

ELECTRONIC RECORDS UNDER CONTROL?

*The informationsystems inventory as instrument
for electronic record-keeping*

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0. Table of contents

1. Introduction.....	1
2. Identifying and localizing (level 1).....	2
3. Context of creation and appraisal (level 2).....	3
4. Technical context and context of management (level 3).....	5
4.1 Technicalcontext	6
4.2 Context of maintenance	6
5. The informationsystem inventory in practice	6
5.1 Point of view of the informationsystem inventory	6
5.2 Getting started and keeping up-to-date	7
5.3 Example datamodel for a informationsystem inventory	8
6. Conclusion.....	10

1. Introduction

Many archivists are in doubt as how to handle electronic records. In general, it is thought that the expansion of the record-keeping system is the main solution. The term *record-keeping system* relates to the whole of procedures, methods, knowledge, means and documents that are being used for record-keeping¹. This record-keeping system makes great demands on the intellectual management of records. Electronic records are made up of several components which, as opposed to paper records, do not constitute a unity and which can only relate to each other in a logical manner. The context of electronic records for instance, needs to be archived separately². The record-keeping system should follow the organisational and work process and is therefore, in principle, unique for each organisation. A ready-made solution can therefore not be offered and it's not always clear as to how one should start designing a record-keeping solution for electronic records.

One option is to develop and keep an informationsystem inventory with information on the electronic information systems and the electronic documents within the organisation³. Several goals can be achieved with the informationsystem inventory. The informationsystem inventory can be limited to the identification and localization of records. In its most simple form disposes the organisation at least of an overview of all available electronic records. But, the designing of an informationsystem inventory can be taken somewhat further. When adding the archival value, extending the archival strategies and the management of contextual data to the identification and the localization of the records, this information system inventory will become one of the most important instruments in the record-keeping system of electronic records. This kind of informationsystem inventory will prove to be an important instrument in getting control over and keeping control over the electronic records. This article will highlight the possibilities and advantages of an informationsystem inventory. After describing the importance of identification and localization for the whole organisation, more specific archival problems will be adressed. Finally, you will find a practical example and a data model.

¹ P. HORSMAN, *Digitaal archiveren. Het recordkeeping system als kader voor het beheer van digitale archiefbescheiden*, Den Haag, 1998, p. 10.

² H. HOFMAN, *Het intellectueel beheer van archiefbescheiden in het digitale tijdperk*, P.J. HORSMAN, F.C.J. KETELAAR en T.H.P.M. THOMASSEN, *Naar een nieuw paradigma in de archivistiek*, 1999, p. 121-131.

³ F. BOUDREZ, *Het digitaal archiveringssysteem: beheersinventaris, informatielagen en beslissingsmodel als uitgangspunt*, Antwerpen, 2001, p. 13-14.

2. Identifying and localizing (level 1)

An informationsystem inventory is basically an instrument to identify and localize documents. Identification and localization are basic conditions in order to get records into a controlled management. This control is important for the organisation in general as well as for the archivists in particular.

Administrations have to deal with a growing amount of information. This flow of documents is more and more of an electronic nature and contains documents which are of vital importance to the organisations' (juridical) responsibility and operational management. However, documents are only usable as mnemonic device, source of knowledge or evidence if the organisation has access to them. Therefore, it is necessary for the organisation to be able to localize and find the documents again. Only a small number of organisations have a clear overview of the electronic records they manage. Which electronic records do you have at your disposal? Where and in which form can they be found again? Electronic information seems to be scattered in word processing files, spread-sheets, databases, e-mails, intranet- or internet sites, document management systems, and is stored on main-frames, file servers, local harddisks and external carriers. The creation of electronic documents in a controlled environment is more the exception than standard practice. This is why an overview of documents is lacking and why the organisation itself usually ignores the information of which she disposes and for which documents she is responsible. Such an overview is important from the perspective of accessibility as well as from a management perspective.

This applies to documents in general but is even more important for electronic documents. After all, electronic records aren't tangible or as easily visually noticeable as paper documents. Therefore one needs to know in advance where the documents are located, when searching for electronic information, or there has to be an instrument available. The accessibility of records at the creator within their dynamic phase will rise when using an informationsystem inventory in which the documents are identified and localized. Another important difference with paper documents is the greater risk of loss of electronic records. Hard drives and computers are frequently replaced and the threshold to erase computer files is very low. At least some data is being registered when describing electronic documents, so in principle, some clues will remain. These clues register the existence of the documents and can lead to the finding of the documents. The documents no longer vanish without a trace when destroyed⁴. As long as electronic documents aren't identified, localized or registered, they run the danger of not officially existing for the organisation.

Keeping account of an informationsystem inventory can lead to other indirect benefits for the organisation. Other problems are often discovered when composing an informationsystem inventory. Re-occurring obstacles in this area are often inadequate security, lack of a distinct filing system, inefficient use of the available technology, creation of documents of which it is difficult to keep record. Such an overview can simplify or even make the compilation of ad-hoc lists redundant (f.i. at the occasion of the Y2K problem or the introduction of the euro). An informationsystem inventory can also contribute to a greater conscience of the administration which is needed for record-keeping problems. Archival records are firstly associated with paper and dust, people usually don't realise the archival value of electronic records. Finally, the informationsystem inventory can also be useful in connection to give public access to the records of a public administration or to designate the original, authentic, final or latest version of a document.

Just as in the case of the administration, it's important for the archivist to know which documents are kept at which place and whether there is any kind of management. A consequence of the record continuum thinking is that it is expected of the archivist to guide and supervise the creation of the archive. It goes without saying that the archivist needs to have an overall picture of the kind of electronic records that are being created before he can be able to formulate guidelines and advices. By being involved in the creation, the archivist can make sure that the electronic records that are being created, are archivable. The information in the informationsystem inventory can offer the archivist a basis for the enlargement of his archiving policy concerning electronic records. The electronic records of an organisation can have divergent characteristics which all have their own demands on the record-keeping system. Several procedures, guidelines and software tools have become available lately to help shape your electronic record-keeping system, but it all boils down to basing your choices on the specific needs of the organisation and her documents.

⁴ P. HORSMAN, *Archiveren. Een inleiding*, 1999, p. 20

The first step in this process up till now, is conducting an archival survey. These archival surveys take up a lot of time and efforts and aren't always easy to interpret. Moreover, they only offer a look at a situation at a certain point in time, and they need regular updating or repeating. It's still necessary for most applications to collect retroactive information, and this is not the most appropriate way of working (see further). These surveys can be avoided in principle with a well documented informationsystem inventory. Supervision or inspection by the archivist isn't possible when there is no informationsystem inventory.

From the point of view of information management, document management and electronic record-keeping, the first essential step in bringing electronic records under controlled management, is identification. This controlled management is a step towards intellectual records management of electronic records for the archivist.

3. Context of creation and appraisal (level 2)

The identification and localization of electronic records is a first step towards controlling the archive and making the electronic records accessible. Composing a records schedule can be seen as a second step in this process. As long as there are no records schedules for electronic records, there is a real possibility for records with archival value to be destroyed and for records to be saved at random. The records schedule makes sure that the administration knows which documents are being saved for each period in time. Informationsystem inventories are not meant as a records schedule, although this is possible. The goal at level 2 is first of all to register contextual metadata in the informationsystem inventory which are necessary for archival appraisal in order for a records schedule to be drawn up.

Without identifying all documents within the organisation, it's impossible to determine which documents have archival value. Also, archival appraisal is only possible when you dispose of information regarding the context of creation of records: provenance, function, mandate, business process, relation to other documents, etc.⁵ Collecting these metadata is normally the first step in the archival appraisal process. The records normally leave their original context in the record-keeping process. Traditionally, when the paper records are being removed from the business process and taken to the archive, these contextual metadata are made explicit. After all, with paper carriers it is possible to extract a large part of the contextual information from the documents themselves and from their physical storage. This is not the case for electronic records and consequently it is recommended to link the documents to the functions and activities to each other as soon as they are created and to register the workprocess in which they were created, received and used. These contextual metadata constitute an important component of the electronic records.

Besides, when archiving, it's recommended to start the archival appraisal as early as possible in the life cycle of the documents, and this is even more the case for electronic record-keeping. The appraisal of electronic records is to a great extent determined by the information that is gathered in reference to the context. Essential elements for archival appraisal are the research concerning the authentication and the technical characteristics of the records. Consequently, archival appraisal is done at best at a moment that the records are still active in the information system and stored in their original context⁶. It's difficult to reconstruct high quality information afterwards without the actual active information system. This means that the registration of the relevant information needs to start during the active process. This way, the recording of the informationsystem inventory becomes a part of the selectionprocess in its broad meaning.

The explicit registration of this contextual metadata is not only important to enable appraisal. Electronic documents can only achieve the status of records when their context is explicitly archived. Electronic records are generally divided into three components; content, structure and context⁷. While the content and structure

⁵ H. HOFMAN, *Een uitdijend heelaal? Context van archiefbescheiden*, in: P.J. HORSMAN, F.C.J. KETELAAR en T.H.P.M. THOMASSEN, *Context. Interpretatiekaders in de archivistiek*, 2000, p. 53.

⁶ INTERPARES I, *Appraisal task force report*, p. 5.

⁷ ICA, *Guide for managing electronic records from an archival perspective*, p. 22. Sometimes look and feel and behaviour are regarded as components of an electronic record, besides content, structure and context. (J. ROTHENBERG *Avoiding*

are usually inside the archived electronic records itself, this is not the case for the context. The context has to be registered explicitly. This is one of the main functions of the record-keeping system⁸. A document becomes a record on the basis of its function within the context. Without the context you only have information or a document, but not a record. Electronic records can only be fully understood and give evidence when made in the course of a workprocess and if this process is rebuildable together with the record. Seeing that the context is of the utmost importance when archiving, the relationship between electronic records with the creator, the workprocess and the related records need to be registered explicitly. The archival bond reflects the context and the relations between the records within the record-keeping system.

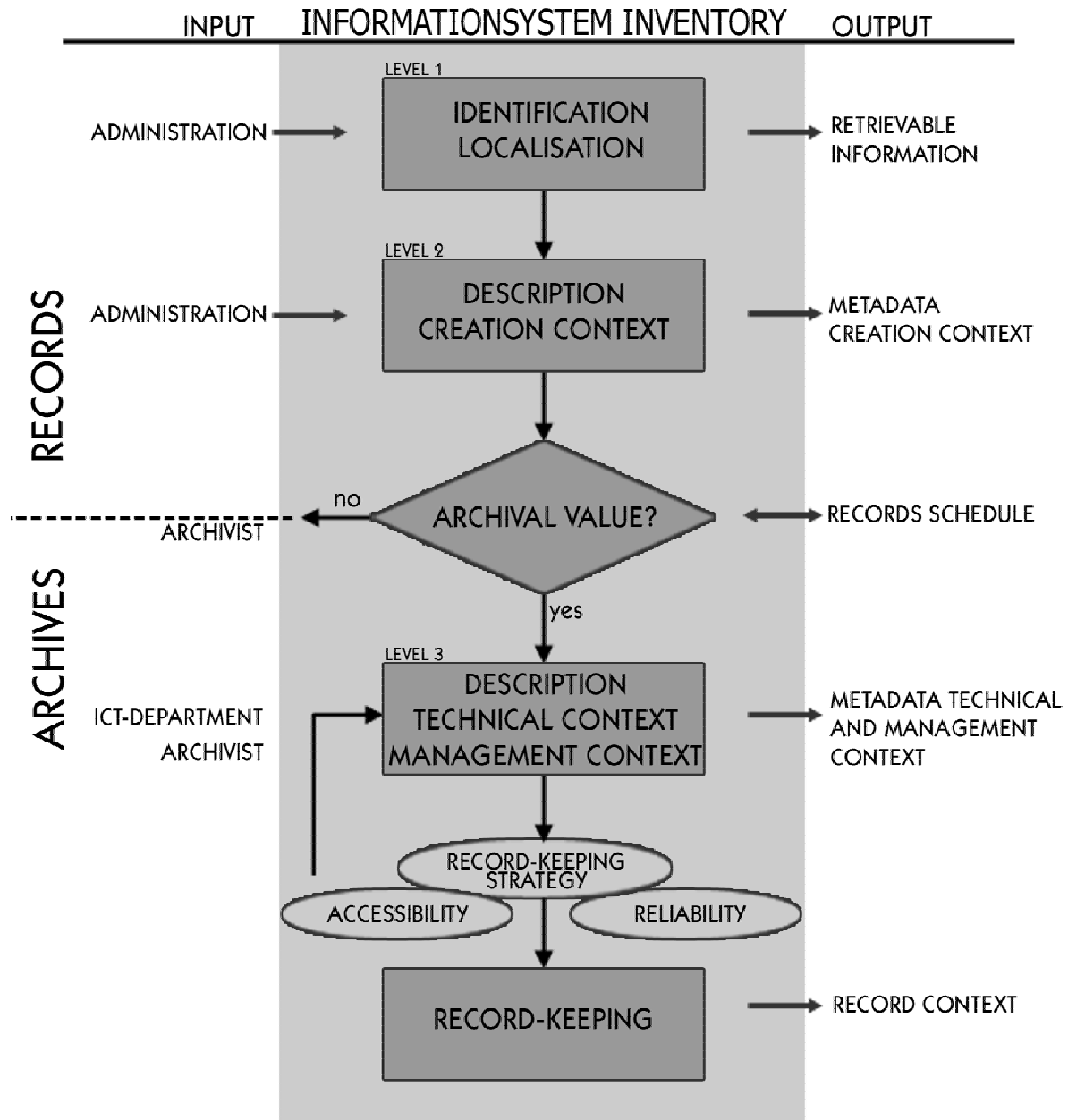
Contextual information about the origin of electronic records is registered in the informationssystem inventory. Two goals are hereby achieved. Essential information which is needed for the archival appraisal is registered and the context of the records is partly described. This offers the advantage that when preparing selections or record-keeping actions, you already possess some documentation so you won't have to start from scratch. Collecting this metadata retroactive is time consuming and in most cases impossible. Nor the administration, nor the IT-services, have systematic overall overviews of running IT-applications and their functions, let alone systematic summaries of past applications. If you're lucky, some information can be gathered from co-workers who used to work or administer these applications. If these people have left the organisation, it's near impossible to gather the necessary data⁹.

The link with the records schedule can be made in several different ways. One can limit oneself by referring to existing records schedules or to the retention period in records schedules. This way, it is possible to make a distinction between documents and records. Further steps have to be taken to bring the documents under controlled management. The pure document management from an archival point of view can stop at this level. Further efforts should be aimed at the documents who have received the status of record. For electronic records this means, among others, that measures need to be taken concerning the accessibility, the reliability and the final record-keeping.

Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation. A Report to the Council on Library and Information Resources, 1999).

⁸ L. DURANTI, *The archival bond*, in: *Archives and Museum Informatics*, 1997 (vol. 11, nrs. 3-4), p. 213-218.

⁹ This statement isn't based only on the experiences in Antwerp but seem to apply for most services. (o.a. M. MOLENAAR, *Digitaal archiefbeheer: niets bijzonders*, presentation given at: *Studiedag KVAN. Digitaal doorgelicht of hoe krijgen en houden informatiebeheerders greep op digitaal gevormde archieven*, Ede, 20 september 2001).



4. Technical context and context of management (level 3)

The information system inventory offers the possibility of preserving contextual metadata in a structural and systematic way, starting from the time of creation. This way, the documents are being described incrementally during their life cycle. The description should start as close to the moment of creation as possible and should be replenished every time the context changes. These metadata can be retained within the information system inventory up to the time when the records are ready to be archived. The information system inventory can be used for managing records in the time period between the archival appraisal and the eventual archiving action. These contextual metadata can be incorporated in the record-keeping management system at the moment of record-keeping and can be completed in there.

4.1 Technical context

It's quite easy to detect which documents need accessibility provisions in the long run or whether a record-keeping solution needs to be elaborated on the bases of the information found in the informationsystem inventory. Because of the aging technology, provisions need to be taken to ensure the readability of electronic information. It's safe to assume that the life span of electronic records will exceed the life span of the informationsystems in which they are created or used. It's best to anticipate this instead of waiting until being confronted with the problem of electronic durability. If not, there is the possibility of suddenly being confronted with the run down of an application (f.i. no more product support, choice of a new application) which results in an operation where records need to be archived very quickly or where no (good) provisions are taken to ensure the readability of documents. Research into the appropriate record-keeping strategy takes time. What's more, is that when choosing migration as a solution to technological aging - the most common approach upto now - it's recommended to dispose of a migrationpath before putting the information system out of business.

It's for this reason that, besides contextual metadata on the creation, technical metadata is being kept in the informationsystem inventory. In fact, the technical characteristics of a document are part of the contextual data. These data are related to the specifications of the technological infrastructure (equipment, operating system, application system, versions, dependencies, dynamic components, etc.) the dimensions and the annual growth. After all, these parameters are important when searching for solutions for durability and record-keeping¹⁰.

Keeping in mind the elaboration of an archival system, the informationsystem inventory can become an asset on the condition that sufficient technical metadata is recorded so it, or at least its framework, can be used as a basis when designing an archival strategy. Furthermore, the archivist is not the only one who will benefit from these data. In extension, this can also be useful for IT-staff to make an inventory of their IT-infrastructure, help-desk functions, or at times when disaster strikes. However, this would mean that the technical data of all electronic documents needs recording, not just the ones with archival value.

4.2 Context of maintenance

The management of documents with archival value also needs documenting. Besides the provisions for accessibility and reliability, contextual metadata concerning the management describes the elaboration of record-keeping strategies: migrationsteps, eventual destruction, present location, past archiving actions, etc.

5. The informationsystem inventory in practice

5.1 Point of view of the informationsystem inventory

An informationsystem inventory can be elaborated in several different ways in practice. The organisation of the inventory demands a clear-cut reflection on the goals of the informationsystem inventory.

¹⁰ These findings are based on the statement that record-keeping of electronic documents in the city of Antwerp starts from the information systems themselves. The archivingstrategy that needs to be followed, depends at great length of the architecture of the information systems and the treatments or functionalities which need to be operational after the archiving. Certain technical information is necessary for this. Again we have to conclude that this information isn't always kept in a structured way and that gathering it, needs time.

In general, two different approaches are distinguished: the information system and the record. In the latter case a main arrangement of the information system inventory, based on the different categories of documents that are preserved at a certain creator, is kept. An overview of the metadata is documented for every different kind of document. This perspective approaches more the classical archival way of describing on bases of dossiers and series. This angle seems interesting when different categories of non-related documents are formed within the same information system (f.i. an office application) and the need exists to gain control over these records. This approach is followed, among others, by the *Public Record Office* (UK) and by *EDDA* (city archives of Amsterdam). The retention period can be easily added to the description so as to enable the information system inventory to function as a records schedule.

When using the information system approach, metadata is gathered at the level of the application. In this case, the summary of electronic records is an element of the description of the information system. It's common within a digital environment, to make an inventory at the level of the information systems. A repetition of technical data is avoided for documents which are created within the same information system. The electronic documents correspond to a great extent to the information system in many of the database applications. The role of the information system inventory with regards to the selection, is limited to delivering the building bricks for a separate records-schedule, but this offers the advantage of being applicable to paper and electronic records. The records schedules have the records themselves as startingpoint. Examples of such management inventories can be found, among others, in the National Archives of the United States¹¹ and the Netherlands (the province of Zeeland)¹².

It was decided that, as far as the city of Antwerp is concerned, the information system inventory will be kept at the level of the information systems. Besides the above mentioned arguments, this decision was also motivated by the need to document the information systems. When starting on the first cases on electronic record-keeping, a lot of time was lost collecting essential metadata on the information systems. This information wasn't recorded systematically. It's necessary to keep documentation on information systems because archiving strategies can't be based on the typology of electronic records. The startingpoint for archiving strategies are the information systems wherein the documents were created¹³. This is even more true for electronic records which aren't created within the classical office devices and who don't have a paper equivalent. Most of the time these documents are missing from the classic records schedules and they cannot be brought under control just by putting them in a folder structure on shared server disks or a RMA. The information system inventory of the city of Antwerp is therefore primarily meant for ad hoc developed information systems which automate (whole parts) of the workprocess.

The choice for an information system approach or an approach from record categories, has consequences for the further usefulness of the information system inventory. In closing, it's possible to let the followed classification depend upon the actual (record-keeping) needs of the organisation, the goals set for the information system inventory and the relationship towards the records schedule.

5.2 Getting started and keeping up-to-date

The maintenance of an information system inventory serves a greater purpose than just record-keeping. The whole organisation (f.i. administration, IT-staff) benefits from starting and maintaining an information system inventory. In this sense, the maintenance of such an inventory becomes the responsibility for the entire organisation and not just for the records manager or archivist alone. Although, you can expect from the archivist that he will play a determining part in the composition and the management of the inventory. He will have to decide, among other things, which metadata fields have to be recorded in the information system

¹¹ VS: Regulations: 36 CFR Part 1222.

¹² Art. 3 van de *Regeling geordende en toegankelijke staat*. In the department of Zeeland, every head of department needs to supervise the designing of an inventory in which the information files are described and linked to their tasks and workprocesses. (art.12).

¹³ F. BOUDREZ, *Het digitaal archiveringssysteem: beheersinventaris, informatielagen en beslissingsmodel als uitgangspunt*, Antwerpen, 2001.

inventory. The agencies - if necessary in co-operation with the IT services - are better placed for the day to day upkeeping of the inventory.

It goes without saying that keeping an informationsystem inventory up to date, needs continual succession and it's not sufficient to fill out the necessary metadata at the moment of development of a new informationsystem. Describing electronic records is an incremental process which implicates a growth in the number of descriptions of records. This needs to be anticipated in the informationsystem inventory. The usability of the informationsystem inventory will naturally depend on the way the information is kept up to date. Having a procedure for this is no luxury, because a number of important management decisions, such as the identification of records, researching the archival value and the choice of archival strategies, is based on the content of the informationsystem inventory.

When developing an informationsystem inventory, one needs to take in account that this is a dynamical instrument and that several parties need access to its data. It depends on the goals, the organisation of the archive management and the extend of the organisation whether you should keep the inventory centralised or decentralised, in regular textfiles, databases or in an intranet application. The form in which the informationsystem inventory is ultimately kept, isn't all that important. The informationsystem inventory of the city of Antwerp is an intranet application in which the metadata is filled-in through a webinterface and the input stored in an SQL-database. This informationsystem inventory is used for archiving purposes and for the overwhole IT management of the city. At the moment of archiving, an export module generates an XML-document which is preserved together with the electronic records.

5.3 Example datamodel for a informationsystem inventory.

IDENTIFICATION AND LOCALIZATION

Name of the informationsystem	<i>Meaning and abbreviation</i>
Storageplace	<i>Where are the documents stored? (centrally, decentrally, server, mainframe)?</i>
Used storagemedia	<i>Hard disks? Magnetical media? Optical media? (type+filesystem)</i>
IT-staff	<i>Contact information of the responsables</i>

CONTEXT OF CREATION

Creator	<i>Organisation, agency</i>
Creators' function	<i>What is the overall function of the creator?</i>
Workprocess	<i>In the practise of which tasks and activities is the informationsystem used?</i>
Informationsystem functionalities	<i>Most important functions (such as dynamical components) for which the informationsystem is being used.</i>
History:	
- Predecessor	<i>Informationsystem that has been replaced by this one</i>
- Versions	<i>For each version: date of introduction, date of replacement or run down, changes.</i>
- Successor	<i>Informationsystem that replace this system</i>
Date of electronic documents	<i>Electronic documents relate to which time period</i>
Publicity	<i>Public or restrictions to the use and access</i>
Input: dependibility of external sources	<i>Is information from other informationsystems being incorporated? Which? Dynamic links with</i>

Output: generated documents	<i>other informationsystems?</i> <i>Documents that are being received or created within the informationsystems.</i>
Related documents	<i>Paper and electronic documents who are related to documents within the informationsystem.</i>

ARCHIVAL VALUE

Archival value	<i>Do these electronic documents have archival value?</i>
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TECHNICAL CONTEXT

Computerplatform	
– Hardware	<i>Description of essential hardware components</i>
– Software:	
<input type="checkbox"/> operating system (+ version)	<i>Operating system of the informationsystem</i>
<input type="checkbox"/> applications (+ versions)	<i>Which software components make up the information system?</i>
<input type="checkbox"/> fileformats (+ versions)	<i>The electronic documents are saved in which fileformat?</i>
<input type="checkbox"/> compression	<i>Which compression algorithms were used for the storage of data?</i>
<input type="checkbox"/> encoding	<i>For textual documents: which character set was used?</i>
Volume of electronic documents	<i>Which is the file dimension of electronic documents in the data system.</i>
Annual growth	<i>Which is the annual growth in mega-, giga- or terabytes?</i>

CONTEXT OF MAINTENANCE

Reliability guarantees	<i>Which provisions guarantee the reliability of the documents?</i>
Migrations	<i>How were the documents migrated to the present format in the past?</i>
Record-keeping actions	<i>Which record-keeping actions were undertaken in the past? For which time period were data archived?</i> <i>How were these documents archived?</i>
Removal	<i>Which documents were removed (+date) from the informationsystem?</i>

6. Conclusion

A well managed informationsystem inventory can contribute a great deal to the intellectual control of electronic records. The informationsystem inventory in its primary form (level 1) responds to a number of tangible needs with regards to the information management and document management of an organisation, such as refinding electronic records and documenting electronic information systems. But the informationsystem inventory can also be used for more fundamental record-keeping problems. The inventory of informationsystems can serve as the basis for an actionplan concerning electronic record-keeping. The informationsystem inventory enables identification of records and appraisal (level 2) and allows the describing of contextual data concerning technology and maintenance (level 3). The organisation knows which electronic documents have a longer life span than their information system so the necessary steps for migration can be taken in due time. Without context there can be no functional, accessible and reliable records. Describing and recording explicitly the context of electronic records is an important part of the intellectual management of records. Because of the absence of a physical unity when dealing with electronic records, the importance of intellectual management as cement between the several different components of electronic records, has grown. With the use of the informationsystem inventory, the record-keeping system for electronic documents can be partly installed and the development of the electronic archive can be controlled. However, this doesn't mean that the archive is fully under control. Therefore other, clear-cut procedures are needed, including the implementation of transfers and liquidations, durable and reliable record-keeping and the accessibility of the electronic archives.