

Revising the quality management plan behind MDAS

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Abstract

As the amount of digital data is rising exponentially, it is evident that trustworthy and certified repositories are needed in order to preserve crucial data. This paper describes the revising process that is being conducted for the quality management plan of Mikkeli Digital Archive System. Archive environment is analyzed with Trac, Drambora and Nestor checklists as well as with SWOT analysis. This work is a natural continuum for the audit conducted in 2007 and the final intention is to apply for ISO 9001 certificate.

Introduction

The development process of Mikkeli Digital Archive System, later on abbreviated as MDAS, was launched between 2003 and 2004 after which it has been maintained and updated actively. MDAS is operated and maintained by Darcmedia, which is a service activity section under the department of electrical engineering and information technology at the MUAS (the Mikkeli University of Applied Sciences). Thus, MDAS is running under the rules and regulations of the MUAS.

The developed archive system complies with OAIS (Open Archival Information System) model and consists of two independent mid-range storage systems, which both include disks and tapes. The repository system, in spite being described in 2006 as a trusted repository [1] and audited in 2007 with the description of “*The maturity of MiUAS as (trusted) repository is high*” [2], have not yet tried to achieve the ISO 9001 certification.

The client base of MDAS is large, which tells something about the reliability and trustworthiness. Services are used by e.g. by Disc Oy (later on Disc), to store and supply radiology and mammography images, industrial enterprises such as UPM and Stora Enso utilize the MDAS archive service for different purposes and three major municipal archives: the cities of Espoo, Tampere and Turku belong to the group of MDAS clients.

This revising process aims to enhance the whole quality management system that influences behind the MDAS operation in order to be able to acquire the status of certified trusted repository. Quality certified action and service is a competitive advance and selling element in the invariable markets of digital long-term repositories. Target is to enhance the status of MDAS as an international trusted digital repository and to provide solutions and services for fields that are needed in a modern society, but not supported by public sector repositories.

Repositories in Finland

In 2006 the evaluation of the National Archives Services of Finland stated that, the repository facility of Mikkeli Polytechnic, current MUAS is a very potential digital repository which “*provides an opinion for dealing with large-scale digital archives in different formats which are already exist in the public sector and need to be preserved permanently or for long periods of time*” [1].

First of the repository system to mention is the governmental KDK-PAS (the National Digital Library – Long-Term Preservation) repository system, but it is not operational yet. Currently, its requirements have been specified, but it will take at least until 2016 before it will be started. Primary purpose of the PAS will be to provide permanent and long-term preservation services for organizations under the Ministry of Education and Culture, archives, libraries and museums, i.e. [3]. This directly means that PAS will not offer services for all actors of civil society, associations, private enterprises or individuals. Another possible restriction for joining the KDK/PAS system is the strict requirement of PAS compliant background system on the client side [3]. Unfortunately these requirements can be measured up by just a few major software vendors. This directly means costs that can be too substantial for smaller actors. Also the annual fee of the service is currently unknown.

Another repository is the SARKK (Digital archive for municipalities) [5] which is created by Tiera Oy (owned by about 100 cities and smaller municipalities). The SARKK operation is available only for the shareholders and it will not offer services for any other organizations. SARKK archive is currently at the piloting stage.

There are multiple commercial actors, which offer digital archive software and service for the time period agreed in the contract. Authors of this paper consider that commercial software and dedicated licenses cannot guarantee preservation for perpetuity and not always even for ten years.

Starting points

The preliminary study about the need for an areal digital content management and preservation in the Mikkeli region was conducted in 1999 at MUAS. The DIGILAB projects were started in 2002 and the first storage system acquired at 2003 as a part of the DIGILAB (ERDF) projects. Then came ESR-funded projects ELKAD, KUNDA and ATON (2004-2007), which were utilizing and developing further the repository-based services in order to enhance it into covering the area of digital archiving more thoroughly. These three projects had a major influence on the development of MDAS and after the projects, a thorough audit was conducted in 2007 [2].

The technical environment consists of EMC CLARiiON CX4 240 disk system with SUN StorageTek SL3000 and IBM 3584 tape libraries. Firstly acquired IBM DS4500 disk environment is still in use, but this system is close to the end of its lifecycle. All critical server environments are clustered and all other components are duplicated.

Most of the findings presented in the following sections are based on 2007/2008 audit [2], personal communication with the personnel of the MDAS and personal observations during six month period. The next few sections introduce the aspects that require attention, aspect that are currently in order and other

aspects that might need to be considered during the revising process.

Aspects requiring improvement

During the 2007 audit it was documented that some of the key people were still working with fixed-term work contracts (Drambora-R21). This was seen as a major problem that might even jeopardize the high level of competence. In addition, 2007 audit revealed some minor problems:

- There was no written liability table (Nestor-5.1, Trac-C3.3)
- Clear naming policy for documentation was missing (Nestor-5.2)
- Some security aspects were undocumented (Trac-A3.6)
- There was no centralized location for the documents
- Documented history of changes was unclear (Trac-A3.6, Trac-C1.8, Drambora-R70)
- Long-term financial sustainability was unclear (Nestor-4.1, Trac-A4.1)
- Question about the evidence of effectiveness of preservation planning (TRAC B3.4) could not be answered due to fairly limited operational time.

According to conversation with personnel, some things are lived inside the walls and therefore have remained undocumented. In spite of personnel technological know-how and understanding, their ability to cover the specialized tasks of other personnel is limited. Currently connected disk- and tape systems are inside the same physical location, although different fire safe spaces, but still in the same building and relatively close to each other. Therefore a disaster in one room might cause disaster also in the other room even though the rooms are heavily protected. To avoid this kind of situation all contents in the repository are saved on three LTO tapes of which is a remote copy.

Aspect currently in order

It is known that the technical level of the repository and the technical know-how of personnel will not form a bottle neck. In the field of digital object management (ingest, preservation, migration, retention), the technical capability as well as the commitment and skills of personnel is in a very good level [2].

In spite, the disk- and tape systems are located inside the same building; those are located inside a fireproof space. Space includes ventilation, gas fire extinction, raised floor and backup power supply created with UPS and secured with diesel generators. Furthermore, the space is designed to stand up to the crash of the above building. Access to these spaces is only granted to those people whose written job description requires this access. Access rights are realized with access card and personal key code. In addition, the corridor from which the access happens, as well as the yielding corridors are monitored by continuous video surveillance. Finally, one offline copy of the stored data is delivered into ELKA (Central Archives for Finnish Business Records) with regularity.

The amount of personnel is suitable for current functionality and development. Personnel attend regularly to educations, conferences and seminars to be able to maintain and enhance their professional knowledge.

The working conditions of personnel are very well taken into consideration. All staff members, including the service manager

are located at the same corridor, which also provides access to the rooms of the biggest client, Disec. Offices are supplied with air conditioning, indirect dimmable lightning, ergonomic desks and chairs and computers and network connections suitable for conducting the job. According to conversations and observations, all employees are equal regardless of their educations, gender, age or other possible aspects. Furthermore, all personnel belong to free health care service provided by MUAS.

Other aspect to consider

The basic assumption and premise for the operation is that every used device is under maintenance contract. When the contract season is close to its end, it is decided case by case if the contract is continued or is it wiser to purchase new equipment and devices that come with a warranty. In spite of the maintenance contracts, it is sometimes crucial to conduct some routine updates or maintenance actions autonomously since service level promises for customers have been given. Naturally these actions must be authorized by the device manufacturer or the service provider and the person responsible for the procedure must be familiar with the required actions.

As stated, operation is bound by MUAS rules and regulations of the university. Major procurement must go through MUAS acquisition procedure. However, there are also benefits in being part of a bigger public enterprise. Quality management policy behind MDAS operation is based on MUAS strategy that is built upon quality, attractiveness and productivity. Also MUAS quality policy has a strong influence on revised MDAS quality management. MUAS quality policy follows the circle of continuous improvement, which is exactly what MDAS is trying to achieve. Therefore, the quality management system behind MDAS is naturally integrated as part of existing MUAS policies and strategies.

The ability of commercial actors to ensure the permanent access of the stored digital contents can be questionable. From the authors' point of view it is a far-fetched idea to consider that commercial actor with dedicated software and devices could be operational after, e.g. 80 years. Therefore, open source is seen as a very good alternative for commercial products and it is an intention to study the subject more in a separate project that should start during this year. Ultimate intention is to continuously improve the long-term archive service.

Revising process

After the 2007 audit process, MDAS has been evolving steadily, practices have become more consistent, devices have been updated and revised and the customer base has grown. In spite this development and enhanced conventions actual quality management plan was not completed. According to the identified flaws, MUAS policies and intuition of personnel the revising process for the quality management plan was launched.

Work is performed by utilizing a combination of Drambora, Trac and Nestor checklists. If however, would be impossible to include every rule of every checklist in this paper. Therefore, only those rules that are not fulfilled are referenced with notation (checklist name - rule number). In addition to the 2007 audit and utilization of checklists it was decided to conduct SWOT analysis to ensure the situation. SWOT includes internal strengths, internal

weaknesses, external opportunities and external threats for the MDAS. Table 1 present the findings.

Table 1: SWOT of MDAS

<p style="text-align: center;"><u>Strengths</u></p> <ul style="list-style-type: none"> • Key personnel are regular workers • Technical know-how and understanding • Steady customer base • Good reputation • Good networks • Large health care actor as a client • Satisfied customers • Agile and continuous development 	<p style="text-align: center;"><u>Weaknesses</u></p> <ul style="list-style-type: none"> • Documentation procedures • Personnel cannot substitute each other completely • Minimal marketing actions • Recognized brand is missing • Limited human resources • Loosely designed strategy and scenarios
<p style="text-align: center;"><u>Opportunities</u></p> <ul style="list-style-type: none"> • Marketing actions taken in order to grow the customer base • Digital archives that are available for everyone are still uncommon • Governmental and municipal digital archives are for particular purpose • Amount of data rises exponentially • Utilization of open source • Failing of public projects • Existing functioning services • Customer to customer marketing 	<p style="text-align: center;"><u>Threats</u></p> <ul style="list-style-type: none"> • Loss of key personnel • Financial sustainability is dependent on clients • Commercial competitors • Politically based opposition • Frequently changing standards and requirements • Laws and regulations that force clients to use other services • Ability to keep up with the fast development of technology

Personnel

When it comes to the stability of personnel, actions must be taken. In spite most of the employees are currently working as regular workers and that TRAC-A2.x and Nestor-4.2 are passed, Drambora-R21 “Loss of key member(s) of staff” is not. The situation has gone in the better direction since 2007; still it does not mean that the key personnel cannot leave. Only skilled and quality consciousness personnel can create quality. Therefore, the risks of losing key personnel should be minimized and the benefits of working as part of MDAS should be raised. These aspects require further investigations; one suggested alternative is an incentive scheme that includes perquisites such as flexible working hours, recreational activities and a competitive salary.

In addition to keeping personnel in the house, their liabilities must be named task by task. Furthermore, every task must have a responsible person and deputy. A written liability table that contains area of responsibility, liable person, job description and deputy is currently under construction. With deputy it is ensured

that all liabilities will be taken care of in spite of personnel losses. However, personnel are not currently capable of fully covering the liability areas of other personnel. Therefore some conversion training is needed to ensure the adequate level of expertise outside the area of personal liability. It is also required that personnel will actively follow the general development in the area of digital preservation and participate in seminars and conferences considering the field of digital preservation.

Finally the staffing plan needs to be updated with MUAS board permission to hire new personnel when needed without board meetings and delays. With this procedure, the negative effect in case of losing key personnel can be reduced.

The personnel of MDAS and Disec work in close co-operation and some of the maintenance duties belong to Disec. In spite of the responsible person, in the end it is the person itself who is responsible for his or her own actions.

Documentation

Multiple minor problems in the field of documentation were identified in 2007 and the situation is still relatively unchanged. However, according to current procedures, all important documents are stored and archived into MDAS. Procedures for naming the documents are still inadequate as shown by the SWOT analysis.

The documentation process is enhanced so that all created documents follow simple, yet effective naming conventions. Multiple document types such as, follow-up reports, tenders, memos, records and budgets are produced. Naturally all documents cannot follow the same naming conventions due to their different usage. However, it has been decided that MDAS starts to use five different elements in the names of documents; topic, version, date, creator and type. Order of the elements is designed according to the expected use of the document type. For example, meeting memos are primarily bound to date and secondarily bound to the topic, while commonly updated or revised documents could be primarily bound to the version or the creator. When the naming convention is consistent, it will make it e.g. easier to keep track of versions, accessing and retrieving is faster, possibilities for sorting are better and it is easier to identify the content without seeing it. Automatic document templates for the most common document types are created, placed in a common location and taken into use. In addition to naming conventions, documents are equipped with sophisticated metadata including attributes such as storage time and rules / rights for managing and accessing.

Rest of SWOT

In the strengths section technical know-how as well as good reputation among customers are the current keys of success. The used software development method is iterative and agile; it resembles extreme programming, but does not follow it literally. However, loops like pair programming, unit testing, stand up meetings and iteration plans are recognizable.

In the weaknesses section, in addition to personnel and documentation issues, a widely recognized brand is missing. Naturally creating a brand is not a simple task, instead the journey from “a brand” to “the brand” is long and bumpy, but in the MDAS case big health care actor Disec and currently satisfied customers greatly aid in the first steps of this branding journey.

In the commercial world, another one's failure can be another one's fortune as the opportunities section of SWOT analysis show. Currently available digital archives are still rare, existing ones are meant for some particular purpose, some are still at planning phase and some have failed totally. These issues serve the purpose of MDAS thus our archive is open for everyone and it is fully operational.

The risk of losing key personnel to e.g. outside company that offers the better benefits and salary is still a threat. However, actions have been taken to reduce this risk. Currently, the customer base is steady, but still MDAS is fully dependent on the profits coming from the clients. Therefore, marketing actions are suggested in order to enlarge the customer base. The rest of the threats are either commercial or political ones that the MDAS has no option to affect. Changing rules, regulations and laws in Finland, for example, might force existing clients to switch into another archive service.

Other important aspects

From the very beginning the intentions of MDAS have been customer orientation, customer satisfaction and fulfilling customer requirements. However, the operation has been reactive, meaning that the operational model responds to the requirements coming from the client when need arises. Specific surveys or requests have not been used. Even though this method has been working relatively well, it is not efficient since it does not try to predict the future development requirements or opinions from the clients. Intention is to enhance the operational model by moving in a more proactive direction with regular feedback questionnaires and interviews. Results are thoroughly analyzed, compared against older results and finally mirrored against the technological development and standards. The proactive operational model provides possibility to be faster when changes happen e.g. in technological or client environment since a feedback survey might have shown the development trend before it happens. However, it must be kept in mind that the area of long-term preservation is strictly tied by standards and regulations, so in a case of a contradiction between client requirements and standards, the latter must be obeyed.

Before this revision, only the minority of the MDAS processes were modeled. However, the processes have lived inside the walls. With this revising process the intention is to model every possible process according to JHS152 recommendation [4]. At the time of writing process map, functional diagrams and the most important functions such as ingesting, preservation and destroying have already been modeled.

2007 audit did not mention this flaw, but according to current knowledge tapes are very vulnerable to temperatures over 50 Celsius. Even though MDAS tape libraries and disk storages are installed in the different server rooms, the above-mentioned thread must be kept in mind. Therefore, it has been an intention to distribute the most critical systems geographically in the region or further. This relocation action would lead to transfer of huge amounts of data and would require special attention.

As stated, the old IBM disk system is getting close to the end of its lifecycle and the EMC system has already been used for some years. This situation will demand to start a new purchasing process in the next years. When systems are acquired or

maintained, the requirements from the clients especially those of Disc must be taken into consideration, due to their special operational requirements.

Cycle of continuous improvement

The figure 1 presents the cycle of continuous improvement that is derived from the MUAS quality policy. The customer orientation plays a big role in the cycle as the requirements for the offered service come from the client and the satisfaction of clients is measured and analyzed constantly. The activity level of the repository is constantly monitored with repository metrics such as access, downloads, the volume of collections, etc. aspects. If and when measurements and analysis show disconcerting numbers, MDAS is further developed. Resource management, excluding personnel, happens inside MDAS, but high level management happens at MUAS level according to their rules and policies.

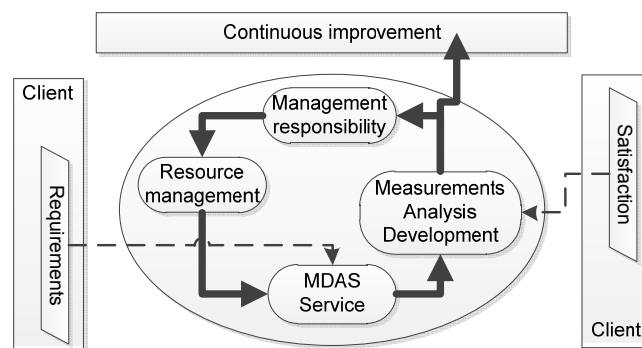


Figure 1. Cycle of continuous improvement

Conclusion

It is the opinion of the writers that a bulletproof quality management system is an illusion that cannot be realized. Naturally with dedication and determined work it can be possible to get closer to perfect quality management, but there is always some unexpected happening lurking around the corner that cannot be predicted as shown by the tsunami in Japan.

The revising process is still under way, but it advances steadily. The public quality manual is almost finished, high-level processes are modeled and personnel has started to absorb the new instructions for documentation, first survey for the MDAS clients was launched and analyzed and conversion training have taken into consideration. Furthermore, enhancing the brand of MDAS and creating a long-term marketing plan has been discussed, but not yet rationalized.

The quality manual is built upon the ISO 9001 standard since the intention to certify the MDAS with an outside evaluator. When the revision is completed and taken into use, MDAS has taken an important step towards being an internationally known certified trusted digital repository.

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Author Biography

Anssi Jääskeläinen has an M.Sc. (2005) in the area of telecommunications from the Lappeenranta University of Technology and a PhD (2011) from the same university with a topic considering UX in early software development. He has four year experience in working in the field of UX and currently his interest is in long-term digital preservation and he is employed by the Mikkeli University of Applied Science.