Long-term Digital Archiving - Outsourcing or Doing it

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Abstract: Governments all over the world are confronted with a new sphere of electronic data that is the consequence of increasingly presented and used information technology (IT). The data is heaping up on desktop computers, servers, tapes, CDs, etc. Not till the last decade did leading employees and the political elite start to ask themselves how will this data be saved as a proof of e-government actions for the near and far future and our posterity. Considering the nature of electronic form compared to the paper form we can define keeping electronic data as a "non-stop" job, while keeping the classical paper form can be defined as a "store-and-leave" job. New legislation and standards regarding the management and archiving of electronic data arise and so do practical solutions – information systems. At the point of implementation we can be confronted with huge expenses and the question of best implementation. How to solve this issue, considering outsourcing the service of long term digital archiving by external contractors or implementing it by the government itself is the topic of this paper. The paper focuses on organizational, technical and financial aspects of the dilemmas "to outsource or not", "parts or the whole service", how to do it, etc. It analyses the decision factors and tries to make conclusions on the basis of theory and research results from different survey projects. It presents the results of the empirical study of the digital archiving filed in the public sector of Slovenia that also focused on the outsourcing of digital archiving service or different segments of this service. The results from the public sector are also compared with the results for the private sector.

Keywords: archiving, electronic data, long term, digital preservation, outsourcing, recordkeeping, digital archive

1. IT, electronic documents and e-government

The phenomena of 20th century, IT and the Internet, changed the face of the human society and everyday of business and personal life. They also influenced governments and their processes in many different aspects. Although IT can cause many positive effects, many "negative" ones occur.

The government creates many data, documents and records in their everyday processes and while using IT the amount is even bigger. Though only a small percentage of it does find its way to the (national) archives, that still is a huge amount of data. Thus issues arise of keeping and managing this data today and in the future since these amounts are increasing rapidly. In National Archives in United States (NARA) for example there are as many electronic documents from September 11th Presidential Commission as there have been processed electronic records received by NARA in 30 years.

IT is also causing changes in traditional bureaucratically structured government. The easy and fast way of communicating over email, real time chat or videoconference, sharing data on servers and other similar consequences of IT implementation is a supplement to traditional personal meetings, paper letters and memos, photocopies, etc. Consequentially, by using IT virtual organisations[1] allow organisations or their departments to implement business processes at low hierarchical levels although they belong to different branches of the government.

Government and its administration operate according to strict rules defined by different types of regulation. These rules also demand a lot of documentation as proof of correctly implemented processes. Processes are well defined so that even most decentralized structures carry them out in the same way, often in a routine manner. These repetitive processes can be routinized and in these cases IT can help a lot. On the other hand many of the government processes cannot be routinized, i.e. processes creating rules, regulations, policies, judgements depend on the environment, employees and the issue itself.

IT is an all-involving factor that demands expensive equipment (hardware and software), sizeable human resources to implement and manage it, extensive knowledge to manage and use it (effectively) and ample planning and policies to avoid chaos and inefficiency. For example, in September 2005 the NARA signed a 308-million-dollar, six-year contract with Lockheed Martin to design a system to preserve the Federal Government's electronic records.

This paper discusses the problem of archiving digital documents and the digital form itself with issues raised by this in the processes of e-government. It analyses the outsourcing of digital archiving and debates on

[1] In a virtual organisation hierarchies collapse and boundaries within and between organisations decline (McLoughlin and Jackson, 1997)

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different issues that arise. It presents the results of the empirical study of the digital archiving filed in the public sector of Slovenia that also focused on the outsourcing of digital archiving service or different segments of this service. The results from the public sector are also compared with the results for the private sector.

2. Paper or electronic documents

Governments have used electronic document[2] archives in many countries for decades but many of them did not see it as an issue until recently. In the USA, for example, electronic records have been used widely since 1970, but plans for long-term preservation did not begin until 1998. There are a few important properties of paper and electronic documents that differ and therefore influence their management and, as a last phase of document life cycle, their archiving.

The first and often not so obvious characteristic is the capability of end users. The end user is, one way or another, a human person. S/he is only capable of understanding content if s/he is capable of reading it (or sometimes viewing or hearing it). Over the centuries different signs and alphabets have developed to accomplish the goal of saving images and, later on, text on different materials or media. Signs can be learned and interpreted by the human mind. Computers, on the other hand, understand bits and need special hardware and software to transform these bits into a form readable to humans.

Modern IT enables much easier creation of data than the standard paper and pen option. Typing and saving is faster and available everywhere from mobile phones, handhelds, laptops and desktop computers. In the increasingly global and profitable world life is faster, more connected and more interactive. Further, more communications lead to more data. According to Dwivedi (2001), the world today creates as many data in a few seconds as it created in the past 2000 years combined. We will be speaking of yotta bytes (2^{80}) in the next decade, a number exceeding the number of stars in the universe. In the US national archives there are an estimated 5 petabytes of data stored in the archives in thousands of digital formats. According to their research estimates, this amount will balloon to 347 petabytes in 15 years (Talbot 2005).

The data on electronic documents are not "attached" to the media (as ink is to the paper) so they can therefore easily be changed. More attention is required when dealing with the integrity, authenticity and trustworthiness of electronic documents. Copying the documents in electronic format is fast and easy. While trying to take 5000 paper documents out of an organization is difficult, doing the same with electronic documents is not.

When focusing on the long term preservation or archiving of electronic documents compared to the archival theory and many well developed principles for paper documents, new issues arise. The issues start at the level of electronic media, which are more sensitive to data loss then paper. Therefore, media refreshment (copying to new media) is required at certain time intervals (practice shows that 5 years is quite appropriate). The next level of logical format is another major problem since ones and zeros written on the physical media must be transformed to a presentable form. Adequate software is therefore needed to present data written in a specific format. However, the software versions and formats are changing so fast over time, and many are also proprietary or not published, not to mention that new versions do not always include all the functionalities of previous ones. There is a tension to use open source software, well documented and open formats, widely supported by the world IT community. To enable the presentation of digital bits for the future, strategies as digital museums, emulation and migration were suggested. Some authors, including Rothenberg (1998), or institutions (the National library in the Netherlands), support emulation while others, including Bearman (1999), favour migration. A recent survey in UK showed that only 3% of respondents are using emulation (The Digital Preservation Coalition 2006). To make a document accessible and searchable, i.e. to exploit the possibilities of IT as much as possible, archived documents must have a good description implemented by metadata. These metadata are used not only for search purposes but also for purposes of authentication, integrity and trustworthiness as well. And since archiving is only the final step in the document life cycle, these metadata have to be captured before the archiving phase.

3. Obstacles of long-term digital archiving

The digital archiving problems arise in many cases because of the properties of the electronic form. The problem of interpreting and representing data is one of the most important ones. Even the well known OAIS standard (OAIS 2003) in its basic element, "the information object", defines the part called "representation

[2] In this paper document is understood as any form (text document, spreadsheet, database, web page) of electronic data on any media.

information". Director of NARA once said "it is not possible to preserve a digital information object (readable to humans), it is only possible to preserve the ability to reproduce it (Thibodeau 2002)". IT demands the maintenance of all the intermediate elements to enable interpretation in representation of electronic data in the long run. The process of archiving paper records includes eliminating paper acid, putting paper in boxes, and put these in dry, water- and fire-proof vaults or rooms for decades or centuries. Doing a similar process with electronic data on some media is a "sure death" for the data. No one will be able to read and represent the data after 100 years, sometimes not even after 10 years. The problem of media, hardware and software obsolescence exists. So the "once-for-all" archiving principle for paper documents no longer holds for electronic data. We now talk about "non-stop-job" principle. Digital archiving is therefore not an easy process of keeping bits sequence of an object but of preserving the possibilities of searching, accessing, interpreting, using and copying an object. Along with those issues, problems of security, authenticity and accessibility arise. Because of the "non-stop-job" principle economic failure is also much more threatening than with a paper archive. There are ongoing costs of system administration, communication bandwidth, IT upgrading, human resources, etc. Digital archiving is therefore more vulnerable to the interruptions of money supply. Budgets should therefore be well planed ahead with expectations on the variability of spending.

4. Outsourcing government services

The term "governance" focuses on working for the public interest (Kettl 2002). Public awareness and demand for good services are at a high level in the democratic and developed world and there are strong influences on the government exerted through different groups like NGOs, civil initiatives, media, etc. Because of the increased power of the private sector and huge multinational companies and globalisation, not only the public but even the private sector has an impact on the government and society. A few large telecommunication (internet, mobile) operators can indirectly influence the development of the information society – price, coverage, digital divide, education, e-business, e-government.

A government with strategy and vision has to focus on clearly defined goals and implement services leading toward them. On the other hand, the private sector can run some government services as well. Outsourcing is an especially attractive option if the services could be routinized enough. This is especially the case if the services could be automated and informatized using IT (Cleveland 2005). The IT can speed up and automate government procedures or enhance transparency, but cannot make up for the decision and policy making. So we are witnessing an intermixture of public and private. The need for outsourcing appears because of different reasons. As stated in Savas (1982) "it is all about reduce, make more efficient and reform". The development of e-governance itself, with more demands from more demanding customers (citizens or private sector) might cause the increase in the number of services or the expansion of their extent if already existing. This can lead to the need for more human and other resources, consequently more financial resources and finally bigger service budgets, which is in conflict with the demands of modern society. So the paradox is here. Outsourcing services to the private sector, spending more or less the same amount of money but giving an impression that government is doing more but not spending more or expanding is a common practice from the past (O.Looney, 1998).

Yet outsourcing is not interesting just for one side – the government. Outsourcing is interesting for private sector as well since it represents a huge, continuative and expanding market. According to the AIIM Whitepaper, some processes are even better outsourced than done in-house. For example, digitization (document scanning and indexing) can be done by the in-house staff who are usually well-skilled, with a detailed knowledge of the business process and the ability to accurately categorize the work. But since this can be a mundane task, and experienced staff can feel devalued if assigned to it, turnover rates and sickness levels can rise markedly during such an exercise (AIIM 2002).

In some cases outsourcing is bounded with externalism as a similar, but more expanded service. Outsourcing allows another person or organization to provide a service or part of the service, previously carried out inside the organization. Externalisation is the delivery of a complete service, including staffing and possibly the relocation of the service away from the purchaser's premises, by an external supplier (Pantry and Griffiths 2004).

4.1 Outsourcing long-term archiving of government

When talking about long-term archiving of government documents we can think of archiving in the national archives or preservation of documents in different public or private organizations since the data retention period can be defined for 5, 10 or 20 years for documents not needed to be transferred to the national archive. In the first case outsourcing is out of the question, since a nation's memory is in question. A hostile

environment, capable of bribes, conflicts of interests, charges for work, etc., as described by O'Looney (1998) is far from acceptable in this case. But in the second case outsourcing could be in interesting option, if planned and managed well.

The questions that arise when outsourcing government archiving include the following: Who is the (new) owner of the records? Are records still publically available if they were available before? What to do with older records that supplier will not have access to and are needed for supplier to operate properly? When talking about archiving outside of national archives, the legislation usually takes care of these issues. In Australia, the Archives Act from 1983 restricts the transfer of custody or ownership without the authorization of the National Archives. When outsourcing archiving services, the transfer of custody usually takes place. This means that ownership is not changed (including intellectual and other rights) but that the supplier of the service physically has the records and is responsible for keeping them. When we talk about change of ownership, the legal, physical and intellectual rights are transferred to other institutions, which is rarely the case with governmental records.

Outsourcing archiving service also raises security issues. In recent research done by Osterman Research (WS&T 2005) 87% of respondents "feel that data security is a significant concern when considering outsourcing". Therefore more than 50% of respondents do not outsource archiving. The Digital Preservation Coalition research (2006) also emphasizes a trust issue for the outsourced digital preservation solutions. This problem might be solved by encrypting data before sending it to an outsourced archive, but then again, the service provider can in this case only save bits and bytes but can not perform the migration or access services. But outsourcing archiving requirements to a service provider can eliminate upfront capital costs, offer a predictable cost structure, and provide valuable expertise to help an organization stay compliant, while getting the service up-and-running very quickly.

In the research made in 2002 by the Resource Research Project (Ball et al. 2003), nine factors are considered important for the decision about outsourcing library, museum or archiving services (Table 1). The table is not made for the final decision about outsourcing but as a consideration fact. The factors are divided in three categories: cultural, economic and functional. Cultural factors include compliancy with organizations strategy, essentialness for the service identity and connectedness to a corporate policy. The economic factors mentioned are high revenue cost, high capital cost and existence of market/supplier. Among functional factors the important ones include difficulties to deliver a service, poor or declining performance, and ease of specification. For example, lack of service specification is one of the 10 main reasons for failing an outsourcing project (Lacity and Hirschheim 1993). Only if the specification is well stated, the supplier can acknowledge subscribers' expectations and demands. For digital archiving service for the public administration body (Table 1) the factors are graded as:

- The service is not so peripheral, since all the processes are well documented and documents often needed.
- Archiving service rarely falls within an organisations strategy.
- If implemented in full scale, digital archiving is difficult to deliver.
- It can be well specified service.
- The implementation costs are high.
- There are few out-of-the-box software solutions, as mentioned in the UK Mind the gap research (The Digital Preservation Coalition, 2006)
- Economies of scale are not so common for this service.

While all of these factors can be graded from say one to four, in some cases the assignment of weightings shows an even clearer picture. The whole matrix depends on the selected service and even differs for the same service within different organizations or different governmental bodies.

Table 1: Decision matrix for outsourcing, values selected for the case of archiving digital archiving service for public administration body by author of this paper

			In-house			Out-source
category	Weight	Factor	NO			Yes
			1	2	3	4
Cultural	?	Peripheral to service identity		X		
	?	Complies with organisation strategy				X
	?	Corporate policy		X		
Functional	?	Difficult to deliver service				X

	?	Poor or declining performances			X	
	?	Easy to specify service			X	
Economic	?	High capital cost				X
	?	Market/Supplier exist		X		
	?	High revenue cost			X	

During the past decades of outsourcing in the private and the public sector there have been many reasons that cause failures in outsourcing projects. Among the most important ones are unreasonable expectations from a subscriber, unrealistic promises from suppliers and inadequate project management and control by subscriber. While not having any experience with digital archiving, institutions could expect too much, especially when private companies promise a lot just to get a business deal. Sometimes they offer more then they are capable of providing because of the lack of human resources, knowledge and experiences. Inexperienced subscribers often think that after signing an outsourcing contract their job is done, but the thing is that no one but themselves knows the business processes as well as they do. Since long term archiving is certainly a long term service, changes of technology are expected during the outsourcing of a service. The contract should therefore not frame the technology but allow for the subscriber to adapt it to the new technological environment when it appears. On the other hand, the balance between implementation of brand new technologies and keeping up with old but certain ones has to be taken into account.

Since digital archiving is successful if all the required conditions are already met at the creation or reception of the documents, i.e. at the beginning of a document's lifecycle, outsourcing archiving processes is not an isolated, "someone will do it", job. It always requires many steps in the organization processes to achieve goals of digital archiving and comply with legislation. In-house preparation for outsourcing digital archiving therefore includes:

- standardizing hardware or minimizing different types and manufacturers,
- standardizing software or minimizing different types, versions and manufacturers,
- standardizing formats according to policies, standards and legislation,
- defining all necessary metadata according to policies, standards and legislation,
- developing policies for record management (and workflow).

4.2 Outsourcing long-term archiving – current state

There are a few researches that focused on outsourcing of archiving services or at least including outsourcing as part of the research. One of the first ones is the Research Library Group (RLG) study from 1998 (Hedstrom, Montgomery 1998). The situation at that time was of course different then today, but the results can give us some basics and enable us to compare it with today's situation. Within one survey, 158 questionnaires were sent to members of the RLG (National or State Libraries, University Libraries, Archives, Museums) and 54 were received back completed. Among other things, results showed that 20 institutions use external sources such as consultants or contracts with third-party vendors to gain access to expertise in digital preservation or to outsource certain digital preservation functions. Interestingly most of these organisations had the highest levels of staff expertise. A few institutions had outsourced digital conversion and preservation microfilming, but no institutions had experience with outsourcing digital preservation activities. Respondents stressed the need for flexible, affordable, beneficial services with a possibility of quality control. The need for a consortium of institutions to share leads and experiences with vendors and to develop quality services without redundancy was also suggested. Respondents also stressed the concern about losing control over their material and trust issues. The list of most wanted services to outsource included conversion services, migration services (over 70%) and outsourcing of archival hardware and software (over 50 %).

A more recent research in the UK gathered 104 responses from a wide range of organizations in different sectors (The Digital Preservation Coalition 2006). "The selected individuals all had an assumed interest in digital preservation as part of their professional responsibilities, and included a range of roles including records managers, archivists, librarians, but also IT managers and data producers". Among different current strategies for digital preservation around 8% mentioned outsourcing digital preservation. The research report states that since there exists no commercial off-the-shelf digital archiving solution at present, and any solution has to be created to suit the individual needs of an organization, there is a need to be able to outsource solutions and trust them.

A study was also conducted in Slovenia in the beginning of 2007 by our team at the University of Ljubljana, Faculty of Administration. We used web surveys and obtained 360 responses (2332 email invitations were

sent out) from different organizations from the public and the private sector. Among other topics, the survey included questions regarding the outsourcing of different services and sub-services related to digital archiving. The questions were formulated in this way: "Did you or would you use outsourcing for the following services in the area of digital archiving?". Possible answers included the following options: already did, probably would, probably wouldn't, haven't, won't and don't know. The results in the public (Figure 1) and private sector (Figure 2) show that the public sector is more interested in outsourcing than the private sector and that most outsourcing is already done in the field of backup services, digitization service and archiving hardware and software.

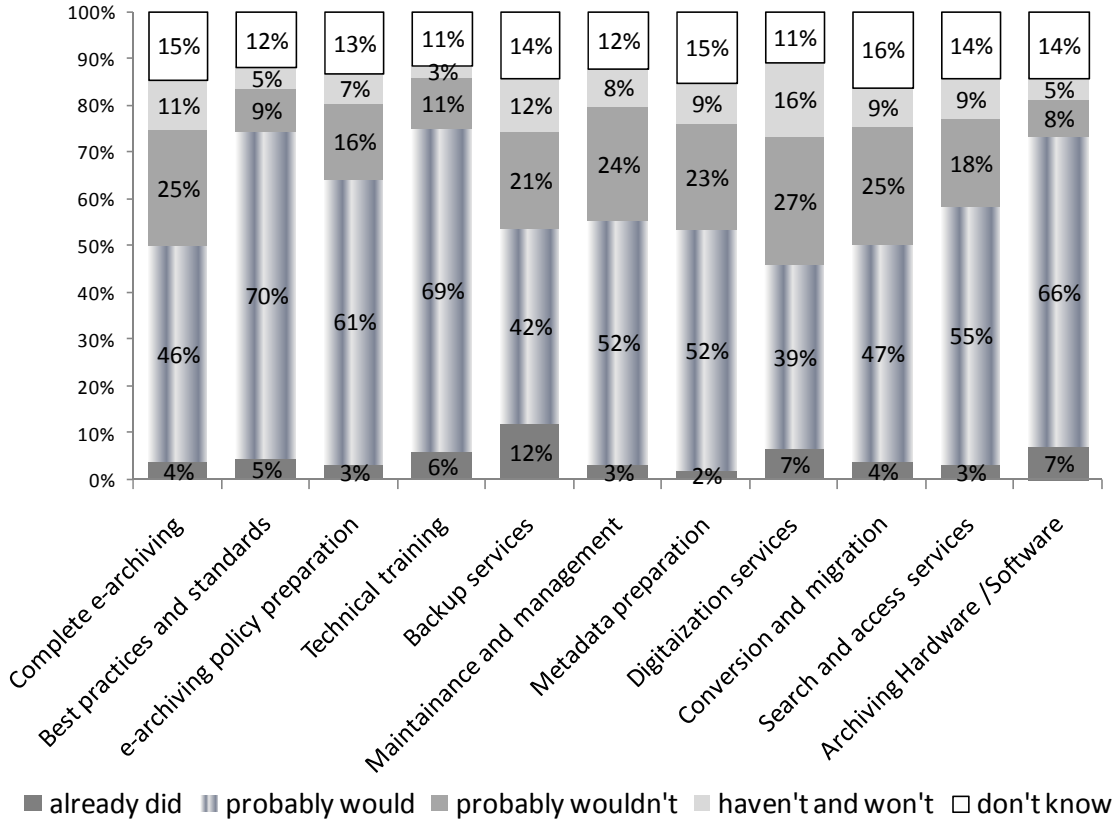

Figure 1: Public sector (n=194)

In the public sector the highest interest ("probably would" answer) is shown in the outsourcing of consulting services about best practices and standards in the field of digital archiving followed by intentions to outsource technical training, outsourcing of archiving software and hardware and archiving policy preparation (Figure 1). In the private sector the interest is similar with outsourcing search and access services also high (Figure 2). At the "haven't and won't" segment of answers we find for both sectors the outsourcing of the digitization service and outsourcing of complete e-archiving scoring very high joined by outsourcing of the backup service for the public sector and conversion and migration services for the public sector. The results show that in backup and digitization fields, which are well known to organizations, most decisions have already been made. In other fields the future of outsourcing is still grey, therefore knowledge from best practices is needed.

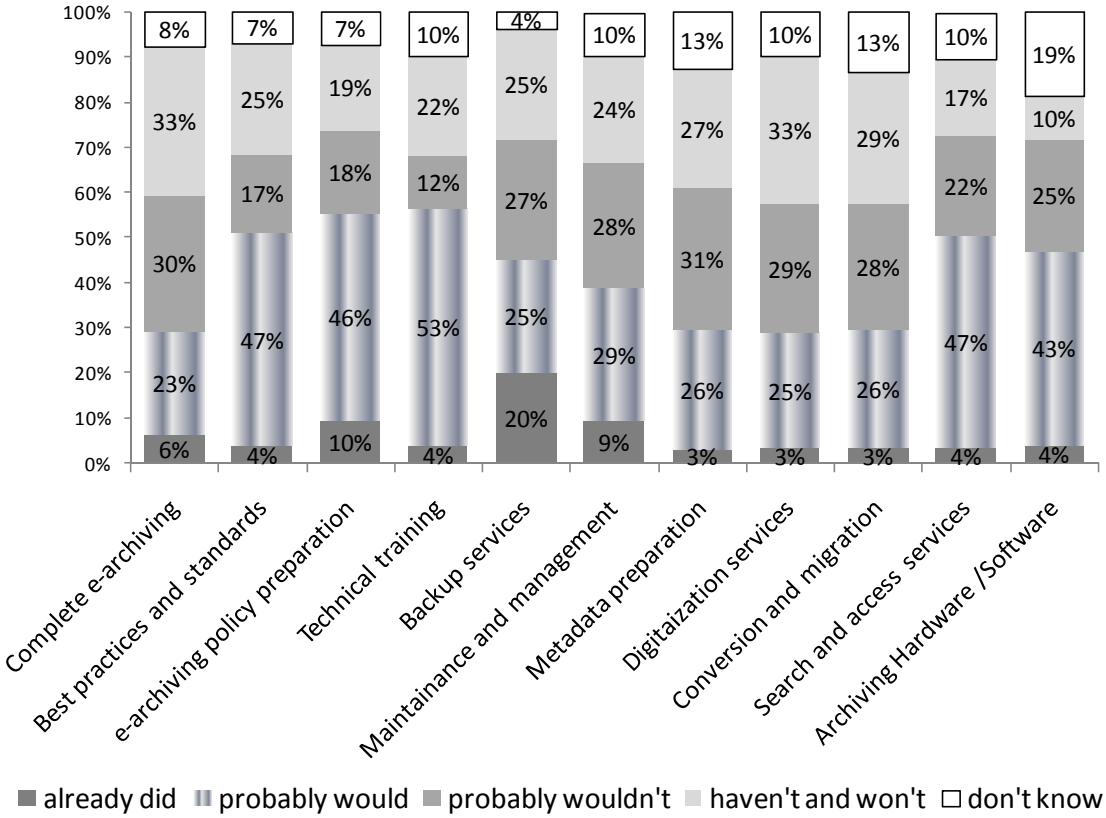

Figure 2: Private sector (n=129)

When further analysing the two sectors we defined the subgroups of ministries and their bodies (n=25), administrative districts (n=36), municipalities (n=78), faculties (n=15) and other public bodies (n=37)[3], small private organizations of up to 9 employees (n=32), medium with 10 to 49 employees (n=33) and large with more than 50 employees (n=47). Results show that within municipalities group, most already outsourced service ("already did" answers) is backup services, implemented by 15% of municipalities. The same goes for 20% of administrative districts while 20 % of ministries made their greatest effort in outsourcing hardware and software for digital archiving. According to their wishes and intentions ("probably would" answers) most of organizations in these groups wish to outsource services of consulting with best practices and standards, while 82% of municipalities and 80% of faculties still having big plans for outsourcing hardware and software and 84% of ministries and 67 % of administrative districts for outsourcing technical training. The least outsourced service ("probably wouldn't", "haven't and won't" answers) in the future beside digitization would be complete e-archiving and metadata preparation for ministries, backup services and maintenance and management for administrative districts and complete e-archiving service for municipalities and for other public bodies. The faculties subgroup shows very specific results since no services listed have been outsourced yet. However, like other subgroups, 80% of faculties are interested in outsourcing the consulting about best practices and standards and 60 % are planning to implement in-house metadata preparation and search and access services as well. Outsourcing of hardware and software is very likely to be used by 80% of them. The results are interesting if we know that many universities and their faculties (with libraries) are the leaders, partners and solution providers of different digital preservation projects in the world. We can only mention initiatives like DSpace, JHOVE, Espida, CASPAR, DPE, PLANETS, LOCKSS, etc.

In the private sector the results of subgroups are reflected in the general results for the whole private sector: companies already outsource backup services, they show interest to outsource consulting of best practices and standards service and technical training, and make in-house implementation of digitization and complete e-archiving. When looking for differences, larger companies with more employees would, compared to smaller companies, more likely outsource searching and access services, digitization, consulting of best practices and standards service and archiving hardware and software. Smaller companies are more determined about outsourcing backup services and not outsourcing the complete e-archiving service.

[3] Slovenia has N=15+40 ministries with bodies, N=58 administrative districts, N=193 municipalities, N=40+3 faculties within universities.

When comparing results from different subgroups for each service the results show some more information. For the outsourcing of the complete digital archiving service there is more intention to outsource it then not ("probably would" .vs. "probably wouldn't"), except for the small private companies with less than 9 employees. There is a huge interest in outsourcing consultation on standards and best practice with least intention at smaller private companies. The biggest need for outsourcing e-archiving policy preparation is shown by municipalities, while compared to the other groups outsourcing of technical training is least possible in smaller companies. Results for outsourcing maintenance and management of digital archiving are extreme in municipalities ("wouldn't") and faculties ("would"). Archival metadata preparation is the least outsourced service "already done" by organisations. At the end we can conclude that municipalities subgroup is most interested in any kind of outsourcing, universities and faculties haven't outsource anything yet and smaller companies have a higher average of "haven't and won't" answers then bigger companies.

5. Challenges of the future

Long-term electronic preservation should be included in the main strategies of the e-governments of each modern country and its public administration. Considering the continuous increase of the amount of records in the electronic form and their short life expectancy fast measures are urgent. Among possible solutions the paper in its first part suggests public-private-partnership that can establish this service in a fast, efficient and inexpensive way. Decision factors presented and graded in this paper show that outsourcing is an appropriate solution for digital preservation and suggest public administration bodies or private sector organisations to use this option. The reason lies in its ease of specification, peripheralness to the service identity and compliancy with organisational strategy. These facts can be supported by high capital cost and high revenue cost if the service is implemented by the organisation itself. At the same time there is almost no off-the-shelf product for this service on the market today. As discussed in the paper the interest for outsourcing in general also rises from the limited budgets of organisations, importance of citizen-client perspective, public-private-partnership tendencies, continuous changes in IT and customer/business culture. Outsourcing long-term electronic preservation can bring cheaper service in the long term, technologically advanced solutions that do not demand a lot of human resources and technical and expert knowledge from the organisation.

The results from the research in Slovenia in the second part of the paper prove that there exists a fair amount of interest for outsourcing of a long-term electronic preservation service and related sub-services. The results show that the interest is even higher in the public than in the private sector, the highest within the municipalities that participated in the survey. The percentage of organisations that did participate, and will or will not outsource the selected sub-services, shows that decisions have been made for the sub-services that mostly belong to electronic document management field. Now the decisions about the services and sub-services of digital preservation have to be made. The first one is of course consulting services of best practice and standards that enable the best possible plan and strategy for digital preservation. For all the other sub-services that will be implemented using outsourcing or not, these plans and strategies will be used later on.

The paper with its theoretical discussion and empirical results hopefully persuades organisations of the public and private sector that outsourcing the digital preservation services is the possible and positive (but not necessary) option to preserve electronic documents for the generations to come.

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