

Organizational Records Systems

An Alternative View to (Enterprise) Information Systems

Sherry Li Xie^{1,2,3} and Guanyan (Amelie) Fan^{2,3}

¹Key Laboratory of Data Engineering and Knowledge Engineering,
Ministry of Education of China, Beijing, China

²Center for Electronic Records Management Research, Beijing, China

³School of Information Resource Management, Renmin University of China,
59 Zhonguancun Ave, Haidian District, Beijing, 100872, China

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Abstract: The field of Information Systems (ISs) has been around since the 1960s (Hirschheim and Kleinand, 2011) and the notion of Enterprise Information Systems has been fully acknowledged for close to 30 years (Xu, 2007). Long existing in organizations or enterprises is also the field of records management, now predominantly, digital records management, which shares the many goals of the fields of ISs and EIS in terms of supporting enterprise operations and advancements. The DRM field recognized rather early in its battle to combat digital records challenges that the need to work closely with the ICT profession for devising information system functional requirements and for developing long term preservation strategies for valuable digital records. It is still rare, however, to spot discussions regarding the relationships among the fields in the ICT literature today. It is the intention of this communication piece to introduce one of the major developments of the international DRM field, i.e., the Chain of Preservation model, in particular the types of records systems that it encompasses, to the ISs and EIS professions, for the purpose of invoking further discussions and future collaborations.

1 INTRODUCTION

While lacking a universally agreed definition, information systems (ISs) can be generally understood as the utilization of information and communication technologies (ICT) to support organizations in achieving their business goals (Xie, 2015). To promote efficiency and effectiveness thus comes naturally with business cases that introduce ISs into organizations. ISs designed for supporting back-office business functions such as accounting, finance management and human resource management as well as ISs designed for supporting customer- or supplier-facing business functions such as customer relationship management, supply chain management, sales, and marketing etc. are typical examples in the development history of ISs. Similar to ISs, the phrase enterprise information systems (EIS) does not appear to be defined with consensus, and interpretations in the ICT field vary. For example, in the editorial of the inaugural issue of the Enterprise Information Systems journal, EIS was introduced as the equivalent to Enterprise Resource Planning (ERP) (Xu, 2007), yet

in Enterprise Information Systems and Implementing IT Infrastructures: Challenges and Issues, EIS “comprises of information systems such as enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM) and e-commerce” (Parthasarathy, 2010). Nonetheless, EIS is generally seen as, with reference to the ineffectiveness and even failures of the earlier ISs implementations, the more logical and intelligent response to organizations’ needs, in particular against the context of the increasingly complex global environment and integrative nature of business operations. Like the ISs/EIS situation, the concepts of knowledge and information lack universally accepted definitions, yet there are approaches that tend to focus only on their similar characteristics. For example, Gartner defines “information” and “knowledge assets” in almost identical way, as “Information relevant to an enterprise’s business function, including the captured and tacit knowledge of employees, customers or business partners; data and information stored in structured databases; data and information stored in textual form and unstructured databases (e.g.,

e-mail and workflow systems); information stored in digital and paper documents; purchased content; and public content from the Internet or other sources". This paper, therefore, takes this general stance to treat information and knowledge assets as synonym's for discussion purposes.

The most basic promises of EIS lies with integration, be it business process integration, system integration, data/information integration, or all of the above. With integration, organizations can function as a whole: business processes can be streamlined, information silos can be bridged, and data integrity can be better ensured. As a result, wastes of ICT investment can be largely reduced (if not entirely avoided), employee resistance to new technologies can be minimized, and information can be available in real or near real time and be shared as needed irrespective of boundaries of business units and/or organisations. Ultimately, enterprises can be leaner, more agile and responsive, more efficient and effective ... all qualities desired for business sustainability and stronger competitive advantages, and all goals of EIS implementations.

The field of organizational digital records management (DRM) shares the same goals. DRM is the branch of records management (RM) that focuses specifically on the impact that was brought by digital technologies, i.e., ICT, to the characteristics of records and their management. RM traditionally addresses the creation, maintenance, use, and preservation of records in analog format – mostly paper based, where records are “documents created (made or received) in the process of conducting practical activities and set aside for future action or reference” (UBC Project, 1995; InterPARES Project, 2001) or “information created, received, and maintained as evidence and information by an organization or person in pursuance of legal obligation or in the transaction of business” (ISO 15489-1, 2001). It is rather clear that these two definitions – both influential in the international records community – cannot be viewed as the same and some of the differences are indeed fundamental. Nevertheless, the cores of the two definitions speak both to the same silent characteristic of records, i.e., their inseparable linkage to human activities – be it individual or organizational. This suffices the need of this paper, which will then bypass the discussions on the discrepancies of these definitions as they are not directly relevant to the intention of this paper. The branch of DRM, having so far accumulated for more than 40 years' research and practices, generally acknowledges that ICT, while changes dramatically the format and presentation of digital records, does

not change their nature (Duranti, 2001; Xie, 2012). Like traditional records, digital records participate in all of the organizations' business activities, facilitate the completion of transactions and decision making, and ensure both internal and external regulatory compliances. As the definition of record in the context of the United States Federal Government (2008) has demonstrated, digital records are simply another type of records (*emphasis added*):

§3301. Definition of records

(a) RECORDS DEFINED.—

(1) IN GENERAL.—As used in this chapter, the term “records”—

(A) includes all recorded information, regardless of form or characteristics, made or received by a Federal agency under Federal law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the United States Government or because of the informational value of data in them;

(2) RECORDED INFORMATION DEFINED.— For purposes of paragraph (1), the term ‘recorded’ information includes all traditional forms of records, regardless of physical form or characteristics, including information created, manipulated, communicated, or stored *in digital or electronic form*.

This paper, working with the understanding that both ISs/EIS and DRM exist to serve the business needs of organizations, introduces the records systems developed by the International Research on Permanent and Authentic Records in Electronic Systems (InterPARES) project, with the intention to communicate with the ICT peers of the DRM profession for the purposes of further discussion and future collaboration.

2 THE InterPARES PROJECT

The InterPARES project consists of four phases, i.e., InterPARES I - III and the InterPARES Trust (2013-2018). The first phase of the project was initiated in 2001 as a logical extension to the UBC Project 1995 - 1997, entitled Preservation of the Integrity of Electronic records, which was one of the first academic research projects world-wide that focused on the challenges and issues associated with digital (then electronic) records. From 1995 to 2012, the

projects, with hundreds of researchers and graduate research assistants, had investigated a variety of research topics in a broad realm of domains, including, for example, digital arts, electronic government, and electronic science, against the technological backdrop of databases, document management system, electronic records management systems (or records management applications as used in the DoD5015.02-STD), and dynamic, interactive and experiential systems that heavily rely on network technologies. The DoD5015.02-STD, entitled “Electronic Records Management Software Applications Design Criteria Standard” (most recent edition issued on April 25, 2007), was a joint production of the UBC project and the United States Department of Defense Records Management Task Force. By nature, such electronic records management software applications are ISs, and they provide ICT functionalities to facilitate organizations’ conduct of activities regarding electronic records management. This type of ISs, however, was designed to typically manage unstructured digital records such as those created using the Microsoft Office Suite. The InterPARES project extended its investigations into the other types of ISs in organizations, and as a result, developed the organization/enterprise-wide understanding of ISs and captured it in one of its major products, i.e., the Chain of Preservation (COP) model.

3 THE COP MODEL

The name of the COP model points to the ultimate objective of the InterPARES project, i.e., to ensure long-term or permanent preservation and accessibility of digital records – a representative reflection of the mission of the records community (InterPARES 2, 2008). For the records community, this model serves both the professionals of the fields of RM and archival administration (AA) in that both work with the same materials, i.e., records, and the latter requires the former as managerial foundation. Together, these two professions complete the lifecycle management of records, with RM disposing of, at any given time, records that are no longer needed and AA providing custody and assess to significant records that require long-term or permanent preservation, upon transferring from RM. Specifically, the COP model presents the lifecycle management in three types of systems: record-making system, recordkeeping system, and records preservation system.

3.1 Record-making System

The InterPARES project defines record-making system as “a set of rules governing the making of records, and the tools and mechanisms used to implement these rules”, where record-making encompasses “the whole of the principles, policies, rules and strategies that controls the process of creating records from made or received documents”. The concept of document, by the development of the InterPARES project with regard to the digital environment, covers static and dynamic/interactive ones, and when satisfying the requirements for being records, become digital records (Duranti and Thibodeau, 2006; Xie, 2012). In the COP model, these concepts are depicted by activities and sub-activities. Activity number 2, i.e., A.2, is termed as Manage Records in a Record-Making System (Figure 1), which consists of three sub-activities, A2.1 Monitor Performance of Record-Making System, A2.2 Manage Making & Receipt of Records (Figure 2), and A2.3 Manage Setting Aside of Completed Records (Figure 3). A2.2 and A2.3 each contain their own sub-activities, e.g., A2.2.1 Make Documents and A2.3.1 Monitor Performance of Record-making Transfer System. Activities and sub-activities are associated with content inputs and outputs and are indicated by arrows. For example, Information About Kept Records for Creation serves as input for A2.2.1 Make Documents, which produces outputs Made Documents and Information About Made Documents’ Context. Made Documents then serves as input for A2.2.2 Capture Documents and Information About Made Documents’ Context serves as input for A2.2.3 Identify Documents. See figures and activity definitions below (the COP model developed also definitions for all content inputs and outputs, which are omitted in this paper as most of the information

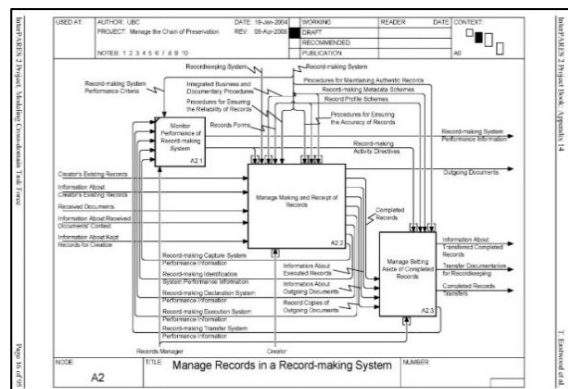


Figure 1: Manage Records in a Record-Making System.

relevant to the purpose of this paper is covered already in the activity definitions).

A2 Manage Records in a Record-making System refers to the provision of overall control and co-ordination of activities in the record-making system, including the creation and setting aside of records, and monitoring of the performance of the record-making system. Its three sub-activities are defined with the following meanings, where the term creator (in A2.2) refers to the records-creating organization:

- A2.1 Monitor Performance of Record-making System: To assess the efficacy of the performance of the record-making system by analyzing performance reports on the operation of each of the record-making system's sub-systems and issue activity directives for record-making activities and information on the performance of the record-making system for use in continued maintenance of the chain of preservation framework.
- A2.2 Manage Making and Receipt of Records: To provide overall control and co-ordination of document and record making and receipt activities, including the capture and identification of documents made or received by the creator and their subsequent declaration and execution as records.
- A2.3 Manage Setting Aside of Completed Records: To provide overall control and co-ordination of the transfer of executed or completed records to the recordkeeping system by preparing the records for transfer, transferring the records and monitoring the performance of the record-making transfer system.

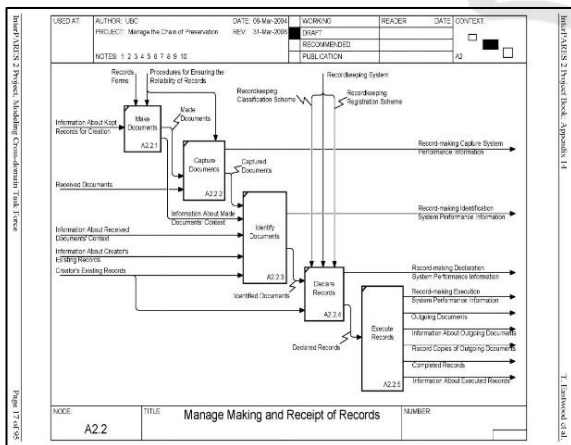


Figure 2: Manage Making and Receipt of Records.

The five sub-activities of A2.2 are defined with the following meanings:

- A2.2.1 Make Documents: To compile digital information in a syntactic manner in accordance with

the specifications of the creator's documentary forms, integrated business and documentary procedures and record-making access privileges.

- A2.2.2 Capture Documents: To record and save (i.e., affix to a digital medium in a stable syntactic manner) particular instantiations of incoming external documents or internal documents made by the creator in the record-making system in accordance with the specifications of the creator's integrated business and documentary procedures and record-making access privileges.
- A2.2.3 Identify Documents: To attach to each document identity metadata that convey the action in which the document participates and its immediate context.
- A2.2.4 Declare Records: To intellectually set aside records by assigning classification codes from the classification scheme to made or received documents and adding these codes to the identifying metadata and by assigning to the documents registration numbers based on the registration scheme, and adding these numbers to the identifying metadata.
- A2.2.5 Execute Records: To attach to each record metadata that convey information related to, and actions taken during the course of, the formal execution phase of the administrative procedure in which the record participates, which may also involve transmitting documents to external physical or juridical persons and making record copies of the sent documents.

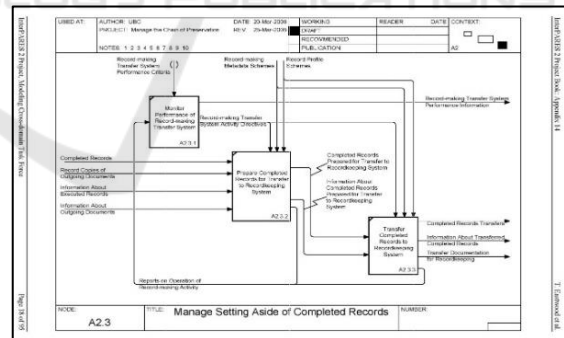


Figure 3: Manage Setting Aside of Completed Records.

The three sub-activities of A2.3 are defined with the following meanings:

- A2.3.1 Monitor Performance of Record-making Transfer System: To assess the efficacy of the performance of the record-making transfer system by analyzing reports on the operation of record-making activities, and issue activity directives for transfer activities and issue information on the performance of the record-making transfer system for use in continued maintenance of the record-making system.

- A2.3.2 Prepare Completed Records for Transfer to Recordkeeping System: To attach to completed records integrity and related metadata that convey information related to, and actions taken during the course of, managing the records for records management purposes prior to setting them aside in the recordkeeping system; compile information about the records that is needed to meet all transfer information requirements; and ensure that the records are in the proper format for transfer to the recordkeeping system as prescribed by recordkeeping system rules and procedures and technological requirements.
- A2.3.3 Transfer Completed Records to Recordkeeping System: To send or transmit completed records prepared for transfer to the office responsible for the recordkeeping function with the accompanying documentation necessary for recordkeeping.

3.2 Record-keeping System

Record-keeping system refers to the set of rules governing the storage, use, maintenance and disposition of records and/or information about records, and the tools and mechanisms used to implement these rules, and record-keeping encompasses the whole of the principles, policies, rules and strategies employed by the creator that establishes and maintains administrative, intellectual and physical control on its records. Figure 4 depicts activity number 3, i.e., A3 Manage Records in a Recordkeeping System, referring to the provision of overall control and co-ordination of activities in the recordkeeping system, including records storage, retrieval and access, disposition, and monitoring of the performance of the recordkeeping system.

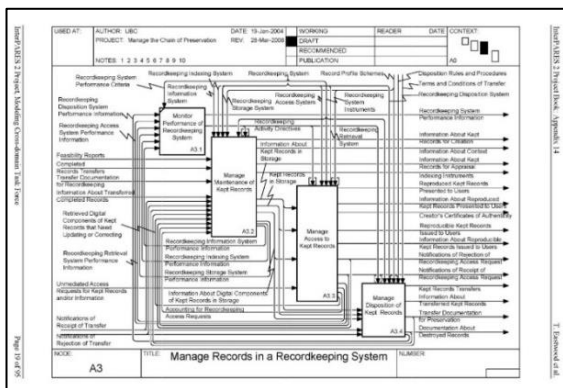


Figure 4: Manage Records in a Recordkeeping System.

The four sub-activities are defined with the following meanings:

- A3.1 Monitor Performance of Recordkeeping System: To assess the efficacy of the performance of the recordkeeping system by analyzing performance reports on the operation of recordkeeping sub-system activities, and issue activity directives for recordkeeping activities and information on the performance of the recordkeeping system for use in continued maintenance of the chain of preservation framework.
- A3.2 Manage Maintenance of Kept Records: To provide overall control and co-ordination of the recordkeeping storage system and the records stored in the system by managing information about kept records and their digital components, placing the records in storage, maintaining the digital components and monitoring the performance of the storage system.
- A3.3 Manage Access to Kept Records: To facilitate discovery of, and manage requests for, kept records and/or information about kept records, and monitor the performance of the recordkeeping access system.
- A3.4 Manage Disposition of Kept Records: To provide overall control and co-ordination of records disposition activities, including monitoring the performance of the disposition system, processing disposition information and, in accordance with disposition activity directives and disposition rules and procedures, destroying kept records and/or preparing and transferring kept records to the designated preserver.

Figure 5 depicts the sub-activities of A3.2:

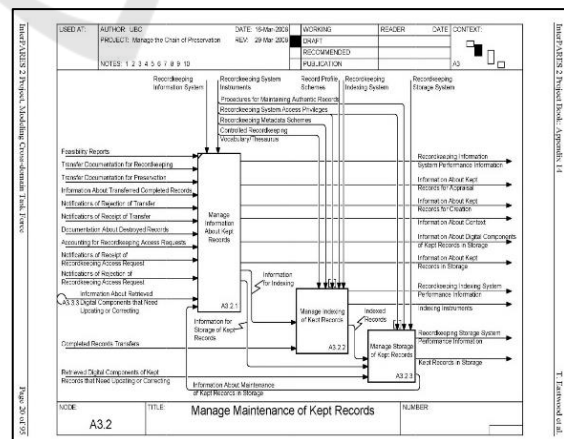


Figure 5: Manage Maintenance of Kept Records.

- A3.2.1 Manage Information About Kept Records: To compile information about records in the

recordkeeping system and about records maintenance activities and to provide overall control and co-ordination of that information for use in records appraisal activities by the preserver and in records indexing, storage, access and disposition activities by the creator.

- A3.2.2 Manage Indexing of Kept Records: To provide overall control and co-ordination of records indexing activities, including monitoring the indexing system, indexing kept records and developing indexing instruments to help facilitate records discovery and retrieval (A3.2.2 contains its own 3 sub-activities: A3.2.2.1 Monitor Performance of Recordkeeping Indexing System, A3.2.2.2 Index Kept Records, and A3.2.2.3 Develop Indexing Instruments. Definitions for sub-activities listed in brackets such as those listed here and those appearing in subsequent sections in the same manner are all omitted).
- A3.2.3 Manage Storage of Kept Records: To provide overall control and co-ordination of the recordkeeping storage system and the records stored in the system by placing the records in storage, maintaining their digital components and monitoring the performance of the storage system (A3.2.3 contains its own 3 sub-activities: A3.2.3.1 Monitor Performance of Recordkeeping Storage, A3.2.3.2 Place Kept Records in Storage, and A3.2.3.3 Maintain Records in Recordkeeping Storage System, and A3.2.3.3 contains its own 5 sub-activities: A3.2.3.3.1 Monitor Kept Records in Storage, A3.2.3.3.2 Back-up Recordkeeping Storage System, A3.2.3.3.3 Correct Problems with Kept Records in Storage, A3.2.3.3.4 Update Kept Records in Storage, and A3.2.3.3.5 Refresh Media for Kept Records in Storage. Their definitions are omitted).

Figure 6 depicts the sub-activities of A3.3:

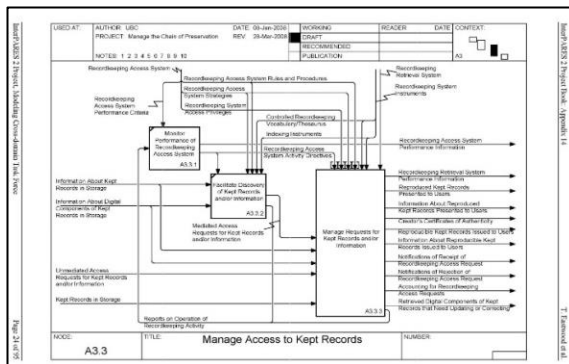


Figure 6: Manage Access to Kept Records.

- A3.3.1 Monitor Performance of Recordkeeping Access System: To assess the efficacy of the

performance of the recordkeeping access system by analyzing reports on the operation of recordkeeping activities, and issue activity directives for access activities and information on the performance of the recordkeeping access system for use in continued maintenance of the recordkeeping system.

- A3.3.2 Facilitate Discovery of Kept Records and/or Information: To provide authorized internal and external users access to, and assistance in the use of, the tools and resources necessary to support querying and searching for, and discovery of, information, records and/or records aggregates in the recordkeeping system suited to a particular inquiry or purpose.
- A3.3.3 Manage Requests for Kept Records and/or Information: To provide overall control and co-ordination of internal and external requests for access to records and/or information about kept records by processing access requests, retrieving digital components for requested records and/or information, verifying retrieved components and information and providing access to retrieved records and/or information (A3.3.3 contains its own 4 sub-activities: A3.3.3.1 Process Requests for Kept Records and/or Information, A3.3.3.2 Retrieve Requested Kept Records and/or Information, A3.3.3.3 Verify Retrieved Kept Records and/or Information, and A3.3.3.4 Provide Access to Retrieved Kept Records and/or Information. A3.3.3.1 and A3.3.3.4 each contains 4 and 3 sub-activities, respectively: A3.3.3.1.1 Register Recordkeeping Access Requests, A3.3.3.1.2 Retrieve Information to Process Recordkeeping Access Requests, A3.3.3.1.3 Generate Recordkeeping Retrieval Requests, and A3.3.3.1.4 Generate Recordkeeping Requests Specifications, and A3.3.3.4.1 Reconstitute Kept Records and/or information, A3.3.3.4.2 Manifest Kept Records and/or, and A3.3.3.4.3 Package Kept Records and/or Information for Output. Their definitions are omitted).

Figure 7 depicts the sub-activities of A3.4:

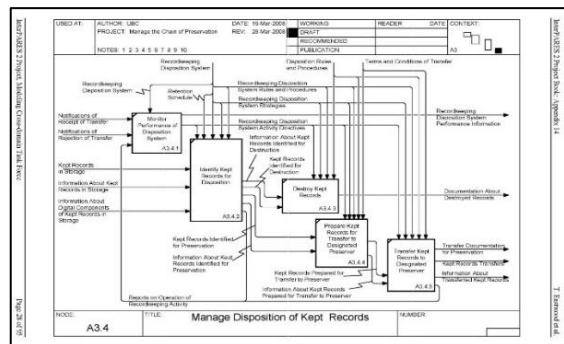


Figure 7: Manage Disposition of Kept Records.

- A3.4.1 Monitor Performance of Disposition System: To assess the efficacy of the performance of the recordkeeping disposition system by analyzing reports on the operation of recordkeeping activities, and issue activity directives for disposition activities and information on the performance of the recordkeeping storage system for use in continued maintenance of the recordkeeping system.
- A3.4.2 Identify Kept Records for Disposition: To identify records and information about records in the recordkeeping system earmarked either for destruction or transfer to the designated preserver, as determined by the creator's retention schedule.
- A3.4.3 Destroy Kept Records: To obliterate kept records, and information related to the records, identified for destruction and provide documentation about the records destroyed.
- A3.4.4 Prepare Kept Records for Transfer to Designated Preserver: To attach to kept records integrity and related metadata about actions taken during the course of preparing the records for transfer to the designated preserver in accordance with the terms and conditions of transfer, and compile information about the records that is needed to meet all transfer information requirements.
- A3.4.5 Transfer Kept Records to Designated Preserver: To send or transmit kept records prepared for transfer to permanent preserver (or, as applicable, the office of the creator responsible for the permanent preservation function) with the accompanying documentation necessary for permanent preservation.

3.3 Records Preservation System

Records preservation system refers to the set of rules governing the permanent intellectual and physical maintenance of acquired records and the tools and mechanisms used to implement these rules, and records preservation encompasses the whole of the principles, policies, rules and strategies that controls the physical and technological stabilization and protection of the intellectual form of acquired records intended for their continuing, enduring, stable, lasting, uninterrupted and unbroken chain of preservation, without a foreseeable end. Figure 8 depicts the sub-activities of A4 Manage Records in a Permanent Preservation System, referring to the provision of overall control and co-ordination of activities in the permanent preservation system, including records appraisal and selection, acquisition, description, storage, retrieval and access, and monitoring of the performance of the permanent preservation system. The five sub-activities are defined as follows:

- A4.1 Monitor Performance of Permanent Preservation System: To assess the efficacy of the performance of the permanent preservation system by analyzing performance reports on the operation of permanent preservation sub-system activities, and issue activity directives for preservation activities and information on the performance of the permanent preservation system for use in continued maintenance of the chain of preservation framework.

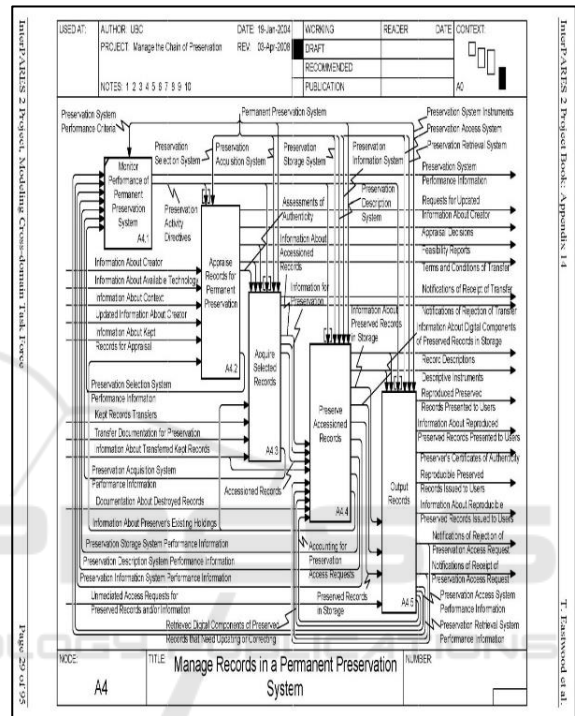


Figure 8: Manage Records in a Permanent Preservation System.

- A4.2 Appraise Records for Permanent Preservation: To make appraisal decisions by compiling information about kept records and their context, assessing their value, and determining the feasibility of their preservation; and to monitor appraised records and appraisal decisions to identify any necessary changes to appraisal decisions over time.
- A4.3 Acquire Selected Records: To bring records selected for permanent preservation into the custody of the preserver by registering and verifying transfers, confirming the feasibility of preservation, and accessioning the records or rejecting transfers if they are inadequate.
- A4.4 Preserve Accessioned Records: To manage information about, and the description and storage of, records acquired for permanent preservation.

- A4.5 Output Records: To facilitate discovery of records and/or information about records in the permanent preservation system, manage requests for preserved records and/or information about the records and monitor the performance of the permanent preservation access system.

Figure 9 depicts the sub-activities of A4.2:

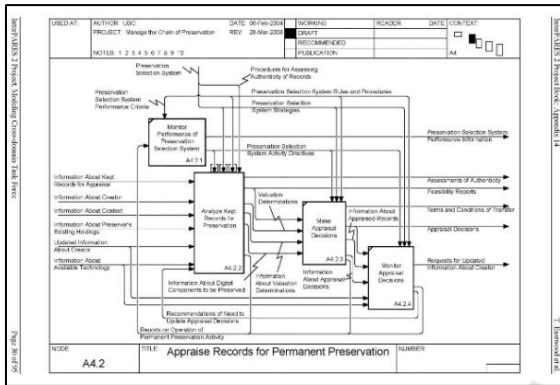


Figure 9: Appraise Records for Permanent Preservation.

- A4.2.1 Monitor Performance of Preservation Selection System: To assess the efficacy of the performance of the permanent preservation selection system by analyzing reports on the operation of preservation activities, and issue activity directives for selection activities and information on the performance of the permanent preservation selection system for use in continued maintenance of the permanent preservation system.
- A4.2.2 Analyze Kept Records for Preservation: To assess information concerning the kept records being appraised, including their contexts, value and preservation feasibility (A4.2.2 contains its own 3 sub-activities: A4.2.2.1 Analyze Information About Records, A4.2.2.2 Assess Value of Records, and A4.2.2.3 Determine Feasibility of Preservation. Both A4.2.2.2 and A4.2.2.3 contain 3 sub-activities, respectively. For A4.2.2.2, they are: A4.2.2.2.1 Assess Continuing Value of Records, A4.2.2.2.2 Assess Authenticity of Records, and A4.2.2.2.3 Determine Value of Records. A4.2.2.2.2 contains its 3 sub-activities: A4.2.2.2.2.1 Compile Evidence Supporting the Presumption of Authenticity, A4.2.2.2.2.2 Measure Evidence Against Requirements For Authentic Records, and A4.2.2.2.2.3 Verify Authenticity. For A4.2.2.3, they are: A4.2.2.3.1 Determine Record Elements to be Preserved, A4.2.2.3.2 Identify Digital Components to be Preserved, and A4.2.2.3.3 Reconcile Preservation Requirements with Preservation Capabilities.

- A4.2.3 Make Appraisal Decisions: To decide on and document the retention and disposition of records based on valuation and feasibility information, and to agree on and document the terms and conditions of transfer of the records to the preserver.
- A4.2.4 Monitor Appraisal Decisions: To keep track of appraisal decisions in relation to subsequent developments within the creator's and/or preserver's activities that might make it necessary to adjust or redo an appraisal, such as substantial changes to: (1) appraised records and/or their context, (2) the creator's organizational mandate and responsibilities, (3) the creator's record-making or recordkeeping activities or systems, (4) the preserver's records preservation activities or systems and/or (5) the preserver's organizational mandate and responsibilities.

Figure 10 depicts the sub-activities of A4.3:

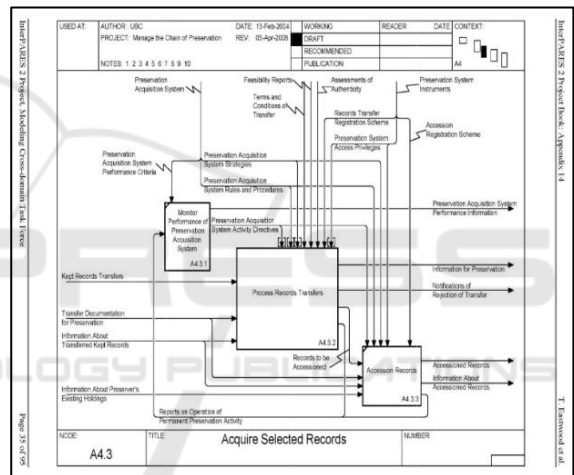


Figure 10: Acquire Selected Records.

- A4.3.1 Monitor Performance of Preservation Acquisition System: To assess the efficacy of the performance of the permanent preservation acquisition system by analyzing reports on the operation of preservation activities, and issue activity directives for acquisition activities and information on the performance of the permanent preservation selection system for use in continued maintenance of the permanent preservation system.
- A4.3.2 Process Records Transfers: To register records transfers received by the designated preserver, confirm the authorization for the transfers, verify their content, confirm the authenticity of the records in the transfers and confirm the feasibility of preserving the transferred records (A4.3.2 contains 5 sub-activities: A4.3.2.1 Register Transfers, A4.3.2.2 Confirm Authorization for Transfers, A4.3.2.3 Verify

Content of Transfers, A4.3.2.4 Confirm Authenticity of Records, and A4.3.2.5 Confirm Feasibility of Preservation.

- A4.3.3 Accession Records: To formally accept records selected for permanent preservation into custody and document transfers in accessions documentation.

Figure 11 depicts the sub-activities of A4.4:

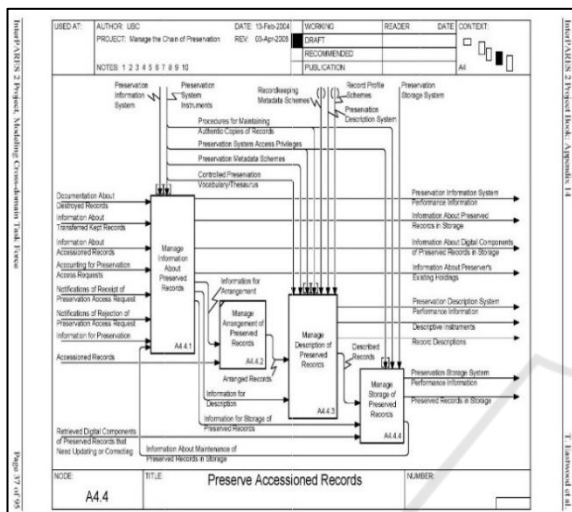


Figure 11: Preserve Accessioned Records.

- A4.4.1 Manage Information About Preserved Records: To compile information about records in the permanent preservation system and about records preservation activities and to provide overall control and co-ordination of that information for use in records selection, acquisition, description, storage and access activities (A4.4.1 contains 3 sub-activities: A4.4.1.1 Monitor Performance of Preservation Information System, A4.4.1.2 Compile Information for Preservation, and A4.4.1.3 Update Information on Preservation Actions).
- A4.4.2 Manage Arrangement of Preserved Records: To provide overall control and co-ordination of records arrangement activities.
- A4.4.3 Manage Description of Preserved Records: To provide overall control and co-ordination of records description activities, including monitoring the preservation description system, describing preserved records and developing description instruments (A4.4.3 contains 3 sub-activities: A4.4.3.1 Monitor Performance of Preservation Description System, A4.4.3.2 Describe Preserved Records, and A4.4.3.3 Develop Description Instruments).
- A4.4.4 Manage Storage of Preserved Records: To provide overall control and co-ordination of the

permanent preservation storage system and the records stored in the system by placing the records in storage, maintaining their digital components and monitoring the performance of the storage system (A4.4.4 contains 3 sub-activities: A4.4.4.1 Monitor Performance of Permanent Preservation Storage System, A4.4.4.2 Place Preserved Records in Storage, and A4.4.4.3 Maintain Records in Permanent Preservation Storage System. A4.4.4.3 contains 5 sub-activities, A4.4.4.3.1 Monitor Preserved Records in Storage, A4.4.4.3.2 Back-up Preservation Storage System, A4.4.4.3.3 Correct Problems with Preserved Records in Storage, A4.4.4.3.4 Update Preserved Records in Storage, and A4.4.4.3.5 Refresh Media for Preserved Records in Storage.

Figure 12 depicts the sub-activities of A4.5:

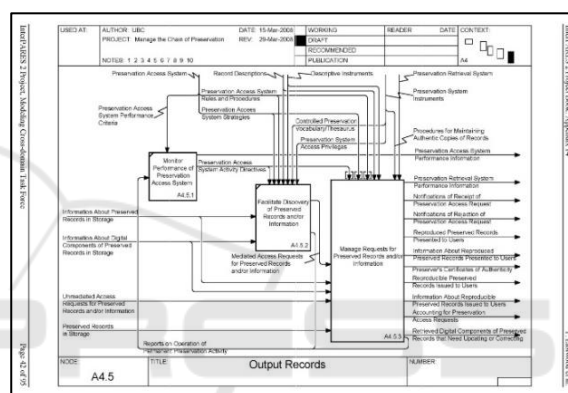


Figure 12: Output Records.

- A4.5.1 Monitor Performance of Preservation Access System: To assess the efficacy of the performance of the permanent preservation access system by analyzing reports on the operation of preservation activities, and issue activity directives for access activities and information on the performance of the permanent preservation access system for use in continued maintenance of the permanent preservation system.
- A4.5.2 Facilitate Discovery of Preserved Records and/or Information: To provide authorized internal and external users with mediated access to and, as necessary, assistance in the use of, the tools and resources needed to support querying and searching for information, records and/or records aggregates in the permanent preservation system.
- A4.5.3 Manage Requests for Preserved Records and/or Information: To provide overall control and co-ordination of internal and external requests for access to preserved records and/or information about the records by processing access requests, retrieving digital components for requested records and/or

information, verifying retrieved components and information and providing access to retrieved records and/or information (A4.5.3 contains 4 sub-activities: A4.5.3.1 Process Requests for Preserved Records and/or Information, A4.5.3.2 Retrieve Requested Preserved Records and/or Information, A4.5.3.3 Verify Retrieved Preserved Records and/or Information, and A4.5.3.4 Provide Access to Retrieved Preserved Records and/or Information. A4.5.3.1 contains 4 sub-activities: A4.5.3.1.1 Register Preservation Access Requests, A4.5.3.1.2 Retrieve Information to Process Preservation Access Requests, A4.5.3.1.3 Generate Preservation Retrieval Requests, and A4.5.3.1.4 Generate Preservation Requests Specifications. A4.5.3.4. contains 3 sub-activities: A4.5.3.4.1 Reconstitute Preserved Records and/or Information: A4.5.3.4.2 Manifest Preserved Records and/or Information, A4.5.3.4.3 Package Preserved Records and/or Information for Output.

4 CONCLUSION

From the above illustration, it can be concluded that ISs and EISs are record-keeping systems in the eyes of the digital records management profession. By a limited research on the functionalities of the current representative ISs and EISs, it appears that these systems do not possess the functionalities of those as described in the recordkeeping system and the records preservation system. It is not unusual for a digital records management system to be implemented in enterprises, such as those certified by the DoD5015.2-STD or the MoReq2010 Specification, to manage their unstructured digital records, transaction-oriented ISs and certainly EISs, however, are normally left out the control of organizational DRM program – an issue that may not be readily acknowledged by the ISs and EIS fields. ISs and EISs are designed to streamline the conduct of business activities, are expected to offer speed and convenience, and are equipped with standard features of control and security; they are, therefore, for current operation and immediate usage, sufficient. What is missing in these systems is the requirement of systematic and consistent management of organizational information in the form of records, one that takes the stance of the enterprise as a whole, aiming to ensure the accessibility and trustworthiness of digital records for not only as long as the enterprise exists, but also for as long as society needs them.

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REFERENCES

- Duranti, L., 2001. Concepts and Principles for the Management of Electronic Records, *The Information Society. An International Journal*, 17 : 1-9.
- Duranti, L., Thibodeau, K., 2006. The Concept of Record in Interactive, Experiential and Dynamic Environments: the View of InterPARES, *Archival Science* 6, 1 : 13-68.
- InterPARES. 2001. Terminology Database. http://www.interpares.org/ip2/ip2_terminology_db.cfm
- InterPARES 2, 2008. Experiential, Interactive and Dynamic Records. <http://www.interpares.org/ip2/book.cfm>.
- ISO 15489-1, 2001. Information and documentation – Records management. Part 1: General.
- NARA, 2008. Basic Laws and Authorities, <http://www.archives.gov/about/laws/#disrec>
- Parthasarathy, S., 2010, *Enterprise Information Systems and Implementing IT Infrastructures: Challenges and Issues*. Business science reference. Hershey, New York.
- Xie, S. L. 2012. Preserving Digital Records: InterPARES Findings and Developments in Records and Information Management for Financial Analysis and Risk Management, Victoria L. Lemieux, ed. Springer: 187-206.
- Xie, S. L., 2012. The Concept of Record and Its Evolution in Digital Environments: The InterPARES Perspective, *The Journal of Archival Science*, 3: 46-51.
- Xie, S. L., 2015. Co-Design of Information Systems with Digital Records Management A Proposal for Research in Fred, A. et al., ed. Proceedings of the 7th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management. IC3K 2015 Volume 3: KMIS: 222-228.
- Xu, X., 2007. Editorial: Inaugural issue, *Enterprise Information Systems*, 1:1, 1-2, DOI: 10.1080/17517570712331393320
- UBC Project, 1995. The Preservation of the Integrity of Electronic Records. <http://www.interpares.org/UBCProject/index.htm>.
- United States Department of Defense, 2007. Electronic Records Management Software Applications Design Criteria Standard. <http://dtic.mil/whs/directives/corres/pdf/501502std.pdf>.