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ELECTRONIC **R**ESOURCE **P**RESERVATION AND **A**CCESS **N**ETWORK

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Executive Summary

The Leibstadt Nuclear Power Plant (Kernkraftwerk Leibstadt, KKL) has been operative since 1984 and delivers a power output of 1200 MW. Legal regulation is strict, and it is imposed and controlled mainly by the Swiss Federal Nuclear Safety Inspectorate. This also holds true for the plant's registry and document management. The documentation service recently implemented a new Electronic Document Management System (EDMS) that manages all official documents and records, comprising both technical documentation and office documents and records. They chose a proprietary, off-the-shelf solution that harmonises with the IT environment at KKL and stores documents in a database. Due to the proprietary nature of the system, this might entail problems at a later point in time when migration will become necessary.

Selection policies determine whether a newly created document is registered within the EDMS. All registered documents are allocated a unique identifier and version control is applied when documents in the EDMS are changed. For preservation, the documents are migrated from their creation format into either TIFF or PDF. Incoming mail is scanned and kept digitally. Retention periods are specified within the EDMS and can span until after the end of plant operation, setting a time horizon of some 50 years. Access to archived documents is open to all staff, with the exception of some confidential document types.

Chapter 1: The ERPANET Project

The European Commission and Swiss Confederation funded ERPANET Project[1] (Electronic Resource Preservation and Access Network) works to enhance the preservation of cultural and scientific digital objects through raising awareness, providing access to experience, sharing policies and strategies, and improving practices. To achieve these goals ERPANET is building an active community of members and actors, bringing together memory organisations (museums, libraries and archives), ICT and software industry, research institutions, government organisations, entertainment and creative industries, and commercial sectors. ERPANET constructs authoritative information resources on state-of-the-art developments in digital preservation, promotes training, and provides advice and tools.

ERPANET consists of four partners and is directed by a management committee, namely Seamus Ross (HATII, University of Glasgow; principal director), Niklaus Bütikofer (Schweizerisches Bundesarchiv), Hans Hofman (Nationaal Archief/National Archives of the Netherlands), and Maria Guercio (ISTBAL, University of Urbino). At each of these nodes a content editor supports their work, and Peter McKinney serves as a co-coordinator to the project. An Advisory Committee with experts from various organisations, institutions, and companies from all over Europe give advice and support to ERPANET.

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[1] ERPANET is a European Commission funded project (IST-2001-32706). See Hwww.erpanet.orgH for more details and available products.

Chapter 2: Scope of the Case Studies

While theoretical discussions on best practice call for urgent action to ensure the survival of digital information, it is organisations and institutions that are leading the drive to establish effective digital preservation strategies. In order to understand the processes these organisations are undertaking, ERPANET is conducting a series of case studies in the area of digital preservation. In total, sixty case studies, each of varying size, will investigate awareness, strategies, and technologies used in an array of organisations. The resulting corpus should make a substantial contribution to our knowledge of practice in digital preservation, and form the foundation for theory building and the development of methodological tools. The value of these case studies will come not only from the breadth of companies and institutions included, but also through the depth at which they will explore the issues.

ERPANET is deliberately and systematically approaching disparate companies and institutions from industry and business to facilitate discussion in areas that have traditionally been unconnected. With these case studies ERPANET will broaden the scope and understanding of digital preservation through research and discussion. The case studies will be published to improve the approaches and solutions being developed and to reduce the redundancy of effort. The interviews are identifying current practice not only in-depth within specific sectors, but also cross-sectorally: what can the publishing sector learn from the aeronautical sector? Eventually we aim to use this comparative data to produce intra-sectoral overviews.

This cross-sectoral fertilisation is a main focus of ERPANET as laid out in its Digital Preservation Charter.[2] It is of primary importance that disparate groups are given a mechanism through which to come together as best practices for digital preservation are established in each sector.

Aims

The principal aims of the study are to:

- build a picture of methods and match against context to produce best practices;
- accumulate and make accessible information about practices;
- identify issues for further research;
- enable cross-sectoral practice comparisons;
- enable the development of assessment tools;
- create material for training seminars and workshops; and,
- develop contacts.

Potential sectors have been selected to represent a wide scope of information production and digital preservation activity. Each sector may present a unique perspective on digital preservation. Organisational and sectoral requirements, awareness of digital preservation, resources available, and the nature of the digital

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[2] The Charter is ERPANET's statement on the principles of digital preservation. It has been drafted in order to achieve a concerted and co-ordinated effort in the area of digital preservation by all organisations and individuals that have an interest and share these concerns. Hhttp://www.erpanet.org/charter.phpH.

object created place unique and specific demands on organisations. Each of the case studies is being balanced to ensure a range of institutional types, sizes, and locations.

The main areas of investigation included:

- perception and awareness of risk associated with information loss;

- understanding how digital preservation affects the organisation;

- identifying what actions have been taken to prevent data loss;

- the process of monitoring actions; and,

- mechanisms for determining future requirements.

Within each section, the questions were designed to bring organisational perceptions and practices into focus. Questions were aimed at understanding impressions held on digital preservation and the impact that it has had on the respective organisation, exploring the awareness in the sector of the issues and the importance that it was accorded, and how it affected organisational thinking. The participants were asked to describe, what in their views, were the main problems associated with digital preservation and what value information actually had in the sector. Through this the reasons for preserving information as well as the risks associated with not preserving it became clear.

The core of the questionnaire focused on the actions taken at corporate level and sectoral levels in order to uncover policies, strategies, and standards currently employed to tackle digital preservation concerns, including selection, preservation techniques, storage, access, and costs. Questions allowed participants to explore the future commitment from their organisation and sector to digital preservation activities, and where possible to relate their existing or planned activities to those being conducted in other organisations with which they might be familiar.

Three people within each organisation are targeted for each study. In reality this proved to be problematic. Even when organisations are identified and interviews timetabled, targets often withdrew just before we began the interview process. Some withdrew after seeing the data collection instrument, due in part to the time/effort involved, and others (we suspect) dropped out because they realised that the expertise was not available within their organisation to answer the questions. The perception of risks that might arise through contributing to these studies worried some organisations, particularly those from sectors where competitive advantage is imperative, or liability and litigation issues especially worrying. Non-disclosure agreements that stipulated that we would neither name an organisation nor disclose any information that would enable readers to identify them were used to reduce risks associated with contributing to this study. In some cases the risk was still deemed too great and organisations withdrew.

Chapter 3: Method of Working

Initial desk-based sectoral analysis provides ERPANET researchers with essential background knowledge. They then conduct the primary research by interview. In developing the interview instrument, the project directors and editors reviewed other projects that had used interviews to accumulate evidence on issues related to digital preservation. Among these the methodologies used in the Pittsburgh Project and InterPARES I for target selection and data collection were given special attention. The Pittsburgh approach was considered too narrow a focus and provided insufficient breadth to enable full sectoral comparisons. On the other hand, the InterPARES I data collection methodology proved much too detailed and lengthy, which we felt might become an obstacle at the point of interpretation of the data. Moreover, it focused closely on recordkeeping systems within organisations.

The ERPANET interview instrument takes account of the strengths and weaknesses from both, developing a more focused questionnaire designed to be targeted at a range of strategic points in the organisations under examination. The instrument[3] was created to explore three main areas of enquiry within an organisation: awareness of digital preservation and the issues surrounding it; digital preservation strategies (both in planning and in practice); and future requirements within the organisation for this field. Within these three themes, distinct layers of questions elicit a detailed discovery of the state of the entire digital preservation process within participants' institutions. Drawing on the experience that the partners of ERPANET have in this method of research, another important detail has been introduced. Within organisations, three categories of employee were identified for interview: an Information Systems or Technology Manager, Business Manager, and Archivist / Records Manager. In practice, this usually involved two members of staff with knowledge of the organisation's digital preservation activities, and a high level manager who provided an overview of business and organisational issues. This methodology has allowed us to discover the extent of knowledge and practice in organisations, to understand the roles of responsibility and problem ownership, and to appreciate where the drive towards digital preservation is initiated within organisations.

The task of selecting the sectors for the case studies and of identifying the respective companies to be studied is incumbent upon the management board. They compiled a first list of sectors at the very beginning of the project. But sector and company selection is an ongoing process, and the list is regularly updated and complemented. The Directors are assisted in this task by an advisory committee.[4]

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[3] See Hhttp://www.erpanet.org/studies/index.phpH. We have posted the questionnaire to encourage comment and in the hope that other groups conducting similar research can use the ideas contained within it to foster comparability between different studies.
[4] See Hwww.erpanet.orgH for the composition of this committee.

Chapter 4: The Kernkraftwerk Leibstadt

http://www.kkl.ch/

Leibstadt Nuclear Power Plant (Kernkraftwerk Leibstadt, KKL) is situated close to the Rhine, on the Northern border of Switzerland. Starting operations in 1984 after some twenty years of planning and construction, KKL is the youngest and most powerful of the five nuclear power plants currently operating in Switzerland. It is running a boiling water reactor of type General Electric BWR-6 that delivers a base load net power output of 1165 MW.[5] Thus, KKL accounts for 15 percent of Swiss electric energy production.[6]

KKL is a public limited company owned by seven partners, all of them major electric power companies. It does not sell its power directly, but only through these partners. Some 440 staff work on site. Both documents and records management are the responsibility of the Technical Documentation and Library Group with its four employees, also referred to as the registry. They care for both paper and digital documents and records. In particular they are responsible for the organisation's Electronic Document Management System (EDMS) that spans technical as well as office documents and records.[7] The Group forms part of the ten-member team in the Central Documentation and Data Processing Section, a section of the Administration and Procurement Department.

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[5] This is the current, upgraded capacity. Original capacity was 900 MW. See Hhttp://www.kkl.ch/H.

[6] For the source of this information, please see the KKL homepage at Hhttp://www.kkl.ch/H (German and French only). For more information on atomic energy and nuclear reactors you may refer to the Nuclear Reactors Knowledge Base of the International Atomic Energy Agency IAEA at Hhttp://www.iaea.org/inis/aws/reactors.htmlH and its Internet Directory of Nuclear Resources (Hhttp://www.iaea.org/inis/ws/index.htmlH), or to the Wikipedia entries about Nuclear Reactors at Hhttp://en.wikipedia.org/wiki/Nuclear_reactorH and Boiling Water Reactors at Hhttp://en.wikipedia.org/wiki/Boiling_water_reactorH.

[7] Note however that not all documents fall into their custody, some kinds of documents being administered by other staff. It is planned to provide for transparent access over all the company's documents and records within the next two years.

Chapter 5: Circumstances of the interviews

ERPANET first contacted the KKL via its website contact form in September 2003. Due to heavy workload at KKL, conducting a case study was delayed until summer 2004. On July 14, 2004, a 90 minutes interview was conducted on-site with Mr Knut Urban, Section Head of Central Documentation and Data Processing, and Mr Jakob Ruder, Group Leader Technical Documentation and Library. Mr Ruder also answered additional questions by telephone.

ERPANET wishes to thank both interviewees, as well as all other people involved, for their kind assistance and the time they devoted to this case study.

Chapter 6: Analysis

This section presents an analysis of the data collected during the case study. It is organised to mirror the sequence of topics in the questionnaire.

- Perception and Awareness of Digital Preservation

- Preservation Activity

- Compliance Monitoring

- Digital Preservation Costs

- Future Outlook

Perception and Awareness of Digital Preservation

ERPANET's interviewees focused on records and documentation in general when speaking about awareness. The simple fact of working in a nuclear power plant demands a high awareness of the importance of good documentation and record-keeping. Records and documents in KKL's EDMS are constantly being reused. Crucial documents such as construction plans will remain relevant during the whole of the plant's lifetime. The documentation section's task is therefore to guarantee ongoing access to the documents for the long term, since plant operation and security directly depend on them.

Acceptance of the work and influence of the documentation section has been growing steadily over the last few years. Similarly, acceptance of the constraints imposed by records management is high. In fact, documentation staff estimate that over 95 percent of records and documents that need to be kept and managed centrally are already in care of the documentation section, the remainder being mainly paper documents that have not yet been inserted into central registry. The documentation section also benefits from a good reputation with respect to its services. In fact, interviewees stated that staff show little reluctance to accept that control over documents and records belongs to the documentation group, since they know that they can access those documents at any time in a quick and straightforward way when in the custody on the documentation section.[8]

This high awareness translates also into support from senior management. The interviewees reported that they never had any problem in securing financial and organisational support for document management and preservation measures. Unlike in some other organisations examined through ERPANET's case studies,[9] KKL senior management seem to be aware of the importance of records management in general and of digital preservation in particular. However, interviewees did not detail to what level senior management or general staff were aware of the specific risks inherent to digital preservation.

The main problems

A main problem has been resolved already, namely the brittle state of construction plans. This has been addressed successfully by the major digitisation effort described

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[8] For staff, there is hardly a difference between accessing a document on their local hard disk and accessing a document in the EDMS.
[9] Refer for example to the case study reports of some international organizations, available at http://Hwww.erpanet.orgH.

later. The organisation perceives itself to have no major problems at this time. However, the organisation is aware that it will have to undertake migration of its current EDMS in the future. As will be detailed below, straightforward and reliable extraction of information from this system has not yet been assured.

Asset value and risk exposure

The KKL's information assets such as technical documentation and organisational records are the basis of daily business. Beyond that, they form the basis on which the regulation authority (see below) grants operation permission. All technical details must be documented and all changes to critical settings must be accepted by the regulation authority. It is therefore obvious that complete and authentic documentation of the facilities, operations, and business processes is required for the plant to be operative. Add to this the security concerns that are involved. The physical security and health of plant staff and, in extreme cases, of the neighbouring population are at stake. Since the requirements of the regulation authority are quite specific and detailed, no formal risk analysis has been conducted in addition to these.

Regulatory Environment

A number of laws, decrees, conventions, and resolutions govern the use of nuclear energy in Switzerland.[10] According to the Federal Law on the peaceful use of nuclear energy,[11] nuclear power plants are subject to the supervision of the Swiss Confederation. The Swiss Federal Nuclear Safety Inspectorate (Hauptabteilung für die Sicherheit der Kernanlagen, HSK)[12] is the federal agency responsible for enforcing and monitoring this legal basis and for supervising the work of every institution, research or commercial, that uses nuclear technology. The HSK has issued a series of regulatory guidelines to translate the legal basis into practice.[13] Of these, some explicitly address records management, documentation, and preservation issues, such as the guidelines on "Organisation of Nuclear Power Plants" or on "Periodical Security Checks of Nuclear Power Plants".[14] The former specifies, among others, the important organisational, technical, and operating documents that need to be preserved. It requires that "The reconstructability of operation and plant changes must be ensured through appropriate documents throughout the entire operating life (i.e. until the nuclear power plant is no longer subject to the Atomic Energy Act). This shall be guaranteed through an appropriate archiving system."[15] The latter names documents used to conduct the periodical security checks required by law.

In particular, pressurised installations in Swiss nuclear power plants are monitored on behalf of the HSK by the Nuclear Inspectorate of the Swiss Association for Technical

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[10] An overview on these can be found at Hhttp://www.hsk.psi.ch/deutsch/gesetzgrundlagen/start4.htmH (German only). See also the IAEA's factsheet on Switzerland at Hhttp://www-pub.iaea.org/MTCD/publications/PDF/cnpp2003/CNPP_Webpage/PDF/2003/Documents/Documents/Switzerland 2003.pdfH.

[11] Hhttp://www.admin.ch/ch/d/sr/732_0/index.htmlH.

[12] Hhttp://www.hsk.psi.ch/H.

[13] Some of these guidelines are available in English at Hhttp://www.hsk.psi.ch/english/main8.phpH, while most exist only in their German version, which can be accessed at Hhttp://www.hsk.psi.ch/deutsch/gesetzgrundlagen/start41.htmH.

[14] Hhttp://www.hsk.psi.ch/english/files/pdf/R-017e.pdfH and Hhttp://www.hsk.psi.ch/deutsch/files/pdf/R-048_D.pdfH (German only), respectively.

[15] 'Organisation of Nuclear Power Plants', op cit, p.11.

Inspections.[16] They have issued another series of guidelines pertaining to their work. Again, these guidelines specify requirements for the related documentation.[17]

Further guidance is available from the Nuclear Safety Standards Commission in Germany.[18] In addition, guidelines are also issued by the International Atomic Energy Agency, IAEA.[19] Usually, these translate into the national guidelines issued by HSK.

Preservation Activity

At the beginning of KKL's lifetime, Registry and Documentation operated only with paper-based documentation. Digital finding aids were nonetheless employed, consisting mainly of simple lists and spreadsheets and remaining on a basic level of detail. In 1994, a first Electronic Document Management System (EDMS) was introduced, comprising a file system and an Oracle database for data management. At the same time, a major digitisation effort commenced hereby documentation staff started to digitise microfilms, plans, and other documents. Interviewees cited two reasons for this digitisation programme. Besides improving and facilitating access, digitisation was mainly a method of conservation, in particular for plans. In fact, construction plans had suffered from repeated changes and corrections and had reached a state where further changes could not be traced. The need for a conservation solution was urgent, and a pragmatic approach was chosen, involving the immediate digitisation of the most important and used plans, followed by digitisation of the remaining plans and eventually all of the technical documentation. To give an idea of the scope of this effort, the head of documentation cited the figure of 30,000 plans.

A parallel effort involves separating composite documents such as folders or handbooks that had originally been registered only in a summary way. These are currently being described in more detail, namely on a single document level, while the relationships between them are documented in metadata. Older, less relevant documents are not being scanned systematically, but on an ad-hoc basis only. Since the HSK prescribes that the paper version is legally binding for paper originals, paper documentation dated before the introduction of the EDMS continues to be kept in a parallel way, as do new paper documents including incoming mail. It is planned to fully discard the paper documentation at a later point in time under the condition of approval by the HSK.

In March 2004 KKL moved to a new document management solution by implementing a workflow-based EDMS. In order to select an appropriate system, staff relied on a market survey that was conducted together with an external consultancy, and on a needs analysis based on previous experience and the specifications of the applicable laws and guidelines. The latter considerably narrowed the choice. The product that was chosen is manufactured by the "Gesellschaft für Integrierte Systemplanung" (GIS)[20], based in Erlangen (Germany). This vendor had already acquired experiences with documents management systems for nuclear installations and therefore was best able to answer to the specific requirements of KKL with a standard software product.

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[16] Schweizerischer Verein für technische Inspektionen, SVTI. See Hhttp://www.svti.ch/pages/index.cfm?dom=5&rub=1047H for the homepage of the Nuclear Inspectorate.

[17] The Nuclear Inspectorate's guidelines are accessible at Hhttp://www.svti.ch/pages/index.cfm?Artikel_ID=1372H (German only).

[18] Kerntechnischer Ausschuss, KTA. See their homepage at Hhttp://www.kta-gs.de/welcome_engl.htmH.

[19] Hhttp://www.iaea.org/H.

[20] Hhttp://www.gis-systemhaus.de/H.

No specific problems related to this migration have been reported. Among other changes that will be discussed below, the new EDMS requires a more systematic approach to scanning and entering incoming paper mail.

Policies and Strategies

A policy for documentation and archiving is mandatory for a nuclear power plant.[21] KKL's policy details guidelines for preserving documents and records, as well as retention periods. This includes technical documentation as well as administrative documents, including minutes and notes. Due to the risks at stake in a nuclear power plant, parts of the records have to be retained until after the end of operations. Assuming a maximal lifetime of some 50 to 60 years, this stretches the time horizon until around 2050.

The policies apply throughout the entire organisation under the responsibility of the documentation section.

Selection

The archiving policy mentioned before specifies the types of documents that have to be preserved for a certain period of time, based on the laws and guidelines mentioned above. This was implemented when the documentation section came into existence, and is subject to adjustment should the regulatory environment change.

In the early years, delivery of relevant documents to the central registry involved some goodwill of staff and registry control over this was therefore limited. The current EDMS has considerably automated and tightened the selection process. When creating a document that belongs to a registered type, staff must now use a template linked directly to the EDMS. As a result, the new document is automatically registered by the EDMS at the point of creation. It is assigned an identifying number and can be tracked from this point onwards. At the same time, the official character of the document is expressed by its template style and a barcode containing the identifying number. This makes it convenient for any addressee of the document to identify it as official, and thus prevents circumventing this process by rendering any non-registered document meaningless.

Preservation

KKL use two standard formats for long-term preservation of their documents and records, namely TIFF group 4 and PDF.[22] PDF is the target format for most types of files, with the exception of those produced with CAD (Computer-Aided Design) software and other drawings and plans. These are converted into TIFF since this offers higher quality and better possibilities. Documents are created in a broad range of source formats, and converted to one of these standards upon finalisation. This standard version is called the "original format" internally, whereas the creation format is referred to as the "source format". Alongside these "originals", the source versions are also kept in the EDMS. The EDMS is hereby considered to provide for preservation as well as documents and records management.

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[21] See the subchapter on *Regulatory Environment*, above.
[22] TIFF stands for the Tagged Image File Format, Adobe. For the TIFF specification see Hhttp://partners.adobe.com/asn/tech/tiff/specification.jspH. PDF is the Portable Document Format developed by Adobe. The PDF 1.4 reference is accessible from Adobe's PDF specifications page at Hhttp://partners.adobe.com/asn/tech/pdf/specifications.jspH.

The EDMS also caters for workflow and versioning. Version numbers are assigned automatically by the system. Staff that wish to edit an existing but finalised document are provided with its source version; the edited version is then converted into the respective standard format again and assigned a new version number. These procedures are administered by built-in workflow to guarantee the authenticity of archived documents. While currently all versions are kept live in the EDMS, the interviewees consider that removing some older versions from the live system to remote storage would be sensible.[23]

KKL have chosen the standard TIFF and the de-facto standard PDF in order to minimise the number of formats used in the EDMS. (It should be noted that the plant is using some 80 formats as internal source formats.) This limitation is expected to greatly facilitate future migrations or other preservation measures. Speaking about the long-term perspectives of the two formats they use ERPANET's interviewees opined that for TIFF there are no short- or medium-term problems to be considered, but that for PDF the perspectives are less brilliant. They are aware of limits to the portability of PDF documents and envisage that a migration would become necessary in the medium term. In particular they expressed their hopes that ongoing work on PDF will lead to a more stable format, citing PDF/X and PDF/A as possible solutions.[24]

Technically speaking, the EDMS is a database, as opposed to the earlier solution with a fileserver and an Oracle database for metadata. KKL use a proprietary product that is not openly documented. Therefore, for the documentation section staff it is a black box. The reason for this is historical and resides in the plant's Enterprise Resource Planning (ERP) software. Originally, this has been developed in-house. It was developed according to organisational needs and new functionality was constantly added. When the KKL decided they had to correct a number of flaws and errors in this software, the respective know-how was no longer available in-house. Therefore the decision was taken that a market product had to be located with which to replace it. In order to facilitate processes and to harmonise the IT landscape, the EDMS was procured from the same company as the ERP was originally purchased. Interviewees acknowledged that this is not an ideal solution and that they are aware of the risks involved. It is not yet clear exactly how the content will be extracted from the current EDMS once it has to be replaced, which is expected to take place in about ten years, and this may involve considerable work and expenses besides carrying a certain risk.[25] Even before, version

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[23] Note that this standards-based strategy does not apply to more complex record types - take databases as an example. Databases are kept live and migrated to new versions if necessary. In addition, KKL preserve important information within databases by printing out respective views or lists and archiving these printouts as (digitised) documents.

[24] PDF/X is a focused subset of PDF designed specifically for reliable prepress data interchange. For more information about PDF/X, see Hhttp://www.pdf-x.com/H and Hhttp://www.planetpdf.com/mainpage.asp?webpageid=1220H. PDF/A ("PDF Archive") is a standard based on the PDF 1.4 reference and currently under development. It aims at providing a restricted version of PDF that excludes features of risk for preservation. All relevant information about the PDF/A standardisation process and the PDF/A committee can be found at Hhttp://www.aiim.org/standards.asp?ID=25013H. See also the paper of Susan J. Sullivan at the ERPANET Seminar on "File Formats for Preservation": Hhttp://www.erpanet.org/www/products/vienna/slides/erpaTrainingVienna_Sullivan.pdfH, and the following discussion summarised in the forthcoming Seminar Report.

[25] Note that most available EDMS are proprietary products, and that therefore other organisations will face similar challenges. For an overview on available document management systems / records management systems, see the respective matrix produced by the Dutch Taskforce Digitale Duurzaamheid and available at Hhttp://matrix.overheid.nl/matrix.jsp?id=951H. Only a few open source EDMS exist, among which Open Information Management Server

changes of the system might cause problems. However, KKL are convinced that the solution they chose is pragmatic, and that the advantages this entails are not negligible.

The EDMS is administered by a dedicated database server and kept on two mirrored disk systems distributed on the plant site, both holding 100 percent of the data. In addition to this, the originals from the EDMS are also written on WORM discs[26] in a jukebox for long-term storage. However, documentation plans to abandon this system and to use hard disks instead. Interviewees cited the low price and increased data security through regular checks at short intervals as main arguments for this planned move.

The metadata set the KKL is using for information stored in its EDMS has grown organically from the beginnings in 1982 and now contains some 40 elements. No standards were followed, but rather the set was developed according to the business needs. Metadata are partly assigned automatically. Most metadata are descriptive and retrieval metadata, but some also have a technical or preservation character. These include the different dates of production, editing, and conversion, the original format, as well as version numbers and workflow information. Some elements were introduced to cater for the more detailed description of composite documents, such as "is part of" and "contains". The metadata set also includes a field called signature. This is no digital signature in the strict sense of the word, but rather a proof of origin.[27] The person that produces a document is distinctly identified through username and password. This author information is logged in the metadata and cannot be altered. To facilitate author recognition, it is also included in the content of the converted ("original") version of the document, whereby the author name is distinctly printed in italics.

Access

For KKL staff, almost no access restrictions are in place.[28] In principle, every collaborator has free access to the EDMS from his desktop. However, there is a class of confidential documents to which access is restricted, mainly dealing with plant security. Only a very limited group of people can access these documents. In addition, the EDMS is designed to allow further restrictions that can be applied at any time if deemed necessary.

An access copy of the requested documents is delivered to users, while the preservation copy remains in the archive. There is no specific access format, but rather documents are delivered in the preservation format, namely PDF or TIFF, which are also deemed broadly accessible.

(Hhttp://english.openims.com/openims_english_com/openims_english_com_homepage.phpH), MyDMS (Hhttp://dms.markuswestphal.de/about.htmlH), Zope (Hhttp://zope.sourceforge.net/H), and Cocoon (Hhttp://cocoon.apache.org/H).

[26] "Write Once, Read Many"; see Hhttp://en.wikipedia.org/wiki/WORMH for more information.

[27] Note the difference in German between "Unterschrift" and "Signatur", both rendered by "signature" in English: while the former denotes the legally binding signature, the latter is a weaker term, mainly denoting an indication of the originating person. It is this latter term that is used by KKL.

[28] Note however that, of course, physical access to the plant site is under very strict control, and that access to the information infrastructure requires a user account, controlled by user name and password.

Compliance Monitoring

As mentioned above, the HSK is the main organisation responsible for externally monitoring Swiss nuclear power plants. Every few years they conduct very thorough audits against the guidelines mentioned earlier. During the last one, in 1998, 2 full days were spent on the documentation service alone. KKL and HSK are constantly in close contact, since the plant has to deliver reports on a monthly basis and the controlling agency has to approve all relevant changes to the facilities and the operations. Consequently, the agency is very well informed about all business and operational matters. For the undetermined future it is envisaged to allow the HSK direct access to the KKL's EDMS to facilitate their controlling and monitoring work.[29]

Additionally, KKL documentation has been audited for internal reasons twice during the last ten years, once by an external and once by an internal team. In 2003 a Total Quality Management (TQM) procedure was introduced that was certified the following year. This will be audited every two years in the future. For the documentation service, introduction of TQM did not cause additional measures, since all respective requirements were already being fulfilled.

Digital Preservation Costs

While it did not prove possible to detail the full costs for preservation, some figures are available. The Central Documentation and Data Processing section is running an annual budget of about 500,000 CHF (Swiss Francs). Of this, some three quarters are actually spent on documentation and preservation. To this must be added the costs of personnel (10 FTE, four of which focus on documentation and preservation), which amount to somewhat below one million CHF, the IT costs (impossible to specify), and amortisation costs. Compared to KKL's general annual budget of 40 million CHF (without costs of personnel) this is well over one percent. Taking into account the costs of personnel as well, the share is even higher.[30] Compared to other organisations examined through ERPANET case studies,[31] where the preservation budget is below one percent of the whole organisational budget, this is a high figure and reflects the importance of documents and records management at KKL.

Future Outlook

ERPANET's interviewees declared their satisfaction both with the general awareness of digital preservation and the solution currently in place in their organisation. No urgent action items have been identified. Two points that demand attention have already been mentioned: the obsolescence threats to the PDF format, and the database solution adopted for the EDMS. Both will have to be tackled in the years to come.

Another problem has been touched upon briefly during the interview. The Electronic Document Management System of the KKL has to serve two very distinct areas, namely office and technical. Interviewees reported that it was difficult to find vendors of such integrated solutions and expressed their wish to see more commercial offers of this kind available.

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[29] Since the HSK is entitled to access all KKL documents anyway, this would be easy to implement from a security point of view.

[30] Considering that the IT costs must be non-negligible, taking them into account would further accentuate the picture.

[31] Only few organisations specified cost details. Among those who did, the dpa, FIFA, and others reported their preservation budget to be in fractions of one percent. See the respective case study reports available from Hhttp://www.erpanet.org/studies/H.

Chapter 7: Conclusions

The present report sketches the picture of an organisation that is well aware of the importance of its information assets. The strict regulatory environment and the business and security risks at stake in a nuclear power plant understandably translate into the highly co-ordinated and necessarily strict documents and records management at KKL. Thus this study confirms a finding gained through earlier ERPANET case studies: the more valuable a company's digital information assets are, and the more risks are involved in their loss, the less problematic it is for documentation and records management to obtain appropriate support and funding. In particular, the strict and detailed regulatory environment greatly assisted in formulating preservation policies and strategies. A number of guidelines address requirements for technical and administrative documentation, and parts of this translate directly into policy.

KKL's choice of two preservation formats corresponds with best practice documented in a number of other organisations. As has been mentioned during the interviews, constant monitoring of format developments is indispensable even for widely accepted and stable standard formats. The close eye KKL is keeping on PDF/X and PDF/A answers this need. While TIFF does not give cause for concern at this moment, it is evident from the history of file format development that it will have to be monitored as well.

The use of a proprietary EDMS with a database that is a black box for KKL may cause problems once it comes to extracting the content in the course of a migration or system change. Declaredly, this is not an ideal solution. However, it well reflects the reality in many organisations; that is, to find a balance between different business needs. In the present case, the desire to harmonise the IT landscape had to be balanced against the wish to have a document management system that is as openly specified as possible. Given KKL's commitment to digital preservation there can hardly be a doubt that a future migration or replacement of the EDMS will receive appropriate support.

Appendix 1: References

The website of the KKL
   http://www.kkl.ch/T

The Swiss Federal Nuclear Safety Inspectorate
   http://www.hsk.psi.ch/

The Nuclear Inspectorate of the Swiss Association for Technical Inspections (SVTI)
   http://www.svti.ch/pages/index.cfm?dom=5&rub=1047

The Nuclear Safety Standards Commission (KTA)
   http://www.kta-gs.de/welcome_engl.htm.

The International Atomic Energy Association
   http://www.iaea.org/

The Gesellschaft für integrierte Systemplanung
   http://www.gis-systemhaus.de/

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