Stefano Allegrezza[1]

THE FUTURE OF OUR PERSONAL DIGITAL MEMORIES: IT'S TIME TO START THINKING ABOUT IT

Abstract

This paper deals with the issue of personal digital archives, reflecting on the consequences that digital technology will have on this kind of archives and trying to imagine what their future may be.

The digital revolution that involves every sector of our society is also transforming personal archives: apart from some sporadic printing of documents, mostly carried out for contingent purposes, all our activities now produce digital content: emails have replaced traditional paper letters; selfies have replaced postcards; digital photos have replaced the paper ones; blogs have replaced diaries; electronic agendas have replaced the paper ones, ebooks are replacing paper books, and so on; in addition there are "new" kind of documents such as posts, tweets, websites etcetera. Personal archives are turning into fully digital archives.

As a consequence, if in the past in personal archives we found mainly analogue documents (tipically paper) now we find documents recorded on storage media such as floppy disks, optical media, USB sticks, hard disks (some of which are already obsolete and difficult to read); moreover, an increasing part of those documents are stored on cloud services (like Dropbox or Gdrive) whose access is protected by authentication methods and usually nobody shares their credentials with other people. So some worrying questions arise: in ten or twenty years or more, will we still be able to access these archives? What future awaits them? Will personal archives still exist? It's time to seriously think about this problem and to find concrete solutions if we want to secure a future for the personal digital memories that all people are creating in our days.

Key words: archives, digital archives, personal archives, personal memories, personal digital archives

1 INTRODUCTION

Until a few years ago when an archivist was asked to rearrange and draw up the inventory of an illustrious person's archive after his death, he was faced with a rather familiar situation. Usually he/she had to deal with documents created on well-known materials and with a very concrete consistency: most of the time it was paper of various kinds (paper for notes, paper for sketches, photographic paper, etc.) but in the past other materials were used (parchment, wooden or wax tablets, papyrus, etc.). The archivist could easily find the "documents" (of various kinds: writings, letters, notebooks, postcards, scattered notes, diaries, photographs, telegrams, etc.) left by the creator because it was enough to go to his/her home, to his/her office or in general to the places where he/she had carried out his activity and where the documents had been left.

But can we assume that this will be the situation that the archivist will find in the coming years? What will become of personal archives in five or ten years? Indeed, how have they already are?

In short: what will their future be? These are the questions we will try to answer with this paper.

1   University of Bologna (Italy)
     Assoc. Prof. dr. Stefano Allegrezza, Università degli Studi di Bologna, Italy, stefano.allegrezza@unibo.it

2 PERSONAL ARCHIVES AND DIGITAL REVOLUTION

In order to answer these questions, it is worth starting from some considerations about how many of the activities that for centuries we have carried out by using paper documents (or any other "analogue" medium) have changed in recent years.

For example, let us consider the traditional paper letters, those that in the past we wrote by hand (later with the typewriter and then with the computer: in the latter case we needed to print them), then we put the stamp and then we put it in the mailbox: in the last ten-twenty years they have been literally "superseded" by e-mails that we receive and send using computers or smartphones, and, therefore, there is no longer a need for printing.

Let us think of the postcards that until the end of the last century were the most used way to let our loved ones know in which magnificent holiday place we had spent our holidays: today they have been superseded by "selfies" taken in the most disparate tourist locations and immediately published on our preferred social media (for example: Facebook, Twitter) or on our preferred messaging system (for example: WhatsApp) (Marshall, 2017)

Let us consider the telegrams that in the past we used to quickly communicate news, such as the telegrams of condolences or congratulations: today they have been "replaced" by other tools that allow us to send messages in real time and give us almost instantly the guarantee of delivery to the recipient (for example text or voice messages sent by WhatsApp).

Again: the notebook on which in the past we took notes and notes today is increasingly replaced by one of the many "Apps" that allow us to take electronic notes directly on smartphones; the "old" paper agenda has been superseded by the various electronic diaries today available, starting from those on our smartphones to those accessible on the web (Google Calendar or Microsoft Office 365, just to mention some of the most used ones) and accessible through our computer devices (personal computers, notebooks, tablets or smartphones).

In the same way, the old paper "telephone book" in which, in the past, we used to write the surnames and names of our friends and relatives with their address and telephone number, has now been replaced by the phone book available on our electronic devices, that is, without any doubt, much more comfortable to consult and keep updated.

Again: the "old" diary that in the past gathered, almost a silent friend, our most intimate thoughts, today has been superseded by virtual diaries - the most famous case is that of Facebook - which, on the contrary, has become the way to make everyone aware of our personal life in a sort of exasperated individual protagonism. We could ask ourselves: if Anne Frank had lived in our age, what kind of diary would have left to posterity?

Even the notes we take during business meetings or lessons are written directly using a computer, tablet or even a smartphone and, therefore, are in a digital format.

In the multimedia world the situation is similar: from the beginning of the century analogue photographs have been superseded by digital ones, and now only a small fraction of digital shots are printed on paper, which, hundreds, if not thousands, we do: now the watchword is "sharing" and the photos are immediately published on one of the many social media that, like Facebook, Instagram and Flickr, have experienced enormous growth in recent years. In the same way, the audio and video recordings that "capture" the important moments of our existence are now exclusively in digital format.

Again: train, bus, and airplane tickets are also computer-generated and natively digital documents; however, while the "old" generations continue to print them on paper – it is due to the trust that almost instinctively they put on paper - the "new" generations no longer print and simply show to the controller the display of the smartphone on which the ticket (or the two-dimensional code necessary for its verification) is displayed. In the same way to orient ourselves in the cities or along the routes we no longer use maps or city maps – it was usual only fifteen years ago - but more and more often we use digital tools that, like the GPS navigator, allow us to navigate without too many difficulties and easily indicate the path to our favourite destination.

The examples could continue and are numerous: even the financial and economic management of an individual's life is almost entirely digital: current account movements are nothing more than registrations in a database of a bank and statements are sent by e-mail, as well as through the same medium or through digital channels, however, the electricity, gas and water supply bills come to us.

In the health's world, the digital revolution has come a long way: just to give an example, in the hospital digital radiographs have replaced the "old" plate radiographs and after carrying out a radiological examination the iconographic documentation is delivered to us in digital format on optical media (CD or DVD).
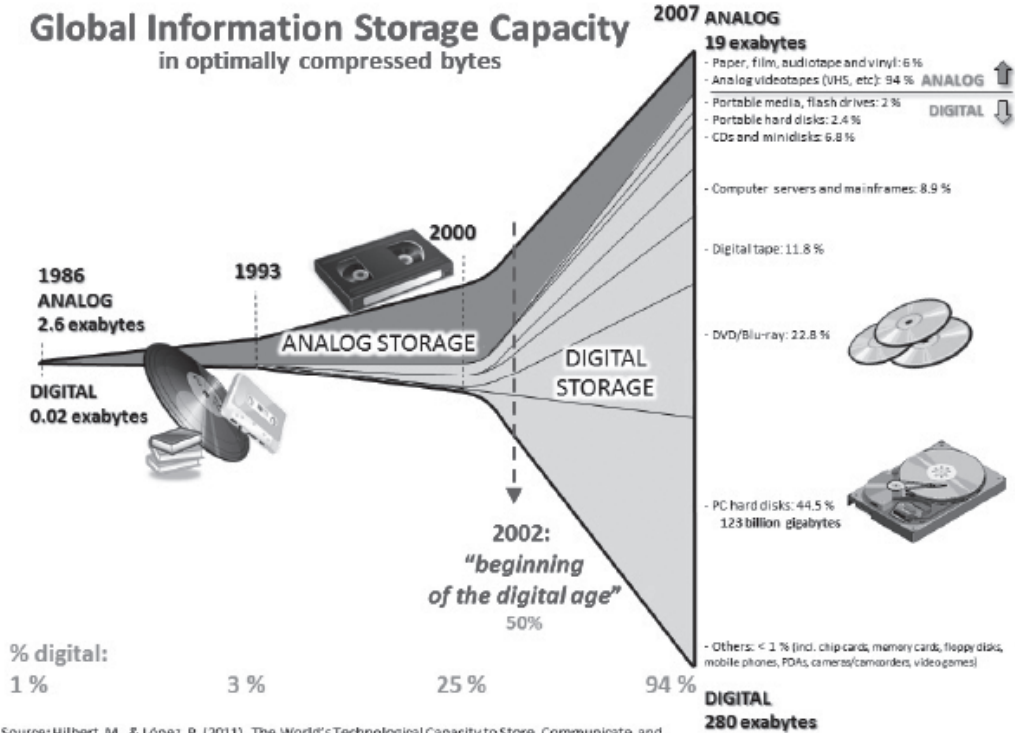
In the school world the situation is quite similar: at the end of the school year, students' parents no longer receive "paper" school reports because they are made available to them in electronic format on the document management system that the school has adopted (and which parents must have access to be able to consult the grades obtained by their children).

These are just some of the countless examples that could be done, but they are sufficient to understand the extent of the digital revolution we are experiencing and to which we are getting used to. And it is clear the evolutionary trend towards which even the personal archives are heading: it is very likely (if not almost certain) that in a not too far future these archives - and not only these - will become digital. If something does remain analogue, it will be the documents that, formed in digital (and, therefore, digital natives), will occasionally be printed for contingent reasons and are intended to be stored only temporarily.

A global revolution is in progress, comparable, according to some, to that resulting from the invention of printing. Furthermore, there are new types of "documents" that did not exist in the past (personal websites, blogs, profiles on Facebook, Twitter accounts, Instagram, Pinterest, etc.) but which can not fail to become part of a personal archive.

In short, personal archives are turning into digital archives, but to date the transition is not yet fully completed; so the situation that normally an archivist need to face is that of "hybrid" archives, in which part of the archive is still "analogue" and a part, more and more growing, is "digital". According to some scholars, the year in which the creation and archiving of "digital" documents has surpassed that of "analogue" documents is placed around the beginning of the new century. In particular, the study by Martin Hilbert and Priscilla Lopez entitled "The world's technological capacity to store, communicate, and compute information", published in 2011 but still current under many point of view, reveals that in 1986 only 1% of the data had been digitally archived, they reached 3% in 1993, 25% in 2000 and 94% in 2007 (see Figure 1) (Hilbert, 2011). They conventionally identified the beginning of the digital era in 2002, because in this year occurred the overtaking of the "digital" on the "analogue".

Figure 1. Global information Storgae Capacity from 1986 to 2007.

Source: Hilbert, M., & López, P. (2011). The World's Technological Capacity to Store, Communicate, and Compute Information. *Science*, 332(6025), 60 –65. http://www.martinhilbert.net/WorldInfoCapacity.html

(source: Hilbert,M., and Lopez, P. (2011). The World's Technological Capacity to Store, Communicate and Compute Information. Science, 332(6025), 60-65)

3 THE PRESERVATION OF PERSONAL DIGITAL ARCHIVES

The examples we have just seen raise a question: what will remain of all this enormous quantity of digital documents we create today? The problem of preserving digital archives - and, in this case, personal digital archives - undoubtedly belongs to those that most haunt the archival community. Up to now, the preservation of these archives has been possible thanks to the adoption of preservation strategies and the use of the analogue materials mentioned above, which, despite their fragility and uncertainty, have allowed documents to come up to the present. Unfortunately, we can not say the same thing for digital documents, since they actually consist of sequences of bits that are far more difficult to preserve than their analogue counter-parts, and this because of at least three orders of difficulties:

1. first, digital documents need to be stored on "storage medium": it may be the hard drive of the user's computer or the storage system of the e-mail service provider in the case of e-mails; an optical disc (such as CDs or DVDs on which such documents are often stored); a flash memory (like the pendrives that we always carry with us); a magnetic tape (such as those used in the backups that service providers carry out on a regular basis); or a virtual space like the cloud where more and more often we put our important documents.

2. secondary, digital documents, since they consist of sequences of bits, must be coded according to a certain "electronic format" in order to be read and interpreted.

3. finally, while to be able to read, even after several years, a paper document we need only a good eyesight, in order to read a digital document a good eyesight is no more sufficient because we need an appropriate "technological platform" (typically a computer with a certain operating system and certain programs, or a tablet or a smartphone) as well.

Unfortunately, all these three components are very fragile factors and certainly make the preservation over time of digital documents not easy; in fact:

1. storage media are subject to the phenomenon of obsolescence, due both to their limited duration over time and to the fact that the market continuously propose new media, making obsolete and unreadable those that were used until a few years ago;

2. electronic formats are also subject to rapid obsolescence, due to their rapid evolution and to the fact that certain formats (for example, proprietary ones) strongly depend on the software with which they must be interpreted and which may no longer be available over time;

3. finally, even the technological platforms quickly become obsolete because of their very fast evolution and the fact that the market constantly offers more and more modern devices, making obsolete those that only yesterday were the latest novelty.

In short, these three problems (the obsolescence of storage media, the obsolescence of electronic formats and the obsolescence of technological platforms) make a digital document produced or received today probably not readable in ten or twenty years, obviously unless appropriate digital preservation strategies are adopted.

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It is not the case, here, to go deep into the various preservation strategies (emulation, migration, hardware preservation, normalization, etc.) proposed by the international research groups who have been questioning these issues in an attempt to find a solution. However, it is important to note that ordinary people will hardly be able to use those strategies. In fact, who is able to adopt the so-called "refreshing" strategies: transferring digital documents from a storage medium that is becoming obsolete to a more current one to prevent the loss of digital documents stored on such medium? Who is able to carry out the so-called "migration": converting documents in an electronic format that is becoming obsolete towards a more modern one? Who has the skills to remedy the consequences that occur when the computer in which all documents were stored (emails received and sent, reports, drafts of speeches, photographs, etc.) suddenly stops working bringing into oblivion all the precious material it contains? Who adopts, as would be desirable, back-up strategies to prevent data loss that occurs in such cases?

4   THE CRITICAL ISSUES IN THE PRESERVATION OF PERSONAL DIGITAL ARCHIVES

The issue of archiving and preserving personal digital archives presents all the complex problems related to digital archives in general, but in addition presents some peculiar aspects that are very important to keep in mind:

- the tendency to accumulate huge and often uncontrollable amounts of documents, due on the one hand to the enormous storage capacity of the media today available, and on the other to the trust placed in the technological tools to make it possible to recover what is necessary simply by relying on the search functions (which, however sophisticated they may be, are not in any case able to return the accurate results that could be obtained with a correctly created archive);

- the lack of a logical sorting criterion during the stage of digital archive's creation, due on the one hand to the lack of archival knowledge (which are becoming increasingly important in the "new" digital world); on the other hand, to the lack of archival tools (for example: a filing planes for personal digital archives; a records management system for personal digital archives, etc.) (Hawkins, 2013) that can help ordinary people to create their archives according to archival principles; this is of fundamental importance, since the lack of an ordering criterion leads people to create messy archives that are very difficult to "rearrange" in a later stage;

- the tendency to distribute digital documents on multiple storage systems, on multiple platforms, on multiple services; ordinary people usually justify this by the fear of losing digital content (so they make multiple copies of the same documents on multiple media) but which inevitably generates disorder and confusion;

- the lack of the appraisal and disposal operations, activities that acquire an increasing importance compared to the huge quantity of personal digital documents that we produce and that risks becoming quickly unmanageable.

- the lack of the awareness on the problem of digital preservation and on the fact that personal digital archives are intrinsically more at risk than analogue counterparts and therefore need more attention and "curation".

As it is simple to argue, these highly critical elements strongly influence the chances of success of a preservation strategy applied to personal digital archives.

5   THE ISSUE OF PERSONAL DIGITAL HERITAGE

Alongside the critical elements outlined in the previous paragraph, we must bear in mind a further problem - linked to the broader research sector called "digital heritage" - that is perhaps the most critical issue.

To better understand things, let's imagine the situation – already described in the Introduction - in which an archivist has been asked to rearrange and draw up the inventory of the archive of an illustrious person who recently died. In order to access the analogue portion of his archive the archivist needs to go to the places where he has carried out his professional and personal life (his home, his office, etc.) and he can easily access all his documents; but in order to access the digital portion of his archive this is no longer sufficient. In fact, probably the archivist will be able to find the storage media used by him (such as floppy disks, CDs, DVDs, USB pen drives, hard disks, etc. - see Figure 2) at his home or in his office but when he will try to recover the digital documents stored on such media he will find that many of them are already obsolete and therefore difficult or impossible to read (Redwine, 2015).

But even if storage media was not obsolete, there is another and more difficult problem to solve: storage media are able to store the data recorded on them for a limited period of time depending on the type of technology used; even if the media is not obsolete, even waiting a few years could mean the loss of the content of such media.

Figure 2. An example of how the digital portion of a personal archive could show up: please note the presence of many obsolete storage media (floppy disk, DAT, DCC, Mini Disk, LS-120, etc.)

(source: https://www.theregister.co.uk/2013/07/18/data_storage_technology)

Moreover: storage media is often protected by access control systems: we need authentication information to access computers, tablets, smartphones and even to access documents stored on some storage media that use encryption mechanism to protect contents (such as external hard disks or USB sticks). If you do not have these authentication information it is impossible to access the digital archives stored on them.

It's not over here because there are still further problems to solve. Today more and more people no longer archive their digital documents on storage media but on "virtual places" such as Dropbox, Google Drive, Microsoft OneDrive, Amazon S3 and so on. For example, let's consider email archives: usually e-mail is no longer managed using a dedicated e-mail client but is more and more managed via remote services (such as webmail); therefore email archives are no longer stored on the creator's computer but they are stored on mail servers available on-line.

As a consequence, at the death of an illustrious person the archivist has a very big problem to solve: he must identify the "virtual places" where that person stored the portions of his digital archive. Most of the time, available information are fragmented and not sufficient; the archivist is faced with questions like: did the producer archive some documents on Dropbox? One Drive? G drive? Did he archive photos on Flickr? Instagram? Google Images?

Did he have profiles on the various social media (Facebook, Twitter, etc.)? Did he/she have had any website? Did he/she have had any blog? Did he/she have had any mail address? If yes, which ones? On which mail servers are his/her mailboxes? Unfortunately, it is not easy to provide an answer to these questions; often it is impossible.

But the difficulties do not end here. Even if it is possible to know where the portions of the illustrious person's archive are stored, the archivist will come across the difficulty (and often the impossibility) of accessing them. In fact, virtual places are normally protected by access control systems: we need authentication information (typically username and password) to access webmail, virtual spaces (G drive, Drop box, One Drive, etc.), accounts on social media, and so on. Without this information, which usually nobody shares with others and are therefore lost with the death of the creator, it is impossible for anyone to access the documents archived on the various online services. Even if it is possible to obtain such information (for example, because with lucid vision the creator has shared them to some of his relatives or friends) the situation does not allow any delay and the archivist must act as soon as possible. In fact, when the various online service providers realize that the service is no longer used by a given user, after a certain period of time they provide for the deactivation of the service and the cancellation of the related account. This can happen, depending on the policies adopted, in times varying from a few months to a few years at the most. Virtual places can still be available after a few days or a few weeks after the death of the creator, but probably they become inaccessible after a few months or a few years.

Let us consider the paradigmatic case of e-mail messages on the webmail system: access to the e-mail box is normally protected by authentication credentials, known only to those who created and use that particular e-mail box. But what happens to his death? Usually it is almost impossible for anyone else to recover access to the mailbox, since usually nobody is concerned with communicating these credentials to other parties: as a result, all these emails remain "trapped" in the mailbox and remain there until when, after a shorter or longer time, the account is disabled or deleted by the "inactivity" email service provider.

We must also consider the fact that many of the services that today are used by the majority of people tomorrow may no longer exist, for example because the company that offers them is in financial difficulty or because, trivially, the interests of users move to other platforms.

Therefore it is clear that in the world of personal digital archives the operations of rearranging, inventorying and valorisation must be undertaken immediately, thinking of the disappearance of the archive that can take place even after one or two years (sometimes even earlier). As can be understood, the approach must be diametrically opposed to that which one has towards analogical archives (where it is possible to carry out interventions even after years or decades after the death of the producer). With digital archives no extension is allowed.

In conclusion it is very difficult (indeed, most of the time impossible) to access the digital archive of a deceased person, be it the archive of his e-mails or that of his documents on G drive. The rules concerning the succession of digital assets are substantially non-existent and on more than one occasion the family members of a deceased have failed to access their accounts, hindered by the pedestrian application of the law on privacy. In this way, more and more often personal data, memories and testimonies of our lives remain stored exclusively in the form of bits and often remain forever hidden behind inscrutable passwords and sometimes protected by laws that have not yet contemplated the problem of digital heritage.

6 WHAT HOLDS THE FUTURE FOR PERSONAL DIGITAL ARCHIVES?

Faced with all these difficulties, can we be sure that we will we be able to preserve the personal digital archives that are being created today as we have been able to preserve the personal archives in the past? The answer is not the most comforting. The long-term preservation of digital archives in general is not simple nor, at the present, guaranteed. Sometimes it is even impossible; indeed, now we have the awareness that digital materials are not kept in a "passive" way (that is: without doing anything), just as, simply speaking, it happened for traditional paper materials, and that being able to preserve them and guarantee their legibility over time even for a few years only, it requires considerable effort and, more often than not, skills that are not available to everyone. For this reason we can reasonably believe that our era is running the risk of "losing" digital files in person, whether it is material produced in the personal field or in the workplace or professional.

In this regard, the reflections of Vint Cerf, deputy head of Google and one of the fathers of the Internet, are very significant. In 2015, he surprised everyone when in the annual meeting of the American Association for the Advancement of Science he declared that « If we don't find a solution, our 21st century will become an information black hole", a real "digital dark age". The advice that Cerf gave seems at first glance disconcerting: "If you have a picture that you really care about, print it".

7 CONCLUSIONS

As we have seen, digital archives face the danger, far from unrealistic, of being lost; indeed, it is very likely that most of the digital archives of people who have been formed in recent years have already been lost.

Unfortunately, the category of personal archives is much more at risk than that of public or enterprise archives that, for a variety of reasons (interests of study, legislative requirements, economic relevance, etc.) traditionally receive more attention from the archivists (Vettore, 2014).

If we consider that for centuries they have been a privileged source for a whole series of sectors (in historical research, demo-ethno-anthropological, sociological, artistic, geographic, literary, philological, just to name a few) we understand how the eventuality of loss of digital personal archives that are created in our time would have extremely negative consequences for multiple areas of research.

Nevertheless, the preservation of personal digital archives is slowly becoming part of the broader scientific debate on digital preservation, but there are still no authoritative studies and research projects on the subject, there is a lack of critical reflection on the many problematic aspects of the issue, serious proposals are lacking. Basically, it is a field of research still largely unexplored.

It is necessary to urgently address these issues, starting from a serious and systematic study of the issues of particular theoretical and technical complexity related to the training, management and conservation of digital files in person, putting in place awareness actions to increase the level of awareness on these issues; identifying methods, systems and strategies that are both simple and effective and that can be used not only by specialists in the sector (for example, archivists, computer scientists …) but also by ordinary people.

Only by trying to understand how digital can influence the methods of settling documents and coming to suggest practical and operational solutions to ensure the preservation of the archives of people who are forming today, we can avoid that there are no traces of these archives walk towards that digital dark age, the digital middle age that someone has already begun to prefigure.

The digital revolution that involves every sector of our society is also transforming personal archives. Apart from some sporadic printing of documents, mostly carried out for contingent purposes, all our activities are now produce digital content: emails have replaced traditional paper letters; selfies have replaced postcards; digital photos have replaced the paper ones; blogs have replaced diaries; electronic agendas have replaced the paper ones; in addition there are "new" documents such as posts, tweets, websites and so on. Personal archives are turning into fully digital archives. Therefore if personal archives in the past consisted mostly of paper documents written on paper - a well known and with a very concrete consistency material - today they begin to consist of documents written on storage media such as floppy disks, optical media, USB sticks, hard disks (some of which are already obsolete and difficult to read); moreover, part of the documents are stored on online services (like Dropbox or Gdrive) whose access is protected by authentication mechanisms. So a question arises: in ten or twenty years or more, will we still be able to access these archives? What future awaits them?

The answer is not the most optimistic, because the preservation of digital archives over time is threatened by many problems, such as the obsolescence of storage media, electronic formats and digital devices necessary to read these documents. In fact, storage media are subject to the phenomenon of obsolescence, due to their limited duration over time and to the fact that the market is continuosly proposing new media, making illegible those that were used until a few years ago; electronic formats are also subject to rapid obsolescence, due to their rapid evolution and to the fact that certain formats (for example, proprietary ones) strongly depend on the software they must be interpreted with and that may no longer be available over time; finally, even devices quickly became obsolete due to the rapid evolution and the fact that the market constantly offers increasingly modern devices, making obsolete those that only yesterday were the latest news.

The issue of archiving and preservation of personal digital archives has all the complex issues related to digital archives in general, but in addition presents some peculiar aspects that offer interesting insights for studies and researches:

• the tendency to accumulate huge and often uncontrollable amounts of documents;
• the lack of a logical sorting criterion during the stage of digital archive's creation;
• the tendency to distribute digital documents on multiple storage systems, on multiple platforms, on multiple services;
• the lack of appraisal and disposal operations;
• the lack of awareness on the problem of digital preservation.

Faced with all these difficulties, can we be sure that we will be able to preserve personal digital archives that we are creating just as we have been able to preserve "traditional" personal archives of the past? The answer is not the most comforting. The long-term preservation of digital archives in general is neither simple nor guaranteed at the present. Sometimes it's even impossible; indeed, now we have the awareness that it is not possible to preserve digital materials in a "passive" way (without doing anything), just as, simplistically speaking, it happened for traditional paper materials, and that preserving them over time - even for a few years only - requires considerable effort and, more often than not, skills that are not available to everyone. For this reason we can reasonably believe that our era is running the risk of "losing" personal digital archives.

If we consider that for centuries they have been a privileged source for a whole series of scientific sectors (in historical research, demo-ethno-anthropological, sociological, artistic, geographic, literary, philological, just to name a few) we understand how the eventuality of loss of personal digital archives that are being created in our time would have extremely negative consequences for multiple areas of research.

The preservation of personal digital archives is slowly becoming part of the broader scientific debate on digital preservation, but there are still no authoritative studies and research projects on the subject, there is a lack of critical reflection on the many problematic aspects of the issue, serious proposals are lacking. Basically, it is a field of research still largely unexplored.

So it is urgent to address these issues, starting from a serious and systematic study of the issues of particular theoretical and technical complexity related to the creation, management and preservation of personal digital documents. Only in this way will we be able to secure a future for the personal digital archives that are created today.

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