced a new feature that represents the messages from the same thread in a timeline, showing each communication as it was sent, while hiding the redundant text.

kind of messages we receive. Many email applications also support rules to automatically sort and tag the emails that remain in the *inbox*. For example, *Gmail* enables us to create filters to always (or never) mark as important all messages from a certain sender. Several tools (e.g., *Evite*[36] or *MailChimp*[37]) can help us to significantly reduce the email traffic related to specific events that would otherwise clog our *inbox*.

As with any PIM activity, approaches to the organization and maintenance of email vary while comparing our ways of handling paper or electronic documents and web references. Some of us organize, some don't and some do a periodical *spring cleaning*. Generally, for most of the people their email is less well organized than e-documents and files, but it is interesting to observe that some people invest all their primary organizational efforts into taking care of their email account, even to the point of routing e-documents and web references through email messages, so they can be filed in a way corresponding to the email organization. Some email applications, such as *Gmail*, encourage a *leave it and label it* approach to the sorting, by which messages are left in the *inbox* and tagged, creating an alternate kind of organization. The *everything through email* approach has two potential drawbacks: [1] *Existing email applications are already overloaded*, hence adding more features, no matter how carefully designed, may only make matters even worse, [2] *Sometimes we may actually feel the need to turn off the email*, or at least ignore it, in order to make a real progress on a task or a project.

2.7.8.2 Search

Search is best viewed as another PIM tool that may obviate some PIM activities (e.g., organizing information in order to ensure its later accessibility), while having minimal impact on others (e.g., organizing information in order to make sense of it or as part of project planning). Search has a *magical genie* ability to materialize information on command. Search shares some characteristics with email. Both can be described as technology and interaction. As well as for email, the need for a search and its expression in a search query emerges from, and is guided by, the information item currently under consideration, rather than fully formed in our heads. Search also forces us to step outside from our current working context.

Search as a technology examines the tools and structures underlying the search interaction and explores how they could support a wider set of potential application. Desktop search facilities have been around for decades[38], while constantly improving the technology involved. Search facilities have been integrated across several forms of information (e.g., files, email messages, recently viewed web pages, etc.) and different operation systems (e.g., we can search across different operation systems regardless on which one the information resides) and location (e.g., the Web, network file sharing, or a local device). The search behavior in the use of computing re-

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36 *Evite* can help us to deal with the email correspondence related to event planning, such as to automatically send invitations or manage RSVPs.

37 *MailChimp* is able to help us manage the flow of bulk emails, while also offering many advanced tools especially useful for public relations and marketing.

38 For example, the SMART, a system implemented by Michael Lesk and Gerald Salton at Harvard in the early 1960s, enabled a kind of search for personal information. SMART was ported to UNIX on DEC systems in the late 1970s by Fox, Buckley, Voorhees and others working for Salton at Cornell. A system supporting the search for personal information was in place on MacIntosh systems running AIX at Brown University in the late 1980s (Jones 2008).

sources is changing too. It can index the information rather than just perform a search. Indexing is extremely important to make search fast. It basically collects all the items to be indexed, extracts the data for each of them, identifies inter terms from the extracted data and creates the index. The search itself focuses on the query and attempts to retrieve the information to match this query. Most search services support the creation of more advanced queries which specify additional properties of the desired information (e.g., language, format, etc.) and are able to combine search terms using Boolean expressions, however these advanced options are rarely used. While looking for a specific information item, we may need to recall more than just one or two of its content words. We may specify, for example, item attributes such as date or date range, type, folder name and even people involved. The information filtering focuses on the information item and attempts to identify matching categories (persistent queries).

Search as interaction looks at the standard search dialog as a way to find information. It gives attention to the visible parts of search, such as the user interface, for specifying a search query and for listing results. Search as interaction also focuses on a dialog between human and computer. Search is initiated by the person who tries to construct a query that describes the item or set of items he or she wishes to receive. Sometimes we may initiate a search simply to explore, without a definite result in mind. We scan the results returned by a search query and, as we do, we try to recognize the items that meet our needs. Items represented in the result listing are generally ordered by some attribute such as date[39] (received, last modified or encountered), or relevance. The search interaction may continue through several iterations, possibly either until we get what we are after, we settle with what we get, or give up. Search as interaction most obviously supports finding and re-finding, but variations on interactive searching can also support the management of our personal information in all of its senses and the respective PIM activities such as keeping (e.g., by suggesting how to file or tag new items), organizing (e.g., by suggesting new ways to group items by folders or tags), maintaining (e.g., by identifying copies or near-copies for version control), managing the information flow (e.g., by helping us to track how information about us or sent by us to others is used), or making sense (e.g., by helping us with our efforts to identify larger patterns in a collection of information).

2.8 Personal Information Left Behind

Many of us often say that we don't care about our legacy. But judging from the amount of resources we put into creating (and curating) our personal collections, wills and estate plans, we can assume that passing on our artifacts is an important activity. Most societies have well-established rules for dealing with (and inevitably dispossessing) the wealth of material artifacts left behind by the deceased, to ensure that everything happens in an orderly fashion. Generally, people first look into the legal will. If the will is absent, or legal regulations allow, cultural or religious conventions are followed. Often an executor is involved in the process of legacy distribution. The surviving family divides up the physical possessions and takes them as their own. Processes related to transition of digital legacy continue under construction. As Paul-Choudhury (2011) notes "We have learned how to create vast digital legacies but we

39 Although we mostly prefer ordering search results by time, the definition of *time* can vary with an item's form in ways that generally correspond to a personally meaningful event (past or anticipated) (Jones 2008).

don't know yet how to tide them up for our successors." A digital legacy is a sum of all the digital artifacts and assets one leaves behind for others. Paralleling the physical artifacts, the digital artifacts can be distributed while remaining connected to us as original creators or owners, but cared for by our heirs (Massimi et al. 2011; Carroll and Romano 2011). Similarly to concepts previously described in the part *2.7.7.1 Keeping*, Paul-Choudhury divides people into two groups that address the preparation of digital legacy in different ways. The "preservationists" believe that we owe maintenance of our digital legacy to our descendants, while the "deflationists" think that it is vital that the Internet learns how to forget. We also need to address ethical questions like who should decide what happens to our digital assets, whether the care taker should remove them, manage them, or if other people should continue in their construction (Carroll and Romano 2011).

Prior research shows that the bereaved often have troubling experiences with their digital inheritance. The research also showed that people wouldn't take any action in order to prepare guidelines on how their digital devices and content should be handled upon their own death. However, the research participants were mostly concerned about the way in which their personal technologies would be handled after they die. In cases where participants actually took some action, it remains unclear whether they were the result of pre-existing decisions, or attributable to the process of sorting through the deceased's assets. These participants clearly wanted to make it easy for their families to access their digital assets after their death (Massimi and Baecker 2010).

Finding a way to put the digital legacy to rest is equally important as its retrieval. We have to be able to consult the information when we want and when appropriate, without being upset about our memories all the time (e.g., we may store the data of the deceased in password-protected .zip files) (Odom et al. 2010). *Technology heirlooms*[40] are frequently discussed in relation to putting the digital legacy to rest. A *technology heirloom*, such as the "Backup Box" aggregating *Twitter* updates, is a technological (digital) artifact that is designed with the intention that it might outlive its owner and can be passed on. These artifacts might (either materially or conceptually) carry an imprint or impression of the previous owner (Kirk and Banks 2008).

The personal information commonly left behind in the digital world extends to [1] Files stored on our devices, [2] Social networking accounts, [3] Accounts involving financial transactions, [4] Email accounts, etc.

Digital files stored on our devices, especially computers, are the most common digital artifacts to be addressed within our digital legacy. Research shows that people usually don't know what to do with the deceased's digital files. However, they feel the obligated to keep the device where the files are located. As a result the device is often hidden and its content remains untouched. While many of our computer-stored files are insignificant, together with other digital assets, they potentially are chronicles of our lives. We need to ensure that the data which have importance can be easily identified and preserved (Massimi and Baecker 2010; Carroll and Romano 2011).

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40 The *technology heirlooms* emerged from Microsoft Research project in the UK. Objects as *Digital Slide Box*, *The Backup Box* and *Timecard* were developed to bridge the gap between physical and digital legacy, while also exploring the possibility of digital data fulfilling the role of life chronicles. They are based on the assumption that, in many cases, home is the best place for reminiscing about someone. Further information about the project can be found on http://research.microsoft.com/en-us/projects/heirlooms/default.aspx.

Social networking accounts have already some options available enabling to take care of them after the user's death. For example, on *Facebook* we can transform a user's profile into a memorial state, but the mechanisms of transferring account ownerships (and attendant digital possessions) to the bereaved are confusing (Massimi and Baecker 2010; Massimi et Al. 2011; Carroll and Romano 2011). Social networking profiles may also contain interesting personal information of the user, that would be important to the bereaved.

Accounts involving financial transactions. As we spend more time in our lives online, we start to perform many activities involving money transactions online. The financial accounts (e.g., banking, retirement, insurance, etc.) are typically addressed in the legal will but, as we move to an internet-based control of these assets, they quickly become digital entities. We may perform financial transactions using certain, exclusively online, services (e.g., *PayPal*). We may also have subscriptions to newspapers that are payed periodically. These also require a special consideration (Carroll and Romano 2011).

Email accounts have already been discussed as a support tool for personal information management. But an email account can represent a great deal of who we are and what we do. A casual observer with an access to our *inbox* and our sent messages might be able to infer a lot concerning our friends or the tasks that fill up our typical day (Jones 2008, 296). Since the email account credentials are also increasingly being used as a master password to access many other online accounts, a casual observer may also have the ability to reset and access any other attached account.

2.9 Why Our Digital Legacy Is at Risk

The *Baby Boomers* and *Generation X* have begun to face the issues related to digital legacy inheritance. The pressure on establishing rules grows, as these younger generations, who fully participate in the digital lifestyle, begin to recognize their mortality. We should exteriorize our wishes regarding our legacy to avoid ambiguity of our intentions (Carroll and Romano 2011). In this part we will briefly describe several factors that affect our digital legacy and are necessary for an effective decision-making about it: [1] Legal framework, [2] Privacy and Security, [3] Personal Identification Online, and [4] Autorship and Ownership.

2.9.1 Legal Framework

When dealing with our physical and digital artifacts, we experience different levels of legal interaction. Legal regulations exist between individual and state, between state and enterprises and between individuals. The digital technologies are still too young to be fully acknowledged within legal frameworks. With the World Wide Web in its early twenties, we don't know well what services, protocols and social standards will take place in the next several years. At present, we lack legal policies to deal with digital assets properly (e.g., if the service is shut down, we might loose our content), while taking action is difficult as there is too much room for uncertainty. The policies regarding the death of a user are still in their infancy, but hopefully this issue will soon start to be addressed proactively[41]. Ideally, services that host digital content would have a legally

41 The legal frameworks seem to respond to needs as they emerge. In the past, for example, people would grant access to their bank accounts to their relatives so that in the event of their death, they could withdraw all the money they had and wouldn't have to pay taxes imposed on heritage. In many countries, these taxes were abolished for first-level heirs. Now there is no more need for this kind of action.

enforced way (or at least an industry standard) to deal with the death of their users. With every account we create, we submit to the company's terms of service. They are mostly unreadable[42] and many do not specify what happens with the content upon our death. But some (e.g., *Yahoo*) state that the account is not transferable. A certain pressure for standardization of the laws and policies also comes from the digital companies themselves. For example, if a centralized register of the dead would be in place, the companies could automatically proceed to the execution of actions regarding the user's death (e.g., transform the account automatically to the memorial state, delete it, or waive the purchased rights for use of books, movies, or music tracks) as specified in their *Terms of Service* (TOS). Until a commonly accepted framework is in place, we have the ability to entitle a trusted person to carry out our wishes, if we make the necessary arrangements (Carroll and Romano 2011).

It is quite surprising that most of the regulations related to the Internet imposed in the USA, legally obey to the *Electronic Communications Privacy Act* (ECPA) from 1986. The ECPA reform movement is trying to formulate and impose at least some necessary changes. According to ECPA, the data is divided into several groups—content and non-content, prospective and retrospective—and each of them is treated with different level of protection. Sometimes the difference between content and non-content type of data depends on the reason for which these are being collected. Even though ECPA law dates back to 1980s, the majority of the lawyers and judges never heard of it (e.g., asking for permission to access somebody's data from email in order to present them in trial can get very difficult) (Banker et al. 2011). Even though a lot of privacy related information is kept secret, *Google* applies a *transparency policy*[43], while informing its users when their data is requested by the government, so they can get involved. Depending on the type of data, and the purpose for which the company collects, stores, and uses it, the respective policies can differ, even for the same information. Generally, the services apply laws of the country where their collected data is being stored (2011).

The laws about electronic communication in Europe are primarily handled by the European Union and are much more recent—thus far more developed—than those applied in the USA. EU mandates registration of the data gatherers, who are highly constrained in the data they are allowed to collect from people. The subject, the person whose data is being collected, must grant a permission before this information can be shared with others and information can only be shared with other approved data gatherers. The data gatherers who fail to follow these rules essentially lose their accreditation, which is a very serious penalty for companies whose business depends on the ready availability of consumers' information. Furthermore, as a key objective of the 2011 *Data Protection Strategy*, the European Union promotes "the right to be forgotten" (Paul-Choudhury 2011), which means that as soon as the personal data fulfills its original purpose for which it was made available, it should be deleted. However, these rules most likely won't be adopted in the USA (and actually are in conflict with state-level freedom) and will create serious problems for non-EU companies who want to do business in Europe and for European companies who want to partner with companies based elsewhere, in order to provide the basic services to their customers (Jones 2008, 191).

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42 However *Dropbox* recently proceeded to the actualization of their terms of service, in order to make them more readable and understandable.

43 Data about inquiries made to *Google* is available on http://google.com/transparencyreport.

2.9.2 Privacy and Security Issues

The digital era, where recording, saving and transmission of information is ubiquitous, raises problems of privacy and security that didn't exist, or were much less severe, when information was kept in paper form only. We place a big amount of trust into online services, while their durability is uncertain (e.g., they may fail, or be bought by bigger ones) (Carroll and Romano 2011). Jones mentions (2008, 188) a *Harris Poll*, conducted in 2003, which labels three groups of users: [1] *Privacy fundamentalists,* who are strongly resistant to any further erosion in their privacy, [2] *Privacy unconcerned,* who have no strong concerns, and [3] *Privacy pragmatists,* as the largest group of people, who feel very strongly about the protection of their personal information and their privacy against abuses or unauthorized uses, but are also willing to share their information when the apparent benefits outweigh the risks. While it seems that younger people care less about their privacy, this attitude likely changes with age, families, reputation and careers, that can eventually suffer by revelation of youthful acts (Jones 2008, 187).

Large organizations have system administrators to set up and maintain privacy and security policies, but as individual users we typically only have ourselves, family members and friends. We often carry assumptions from the physical world into the digital world and base our policies on interpersonal trust relationships. Frequent mismatches occur between our mental models related to privacy and security and current system designs and operations. We setup accounts, passwords and use encryption. We limit physical access to devices (we use location as proxy, when we trust people in our household or those who come to our homes, and let them use our devices). We hide sensitive files within our current device (but search tools enable a fast and accurate discovery of desired content regardless file name or directory structure), but also on off-limit devices (while believing that device boundaries are the same as the data boundaries), or delete them. We often believe that we can prevent policy violations by being physically present (however computer violations are often faster or less obvious than physical-world break-ins, which may complicate detection even if the file owner is in the same room as the offender). In most cases, the immediate benefit of the ability to quickly access a computer outweighs the concerns about privacy and security (Mazurek et al. 2010). Even though more fine-grained controls are available (e.g., *Dropbox* offers options for sharing files with selected users, place them into a public folder, or keep them private), they may not be sufficiently usable and we might not want to spend time specifying them (Mazurek et al. 2010, 649). In general, we like to share certain files (e.g., photographs, works-in-progress, etc.), but become frustrated when our data is put at risk or exposed in a different way that we would expect.

We have to establish our own privacy policies, regarding who can see what information about us and under which circumstances. Each of us is responsible for determining personal privacy policies, matching them against those stated by the organizations with which we interact and verifying whether the organizations actually comply with the policies as they state them[44]. We have to avoid to be too chatty, too trusting and too hurried in our behavior and bear in mind that companies change their policies every now and then, often without notice (Jones 2008). We can start defining our personal policies with either assuming that everything is pri-

44 There was a W3C sponsored attempt to create a framework called "Platform for Privacy Preferences Project" (P3P), aimed at the support of common language for representation of privacy preferences and policy. Some tools like http://privacybird.org and http://privacyfinder.org were built, but the project was suspended far before it could be completed (Jones 2008).

vate and share only certain information, or that everything is public and we restrict access to some of it. We may want to employ a different personal privacy policy according to location (e.g., home, office, etc.) (Mazurek et al. 2010).

Most of the output we produce is work-related. Our professional information becomes intermingled with our personal information on our computer, in our email and other devices. There is an inevitable overlap between personal and organizational information management. The policies on personal information at work and intellectual property produced in a company rarely exist and, if they do, they vary. The existing policies are mostly designed to meet the legal requirements for archiving practices, but do not deal with issues such as what information we can take with us when we leave the company, etc. (Jones 2008) As a recent example shows (Malik and Kim 2011), Osama Bedier, who worked for *PayPal* and was recently hired by *Google*, used his personal computer for meetings both with *PayPal* and *Google*. When hired by *Google* he took all work-related data with him (even those stored in the company's *Dropbox*) and refused to turn them back. *Google Wallet NFC*, which was announced recently, is a very similar product to a due-to-be announced service developed by *PayPal*. As a result *PayPal* is now suing *Google*, while it remains strange that there were no previous arrangements for the eventuality of an employee leaving the company.

Better privacy protection depends on better communication with the users (Jones 2008). The privacy policies should be articulated in a way that is easily readable, that explains to the users their options and, when changes in privacy policies and terms of service are made, the companies should ensure that the users are notified (Banker et al. 2011). Within the same company, various models of privacy policies may apply (e.g., *eBay* and *PayPal* apply different institutional policies even thought they belong to the same group) (Banker et al. 2011). An emerging tendency suggests that our personal information should be treated as personal assets. Sandy Pentland, a professor at MIT's Media Lab, argues that it would significantly simplify the management of our personal information. This approach could be a way to have more control over our data, knowing who is actually using it and even to make profit from companies who do. If our personal information became personal assets, the companies would have to ask us only for the data they actually need, while being useful to actually deliver better products to users (Hickins 2011).

We want to make sure that our digital assets are secure, both before and after our death. Security issues remain active, even while (as the New York attorney Ramon Fichman, who advises technology startups, argues) the rights to privacy die with the person (Rockwell 2009). Passwords are the most common tool we use to protect our digital assets, but access is disabled in the event of emergency or death[45]. When placing a large amount of our personal information online, we should be aware that it may become inaccessible. There has to be a way to provide (or not) permission to access our password-protected information[46]. In Portugal, according to attorney Manuel Lopes Rocha, the digital companies are obliged to pass personal information to the heirs, as imposed by law where a set of rights related to a person is inherited by the heirs (this

45 An even more problematic counterpart to passwords is biometrics. Systems which use biological markers unique to an individual (e.g., retinal scans, thumbprints) routinely assume a living body for access (Massimi and Charise 2009).

46 Jones refers to C.C. Marshall (2007) to note that modern password protection "has proven to be a very real obstacle in military situations in which soldiers' email cannot be accessed by relatives after the soldiers' deaths".

set can include correspondence and immaterial rights such as author rights, as well as physical property) (Pereira 2010).

2.9.3 Personal Identification Online

Our digital content (and implicitly personal identity) is connected to us via an identifier (e.g., email address, username, phone number, etc.). If we have enough datasets at our disposition, determining identity can be relatively easy and cheap. We need different identifiers for almost every online service and very frequently each of them has a different format. Throughout the history, three types of identifiers were used: namespace, numeric and combinatoric. Ben Werdmuller (2011) explains that most of the identifiers were never meant to be used by humans. He adds that the only personal identifier that was aimed to be interpreted by humans is the email address. Our almost subconscious ability to abstract a URL address from it was an intended feature. Even our postal addresses were initially meant to be interpreted and used by machines. For example, the URL was initially intended to be understood exclusively by computers. However, we are able to remember quite complex structures (e.g., phone numbers) as far as they belong to a concrete identifier and the structure is fixed. Christian Sandvig (2011) argues that the big difference between the internet and the physical world is that postal addresses are free by consequence because no government can afford not to support them, while online identifiers have a much higher cost that involves their creation and maintenance. Once the infrastructure exists we can associate as many aliases as we want because these are cheap. Namespaces work fine for local structures, but in a global context we need tools to further distinguish them. While we may locally use the surname Smith, in a global context[47] we have to be more specific (e.g., by attaching a number). The problem with using personal names in global structures is their tendency to be overly expressive.

Our struggle to keep pace with the amount of logins that each of us currently owns, seems to be a circumstance of historical standpoint in web development. Short time ago, there was an attempt to launch the *OpenID* for online identification. Blaine Cook (2011) argues that this initiative failed because *OpenID* insisted on very long namespaces. *Techcrunch* came with a different concept for using a *Facebook* account as a general global identifier. But this approach assumes that our *Facebook* identity is built upon real facts, which is not always true (even though, according to *Facebook* terms and conditions it is an obligation). On WWDC[48] in June 2011 *Apple* announced their complex integration of *Twitter* into their newest *iOS 5*. It might be a preview of another tendency to promote *Twitter* to a position of new master identification in online services.

2.9.4 Authorship and Ownership

As creators of digital information, we have certain rights to what we create. Our rights should be protected under intellectual property laws. Depending on what we do with our content, we may share or give up some, or all of them. Once we die, the rights we have over our digital objects change (Carroll and Romano 2011). Our rights are essentially subject to TOS of the service pro-

47 The MIT Media Lab recently created project *Personas*, accessible at http://personas.media.mit.edu, that demonstrates the ambiguity of data collected by data-mining, but it also can be seen as an illustration of the ambiguity of namespaces in global context.

48 WWDC is an abbreviation for The Apple Worldwide Developers Conference.

viders (e.g., many of them claim the services to be untransferable). We should be aware that the wishes of the dead author might be quite the opposite to those of the bereaved[49]. Despite that in the web environment some kind of identification is always exchanged, many transactions remain without clearly affiliated identity and therefore solving questions related to authorship or ownership can be tricky. For example, if the exchange of credit card information is employed, we have at least some proof of who performed the transaction, but even then we can't be sure that it was the credit card holder (Lachut 2009). The systems that interact with user data collaboratively produced inside of networked environments, must account for new ownerships of data and the value of this data beyond the intentions of the original author (Brubaker and Vertesi 2010).

Before computers and the Internet were invented, the author was produced by writing technologies and preserved for the future within the documents. Paper was the *device* and medium all in one and the only way of conceptualization of the author. In the present, the notion of an *original* doesn't exist anymore, as digital documents are likely to be altered many times before we consider them to have their *final* form and duplicating them is incredibly easy. We can *co-author* a document with a piece of software (e.g., using templates) with another person, or even groups of strangers (e.g., *Wikipedia*). The personal collection is *completed* in the moment the person dies. It is necessary to evaluate what should belong there, since not everything that belongs to our PSI is part of our PICs. Foucault asks whether the *complete works* of German philosopher Friedrich Nietzsche should include his laundry lists (Foucault 1984; quoted in Massimi and Charise 2009). Nowadays we could ask whether our *complete PICs* should include cached files of our computer. A combination of authorship and digital medium (e.g., hard-drive, USB drive, SD card, or email account) can often create occulted and possibly immortal relationships as the work is taken up and used by others (Massimi and Charise 2009; Brubaker 2010).

We need to have the ability to choose when our data needs to be privacy-protected. It can be provided as anonymous and unrevealing stream for use in analysis by the provider to improve services, while preventing that potentially compromising data could be traceable (Jones 2008, 235). Anonymity is an option that brings up a vivid discussion. In the digital age, it brings advantages for privacy and identity violators (Jones 2008, 186), but it can have value while "the ability for people to speak their minds about important topics without having that attached to their real names is also important" (Ingram 2011).

2.10 Digital Afterlife

As our presence in the digital world continues to grow, we still die. We own digital artifacts and digital assets. Our digital content is created within an ecosystem. Once we die, the digital content and assets gain their own life, often mediated by people who were close to us during our lives (e.g., they can still post comments on our blog, or use the information that we have published elsewhere on the Web). Our digital assets (anything on the Web that requires a login in order to be used) continue online for a long period of time and can (in extreme cases) stay there forever (or at least for the time that the Web still exists). We should seriously consider the be-

49 For example, Franz Kafka, a German–Czech author, appointed as his executor Max Brod, who decided to publish his work after death. However, Kafka didn't have the intention to publish his work and explicitly asked Brod not to do it. If Kafka would have password protected files, none of his work would be published nowadays. Later in a postscript to the 1925 edition of *The Trial*, Brod wrote that if Kafka would have been so sure about his intentions he would have appointed some other executor (Massimi and Charise 2009).

queathing of our most important digital assets and artifacts. To create a complete digital estate plan may be quite exhausting, but there are many directions in which we can go. We can create lists or tables, on paper or digital, we can store them locally or in the cloud.

Even though there has not been much research in this area, the *Digital Afterlife Industry* is emerging. It contains a wide range of services for digital estate planning, memorialization, online obituaries, post-death and also some funny services (e.g., *My Funky Funeral*). Among all of these, there are tools to support finding that help us prepare and organize our digital legacy for the eventuality of our death. We also find services that help us with our bereavement and grieving (e.g., websites providing information on how to obtain the deceased's digital assets, online obituaries, etc.). The industry has about a billion dollar size and includes over forty companies, most of them are located in the USA and some in Europe (e.g., Sweden and Switzerland). The grieving related services are experiencing the biggest growth in industry (McAlear et al. 2011).

To create our digital afterlife plan, we can use tools provided by the Digital Afterlife Industry, or we can come up with our own systems. Ideally, we may include digital estate planning in our day-to-day activities, so that they wouldn't cost any extra resources. There is no one-size-fits-all solution. While the tools provided by the Digital Afterlife Industry may be well structured, easy to be managed from different locations and secure (all of them use encryption methods), in most cases they cost money. Often the longer you use them, the more you pay. Younger people who are the most engaged in digital life (Millennials and Digital Natives) may not have started considering preparing for death and may find it wasteful to spend money on something they might not need for many decades. It is generally not recommended to include digital assets into legal wills, because they change frequently and updating them may get difficult. Also the will becomes a public record as soon as it is read (Carroll and Romano 2011). Independently of the option we choose, we should select among our friends and family a digital executor. A digital executor is a person who executes our wishes after our death, following our guidelines. It is better to select someone with appropriate distance. A friend might be better than a family member, since family members may have a special relation to our artifacts and may feel tempted to carry out their wishes rather then ours.

The most common types of digital afterlife services are: [1] Post-humous messaging services, [2] Digital estate planning services, and [3] Online memorials and obituaries. Concrete examples will be provided further on, in *3.2.3 Advanced Options*.

Post-humous messaging services were the very first to emerge. They enable an elegant way for bequeathing our assets, or leaving individual messages to those we care for (or don't). Of course it was always possible to deliver post-humous messages with physical media, the difference being that now we don't depend on others to deliver them anymore.

Digital estate planning services are the next step in evolution after post-humous messages. They are perhaps the most controversial in the industry, because of their connection to very unstable legal frameworks and diverse company policies. They allow us to record and, sometimes, execute for us, a wide range of wishes. They take care of the distribution of our digital assets, or may delete them completely. These services normally keep entrusted information until someone activates the distribution process by denouncing our death. Some of the activation processes are simply based on trust as the bereaved person is asked to access a link sent by email. In most cases the activation process is triggered when a verifier (angel) appointed as a trusted person by the user reports the death. In some cases the verifier also serves as a reference for the services

to double-check if the death actually occurred, in others the services actually establish contact with the Register Office. The verification of the death is probably one of the biggest issues in the industry.

Online memorials allow individuals from different parts of our life to connect with each other, even if they previously have never met and honor our life in a way that was never possible before. It is interesting to consider that some individuals who had never had a digital presence of their own, were remembered online. The new online forms of memorial have interesting consequences for Eastern cultures, that would traditionally spend a significant amount of time honoring ancestors. In order to reduce the demand of overcrowded cemetery space, officials in China are advocating the use of online memorials for *virtual tomb-sweeping*[50]. In Hong Kong the government runs a boat to allow families to scatter the ashes of the deceased in the sea, furthermore an online memorial for sweeping and remembrance is provided (Carroll and Romano 2011).

50 The Chinese traditionally worship their ancestors. Their attention to the departed is visibly manifested on the *Tomb Sweeping Day*, which normally takes place around *Ching Ming*, one of the traditional solar divisions in early April. The day is designated to visiting and cleaning the gravesite, which is the eternal dwelling place of the departed forebears, while also performing traditional rituals (Juan 2010).

3

Putting Things Together

One hundred percent of all people still die.
(YOUNG, PARKES AND LAUNGANI 2004)

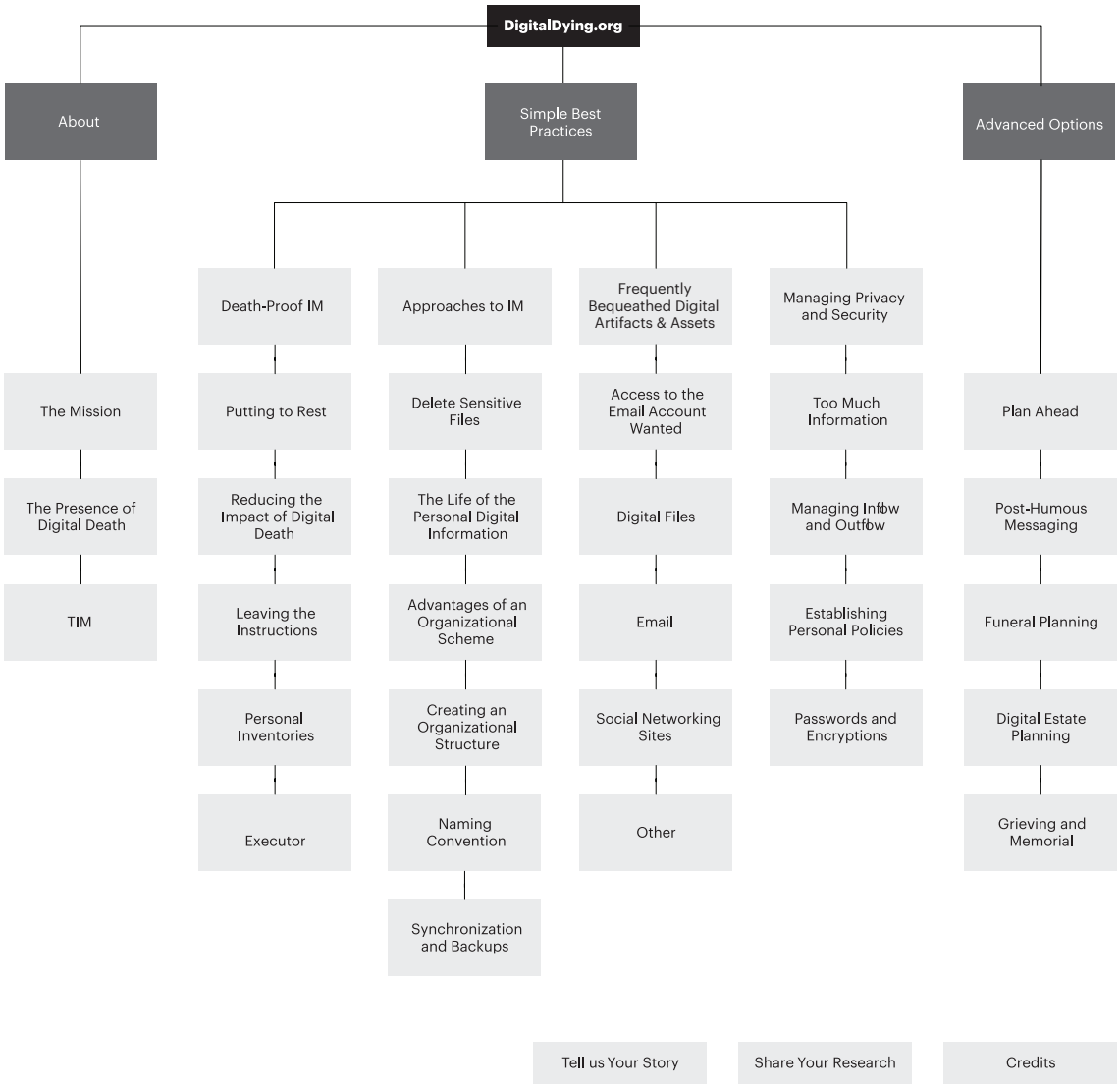
3.1 Project Description

Our project is entitled "Digital Dying in Personal Information Management" and is allocated on the URL *http://digitaldying.org*. As we have already said in *1.1*, the motivation for this project was an experience with death and its consequent implications, within proximity. In our particular case, the issues faced by us didn't involve much digital technology. Our digital inheritance was minimal and limited, more or less, to a cell phone, a personal computer and the information they contained. However, the experience was strong enough to raise our curiosity about all the processes related to the death of an individual in both physical and digital world contexts. The most relevant observation was that the bereavement and grieving processes are conditioned by a variety of factors, which may be more salient if the deceased didn't make any previous arrangement. We felt the urge to contribute to their improvement. If we have the ability to take care of the deceased's matters quickly, we can re-establish our emotional equilibrium faster and it leaves us more quality-time for reminiscing about the bereaved.

We have conducted an extensive research, involving a large amount of literature available in the study area. Our findings were composed as a website, which seemed an obvious choice, since it enables access by a wide audience, is easily updated and can be consulted at any time, on the most convenient device and location. We also wanted to allow people, researchers and individuals, to be able to exchange their information related to thanatosensitive approaches, digital death and alike. The process of its creation was divided into several steps that we will mention, however they didn't necessarily follow one another in this order: [1] Assemble the content, [2] Produce the user interface, and [3] Development and allocation in the virtual space.

We have *assembled the content* in order to advocate for awareness about the phenomenon of digital death and the importance of adopting sustainable practices, in order to reduce its negative impact on the bereaved. The website also invites the readers to self-reflection on more meaningful practices of their personal information management, that can address the thanatosensitive needs as a byproduct. The website is currently subdivided in three parts: *About*, *Simple Best Practices* and *Advanced Options*. The content of this website requires a special effort in order to be maintained up-to-date, as the technology evolves fast and new solutions in the form of devices or services emerge every day. We foresee that more sections might be added according to the informational needs. We also preview including sections with suggestions of *Further Reading*, *Tools & Services* and *News*, of which the last one should represent the information channel (or stream) of a hand-picked collection with interesting articles and events related to the topics discussed on the website and published elsewhere.

The *user interface* was created upon a sixteen-column vertical grid, where each column is 60 pixels wide with a gutter of 10 pixels and a horizontal grid, which is based on a measure of 18 pixels, which corresponds to the line-height of a character from the main text body. This grid system allows some flexibility, since it can easily be adapted for any possible future need. Each page is visually



divided into two major regions. The horizontal navigation bar is located on top of the main visible part and on most of the pages we also included a short story, illustrated by Christina Casnellie. The stories work as a kind of summary or introduction to the problems discussed in each section and all of them are inspired from real situations encountered along our research. We opted for Christina's drawings, rather than photography or any other means, for their particular properties. They have an enlightening character, but readers can easily establish a relation with the situations portrayed. On the other hand, they do not capture any *specific* people and this anonymity can contribute to the generalization of the situation.

At the *development* stage we used the following technologies: HTML5, PHP, CSS3, Javascript and jQuery. The website is still quite simple in terms of structure, so we didn't have to use any control management system or database. The most difficult part, in order to make the project publicly accessible, was the selection of a domain name. We had to compromise between simplicity, ability to transmit an idea about the website content and availability of domain names.

3.2 Website Content

3.2.1 About

3.2.1.1 The Mission

This website emerges in July of 2011, as the result of a research leading to the completion of the degree *Master in Multimedia* at Faculty of Engineering of University of Porto, Portugal.

We explore the application of the concept of thanatosensitivity over personal information management, in order to reduce the impact on the bereaved after an individual's death.

Objectives of our work were to contribute to cross-disciplinary discussion on interwoven topics of personal information management, online personal identity, thanatosensitivity, digital death and digital afterlife, while we introduce *thanatosensitive information management* (TIM).

We created this website in order to provide a place to consult and exchange the information about TIM and to make it accessible and understandable by a broader public.

3.2.1.2 The Presence of Digital Death

For centuries, people have been dealing with physical artifacts including information, but we haven't had enough time yet to develop approaches that would be appropriate for our digital artifacts. On the cover of Clay Shirky's[51] book *Here Comes Everybody* we read "Revolution doesn't happen when society adopts new technologies, it happens when society adopts new behaviors." Learning how to use a new device is not the same as taking advantage of its full potential. We are slowly starting to understand the consequences of our presence in the digital world. Digital technology surely brings many improvements to our lives. We can get our things done faster, we can reach our friends and family at any time and virtually any place, but it also causes many problems. We spend time learning how to use new tools, we get frustrated when we accidentally lose some of our information or when our information is misused and the need to be constantly connected produces a series of psychiatric disorders. However, in the article *MIT Prof: Data Privacy Is Your Problem (or Asset)*[52] by Michael Hickins, Erik Brynjolfsson, an MIT Sloan professor of digital business, is positive about the technology development, while he argues that people didn't stop driving cars even though they created thousands of highway deaths in the beginning. Rather, they introduced practices like stop lights.

The Internet is currently perhaps the most influencing new technology. Our daily activities are increasingly and regularly performed on the Web. We send emails, do shopping, read newspapers, communicate with our friends on social networking websites and so on. While the digital technology has been originally the domain of younger generations, Jenna Wortham notes in her article *As Facebook Users Die, Ghosts Reach Out*[53] that "people over 65 years are adopting *Facebook* at a faster pace that any other age group," however, this generation also has the highest death rate. And so the digital death arrives.

Probably the first time when a wider audience realized that the phenomenon of digital death exists was in 2009, when *Facebook* launched their feature to reconnect with inactive friends. In general,

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51 See http://shirky.com

52 See http://blogs.wsj.com/digits/2011/05/19/mit-prof-data-privacy-is-your-problem-or-asset

53 See http://www.nytimes.com/2010/07/18/technology/18death.html?_r=l&scp=1&sq=ghosts%20reach%20out&st=cse

our technology doesn't acknowledge the possibility of user's death yet. It seems that the most *popular* kind of digital death is related to social networking. Some social websites already provide instructions for ceasing user accounts or for their conversion to memorial state. However, they still don't have clear policies on bequeathing the ownership and its content. Similar problems apply to email accounts. We experience the same problems with email accounts and a variety of other services.

We create our digital content within an ecosystem as we are interconnected with other users. Even though the digital information carries an imprint of its creator or owner (such as a name or nickname, an IP or email address), without a physical confirmation it is often difficult to determine its real ownership. The information we put online can be hard to take away. In some cases it disappears after a while, in others it may stay there forever. We may provide wrong input, it may become out-dated or we may even get confused with some other person. *Personas*[54], a web application created by the MIT Media Lab, can serve as a simple illustration of these problems. We provide our name and we get back an infographics, based on data-mining results, with a description of who we are.

The phenomenon of digital death is not related only to the web-based services. It also applies to computers, hard disks, cell phones and so on. While the media that carries our data count as our possessions, its content may be valuable and should be regarded as our belongings as well. The lack of mechanisms to treat the digital artifacts properly causes difficulties to those who have to manage them after one's death. Passwords are obstacles in accessing a protected personal computer and we can receive a phone call from the deceased's phone number. The time when we have to care for the digital legacy of the deceased has come, but we don't have yet sufficient law or social customs to help us through. Until these become real, we have to take action ourselves and help those who survive us to deal with our stuff.

3.2.1.3 Thanatosensitive Information Management

The personal information management of the living has been studied for quite some time. It addresses questions related to personal information space and the approaches and tools used to take charge of it, as well as the protection of our resources. Information is anything from the physical document or some other *thing* to the abstract means of reducing uncertainty. According to Michael K. Buckland[55], we can consider as information an email message, a book, along with a globe.

Death has implications beyond the individual's life-span and personal control. Yet, we seldom realize them until we experience death within proximity. Planning for death is often postponed or ignored, because it causes discomfort and anxiety. The personal information which we create, keep, send out or experience in any other way, is often overlooked. When a person dies, the bereaved have to hold the funeral ceremony and take care of the dead's belongings among other things, while putting the matters of the deceased to rest. They are often confronted by complications with privacy, social entitlement and even false re-animation of the dead. The digital information is involved in many of these activities and problems. The information relevant to us while alive, becomes pertinent to our survivors.

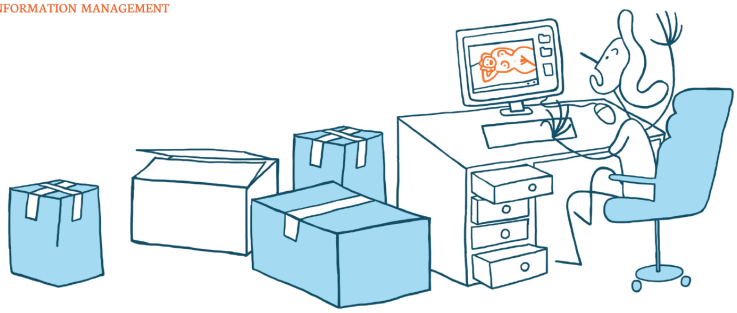
We introduce the *thanatosensitive information management* which focuses on practices, regarding digital information, that may be implemented in our daily personal information management. Its aim is to help the bereaved to fulfill their duties and reduce the impact of death on them by advocating the best practices to the living. Essentially, the *thanatosensitive information*

54 See http://personas.media.mit.edu

55 See http://en.wikipedia.org/wiki/Michael_Buckland

Delete Sensitive Files

APPROACHES TO INFORMATION MANAGEMENT



Susan would often return in her memories to the time after John's death. She was trying to un- derstand what she could do in order to prevent at least some of the situations she went through. She remembered her frustration when Amy and her would go through all the things at his home. They would feel like gold-miners, trying to find hints about anything that needed their attention. Her way to get over the difficult times was to laugh about them. She would often share a story about looking for computer files that would have an interest to be preserved. First of all, they found out that John didn't have any system for organizing of his files. He was a good photographer and they wanted to keep some of his pictures. Luckily, his photographs were all together. In a folder called 'holidays' they found photos from his last trip to Paris. In one of them, his girl-friend was laying naked in an erotic pose on the bed of the hotel room.

APPROACHES TO INFORMATION MANAGEMENT

Delete Sensitive Files

The Life of Personal Digital Information
Advantages of an Organization Scheme
Creating an Organizational Structure
Naming Convention
Synchronization and Backups

Naming Convention

Each piece of information stored within our personal information space has some kind of identifier in order to enable easier retrieval and recognition. Some of them are attributed automatically and used exclusively by the software we use. But mostly it's us who have to come up with a name, label, tag or keyword for the folders and files placed within our information structure. Normally, we do this as a part of the keeping activities.

We should come up with a consistent naming convention and stick to it. A name using descriptive and casual, rather than idiosyncratic, words is better, as it transmits more details about the particular information item. The names can help us to understand immediately what we will find within a file or folder. We should avoid using labels like Stuff since these folders serve only as holding bins, rather than meaningful organization elements. Something like Stuff from my desktop 11-07-20 may be more suitable, since it tells us at least where it was found and when it was created. Sometimes the names can even provide us with a summary of the file or folder content. We have increasingly more opportunities to embed additional information to our files in the form of meta-data, but applying a naming convention is faster and more convenient.

Processing our files into a structure and applying a naming convention helps us to remember what exactly we have stored in our personal space of information. A good and consistent system for names can considerably speed up the process of information retrieval and in some cases the file names can even serve as a reference during a conversation. A naming convention can become extremely useful when collaborating with other people. We should consider to discuss the orga- nizational structure together, since it can prevent misunderstandings and it can contribute to a better efficiency of the work.

The bereaved often rely on our naming convention as the only support tool in retrieving the information from the personal information space after death. Often, they only have a rough idea of what they are looking for, as they don't have contextual memories of the file location or any other additional information. The descriptive names can save them a lot of time, since they may recognize them more easily.

<< >>

management of the deceased gains two forms. It can be anticipated by the living or dying before, or practiced by the bereaved after, the death of an individual. We should have the right to express our wishes regarding our digital legacy. A one-size-fits-all solution doesn't exist, as each person has unique methods which reflect the personality, cognitive abilities, age group, experience, various life-roles, available tools and spaces, special circumstances, and so on. The purpose of this website is to share thoughts and ideas, for discussion and self-reflection, that may eventually serve as inspiration for the development of better personal strategies.

Ideally, we would manage only the most important of our digital artifacts using tools that acknowledge for user's death. We would make sure that our information is comprehensible, has a meaningful organizational scheme and that it is safely stored. Even then, having our information organized and accessible can produce side effects and lead to a bigger vulnerability and to its misuse. We can prevent these by developing and adopting sustainable practices of personal information management of our digital files and understanding thoroughly the best practices for the protection of digital artifacts. We may also hope that the legal systems catch up with the pace of the technology evolution.

For the purpose of this work, we augment the definition of thanatosensitivity, created by Michael Massimi and Andrea Charise in the paper *Dying, Death, and Mortality: Towards Thanatosensitivity in HCI*[56], as follows:

> Thanatosensitivity is a humanistically-grounded approach to person's physical and digital belongings, supported in research and design, that recognizes and actively engages with the facts of mortality, dying, and death, with regards to interpersonal relationships, where belongings refer to a set of everything that can be associated, attached, close or related to an individual's existence.

Thanatosensitive information management regards people in different stages of their lives. The living need overall to get things done. The bereaved have to take care of their daily routines at the same time as undergoing their personal grieving processes and managing the information of the deceased. The dying have essentially the same needs as the living, only that certain actions, such as organizing and passing on their information, may be influenced by the proximity of death. The management of the dead's personal information theoretically pauses at the moment of the death, while resumes almost immediately after the event because, for example, the information about the dead has to be communicated to family, friends, and institutions.

3.2.2 Simple Best Practices

3.2.2.2 Death-Proof Information Management

3.2.2.2.1 Putting to Rest

Susan's dad John passed away when she was still very young. She and her sister Amy were the only two direct relatives, so they had to take care of everything. They had never had to deal with a death within such proximity. It was overwhelming to have to organize the funeral, go through all the bureaucratic processes, heritage and so on. After a couple of months, they managed to put

56 See http://www.sigchi.org/chi2009/altchisystem/submissions/submission_mmassimi_208_1232961565.pdf

his stuff more or less to rest. Finally they had a little time for grieving and mourning. This experience made her think about her possessions. She had some bank accounts spread across different countries where she had lived over the time. She was an active blogger, member of many online social networks and had many web-based accounts. She had an iPhone, several computers, hard drives, iPod and so on. Susan cared a lot for her family and friends. She didn't want anybody to go through all the painful situations that she encountered after her father's death.

3.2.2.2.2 Reducing the Impact of Digital Death

The death of a close person can disrupt even our most familiar practices, routines and interactions, from cleaning to paying bills. The bereaved family members have to contend with a series of emotionally charged and stressful activities and circumstances, while undergoing their personal grieving process. The bereavement is easier in an environment where everybody agrees upon which death-related practices, cultural and religious, are appropriate. Otherwise, it can lead to elevated personal fragility. The bereaved may be caught in the *limb of regret* and re-establishing a sense of emotional balance can endure for long periods of time.

Since our lives are increasingly mediated by new technologies, obviously, the digital artifacts are present and may be needed, while putting to rest the issues, belongings and personal identity of the deceased. We create large collections of digital objects and data. Our digital artifacts have different value for us according to established relationships and their durability. For our survivors, the documents such as tax records can be valuable for their usefulness, while a collection of tweets or photographs can be precious for its potential to chronicle our lives.

The mechanisms to deal with the digitals artifacts are still in their childhood. The bereaved have to gather all of our scattered devices, physical and cloud-based storage media and digital assets, in order to retrieve our information. It can become a nuisance, if we don't leave any guidance to where our stuff is and how to understand it, since every practice of personal information management is unique. Personal information is necessary for putting the dead to rest and also to preserve (or forget) the memories. Implementation of sustainable practices can significantly reduce the impact of the digital death on the bereaved. We can employ a coherent organizational scheme and structure across all of our devices and media, assign a digital executor or leave instructions on how to deal with our digital possession.

3.2.2.2.3 Leaving the Instructions

The importance of bequeathing our possessions is underlined by the effort people put into creating their personal collections of artifacts. Our physical possessions are treated by laws and social or religious customs and eventually get solved out. Some people even draft their wills in order to ensure continuation and success of the progeny and close people. Normally, if this activity happens at all, it takes place around middle age or when some other significant life events, such as the birth of a child or progression in career, prevail upon them. The importance to include planning for our digital legacy grows. We still lack legal and social customs to deal with it, since more and more of our meaningful information is stored in digital form across multiple disks, accounts and devices. The issues of mortality, however, are often confined and rarely addressed publicly.

Our digital legacy can be addressed both directly and indirectly. If we adopt sustainable behaviors towards our digital property, like coherent organizational schemes, comprehensible naming conventions and regular synchronization and backups, we can already be pretty much sure that our survivors won't have major problems. Keeping our most important information in a separate and easy-to-discover file can help a lot, too.

The Last Post[57] by Derek K. Miller is a good example of taking planning for digital legacy one step further. He passed away in May 2011, at the age of forty-one, after a long battle with cancer. He prepared a post for his blog, to be pushed by his wife after his death, where he would officially cease its activity. Derek was a well known person within technology circuits and his blog continues online. This blog post informs people in his online social network groups about his death. It is especially important since he might have never met some of them in his physical life and they wouldn't have any other way to discover that he had passed away. However, Derek's case also shows the other side of the coin. His last post was immediately shared on social networking websites and other online communication channels. The traffic of his blog raised significantly as people would come to read his post and the servers went down. A ghost of Derek appeared as the error page would suggest to contact him by email in case of experiencing problems.

Creating personal inventories may be a good approach to address the digital legacy for those of us who are especially concerned about what happens to their stuff after they die. They allow us to indicate the specific items and instructions for each of them, such as who their beneficiaries are and whether they should be preserved or deleted. We should make sure that our wishes are practicable and correspond to the current laws or to our legal will. We may as well create a small tutorial or a sort of *readme* file explaining how to navigate within our personal space of information and which regions or folders are worth paying a visit to. We may also appoint a digital executor who would be responsible for setting our plans to action.

In either case, we have to keep in mind that, similarly to our physical legacy, the will of our survivors may be in contrast to ours and our wishes may end up unfulfilled. If we have any specific intention with any of our personal information, we have to account for all the possibilities. We may consider password-protection or encryption of our digital files that we want to destroy or make inaccessible. Just remember of Franz Kafka[58], a German-Czech author, who appointed as his executor Max Brod[59] and asked him to destroy his work upon his death. Instead, Brod de-

57 See http://penmachine-bu.appspot.com/2011/05/the-last-post

58 See http://en.wikipedia.org/wiki/Franz_Kafka

59 See http://en.wikipedia.org/wiki/Max_Brod

cided to publish it. Later, in a postscript to the 1925 edition of *The Trial,* Brod wrote that if Kafka would have been so sure about his intentions, he would have appointed some other executor.

3.2.2.2.4 Personal Inventories

Since our personal information is generally scattered across several locations, different forms and tight to various identifiers, the creation of personal inventories can help us by affording orientation among all of these. For example, if we move to a new address, knowing which institutions and registries we have to inform about the change can save us a considerable amount of time. A list of our devices, such as computers, hard disks and so on, can help us to organize, retrieve, maintain and update our information. Some of us may use pseudonyms in our personal and professional activities. A list of these may provide our survivors with important information. After the death of an individual, the heirs have to get in touch with all of the institutions that took part in the personal space of information. Providing a list of all of the places and people that should be notified is a nice favor to whom we care for, since it allows them to have more time to undergo their personal grieving processes and reduces the possibility that they would miss something important. If we are especially concerned about how other people will remember us, we should also include an overview of our personal attitudes, as a documentation of our personal identity, which can be a precious information for our bereaved.

The personal inventories are summaries of our artifacts and assets, both physical and digital. We can use them to appoint to the most important information. They can be a table or a spreadsheet created with tools such as *MS Office*[60], *iWork*[61] or *Google Docs*[62]. We can store them locally on our computer or somewhere within the cloud, for example in *Dropbox*, so it is easier to maintain them up-to-date and we can even print them out. If we use any systems for archiving our books or passwords and other things, we might as well annotate these, rather than multiplying the information. Each item in our personal inventories should have its own entry and include information such as name, location, way of access (e.g., a link) and credentials where applicable.

Our web-based information may require further considerations. Having a list of passwords for our digital assets maybe useful for us, while alive, but may be we don't want to share them with the ones who outlive us. A better option might be to keep the important content of our digital assets within a location that doesn't require a password in order to be accessed. For example, we may want our families to have our photographs that we share with others on our *Picassa* account, but we may not want to give them the ability to curate them for us. However, providing information such as domain name and hosting provider and the steps necessary to access the respective accounts, may be vital for retrieving the content or maintaining our personal blogs or websites.

If we create a digital legacy estate plan, we should include our wishes regarding the actions we are willing to be carried out after our death. These should be specified in the personal inventory entries as well. The digital afterlife web-based applications, for example *Legacy Locker*, *Entrustet* or *DataInherit*, can help us with our efforts in establishing the digital estate plan. If we have a digital estate plan or use any of these applications, we should inform our digital executor about their existence, their location and means of access.

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60 See http://office.microsoft.com

61 See http://www.apple.com/iwork

62 See http://docs.google.com

3.2.2.2.5 Choosing a Digital Executor

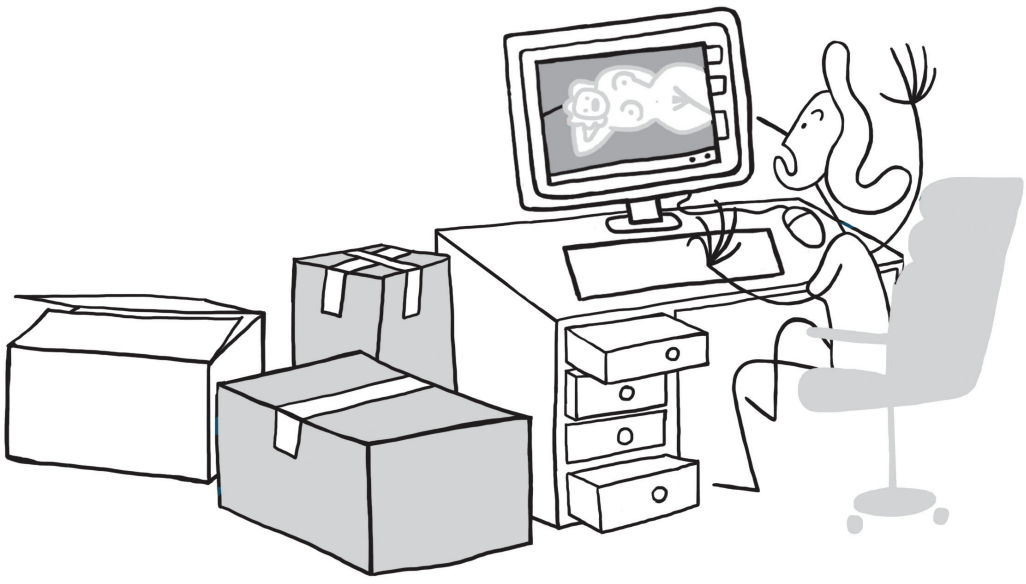
We communicate our wishes regarding our digital legacy to others by leaving behind instructions and creating our personal inventories. Appointing a digital executor is a good way to set our plans in action. The digital executor is a person responsible to act on our behalf after we pass away. Even though they don't have any legally binding power or authorization, due to the current lack of legal support for digital artifacts and information, they can still carry out a wide range of activities.

Being a digital executor is a delicate role and sometimes it may be better played by a web-based service, rather than a physical person. We should select this person wisely. A technically minded person is a must. We have to have a high level of trust of this person, knowing that they won't abuse their power, since they may have, for a certain amount of time, access to some of our digital assets. A friend may be a better option than a close family member, because they have an appropriate distance and won't clutch at everything about us and feel unable to press the delete button. We can ask them to pass our digital artifacts and assets onto the appointed beneficiaries, to push our last messages, to cease our accounts or to change them to memorial state.

3.2.2.3 Approaches to Information Management

3.2.2.3.1 Delete Sensitive Files

Susan would often return in her memories to the time after John's death. She was trying to understand what she could do in order to prevent at least some of the situations she went through. She remembered her frustration when Amy and her would go through all the things at his home. They would feel like gold-miners, trying to find hints about anything that needed their attention. Her way to get over the difficult times was to laugh about them. She would often share a story about looking for computer files that would have an interest to be preserved. First of all, they found out that John didn't have any system for organization of his files. He was a good photographer and they wanted to keep some of his pictures. Luckily, his photographs were all together. In a folder called 'holidays' they found photos from his last trip to Paris. In one of them, his girlfriend was laying naked in an erotic pose on the bed of the hotel room.



3.2.2.3.2 The Life of Personal Digital Information

The digital technologies are based on basic human experiences—the birth, the life and the death. The information and information management also correspond to this life cycle. The information created, kept, sent out, or experienced by us in any other way, is relevant to us, but it may become pertinent to our survivors after our death. It can help them put the deceased and their matters to rest. Our information may be necessary to fulfill the duties of the bereaved or to comfort their emotional needs. Information such as the email conversations in our *inbox*, may be directly related to the bereaved, while information like our name, address and date of birth may be already in their possession.

We keep, find and manage our information in order to meet our anticipated needs, but to foresee the urges of the bereaved is more difficult. Some of their needs for information retrieval are based on common patterns in the bureaucratic processes. For instance, we can be sure that they will need our identification documents and a list of our property, such as titles of houses, cars or information about our bank accounts and alike. If any of these exist in digital form, they should be stored in a special place that is known or easily detected. We may also consider to include them in our personal inventories. Although most of our digital content is insignificant and only about ten percent of the data kept by us is ever accessed again, we should pay a special attention to our sensitive files, as most of us keep on our personal devices stuff that we don't want to be discovered by our family or friends. Coming across an erotic picture in the middle of a photo album from family holidays, may be unnecessary and provide constraints or embarrassing situations to our bereaved. This information should be discarded or hidden in inaccessible places, for example, in an encrypted or password-protected file. We may also use some of the existing web-based services, such as *Legacy Locker*, to do this job for us.

Our bereaved and us, we can both become equally frustrated, if we don't find what we were looking for, or if we encounter the desired information at an inopportune time, when they are not necessary anymore. The frustration may appear from the uncertainty of what we (or them) are looking for, from not knowing its location, by whom it is kept and so on. Our efforts in finding information are supported by our contextual memories regarding space, event, date or time. Yet, these dissolve over time and eventually die with us, so the act of finding gets much more difficult for us and can become almost impossible for others if we don't leave any hints behind. After the death of an individual, along with the social death, the personal information vanishes, as it becomes part of other people's personal information spaces and information inflow gradually reduces. Indeed, the dead and death remain important factors that influence the living and the bereaved.

A small note can help the survivors to understand what to preserve, maintain, discard, forget and deal with one's public records. If we are especially concerned about preserving and distributing some of our digital artifacts, such as photographs, we may as well make several paper-based copies and give them to the designated people throughout our life. Establishing an organizational scheme that accounts for structure, naming convention, synchronization and backups is very useful for the living but may also simplify the emotionally difficult period after one's death. Practicing the approaches and strategies of personal information management on a small scale can help us in more complex situations.

3.2.2.3.3 Advantages of an Organization Scheme

Organization schemes are a crucial element for successful information management. Each of them is variable and reflects personal needs and preferences. An organizational scheme should

address a physical location, appropriate devices for keeping the information, structure and naming convention, synchronization and backups. We should also understand what advantages we gain with different keeping approaches. Generally, we either file everything immediately, file something and leave the rest or file nothing. Filing everything turns out to be unnecessary as it costs many efforts that might be better invested in other activities. Filing nothing doesn't seem to be the best option either. Our space can get overly crowded and it can become difficult to find the information that corresponds to our current needs. Filing something and leaving the rest, often proves to be the most efficient as it enables us to organize and maintain the really important things, while we can always get back to the rest of it that stays in our personal information space as our needs arise.

The most common digital artifacts affected by the organizational scheme are the digital files stored on our computers and other devices. However, the scheme may also include other digital artifacts that we use: our email account, which is perhaps the most powerful digital asset, the social networking websites, which are likely the most influencing digital assets and other digital tools and services, such as *Amazon* that we use for shopping or *PayPal*, which we use to perform payment transactions.

When considering the physical location of our information, we take decisions, whether we want to store our information locally on our computer, cell phone, external hard disk, music player and so on, or in the cloud, using services such as *Dropbox*, *iCloud*, *Flickr* or *Facebook* and alike. Both of these approaches have advantages and disadvantages. The information kept locally occupies space on our devices, but we have a much better control over it and we can access it whenever and wherever we want. Storing our information items in the cloud requires further concerns about privacy and security and we often need to be connected to the Internet. When deciding which of the locations is more appropriate, we should think about the circumstances in which we will use the specific information item and the accessibility of internet connection. A *Photoshop* file may be better accessed from our computer, while stored either locally or in the cloud, the collection of the phone numbers will be probably accessed from our cell phone, we will read e-books and .pdf files on our *Kindle* and listen to our music on our MP3 player.

A good organizational scheme can significantly increase our productivity and reduce the demand on our resources. It can also help our bereaved to understand what content is stored within our files. Prior to the decision whether to alter or update our organizational scheme, we have to measure and evaluate the possible costs and benefits. We have to make an extra effort to convert our older scheme to correspond to the new one, as keeping it *as it is* may create considerable problems with the information retrieval.

3.2.2.3.4 Creating an Organizational Structure

Our personal information space is subdivided in regions related to our current activities. We can call them *hot*, *warm* and *cold*. Hot information is the one currently in use, warm information is the one that is related to our current project or task in hands and cold information is all the one that has been archived. The regions should be periodically maintained and the information moved across them to their respective place. The working information should be stored in easily accessible locations, while the archived information may be stored on external devices.

For an easier orientation within our personal information space, we create and curate smaller subsets of the information. Frequently, our collections are related to our current projects, such

as planning for summer holidays or working on a marketing report. They may be grouped according to task, for example booking a plane ticket, by information type, such as bills, or by its format like .txt, .jpg, .pdf and so on.

The organizational structures may be flat and have simple or complex hierarchy. Simple collections work best flat, as visibility matters for an easier retrieval. It is especially important for working information, as it may remind us to do a task that is missing in order to complete a project or look for a piece of information that we need in order to finish a task. However, as the amount of files within a folder grows, our capacity to attend the information diminishes. If a collection becomes too extensive, we may consider creating a nested hierarchy. We should be careful when assembling such folders, especially when related to similar topics. We easily multiply the same files across different folders and maintaining them up-to-date and always in the most recent version can become really difficult. A good approach for nested hierarchies is to keep a folder with a flat collection and create a separate folder with subfolders, where we include *aliases* pointing to the original files.

The nested hierarchies can be bottom-up, consisting of a folder with all the information items, which are afterwards organized according to their common points. They can also be top-down, starting with a general folder, where subfolders are added for common topics as we distribute the respective information between them. Of course, we can employ simpler approaches. We can distribute our files into folders with different properties that are visible and easily recognized. For example, a color can indicate the importance of the files within the folder.

We should delete what we don't need and always keep only one current version. A number of tools can help us with version tracking. For example, *Lion OS X* includes a feature called *Versions* which allows us to return to previous variants of our files. We can also consider using *Dropbox*, as it allows us to retrieve anterior versions of our documents. While using cloud-based backup systems, we are also protected against sudden disk corruption or loss. Another method, applicable for the documents which we need and are owned by others, is to ask them for those, rather than keep them ourselves. The most important information should be kept apart, discoverable and understandable, even though protected.

3.2.2.3.5 Naming Convention

Each piece of information stored within our personal information space has some kind of identifier in order to enable easier retrieval and recognition. Some of them are attributed automatically and used exclusively by the software we use. But mostly it's us who have to come up with a name, label, tag or keyword for the folders and files placed within our information structure. Normally, we do this as a part of the keeping activities.

We should come up with a consistent naming convention and stick to it. A name using descriptive and casual (rather than idiosyncratic) words is better, as it transmits more details about the particular information item. The names can help us to understand immediately what we will find within a file or folder. We should avoid using labels like *Stuff* since these folders serve only as holding bins, rather than meaningful organization elements. Something like *Stuff from my desktop 11-07-20* may be more suitable, since it tells us at least where it was found and when it was created. Sometimes the names can even provide us with a summary of the file or folder content. We have increasingly more opportunities to embed additional information to our files in the form of meta-data, but applying a naming convention is faster and more convenient.

Processing our files into a structure and applying a naming convention helps us to remember what exactly we have stored in our personal space of information. A good and consistent system for names can considerably speed up the process of information retrieval and in some cases the file names can even serve as a reference during a conversation. A naming convention can become extremely useful when collaborating with other people. We should consider to discuss the organizational structure together, since it can prevent misunderstandings and it can contribute to a better efficiency of the work.

The bereaved often rely on our naming convention as the only support tool in retrieving the information from the personal information space after death. Often, they only have a rough idea of what they are looking for, as they don't have contextual memories of the file location or any other additional information. The descriptive names can save them a lot of time, since they may recognize them more easily.

3.2.2.3.6 Synchronization and Backups

Synchronization and backuping are equally important for our information stored in different locations and devices within our personal information space. Both should be performed periodically and can be scheduled for convenient times, for example, at night or as a background process while we are working. Even though these activities may be time-consuming, losing or being unable to retrieve the most current version of a single file, because we postponed these activities, may be very frustrating.

Synchronization is an important activity in order to prevent the existence of the same file, in different versions, across different locations. It is particularly an issue for people who use more than one computer and many other devices. Some devices are optimized to work together, others have to be synchronized manually. We should make sure that the respective information is always kept on the appropriate device where it is going to be needed.

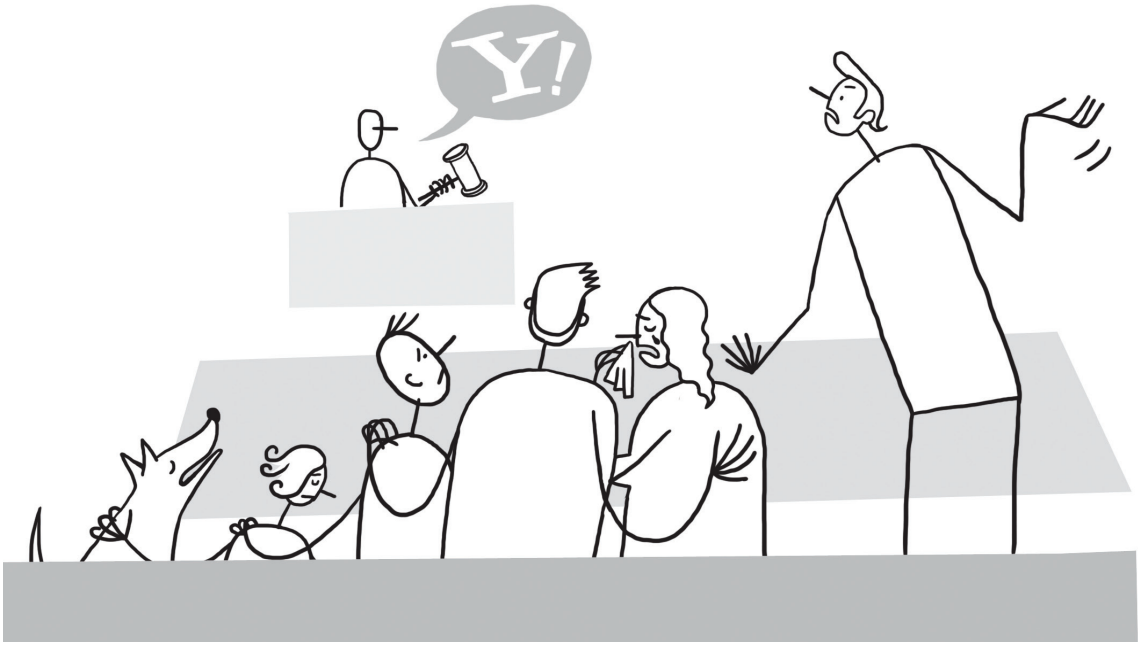
Backuping serves to prevent the loss of our files from hot and warm regions and to archive the items in our cold region. We have some automatic tools that can help us to backup our computers, for example, the *Time Machine* in *Mac OS X* or the *Backup Status and Configuration App* on *Windows Vista*. But, similarly to synchronization, creating backups applies to many other devices, including cell phones, PDAs, MP3 players and so on. We should be cautious and anticipate the issues related to the file formats in which we archive our data. As technology evolves, the formats of our information become outdated. Even a minor change in a file format can seriously alter the appearance of the stored content.

For both synchronization and backuping, we have to consider whether we are going to perform these activities locally or use any of the wide range of web-based services. The physical media have a limited lifetime and they need to be exchanged after a certain period of time, because of their degradation or because their capacity may become insufficient. However, we can access them at any time and we don't need an internet connection in order to do so. The cloud storage may be a reasonable way around, especially for our working information, since we can access it from any device we use and many of the backup services allow us to retrieve previous versions of our documents. However, it is not recommended for the storage of personal or sensitive information, as in some cases managing the privacy and security can be difficult, because the service policies change often and they can even disappear from the market without prior notice.

3.2.2.4 Frequently Bequeathed Digital Artifacts and Assets

3.2.2.4.1 Access to the Email Account Wanted

Susan knew that physical possessions always get sorted out in one way or the other. She was curious about what actually happens to the digital stuff. She had a hard time because she couldn't find much information and she felt like she was probably the only person who feels that this is important. However, in a short time this topic started to be discussed in newspapers and on many blogs. She found particularly striking that most of the web-based services don't acknowledge for the possibility of the users' death. She was baffled when she read a newspaper article about the case of a family who were suing 'Yahoo!' in order to get access to an email account of their son, who was a U. S. marine and died in Iraq. Susan became especially careful with keeping all her important information in a separate folder, so it could be accessible even after her death without having to go through court.



3.2.2.4.2 The Most Common Digital Artifacts: Digital Files

The most common digital artifacts are the files stored on our computers and other devices. As the storage capacity increases, we keep more information items and their amount may become overwhelming. Their management becomes more demanding and we often do it only when we are already losing the sense of having control over them. We should learn to act responsibly. William Jones notes in his book *Keeping Found Things Found* that, even though the storage capacity of our devices constantly increases, there is no evidence that our capacity to attend the information grows as well. Daniel Putterman, in his talk *Your Data in the Cloud: Privacy, Ownership, Convenience* at SXSW 2011[63] alerts that, despite the ability to store in the cloud literally as much data as we want, uploading 4T takes with the current technologies 2.6 years.

63 See http://schedule.sxsw.com/events/event_IAP7059

The story of Radislav Sutnar as described in the article *A Father of Web Design, Kept Alive by His Son*[64], by Stephen Heller[65], illustrates the efforts one has to put in the *thanatosensitive information management* of the dead. His father Ladislav Sutnar[66] was a pioneer of information design with Czech origins. He produced an extensive amount of work, meaningful to be preserved for posterity. Radislav describes his troubles with the management of his dad's information collections. These were distributed among several foundations and archives in order to be preserved. Even though all his information items would probably fit onto a single external harddrive, they were produced on physical support. It is good to realize that conserving this volume of work involves the effort of many people and institutions.

In our personal practices, we can't count on the help of institutions, as our data may be relevant only to a small group of people. In order to act sustainably, we have to apply a meaningful organizational scheme, store our information items in a comprehensible structure with an easy-to-understand naming convention and care for their synchronization and backups. We should make sure that we manage only what is most relevant, keep always only one current version of each file, delete what we don't need and store our items in a place where they are most likely going to be needed afterwards.

Confusing organizational schemes can cause frustration to the bereaved, who often have difficulties in understanding what is the content of our information items kept within our personal information space and determining their value. The value is influenced by the relation we may have with the item itself or its owner (creator). The relationship reflects on all the engagement created with an item during its use, stories that document the memories related to an item and the augmentation regarding the situations in which an item was applied. The most important aspect for determining the value is the item's durability, which is driven by its purpose, meaning and type.

The items can be precious and irreplaceable for any of the reasons mentioned above. For the bereaved, it may be anything that carries an imprint of the deceased, even though the information may be ordinary and exist in multiple exemplars. Items such as legal documents or documentation of completed projects can be extremely difficult to replace. We keep them even if they are seldom accessed, or available from the Web or other external resources. The cost of their maintenance is outweighed by the effort required to locate the information elsewhere as prompted, or the possibility of it to disappear from public stores. We often keep these documents in non-digital form, in order to preserve them for those who survive us. Also, the items can have little or no interest. They usually don't involve much maintenance efforts, rather we need to get rid of them. These categories may overlap, as an information meaningful for someone might be useless for another.

3.2.2.4.3 The Most Powerful Digital Asset: Email

The email account is probably the most powerful digital asset. Most of us have at least one. Its content can represent a great deal of who we are and what we do. A casual observer with access to our *inbox* and *sent messages* might be able to infer a lot concerning our friends or what tasks fill up our typical day, which services we use, what we do for a living and so on. We should be especially careful with our email account password, since it is often enough to reset the passwords

64 See http://theatlantic.com/life/archive/2011/07/a-father-of-web-design-kept-alive-by-his-son/241563

65 See http://hellerbooks.com

66 See http://sutnar.cz/index_en.html

of other web-based services. Email applications can handle many different activities from task or contact management to the construction of a diary. However, none of these were their original purpose, so they may not do any of them especially well.

There are some useful guidelines one can follow for the interaction with an email account, which may contribute to an easier retrieval of its content and better productivity.

We should organize (or filter) the most important information into folders and assign labels to it, while leaving the rest, because we can always get back to it. Even though the email is generally the less well organized part of our personal information space, some people use it to process all of their information, which enables them to have everything within the same structure and at one place.

We have to use clear subject lines. The email messages that we send to others should be short and to the point, as we can always send more if we need to. With a short, clear message, we will get an answer faster. Furthermore, if we manage to put our question directly in the subject line, we will get it right away. If we send too many unrelated questions within the same message, we increase the risk of not getting answers to all. We shouldn't ask unanswerable questions with no clear alternatives for a response. If we receive more messages related to the same topic, we should read the most recent first. Many problems get solved out, if we wait long enough. If we don't have a smart solution right ahead, it is better to wait until we (or someone else) find one. It is useful to quote back entirely by *reply* or just a portion of the previous emails in order to establish the context. We should use plain text and avoid the use of all caps which SEEMS LIKE SHOUTING. We should minimize the use of URLs and attachments, since these require more time to be viewed, force people to leave their current context and cause a wider consideration of the information. We should take a deep breath before responding to contentious emails. If we answer these messages at all, we should ask someone else to read it before we press the send button. An efficient *spam* filter is a must. Our productivity increases if we switch off the email beep and read the email messages during breaks between other tasks.

Email accounts should be included in the personal inventories. We are often encouraged to bequeath our email password to our survivors, but this option should be considered carefully, as it puts our privacy and security at risk. Having access to our email account after our death may be especially important to the bereaved, if we apply the *everything through email* approach. However, we better place all the information relevant to bequeathing to a secure place, aside from accounts that are accessible only with a password and whose providers are often against a post-humous access of the bereaved.

3.2.2.4.4 The Most Influencing Digital Assets: Social Networking Sites

In the past couple of years, we have witnessed a big expansion of the social networking websites as the number of their users grows exponentially. They became perhaps the most influencing digital asset. They provide an important connection between our communities in physical and digital worlds and they occupy a considerable amount of time in our lives.

We use them to project our identity to the world. This identity is equally constructed by us, as by those who comment on our posts or post on our profiles. The dedicated social networking sites enable us to reach a specific audience in a matter of seconds. However, we still have to learn to use them properly. Many people maintain the same connections and publish the same content across different services. But we should distinguish among them. We don't have to necessarily accept friend requests of our bosses on *Facebook* or add our friends on *LinkedIn*.

We store collections of personally relevant content on social networking websites and they encourage us to put there as much personal information as possible. While they can help us to organize our information, such as curriculum, photos or events as a byproduct, we should avoid posting the same content to all of them, as its maintenance and updating can become a nuisance. We should also put more effort in applying our privacy policies, as we never know the full context in which our digital content appears. For example, some companies screen their potential hires on *Facebook* and it may not be appropriate to share party pictures in an unrestricted manner. Similarly to *everything through email,* some people may apply an *everything through social networking* approach to organize their personal information. This is even easier as many of the services allow us to create a local backup of our data.

The social networking websites make the identity persistence possible. If we don't do anything, our content may remain online for an indefinite amount of time. In the article *As Facebook Users Die, Ghosts Reach Out*[67] by Jenna Wortham, we find a testimony of a user who reports that seeing her dead friend's face on *Facebook* was uncomfortable at first, but after some time she actually became grateful for the remembrance. We should be careful when considering what to do with our social networking profiles after our death. They can provide a source of information to our bereaved families and friends. Our profiles are most likely interconnected with many other users, who may be hurt if we decide to take our content away or delete the account. We have never met in physical life many of the people with whom we interact online every day. We should consider to leave a final post for them, since it may be difficult to figure out that we passed away, as there is no physical evidence or confirmation. However, other people may find our persistent online presence on social networking sites creepy.

Slowly, the social networking websites are coming up with solutions for dealing with the death of their users. For example, *Facebook* already gives the possibility to convert user profiles into a memorial state, where only the *wall* remains enabled, so people can reminisce about the dead. But the mechanisms of transferring the account ownership (and attendant digital possessions) to the bereaved remain unclear. We may consider to include the social networking websites into our personal inventory.

3.2.2.4.5 Other Digital Artifacts Worth of Consideration

Our lives are increasingly mediated by the digital technologies and the Internet. We use them to communicate, shop, for entertainment and so on. In our personal information management, we often only pay attention to the most obvious digital artifacts, such as our computers or cell phones, the information contained within these and the digital assets like email accounts or social networking profiles. But our practices should also address other digital items.

Some of the services we use contain our personal information, which should be maintained up-to-date, as it may cause problems when it's not. Some of them, like *PayPal* or *eBay*, actively operate with our money funds, which should be acknowledged in our legal arrangements. However, they communicate with us exclusively online, so it may be hard for our bereaved to discover them in order to put our matters to rest. The same applies to shopping websites, such as *Amazon*, online sub-

67 See http:/nytimes.com/2010/07/18/technology/18death.html?_r=l&scp=1&sq=ghosts%20reach%20out&st=cse

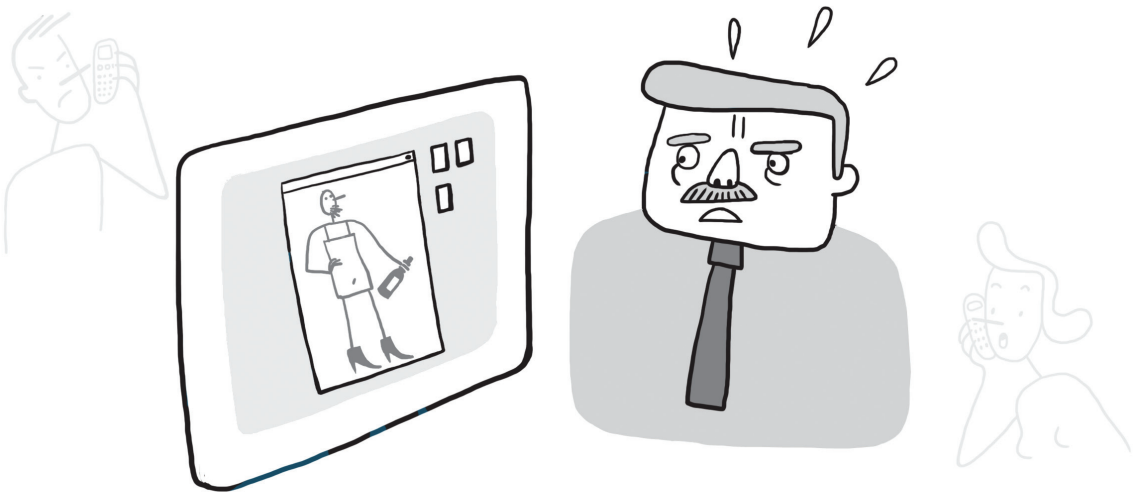
scriptions that charge us periodically, such as *MegaVideo* and the like. If we have a personal blog or a website, we need to pay regularly for the domain name and hosting services in order to maintain them alive. Recently, even the services that we use in our physical lives, switched their communication with us to digital form and we may receive phone or electricity bills via email. Discovering the respective provider may be time-consuming if we don't provide any additional information.

All of this information is of extreme importance to the bereaved in order to put our matters to rest after we pass away. Due to their lack of evidence and the limited access through password-protected accounts, we should include these in our personal inventories or even in our digital estate plans.

3.2.2.5 Managing Privacy and Security

3.2.2.5.1 Too Much Information

One day, Susan received a phone call from her best-friend Nick. He was calling her from work and sounded really annoyed. He started right ahead telling her that his boss had a weird talk with him. He was surprised because he didn't have a clue of what was going on. His boss explained him in a very sleazy way that one of his colleagues had found a blog online that Susan and him had together, where they would put fun stuff that they wanted to share with their friends. The boss ordered him take off a picture where he was dressed like a woman and wearing high-heels. He could either delete it or leave his job. Susan couldn't believe her ears.



3.2.2.5.2 Managing Inflow and Outflow

The management of our information and consequently its privacy and security, gets more complex as our digital presence grows. We often place a big amount of trust and personal information on web-based services and companies like *Google* or *Facebook* further encourage us to do so. However, these have only existed for a couple of decades and we can't foresee how long they will last. Our information must stay secure, both while alive and after we pass away. For purposes

of privacy and security management we divide our personal information into inflow and outflow. The inflow consists of information directed toward us and information potentially relevant or useful to us. The outflow contains information controlled and (or) owned by us, information about us that others may have or may want, information sent, posted or provided by us and information that we have already experienced.

We manage our information outflow for privacy and power. In the first place, we should prevent that unnecessary information gets out. The information can be recorded, stored, transmitted and then retrieved by nearly anyone, anywhere, at any time. Very often we have to make instant decisions regarding information we are willing to provide and many times we don't understand clearly the implications of clicking *yes* or *no* to questions that computer programs or other services ask us. Applying further control over our information outflow can be difficult since it is no longer within our direct reach.

Managing the inflow can afford us more free time and allows us to complete our tasks faster. We often receive information from the same senders. Some of these, such as our friends or coworkers, banks or schools, should be included in our personal inventories, since the bereaved may need to inform them about our death. Most of the times, nothing warns us that the information is coming and only the legal imposition can stop people and institutions from targeting us with it. We should focus our efforts on managing the channel of the incoming information, for example we can turn off email, mute the phone or close the door, rather than the individual items themselves.

3.2.2.5.3 Establishing Personal Policies

We have to establish our own personal policies regarding privacy and security and apply these consistently across our different devices like computers or cell phones and forms of information, such as computer files, posts on social networking websites and so on. We may share everything and restrict access to some information, or we can restrict access to all of it and allow access to some. While running a home business, we may consider creating two separate accounts on our computer or separate email accounts, or at least organizing it in clearly designated folders. If our personal and work information become intermingled, the bereaved will have difficulties telling which one belongs where. While working for a company, we should be careful with the information we store on their computers. It may be against the company policies and, furthermore, the company may deny access to our personal information to our survivors.

After death, the rules for privacy and security management change, as the right to privacy dies with the person. Some of the information becomes addressed to our survivors instead of us, or becomes part of their personal information space and follows their policies from there on. The social death of an individual takes a longer time, as it endures while the bereaved are putting to rest all of the deceased's matters. Wrong or outdated information may persist, as it's difficult to be identified.

We should pick carefully the means in which we communicate our information. It is better to send good things in an email and say the bad ones over the phone. We shouldn't leave a digital or paper trail that can be used against us, because it will. As soon as we realize that we have been misunderstood in written communication, we should use the phone, since resolving misunderstandings without the clues we get from tone and intonation is far more difficult and time consuming. If we need a quick exchange of information, it may be better done with instant messengers. When we send out or publish our information, we should be careful about who has access to it and for how long.

We share some information with others. We should consider dividing our responsibility, as we don't have to maintain everything by ourselves. For example, a parent may take care of the medical records of their kids, while the other takes care of their photographs. In shared information management it is useful to discuss the organizational scheme together with all the people involved. It helps us to get accustomed to each other's approaches and the orientation within other people's organizational schemes becomes easier. Of course, we have to select carefully the people with whom we share our information. For example, we often assume that we trust people who come to our homes, but we don't trust our close friends in the same way as a plumber. Sharing information with people to whom it is relevant is a good way of preventing it from getting locked within our password-protected personal information space, which can make its retrieval impossible.

3.2.2.5.4 Passwords and Encryptions

We need to protect our digital artifacts from different kinds of violations. Large organizations have system administrators to set up and maintain privacy and security policies, but the individual users typically have only themselves, their family members and friends.

We often carry assumptions from physical into digital world and base our policies on interpersonal trust relationships. Frequent mismatches occur between our mental models related to privacy and security and the current system designs and operations. People put their digital content on off-limit devices and restrict the access to them, as they often believe that device and data boundaries are the same. People trust those who are members of their households or come to their homes and let them use their devices. They often believe that they can prevent privacy violations by being physically present, but computer violations are often faster or less obvious that physical-world break-ins, which may complicate their detection, even if the owner of the digital artifact or data is in the same room as the offender. Users hide sensitive files within their devices, but the search tools enable fast and accurate discovery of the desired content, regardless its name or the directory structure. They delete sensitive files, but these often remain stored elsewhere. However, in most cases, the immediate benefit of the ability to quickly access a computer outweighs the concerns about privacy and security. People like to share certain files, such as photographs or work-in-progress, but become frustrated when their data is put at risk or exposed in a different way that they would expect. Often, the available fine-grained controls are not sufficiently usable and require too much time to specify them.

Common tools used to protect personal information and digital devices are accounts, passwords and encryptions. They are used to ensure that nobody, besides the authorized person, can retrieve the data. We should pay a special attention to where we employ our password and be provident in their use. We shouldn't share them and if we do, we should alter them immediately. We should be consistent in logging out from our accounts, especially on shared devices.

Passwords, however, present obstacles in the event of emergency or death, when access to the information becomes necessary. Our information may become inaccessible, or even lost. The items, such as common household bills or pictures from holidays, that are relevant to others might get locked in our password-protected information space, as well as the information contained within our digital assets, since online companies, like *Yahoo!*, don't allow to bequeath the account's content. We should preview these possibilities and make sure that this kind of information is accessible or addressed in our personal inventories or in the digital estate plan.

3.2.3 Advanced Options

3.2.3.1 Plan Ahead

Susan became really interested in everything related to personal information management. She was trying to figure out ways how she could do it herself, but she also experimented some of the newly available web-based services. She found exciting a service that enabled its users to plan for their funerals. She told Nick the next time they met. Nick just laughed and told her a story about his grandpa. When he was forty, he wrote down the contacts of all the people he wanted to have at his funeral. Everybody was joking about his funeral folder all the time. His grandpa maintained the list up-to-date for a long time. He passed away when he was eighty-two. All that Nick's parents had to do was to pick up the folder and send the invitations to the people on the list.

3.2.3.2 Post-Humous Messaging Services

The basic do-it-yourself approaches for creating, maintaining and bequeathing our digital legacy are described in Simple Best Practices. But we may also use the available web-based services that were created specifically for this purpose. However, some of them are payed and especially younger people may find it wasteful to spend money on something they won't need for decades. Managing personal information and preparing digital legacy proves to be useful not only to the bereaved, but also to the living, since it allows us to access all of our important information well-structured and in one place. The so-called *digital afterlife services* are currently the only ones designed with acknowledgment for the death of their users and ensure at least a minimum possibility that our digital artifacts will be actually bequeathed according to our will. These services are still very young and they inevitably carry some imperfections. We highly recommend to examine each of them thoroughly before their possible use.

Finalthoughts.com was the very first post-humous email service to mark the birth of the digital afterlife industry. It was created by Michael Krim in 1999, about five years before *thefacebook.com* (the first version of *Facebook*) would come. It was discontinued because, back then, there would not be enough public interest for this kind of service.

Some years later more of these services would be created. They enabled an elegant way for bequeathing our assets, or leaving individual messages to those we care for (or don't). Of course it was always possible to deliver post-humous messages with physical media, but the difference is that now we don't depend on others to deliver it anymore. The post-humous email services can give us the opportunity to write a message for every beneficiary individually.

Dead Man's Switch[68] or *Just in Case I Die*[69] are both post-humous email services providing the means to write and save a set of email drafts. Users have to check in periodically, otherwise the distribution event is activated and the emails are sent out. The disadvantage of these services is clearly the lack of control over the trigger event and the probability of spreading around the post-humous messages while we are still alive.

3.2.3.3 Funeral Planning Services

Funeral planning services allow us to leave behind a set of our wishes regarding our funeral ceremony. We may indicate where it should be held, in which place we want to be buried and so on. We may also want to leave instructions for our clothing, music and decoration arrangements, a list of attendees, the text for the invitation and the like.

My Wonderful Life[70] is a free website for people who care about how their funeral will be. The website's motto is "You only get one chance to make a last impression." Using a funeral planning site is a good option for people who are willing to help their family and friends by anticipating its arrangements. This website allows its users to create preemptive plans for their funerals, leave letters and favorite memories, write their own obituaries and so on. It uses its own terminology, so instead of a digital executor, one has to choose his *angel*. The *angels* receive an email with information about their role and a link to be accessed in the event of the user's death, leading to the stored information. The weak spot of this service is the vulnerability of security policies, since they are based exclusively on interpersonal trust. There is no confirmation or anything. The fact that the access to the personal information is not protected in any way also makes the website an easy target for *phishing* attacks.

3.2.3.4 Digital Estate Planning Services

Digital estate planning services are the next step in evolution after post-humous messaging. They allow us to update our information frequently and access it from anywhere. They are probably the best option for people who live on-the-go. They are perhaps the most controversial ones within the digital afterlife industry, because of their connection to very unstable legal frameworks and diverse third-party companies policies. They allow us to record and sometimes execute for us a wide range of wishes, including the distribution of our digital assets, or their deletion. These services normally keep entrusted information until someone activates the dis-

68 See http://deadmansswitch.net

69 See http://justincaseidie.com

70 See https://mywonderfullife.com

tribution process by denouncing the death. Generally, the activation process is triggered when a verifier, appointed as a trusted person by the user, reports the death. In some cases, the verifier also serves as a reference for double-checking if the death actually occurred, in other cases the services actually establish a contact with the Register Office.

My Web Will[71] dates back to late 2008 and was intended as an insurance for an individual's digital life. *My Web Will* can be described as a listing of the most common digital assets, with suggested options for actions to take after one dies. These suggestions make digital estate planning much easier and less time-consuming. A user is required to appoint two verifiers, who are informed about their role and asked to contact *My Web Will* should the user die. After the death is reported, *My Web Will* contacts the verifiers directly in order to retrieve a copy of the death certificate. When the verification process is over, the information left by the original user is decrypted and wishes are carried out automatically, either to distribute assets or delete the accounts.

Entrustet[72] started in November 2008 and it has three main services. The first is called *Account Guardian* and lets users store any digital asset and decide what should happen to them after their death. *Entrustet* requires the users to define a digital executor to carry out their wishes as recorded within the service. The digital executor should be a physical person in order to make sure that the personal choices are in coherence with the arrangements in the legal will. The digital executor is asked to confirm the willingness to undertake the responsibility and, once the user dies, has to contact *Entrustet* to activate the inheritance process. During the verification process the digital executor has to provide a physical copy of the death certificate, which the company verifies afterwards with the local death register. The second service is called *Account Incinerator* and enables its users to appoint digital assets to be discretely deleted by *Entrustet* without users' next-to-kin discovering that they had ever existed. Recently, *Entrustet* also added to their line-up a third service called *Digital Property Search*. This is aimed to the bereaved and helps them to find the deceased's digital assets. Their blog[73] provides useful information on how to delete some of these digital assets.

Legacy Locker[74] was launched in the early 2009. It is one of the best known digital estate planning websites. *Legacy Locker* is a safe and convenient way to pass on one's logins and web passwords to the next-of-kin in the case of death or incapacitation. The service is prepared to store any digital assets, important digital artifacts, such as scans of stock certificates, contracts, wills, trusts, deeds, or things in the wallet, as well as written and video legacy letters to be delivered online or in physical form. *Legacy Locker's* verification process is similar to those already described above. They require the user to choose two verifiers who are responsible to denounce the user's death. After this, they are contacted by the company to provide a physical copy of the death certificate. Once the death is verified, the automatic actions are triggered.

Data Inherit[75] is based in Switzerland and uses principles of bank data protection. It allows the user to store digital assets and documents within a simple database interface and to assign a beneficiary for each. The user prints out a 36-character password and bequeathes it to a trusted

71 See https://mywebwill.com

72 See https://entrustet.com

73 See http://blog.entrustet.com

74 See http://legacylocker.com

75 See http://datainherit.com

person who is in charge of the distribution process activation. The user sets up a delay period, during which is contacted by *Data Inherit*. If the user doesn't answer, the distribution process is activated. In addition to web-based service, *Data Inherit* offers an iPhone app and both are regularly synchronized.

3.2.3.5 Grieving and Memorial Services

Remembering and honoring the dead is a custom that exists in almost all the cultures. The digital age brought us new opportunities to remember. The range of grieving and memorial services is growing. We find services that provide us with space to reminisce about the deceased, scan for the deceased's online belongings, create neat books from email communications and projects like digital heirloom and so on.

1000 memories[76] is a free website founded in July 2010 that helps people commemorate the life of the loved ones by putting together everybody's memories in the form of stories, pictures, video and audio. While this service is quite recent, it managed to raise already more than three million dollars in funds. Their objective is to create a permanent place where stories can be easily passed down on future generations in a respectful way. *1000 memories* promises to never put any advertisement on the memorial pages. Creating a basic memorial page is a matter of minutes and it is very easy to invite other family members or friends to contribute and reminisce about the deceased individuals. The website provides a useful link[77] for the bereaved with tips on how to deal with the deceased's death.

The *technology heirlooms*[78] is a project which emerged from Microsoft Research in the UK. Objects as *Digital Slide Box*, *The Backup Box* and *Timecard* were developed to bridge the gap between physical and digital legacy, while also exploring the possibility of digital data fulfilling the role of life chronicles. They are based on the assumption that in many cases home is the best place for reminiscing about someone. The digital heirlooms are objects that gather a number of digital contents, either as a stream from an external source, or hand-curated by the deceased or the family. These objects enable to pass on and reminisce about personal memories that may otherwise get lost.

Memeoirs[79] is a portuguese start-up that specializes in solutions for book email archiving. It is a good tool to create remembrance that can be shared with friends and family. Users log into their email account from the *Memeoirs* page and select contacts and time period to gather the emails. When the collecting of emails is completed, the users select a design style that will be applied to their book. *Memeoirs* dispatches the book within one business day.

3.2.4 Tell Us Your Story

We would be pleased if you shared your story with us. Your story can help other people to find solutions for their problems. We look for personal stories, or even thoughts, that reflect upon your experience in dealing with the digital artifacts of someone who passed away. Your contribution may be used within this website, but we promise to keep all private information secure

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76 See http://1000memories.com

77 See http://1000memories.com/questions

78 See http://research.microsoft.com/en-us/projects/heirlooms/default.aspx

79 See http://memeoirs.com

and publish the content based on your contribution only upon your agreement. Please email us at *mystory@digitaldying.org*.

3.2.5 Share Your Research

If you've done any research, in any area, related to the end of life or the digital death, please let us know. We would like to include your outcomes on *digitaldying.org*. We feel that it's extremely important to share the knowledge by making the information available in order to help others.

3.2.6 Credits

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4

Conclusions

Doctor, doctor shall I die?
Yes, my child, so shall I.
(ANONYMOUS)

We have done an extensive research on topics related to digital death in the context of technology. We discussed [1] the similarities between physical and digital life in *2.1*, [2] creation and maintenance of personal identity in *2.5*, [3] death, mortality, dying and bereavement in *2.2* and *2.3*, [4] digital artifacts and information that are in one's possession in *2.6* and *2.8*, [5] approaches to their management in *2.7* and *2.9* and, also, [6] the emerging digital afterlife technology field in *2.10*. All of these contribute to a better understanding of the needs leading to the establishment of a *thanatosensitive information management*.

In *3.2.1.3*, we describe *thanatosensitive information management* as an approach to personal information management that applies a concept of thanatosensitivity to it. This concept is discussed in *2.4* and further developed in *3.2.1.3*, where we extend its definition as follows:

> Thanatosensitivity is a humanistically-grounded approach to a person's physical and digital belongings, supported in research and design, that recognizes and actively engages with the facts of mortality, dying and death, with regards to interpersonal relationships, where belongings refer to a set of everything that can be associated, attached, close or related to an individual's existence.

We observed that, even though the phenomenon of digital death has appeared already a couple of years ago, we still lack social and legal support to help us dealing with it. This situation where many things are possible, but only a few are reliable, causes further complications in establishing sustainable practices towards *thanatosensitive information management*. However, we also noticed that people do not embrace digital technologies with an unconditional enthusiasm as it was until recent times. They start to be concerned about their digital belongings and to take more conscious decisions on which digital devices or assets they use, what content they share with whom, where they store it and so on.

Applying the term *thanatosensitive information management* turns out to be easier in the context of academic discussion. In practical terms, it is easier to discuss it as information management of the dead that can be both anticipated, or performed after one's death. It expresses the concept, but the practices are based on those already applied in personal information management. Adopting thanatosensitive methods and techniques for our daily tasks can help us to prepare our artifacts and information for the event of our death in a by-the-way manner and doesn't require any extra effort. It can significantly reduce the impact of physical and digital death on the bereaved and enables them to deal with their loss at their pace.

Our research results are presented in the form of a website that contains materials supposed to provide a starting point for possible considerations on the improvement of personal/thanatosensitive management practices. It is meant to be a comfortable space for the exchange of personal experience and research outcomes.

Currently, the digital death and support for the bereavement in the digital age are subject to active and intensive research. Our existing tools are not sufficient. We can't entrust our sensitive information to the digital afterlife or other cloud-based services that have an unstable future, it is difficult to make sure that our devices and external storage media won't get damaged while being sure that our survivors will have the possibility to access our information in case of need.

Our current research on thanatosensitive information management opens many opportunities for future work, which can be subdivided into several categories, according to their time frame requirements.

In a short term perspective, we will invest our efforts into improvements of the project website. These include adding new pages, such as list with further reading references or hand-curated news related to this research area, but also improvements of user interaction and usability.

In a medium term perspective, we'll be simplifying the content of the project website for easier understanding by a broader audience. Also, we will be looking for other channels suitable to promote our project.

In a long term perspective, we are willing to extend our team with collaborators from other areas. This should help us to carry out our main aim—based on our current research, we want to develop sustainable solutions addressing particular needs of different demographical groups in relation to thanatosensitive information management. We will be focusing on the creation of educational plans for groups such as children, teenagers, young and older adults, that will help them to create and adopt new thanatosensitive approaches to the digital artifacts and information.

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Online References

Social Networking Websites

http://facebook.com
http://flickr.com
http://linkedin.com
http://picassa.com
http://plus.google.com
http://twitter.com

Digital Estate Services

http://datainherit.com
http://digitalestateservices.com
http://entrustet.com
http://legacylocker.com
http://mywebwill.com
http://swissdnabank.com

Funeral Planning Services

http://myfunkyfuneral.com
http://mywonderfullife.com

Post-Humous Messaging Services

http://deadmansswitch.net
http://finalthoughts.com (discontinued)
http://justincaseidie.com

Grieving and Memorial Services

http://1000memories.com
http://memeoirs.com

Other Services and Web Applications

http://1password.com
http://amazon.com
http://apple.com/iwork
http://docs.google.com
http://dropbox.com

http://ebay.com
http://evite.com
http://google.com
http://icloud.com
http://mailchimp.com
http://megavideo.com
http://office.microsoft.com
http://openid.net
http://personas.media.mit.edu
http://privacybird.org
http://privacyfinder.org
http://roboform.com
http://singly.com
http://wikipedia.org
http://yahoo.com

Other Links

http://en.wikipedia.org/wiki/Michael_Buckland
http://en.wikipedia.org/wiki/Franz_Kafka
http://en.wikipedia.org/wiki/Max_Brod
http://google.com/transparencyreport
http://research.microsoft.com/en-us/projects/heirlooms
http://schedule.sxsw.com/events/event_IAP7059
http://sigchi.org/chi2009/altchisystem/submissions/submission_mmassimi_208_1232961565.pdf
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All of these were accessible as July 2011 at the time of finishing the writing of this work.