

# managing electronic records

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## Chapter 2

# The use of standards and models

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### Introduction

The topic of standards is one that is viewed ambiguously, certainly in the area of information and records management where they are not at the forefront. On the one hand people scratch their heads, because standards may not seem directly helpful to them and may restrict their autonomy, and on the other they are aware that some standards are needed to enable, for instance, communication and information exchange. Some standards in the current office environment are implemented almost naturally and mostly without much thought because of the software that is used or available. The Microsoft Office suite of software and the internet protocol TCP/IP are examples of widely used *de facto* standards.

The growing interconnectivity and interdependency of organizations in the digital world, however, increasingly require serious attention and thought by organizations as to the consequences for their ability to do business as well as the new opportunities offered. This is strengthened by the external pressure to provide access to information resources and to become open and transparent to the public. The world wide web would then be the main and in a way mythical and virtual place where all that information could be found. In trying to address those challenges one of the decisions organizations have to make is when and where they should or want to use standards. Such standards may range from quality assurance

to information security to metadata standards, as well as records management.

This chapter provides a short overview of the world of standards, focusing on records and archives management. It is important for records managers to understand where standards come from, what different types there are and why they are useful. It includes a description of the most relevant standards, but this is not and cannot be exhaustive. One related area that is not discussed for instance is that of archives which, to date, has developed its own world of standards. Well-known examples are the International Standard on Archival Description/General (ISAD/G), ISAAR (CPF) and the Encoded Archival Description (EAD) and Encoded Archival Context (EAC). Those standards are not exactly related to records management standards, though they concern the same information objects.

### The world of standards

Knowing where standards come from is helpful in understanding them. Different standardization bodies exist, formal and more informal, including the well-known International Organization for Standardization (ISO). The ISO is driven by national standardization organizations, which contribute to international (ISO) standards but can also develop national standards, for example BSI standards in the UK, ANSI standards in the USA and AFNOR standards in France. Other official international standardization organizations include the International Electrotechnical Commission (IEC), International Telecommunication Union (ITU) and United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), each responsible for different domains, but often with close mutual relationships. Standards published by these organizations are based on more or less formal procedures and are considered to be *de jure* standards. Another important source are communities that try to develop open standards, the main example being the Worldwide Web Consortium W3C ([www.w3.org](http://www.w3.org)). Such standards are called open standards because on the one hand everybody can contribute to their development and on the other they are widely available and mostly at no cost. The main driver for such standards is a common need or concern in a community, such as in this case the issue of interoperability on the web. Finally, there are the *de facto* industry standards, such as Microsoft or Adobe's Portable Document Format (PDF). (A proprietary standard like PDF is now being transformed into an ISO

standard, ISO 19005-1, which is intended to be a suitable file format for archiving documents.)

What is the value or meaning of each of these types of standards? ISO standards (apart from having to pay for them) are often rather theoretical and not always translated into or used in products, but they are based on international consensus and therefore have authority. Open standards seem to deal with both these problems, since they are developed by an international community, are often widely used in practice, have authority and people know exactly what they are about. As such they also have authority. The most telling example is EXtensible Markup Language (XML). *De facto* industry standards emerge because many organizations or people are using the products, giving them a good position and a lot of recognition. The problem here is that they are mostly proprietary. This means that their definition is not disclosed making it not only difficult to understand them but also making organizations dependent on the supplier. In practice, however, this is not a real impediment for using them. So it is often not the quality that determines what standards are used, but the reputation or the commitment of a community or the marketing, whichever comes first.

Mostly organizations will use a mixture of standards, thus enabling them to do business and communicate with others. In the information area this may include aspects such as information security, information resource discovery, geo-spatial data, digital preservation, interoperability of information exchange, scanned images, technical documentation, records management and so on and so forth. There seems to be no end. One of the problems is that many standards address similar or related issues, but approaching them from different perspectives. The resource discovery community, for example, is mainly interested in developing standards supporting accessibility and interoperability. The resulting Dublin Core standard, though, overlaps with records management metadata standards. The same goes for information security or preservation standards. Maintaining and preserving information (and records) in a secure environment is also a area of major interest in records management.

It is, therefore, very important for records managers to be aware of other standardization efforts and their possible interaction with records management interests. In organizations, too often different but complementary standards are considered and implemented separately. Co-ordination is necessary because organizations do not want to do things

more than once. Standards should address their requirements in line with the business they carry out and if there are standards for different purposes, such as records management and information security, they should complement rather than contradict each other.

A possible approach in such a situation is to take one standard and identify the requirements as a kind of baseline and see what other requirements should be added from the other, instead of implementing them separately. This can be extended and applied to other related and overlapping standards as well. When those standards change, it can be dealt with in the same way.

It is important to take these considerations into account in order to make standards effective. It also stresses the increasing need for interdisciplinary approaches.

In short, standards on records management are not something on their own; they are or should be embedded in wider communities of standards. Influence, however, should be mutual. The records management community should, for instance, look at the information security domain, and in another area archives should pay more attention to how records management standards will impact on them. In practice, though, many records managers on one side and archivists on the other are still approaching them very much as separate domains.

### Considerations for using standards

Although in many situations it may be obvious whether or not standards should be used, it may be useful to provide some arguments and considerations for using them.

Benefits of using standards include:

- supporting quality assurance, because standards set a recognized level of quality
- supporting information exchange and interoperability and as such increasing efficiency
- offering a framework for implementation, accountability and certification, because they provide a checklist of issues to be dealt with
- reducing costs, because they reduce unnecessary variety and support easier maintenance
- providing stability and authority because of international consensus.

Other considerations include:

- Standards may reduce flexibility.
- There are so many standards, how to know which one suits best?
- One size does not fit all in many cases, so adaptations to the actual situation may be needed.
- Standards may be too perfect (reflecting the ideal situation) or too abstract (because they try to cover all situations).
- Standards are not fixed and will change over time and thus require ongoing future maintenance.

Every organization has to decide what will prevail and where and when standards may or will support the business activities that have to be carried out. Each business sector has its own standards, for example engineering or computer technology, and in this context, the records management community has quite recently started to develop standards.

The remainder of this chapter examines some of the main standardization developments in the area of records management. Starting at the overarching, comprehensive level with ISO 15489:2001, standards for records management processes (functional requirements) and for the information needed to support authenticity, usability and reliability of records (metadata) are described. A special area for standards is the long-term preservation of digital records where there is a common interest with other domains such as libraries and scientific data centres. Here a reference model for a digital repository and many technical and structural standards such as file formats (for example PDF, JPEG and Word), mark-up languages, (for example HTML and XML) and data encoding (for example ASCII and Unicode) exist. Finally, two other related areas, information security and quality assurance, are touched on.

### Standards in records management

Until quite recently there was hardly any international standardization in the area of records management. Most work was done based on practical experience and some shared understanding of what records management is or should be within a certain context, for example an organization, a sector or a country. This has changed.

An important driver for thinking and providing new approaches was the

Australian recordkeeping community. In 1996 they developed AS4390, the first ever standard for recordkeeping (Standards Australia, 1996). This was internationally received as an example that deserved further attention. The initiative was taken to establish an ISO subcommittee, TC46/SC11, to develop an international standard for records management based on the Australian example.<sup>1</sup> The result was the ISO 15489 records management standard, published in 2001 (ISO 15489:2001). Recordkeeping research in Australia also developed in the second half of the 1990s a whole new and powerful paradigm with respect to records, the records continuum, which has incited lots of discussion in the professional community ([www.sims.monash.edu.au/research/rcrg/](http://www.sims.monash.edu.au/research/rcrg/)). Although not perceived by all records managers and archivists as such, it is one of the main concepts underlying development within ISO, because it is the only paradigm that allows the comprehensive, multidimensional view and approach that is needed in both a paper and a digital environment.

ISO 15489:2001 is the main and overarching standard for records management. It provides an excellent framework and a broad view of the principles and core issues. These principles will help organizations to assess and customize their records management needs for their business activities. The standard sets the scene in identifying and discussing the benefits of records management, the regulatory framework, policy and responsibilities, the characteristics of records and records systems, records management processes and controls, and monitoring, auditing and training. The perspective taken is that of the organization or any agent who needs to manage records in the context of doing business. The second part of the standard, ISO 15489-2, the technical report, shows how to achieve this using an implementation methodology derived from the Australian Design and Implementation of RecordKeeping Systems (DIRKS) methodology discussed below (National Archives of Australia, 2001).

### Processes and functional requirements for records management applications

At a lower level a broad range of different sets of functional requirements for records management software applications have been developed. Some are standards, others are reference models. The main reason for this lies in the increasing need of organizations to implement software applications that support their management of electronic records. One has to be aware

that to date none of them is really based on ISO 15489. They are mostly developed within other contexts.

One of the first sets was developed for the US Department of Defense, the DoD 5015.2 STD, 'Design Criteria Standard for Electronic Records Management Applications', issued as a standard in November 1997. It has already undergone a revision, which was released in June 2002, in order to incorporate, among others, the requirement to manage classified records, and is currently being reviewed again.<sup>2</sup> Because it was one of the first sets of functional requirements, and also because of the accompanying certification procedure, it has attracted a lot of attention worldwide. The Department of Defense requires software vendors to certify their software application against the standard, otherwise they it will not be eligible to be used. The standard has been translated into other languages and has served not only as an example for other sets, but also as the required set in tender procedures for records management software.

In Europe other sets of requirements exist. The best known is the set of Model Requirements for the management of electronic records (MoReq) developed for the European Commission and published in 2001 ([www.cornwell.co.uk/moreq](http://www.cornwell.co.uk/moreq)). It is a kind of reference model and is intended to provide a basis for organizations to develop a customized set of requirements, but can also be used for audit purposes. At the moment attempts are being undertaken by the DLM Forum to review and update the MoReq set. The current set is still too based upon UK records management practice and needs to be adjusted in order to give it a broader applicability, for instance in Europe.

The UK National Archives (TNA) has developed its own standard, last revised in 2002 ([www.nationalarchives.gov.uk/electronic\\_records/function.htm](http://www.nationalarchives.gov.uk/electronic_records/function.htm)), and has run a programme for evaluating existing software applications against it, although it was announced in early 2005 that the programme will cease to be offered and the TNA's functional requirements will not be revised. A revised MoReq set may replace them. Examples of other sets of functional requirements are the Norwegian set ([www.riksarkivet.no/english/electronic.html](http://www.riksarkivet.no/english/electronic.html)), the Canadian RDIMS ([www.rdims.com/en/RDIMS.aspx](http://www.rdims.com/en/RDIMS.aspx)) and the Indiana set ([www.libraries.iub.edu/index.php?pageId=3313](http://www.libraries.iub.edu/index.php?pageId=3313)).

In summary, each set has its own history and background and, because of that, certain characteristics that have to be taken into account in order to identify whether such a set might be useful for an organization or not.

This is often not done, which might lead either to overkill – too many requirements – or to insufficient management with the associated risks. Another aspect that is relevant when evaluating these sets is their implicit or explicit metadata requirements. They have to be compared with the metadata requirements an organization may have, as will be discussed later. Furthermore, when people talk about functional requirements they limit them almost always to specifications for records management software. However, software does not work well if the procedural, organizational, juridical and business requirements of an organization are not identified and implemented too.

Finally, the number of existing sets can cause some confusion, not only for potential users or organizations, but also for the vendors, who may have to comply with all of them in order to compete in the market. There is not yet one international standard that has the right level of abstraction for everybody to use it as a reference model. It could be one of the tasks of the above mentioned ISO TC46/SC11 to develop this within the context of ISO 15489.

## Metadata standards

Closely related to functional requirements is, as indicated, metadata. Here we are entering an incredible, complex and often bewildering domain. Though the term metadata is literally 'data about data' and does not really say anything, it gets its real meaning within the different business contexts in which it is used. Resource discovery metadata, for example, helps in improving retrievability and access to information sources, especially on the web. Preservation metadata refers to those metadata that support the preservation of digital objects. The main focus here will be on records management metadata.

In May 2004 the first standard, a technical specification identifying and describing the principles of records management metadata, ISO 23081-1, was published (ISO, 23081-1:2004). It will be replaced in 2005 by a slightly revised version as a standard. As indicated in the title it is a high level standard which explains what records management metadata is, why it is necessary, what roles and responsibilities can be identified, what types of metadata exist and how to manage them. The standard will consist of two other parts. In the second part a further explanation will be given on how to build and implement metadata schemas and the last part will provide a self-assessment instrument with which an organization can evaluate to what extent metadata schemas

they have developed or chosen comply with the principles identified in the first part. In all, the whole set provides a solid framework for organizations to make decisions on the issue of records management metadata.

In the last decade several sets of records management metadata have been developed in different places, for instance in Australia at the national level ([www.naa.gov.au/recordkeeping/control/rkms/summary.htm](http://www.naa.gov.au/recordkeeping/control/rkms/summary.htm)) and in New South Wales ([www.records.nsw.gov.au/publicsector/rk/rib/rib18.htm#NRKMS](http://www.records.nsw.gov.au/publicsector/rk/rib/rib18.htm#NRKMS)), in Canada ([www.collectionscanada.ca/metaforum/n11-232-e.html](http://www.collectionscanada.ca/metaforum/n11-232-e.html)), in the UK ([www.govtalk.gov.uk/documents/Records\\_management\\_metadata\\_standard\\_2002.doc](http://www.govtalk.gov.uk/documents/Records_management_metadata_standard_2002.doc)), and Minnesota in the USA ([www.mnhs.org/preserve/records/electronicrecords/ermetadata.html](http://www.mnhs.org/preserve/records/electronicrecords/ermetadata.html)), but there are many more. Most of these sets are national or local and in their definition they may use ISO standards, for instance ISO 3166 for the country code (ISO, 3166-1:1997; ISO, 3166-2:1998; ISO, 3166-3:1999) or ISO 8601:2000 for the date structure.

Helpful for finding out about records management metadata sets is a metadata schema registry that describes metadata sets or schemas. It can be a great help in identifying and choosing these sets and schemas, because it contain descriptions that help to understand where they come from, why they were developed and what they are about. Another benefit of registries may be the possibility to compare the described standards and to do 'cross-walks'. The latter raises an issue, though, because metadata sets are not documented according to one standard. This often makes it very difficult to compare them.

A registry for records management metadata is currently being built under the umbrella of the InterPARES project, which will also support the evaluation of metadata sets against the principles of the ISO 23081-1:2004 standard and the requirements emerging from the InterPARES I project ([www.interpares.org/ip2/ip2\\_description.cfm](http://www.interpares.org/ip2/ip2_description.cfm)). This has been done for the metadata sets mentioned above, for instance, and gives insight into the strengths and weaknesses of those metadata sets.

Finally, the Dublin Core standard ([www.dublincore.org](http://www.dublincore.org)) is often mentioned as a possible candidate for records management metadata. However, its purpose is to serve retrievability of web resources and it can be seen as the grandfather of many resource discovery metadata sets. This is only a subset of records management metadata and therefore it is simply insufficient.

## Digital preservation

The main standard in this area is the Open Archival Information System (OAIS) reference model (ISO 14721:2003). It originates from the scientific data world (the National Aeronautics and Space Administration, NASA) but has been developed collaboratively by data archivists, librarians and archivists. The reference model offers a comprehensive overview of what is needed to preserve digital objects of any kind through time and technological changes, when they are no longer used within their original environment. In its essence the model has as its main functions:

- ingest
- storage
- access
- preservation planning
- data management
- administration.

The digital objects that have to be preserved should be submitted as submission information packages (SIPs), which will be transformed during ingest into archival information packages (AIPs) and can be made available through dissemination information packages (DIPs). Although it refers users only to migration as a preservation strategy, it is applicable to other strategies too. Since it is a reference model it has to be adapted to different contexts, such as archives and data centres, with different requirements. The model is accompanied by an information model and is widely accepted in scientific data centres, libraries and archives as a framework (ISO, 14721:2003) (OAIS, [www.ccsds.org/documents/650x0b1.pdf](http://www.ccsds.org/documents/650x0b1.pdf)).

OAIS is the focal point around which other standardization initiatives are being developed. An example is the attempt to devise a preservation metadata set by the Research Libraries Group (RLG) in collaboration with OCLC ([www.rlg.org](http://www.rlg.org)). Though the proposed set has not been formally established, it attracts a great deal of attention in the world of digital preservation. Other initiatives in this community are the so-called 'attributes of trusted digital repositories' and the PREMIS working group that has published in May 2005 guidelines for implementing metadata with respect to preservation.

Also, building upon OAIS is the coding and structure Metadata Encoding and Transmission Standard (METS: [www.loc.gov/standards/mets/](http://www.loc.gov/standards/mets/)). This enables organizations to add descriptive, administrative and structural metadata to digital objects as textual and image-based works. It can be used for the different information packages in the OAIS model.

In relation to digital preservation initiatives to build file format registries are under way. Such registries describe existing file formats and could offer services for example that enable automatic transformation from one file format to another or that can check whether a file format is what it says it is. Currently, however, the development of those registries is still in its initial stage. Examples of registries are the UK National Archives' PRONOM ([www.nationalarchives.gov.uk/pronom/](http://www.nationalarchives.gov.uk/pronom/)), which actually contains descriptions but does not offer many services, and the DLF initiative to develop the Global Digital Format Registry ([www.diglib.org/preserve.htm](http://www.diglib.org/preserve.htm)).

### Use of models and methodologies

Having standards is nice, but it is even more important to be able to implement them and that may not be an easy task. The ISO 15489 standard provides organizations with a framework for records management. However, because of its rather abstract character it requires some interpretation and translation to make it applicable at the practical level. One of the methodologies helping this process is the Australian Design and Implementation of RecordKeeping Systems (DIRKS) methodology. An abstract of this methodology is included in the Technical Report accompanying the ISO 15489 standard (ISO, 15489-2:2001).

The DIRKS methodology consists of eight steps that help organizations, as stated on the website of the National Archives of Australia ([www.naa.gov.au](http://www.naa.gov.au)), to:

- 1 understand the business, regulatory and social context in which they operate (step A);
- 2 identify their need to create, control, retrieve and dispose of records (that is, their recordkeeping requirements) through an analysis of their business activities and environmental factors (steps B and C);

- 3 assess the extent to which existing organizational strategies (such as policies, procedures and practices) satisfy their recordkeeping requirements (step D);
- 4 redesign existing strategies or design new strategies to address unmet or poorly satisfied requirements (steps E and F); and
- 5 implement, maintain and review these strategies (steps G and H).

It is a very thorough approach, which has been used mainly in Australia. In Europe some organizations have picked it up but, perhaps not surprisingly, not many, if any, have used the whole process in detail.

This methodology shows not only what a challenge it is to implement proper records management, but also how broad it is. It cannot be addressed by one standard but should be a coherent system of policies, strategies, procedures, methods, processes and standards. To be successful it has to start from what is mentioned under the first bullet point - the business context.

In the previous paragraphs it has become clear that there is a bewildering array of standards and that is why there is the expression 'the nice thing about standards is that there are so many to choose from'. In practice, however, and despite the fact that we are creating huge amounts of information, its management, let alone the use of standards, often does not appear high on the priority list, if at all. In this respect the Information Management Capacity Check (IMCC; [www.archives.ca/06/0603/060301\\_e.html](http://www.archives.ca/06/0603/060301_e.html)), mainly developed in Canada, is a useful instrument and offers a good framework for changing information and records management. By identifying different levels of maturity, it allows organizations to assess the current situation based on a set of criteria, the possible risks and to set the short and medium term goals, all in close relationship with the business activities.

One aspect that should be included in this exercise is the relationship with possible other standards such as the standard on information security (ISO, 17799:2000) and the ISO 9000:2000 series on quality management systems. Information security can be viewed as an aspect of managing records in order to help guarantee authenticity, reliability and integrity, while records management in itself can be seen as an aspect of quality assurance. It is mentioned as such in the ISO 9000:2000 standard. Awareness of these standards therefore can help not only the positioning but also the strengthening of records management.

## Standards in relation to audit and certification

The flipside of the use of standards is the need to be able to assess whether an organization complies with them or not. And that is where audit and certification come in. This special area is at the moment being rediscovered in the records management community. The stability of paper records and deeply rooted methods and procedures in the paper world have been shaken by the advent of digital objects and documents. The subsequent insecurity about how to manage those new objects together with their unstable and intangible nature, the transition many organizations are going through in order to adapt to the new digital world, and finally the recent financial scandals and the new legislation to prevent these, all contribute to the current popularity of audits and certification. An important aspect of auditing is whether organizations use and comply with standards. If they comply they can be certified.

It is therefore useful to be aware of standards in this specific area that auditors use to guide them in conducting audits: they include the Committee of Sponsoring Organisations of the Treadway Commission (COSO) framework (COSO, 1992); the Control Objectives for Information and Related Technology (COBIT) framework; and advice from ISACA (Information Systems Audit and Control Association), [www.isaca.org](http://www.isaca.org); and IT Governance Institute ([www.itgi.org/](http://www.itgi.org/)). COSO focuses on internal control and evaluating corporate governance, while COBIT supports especially the control of IT resources in relation to business requirements. As such both can also help in establishing a good framework for records and information management.

## Further developments: dynamics

Although standards try to provide some stability in a dynamic environment they are themselves also subject to change. With growing experience, new insights as well as changing technology standards have to be adapted and updated. New versions will be published. Mostly these will be further refinements, which do not affect the basic principles. ISO 15489 was published in 2001, for example, and is under review at the moment.

New standards will emerge that build on existing ones or complement them. But with so many new standards emerging it can be difficult to choose what best suits a specific (business) context. It is therefore very important for any organization to identify and formulate the requirements for

accomplishing its business activities before choosing any standard. Such an investment will often achieve a return because it will support more efficient working processes.

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## Footnotes

- 1 Subcommittee SC11 is part of Technical Committee (TC) 46 *Information and Documentation* and consists of 21 members and 11 observers.
- 2 The NARA website gives further explanation including why the standard should be used. See [www.archives.gov/records\\_management/policy\\_and\\_guidance/bulletin\\_2003\\_03.html](http://www.archives.gov/records_management/policy_and_guidance/bulletin_2003_03.html) [accessed 1 September 2005].