



# Records Systems and Information Systems: Connecting in Organizations

Sherry L. Xie<sup>1,2,3(✉)</sup> and Guanyan Fan<sup>3</sup>

<sup>1</sup> Key Laboratory of Data Engineering and Knowledge Engineering,  
Ministry of Education of China, Beijing 100872, China  
sherrylix@outlook.com

<sup>2</sup> Center for Electronic Records Management Research, Beijing 100872, China

<sup>3</sup> School of Information Resource Management, Renmin University of China,  
59 Zhongguancun Ave, Haidian District, Beijing 100872, China

**Abstract.** The field of Information Systems (ISs) has long been recognized, so has Enterprise Information Systems (EISs), a field close to it. Long existing also in organizations or enterprises is the field of records management, now predominantly digital records management (DRM), which shares the many goals of ISs and EISs in supporting the operation and success of organizations. While the DRM field recognized rather early in its battle to digital records challenges that the need to establish formal collaborations with the ISs and EISs professions, it is still rare to spot today discussions regarding such collaborations in the general information and communication technology (ICT) literature. To help bridge the gap, this chapter introduces to the ISs and EISs professions one of the major developments of the international DRM field, that is, the records systems elaborated by the InterPARES (International Research on Permanent and Authentic Records in Electronic Systems) project, for the purpose of invoking further discussions.

**Keywords:** Records systems · Information systems  
Enterprise information systems · InterPARES · Chain of preservation model

## 1 Introduction

Records systems and information systems (ISs) including Enterprise Information Systems (EISs) typically co-exist in organizations, in particular in those who operate under rigorous regulatory frameworks. While lacking universally agreed definitions, ISs and EISs can generally be understood as configurations of information and communication technologies (ICTs) that are deployed in organizations for the purpose of supporting organizations' accomplishment of business goals [1]. Sharing the same purpose, the organizational program for records management – now predominantly digital records management (DRM) – claims its establishment in organizations by facilitating the achievement of operational efficiency and effectiveness as well as legal compliance. The DRM field recognized rather early in its battle to digital records challenges the need to establish formal collaborations with the ISs and EISs professions for devising ISs functional requirements and for developing long term preservation

strategies, it is still rare, however, to spot discussions regarding such collaborations in the information and communication technology (ICT) literature today. Working with the understanding that both ISs/EISs and DRM are charged with the responsibilities of serving the business needs of their sponsoring organizations, this chapter, a substantive extension of the conference paper *Organizational Records Systems - An Alternative View to (Enterprise) Information Systems* [2], analyzes the relationships between records systems and information systems utilizing, as a representative case, the development of the InterPARES (International Research on Permanent and Authentic Records in Electronic Systems) project. To our knowledge, despite that research in both the fields of information systems and records systems abound, the analysis as conducted in this chapter appears to be the first of its kind. This chapter consists of 5 sections: Introduction (this section), Record(s) and Information, Information Systems and Records Systems, InterPARES Records Systems, and Conclusions. Due to the highly conceptual nature of the COP model, efforts are made to streamline the presenting process, incorporating approaches of general account, graph depiction, and definitions as explanations.

## 2 Record(s) and Information

The relationship between record(s) and information was once clear. In the paper world, or, to be more precise, in the world where information systems were not the primary platform for organizations to conduct their businesses, the use of the term information suggested informal and the use of the term record(s) suggested formal. An organizational record consisted of two major parts, content and documentary form [3] and it was recognized by the legal and judicial systems in which its creating organization was operating. By the long established theoretical, methodological, and analytical frameworks, the management of record(s) ensured record(s) reliability, authenticity, and trustworthiness. Collectively, organizational records enabled the establishment and continued existence of organizations, supported their functions and activities, and provided them with foundations on which progression and protection could be built. In this context, (written) information constituted the part of content of a record, and its organization, or the shape of it, conformed to the documentary form of the record. The existence and importance of information, therefore, was manifested in and through records.

Digital (computer) technologies blurred the clarity of this relationship in a truly disruptive way. The term information, along with the term data, was given a new, much more active life by business oriented information systems, which first entered into organizations in the form of “electronic data processing” (EDP) [4, 5] and then, of business applications backed up with (relational) database technologies [5, 6]. With the nonstop advancing of digital technologies, information systems become increasingly wide-spread, common in organizations, and information is now “assets” and “life-blood” for organizations. The once informal term started to obtain a formal status, in either organizational policies and/or governmental regulations. For example, the Australian Federal Government [7, 8] acknowledges formally that information is “knowledge communicated and received” and the U.S. Federal Government [9] defines

information in its government-wide policy as “any communication or representation of knowledge such as facts, data, or opinions in any medium or form, including textual, numerical, graphic, cartographic, narrative, electronic, or audiovisual forms”.

Existing in the same digital world, record(s), however, are persistently viewed by non-records professions as in unbreakable bonds with analog formats and irrelevant to information systems – despite the fact that the records field has been transforming the management of analogue records into that for electronic/digital records since the early 1970s when the pioneering U.S. National Archives and Records Administration (NARA) started to handle data files in the form of punch cards. To the deployment of new information technologies in organizations, the management of records is always an afterthought. For example, the system of managing electronic document(s), which were loosely used to refer to both electronically or digitally captured paper documents, entered organizations without making any reference to organizational records management, and email, a typical representative of the digital disruptive power, remain till today to be a long reach of the program of organizational records management. This reality raises questions such as whether information can replace records in organizations, whether the notion of information as records content fitting into the documentary form of records can hold still true, and what relationships records now have with information in information systems, etc. It is unlikely that information is going to replace records in organizations, at least not in the current time. Organizational records in the digital world imply still authority and maintain still their legal and judicial status. For this reason alone, the blurred relationships between records and information could result in ineffective operation or regulatory violation. They, therefore, warrant to be cleared up.

To clear up the relationships between information and records in digitalized organizations proved to be challenging. Organizations either do not have formal definitions for information or avoid to define it altogether. For example, the Canadian Federal Government, while has in place a government-wide policy on information management, provides no definitions for information – the subject of the Policy on Information Management. Moreover, this policy treats records management as a constituent part of information management, yet its subordinate policy instrument, the Directive on Recordkeeping, introduces the concepts of information resources and information resources of business value, and treats them as the subject of the Directive – despite the title of the Directive speaks to “Recordkeeping”. Although the three concepts of record, information resources, and information resources of business value are formally defined (record is defined in both the Policy and the Directive with identical words), the conceptual relationships between them, and with information, remain problematic, if not entirely impossible, to be clearly identified. The three definitions are listed below for illustration purpose:

- record: for the purpose of this policy, records are information created, received, and maintained by an organization or person for business purposes, legal obligations, or both, regardless of medium or form [10];
- information resources: any documentary material produced in published and unpublished form regardless of communications source, information format, production mode or recording medium. Information resources include textual records

(memos, reports, invoices, contracts, etc.), electronic records (e-mails, databases, internet, intranet, data etc.), new communication media (instant messages, wikis, blogs, podcasts, etc.), publications (reports, books, magazines), films, sound recordings, photographs, documentary art, graphics, maps, and artefacts [11];

- information resources of business value: published and unpublished materials, regardless of medium or form, that are created or acquired because they enable and document decision-making in support of programs, services and ongoing operations, and support departmental reporting, performance and accountability requirements (Ibid);

Some organizations do have a formal definition for information, such as the U.S. Federal Government introduced above. The issue with this case is that once the general definition of information is applied to the specific organizational setting, the distinguishing ability of the definition starts to fade. For example, apart from the definition of information, the OMB Circular No. A-130 Management of Federal Information Resources defines also federal information and public information, with the former being “information created, collected, processed, maintained, disseminated, disclosed, or disposed of by or for the Federal Government, in any medium or form” and the latter being “any information, regardless of form or format, that an agency discloses, disseminates, or makes available to the public”. Because both definitions are in the context of agency operation and legal compliance, it becomes challenging to distinguish information from records in this setting. According to Title 44 of the U.S.C., § 3301, records “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” [12]. Further, for the purpose of emphasizing the relevance of record(s) to the digital world, the second part of the definition explains that “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”. Federal information and federal record(s), therefore, appear to largely overlap with each other in this context.

### 3 Information Systems and Records Systems

The ISs field came to be recognized in the 1960s [13] and has ever since been advancing. Although missing in definitions of ISs universally accepted wordings, the linkage between ISs and organizations appears to always exist, either explicitly or implicitly. Internally, ISs are implemented to support the alternatively called back-office functions such as finance management, property management, and human capital management, and for functions facing customers or suppliers such as customer relationship management (CRM), supply chain management (SCM), sales, and marketing etc., ISs are designed with specifications tailored to address their functional requirements. The linkage between ISs and organizations became completely explicit when

the notion of Enterprise Information Systems (EISs) started to emerge in the 1980s [14]. While choosing to use the term enterprise, EISs has never limited its applications to only commercial organizations. Like ISs, the phrase enterprise information systems (EISs) 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, EISs was introduced as the equivalent to Enterprise Resource Planning (ERP) [14], yet in *Enterprise Information Systems and Implementing IT Infrastructures: Challenges and Issues*, EISs “comprises of information systems such as enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM) and e-commerce” [15]. Nonetheless, EISs is generally seen as, with reference to the ineffectiveness and failures of the earlier ISs implementations, the more logical and intelligent response to organizations’ ISs needs. Advanced ISs and EISs are expected to better address the increasingly complex global environment and the increasingly integrative nature of business operations.

The most basic promises of EISs lies with integration, be it business process integration, system integration, data/information integration, or all 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 organizations. Ultimately, enterprises can be leaner, more agile, efficient and effective. Together, ISs and EISs promise to offer many qualities desired for organizations to achieve business sustainability and competitive advantages.

Although conceptually overlapping in the digital world in terms of their subjects, the DRM field remains to be independent from the field of information management in general, at least in the setting of government organizations. According to Title 44 U.S.C. § 2901(2), records management means “the planning, controlling, directing, organizing, training, promoting, and other managerial activities involved with respect to records creation, records maintenance and use, and records disposition in order to achieve adequate and proper documentation of the policies and transactions of the Federal Government and effective and economical management of agency operations” [16]. By the definition of records introduced in the previous session, records management logically include digital records management. To achieve the goals of DRM, both policies and resources are needed, and digital technology is now one of such indispensable resources. The application of digital technologies to records management resulted in, most typically, the system for managing digital records, or records system. In the field of records management, records system can be understood either narrowly or broadly. The narrow or specific view of records system focuses on the digital systems that manage unstructured records, such as those produced by Microsoft Word Suite and the all kinds of email applications. The broad view, on the other hand, addresses the entire spectrum of records management activities, regardless, thus, where the records exist and how they look like. A records system in the narrow view is indeed one type of business information systems because, as suggested by the above definition, records management or DRM is a business function in organizations and a technological system handling its activities is as the same as those information systems

that handle any other business functions. For the purpose of this chapter, the broad view of records system is adopted and the InterPARES' development on records systems is chosen for the purpose of illustration and discussion.

## 4 InterPARES Records Systems

### 4.1 The InterPARES Project

The InterPARES project has been running for consecutively 16 years, in the form of four distinguishable yet interrelated phases, that is, the completed InterPARES I–III and the currently running InterPARES Trust (2013–2018). InterPARES phase I was built on the influential findings of the UBC-MAS Project, entitled Preservation of the Integrity of Electronic records, which had run from 1995 to 1997. The UBC-MAS Project, as one of the true pioneering digital records projects international, not only produced renewed conceptual knowledge pertinent to records and documents in digital formats, but also the first blueprint internationally for digital technologies to be meaningfully applied to digital records management. 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-MAS project and the United States Department of Defense Records Management Task Force, which specifies the configuration of ICTs for the management of digital records. By nature, such records management applications are ISs, and they provide ISs functionalities to facilitate organizations' conduct of activities regarding digital records management.

Initiated in 2001 and completed in 2012, InterPARES I–III extended its inquiries into digital records in more than one ways. With hundreds of researchers and graduate research assistants, the project 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, and dynamic, interactive and experiential systems that heavily rely on network technologies. As a result, the project had developed an organization/enterprise-wide understanding of ISs, EISs, and captured it in one of its major products, that is, the Chain of Preservation (COP) model.

### 4.2 The COP Model

The name of the COP model points to the ultimate objective of the InterPARES project, that is, to ensure long-term or permanent preservation and accessibility of digital records – a representative reflection of the mission of the records community [17]. For the records community, this model serves both the professionals of the fields of DRM and digital archival administration in that both work with the same materials, that is, records, and the latter requires the former as managerial foundation. Together, these two professions complete the lifecycle management of records, with DRM disposing of, at any given time, records that are no longer needed and the archival administration entities providing custody and assess to significant records that require long-term or

permanent preservation, upon transferring from DRM. Specifically, the COP model presents the lifecycle management in three types of systems: record-making system, record-keeping system, and record-preservation system.

**Record-Making System.** To apply the broad view of records system, record-making system in the context of the InterPARES project means “a set of rules governing the making of records, and the tools and mechanisms used to implement these rules”. Correspondingly, the activity of record-making encompasses “the whole of the principles, policies, rules and strategies that controls the process of creating records from made or received documents”. It needs to point out that the concept of document here is discipline relevant and therefore, should not be interpreted as a synonym to records as commonly found in everyday communications. As established by the findings of the second phase of InterPARES, the concept of document now covers those in digital formats, and can be broadly categorized as static, interactive, and dynamic/interactive ones. These digital documents have a convertible relationship with digital records, that is, when certain conditions are met, digital documents can become digital records although the formats may not be exactly the same [18, 19].

With its goal being the provision of overall control and co-ordination of the activities that it contains, the Record-Making System is designed to consist of 3 major activities Monitor Performance of Record-Making System (A2.1), Manage Making & Receipt of Records (A2.2), and Manage Setting Aside of Completed Records (A2.3), as depicted by Fig. 1 [17]. In Fig. 1 (also as in all figures that follow), arrows from the left side represent input information and arrows from the right side represent output information, which may also be input information for the next activity depending on the specific situation. The arrows from top represent constraints to the activity and the arrows from bottom represent facilities to the activity. The tunnel around (some of) the arrows indicates that the information is relevant not only to the present activity but also to all of its sub-activities. The outputs, therefore, are the results of a comprehensive integration and synthesizing of all of these arrows.

A2.1 is an activity without sub-activities (indicated in the figures by the short oblique line at the upper-left corner) and its job is to assess the efficacy of the performance of the record-making system. Specifically, it is required to analyze performance reports on the operation of each of the record-making system’s sub-activities and issue activity directives and information on the performance of the system. The records it generates is kept for the use in continued maintenance of the entire COP. Both A2.2 and A2.3 are activities with sub-activities, with A2.2 aiming to provide overall control and co-ordination of document and record making and receipt activities and A2.3 aiming to provide overall control and co-ordination of the transfer of executed or completed records to the recordkeeping system.

Figure 2 [17] depicts A2.2, showing its 5 sub-activities of Make Documents, Capture Documents, Identify Documents, Declare Records, and Execute Records. It needs to point out that the term creator in this context refers to the records-creating organization as opposed to individual authors to a document or record. Table 1 provides definitions for these sub-activities.

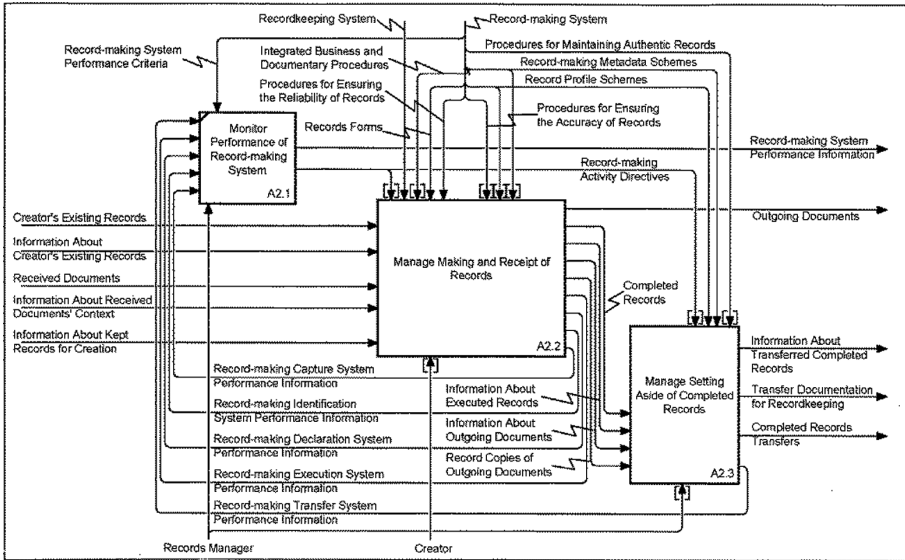


Fig. 1. Record-making system.

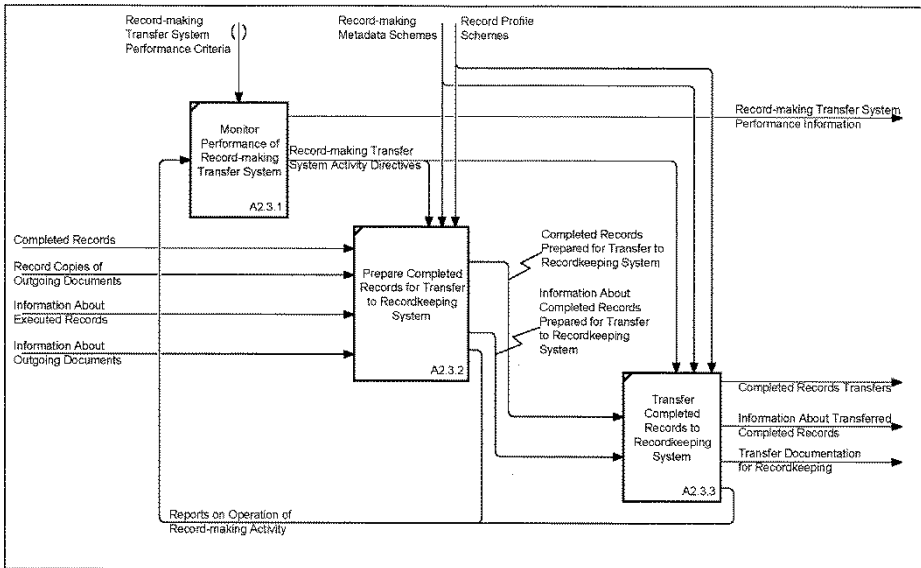


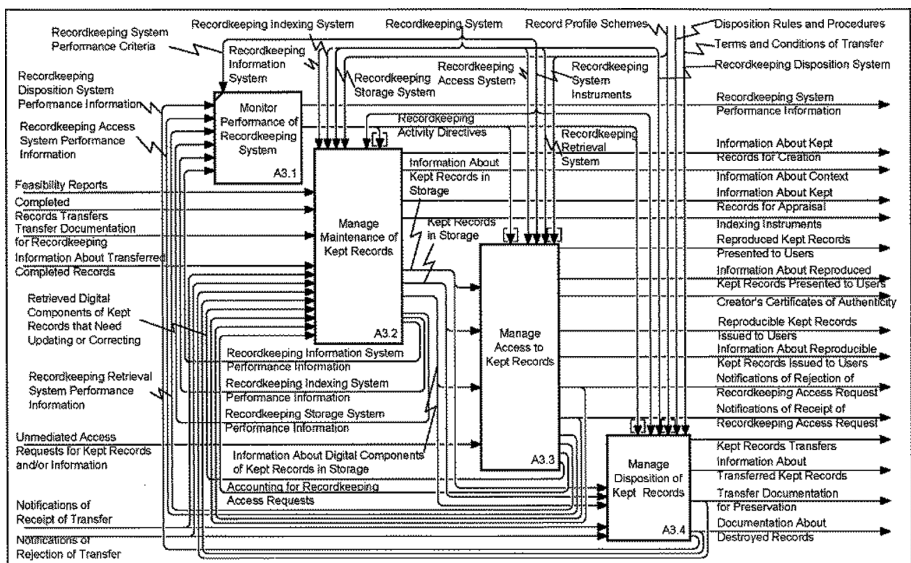
Fig. 2. Making and receiving of records.

Figure 3 [17] depicts A2.3, showing its 3 sub-activities of Monitor Performance of Record-making Transfer System, Prepare Completed Records for Transfer to Recordkeeping System, and Transfer Completed Records to Recordkeeping System. Table 2 provides definitions for these sub-activities.



**Table 1.** Definitions for A2.2 sub-activities.

Activity	Definition
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



**Fig. 3.** Setting aside of completed records.

**Table 2.** Definitions for A2.3 sub-activities.

Activity	Definition
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

**Record-Keeping System.** Like record-making system, the InterPARES record-keeping system goes beyond the narrow view of technological system and refers to the whole 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”. Figure 4 [17] depicts such a system, showing the activities designed to achieve the goal of providing 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 record-keeping system.

In this context, the operation of record-keeping requires a creator to identify the principles, policies, rules and strategies necessary to establish and maintain administrative, intellectual, and physical control over its records, and the activities of A3 Manage Records in a Recordkeeping System are designed to facilitate such an operation. A3 consists of 4 activities: A3.1 Monitor Performance of Recordkeeping System, A3.2 Manage Maintenance of Kept Records, A3.3 Manage Access to Kept Records, and A3.4 Manage Disposition of Kept Records, with the later 3 containing sub-activities. Table 3 provides definitions of these activities, where preserver refers to the entity that is given formally the authority and responsibility of managing records in a permanent manner.

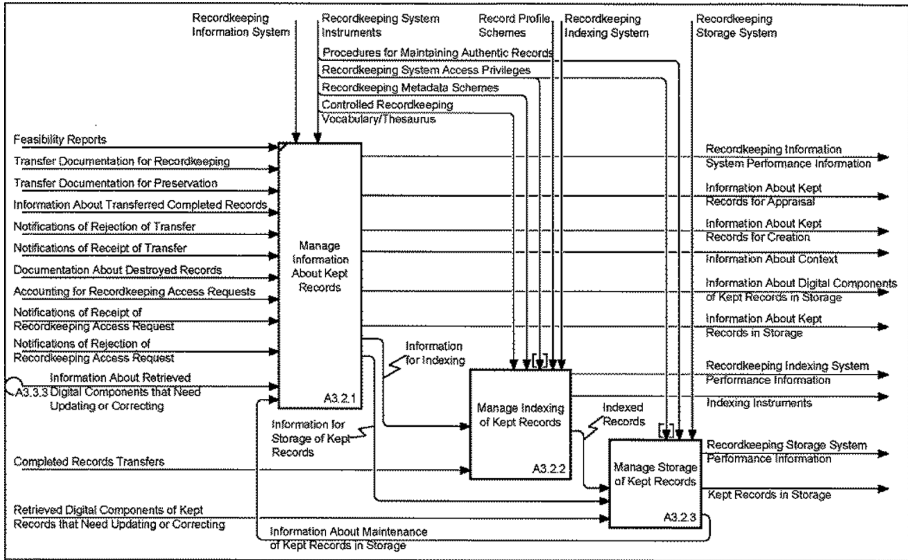


Fig. 4. Record-keeping system.

Table 3. Definitions for A3 sub-activities.

Activity	Definition
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

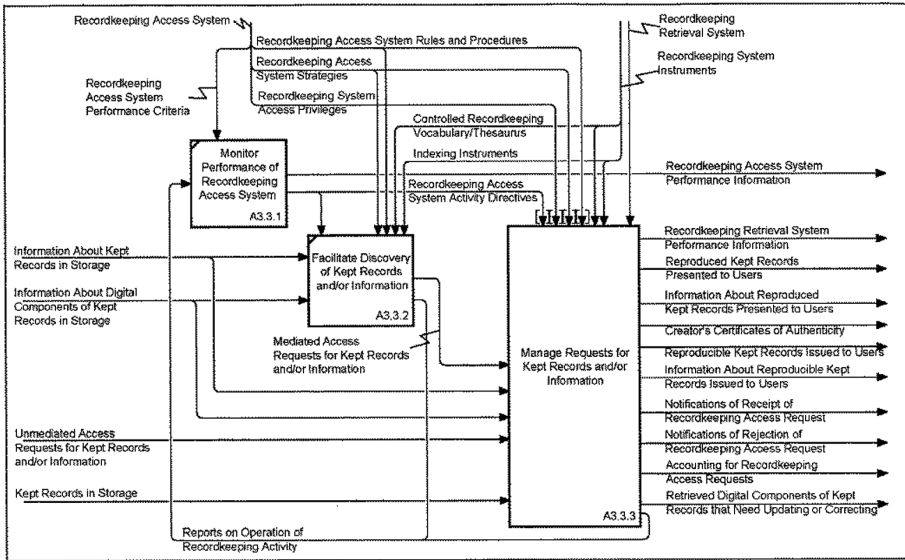


Fig. 5. Maintaining kept records.

Figure 5 [17] depicts A3.2, showing its 3 sub-activities of A3.2.1 Manage Information About Kept Records, A3.2.2 Manage Indexing of Kept Records, and A3.2.3 Manage Storage of Kept Records. Table 4 provides definitions for these sub-activities.

Table 4. Definitions for A3.2 sub-activities.

Activity	Definition
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
A3.2.2.1 Monitor performance of recordkeeping indexing system	To assess the efficacy of the performance of the recordkeeping indexing system by analyzing reports on the operation of recordkeeping activities, and issue activity directives for indexing activities and information on the performance of the indexing system for use in continued maintenance of the recordkeeping system

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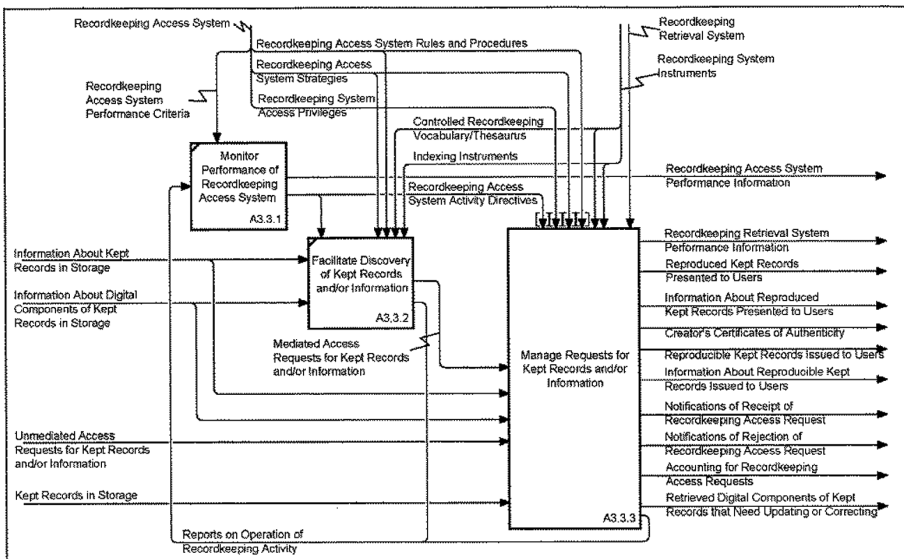
**Table 4.** (continued)

Activity	Definition
A3.2.2.2 Index kept records	To establish and record access points for kept records within the context of a controlled recordkeeping vocabulary applied according to recordkeeping indexing system rules, procedures and strategies
A3.2.2.3 Develop indexing instruments	To prepare tools that facilitate discovery and retrieval of the records in the recordkeeping system, such as guides, inventories and indexes
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
A3.2.3.1 Monitor performance of recordkeeping storage	To assess the efficacy of the performance of the recordkeeping storage system by analyzing reports on the operation of recordkeeping activities, and issue activity directives for storage activities and information on the performance of the recordkeeping storage system for use in continued maintenance of the recordkeeping system
A3.2.3.2 Place kept records in storage	To place the digital components of kept records and their metadata into storage in accordance with the procedures for maintaining authentic records and the actions prescribed by the recordkeeping storage system strategies, rules and procedures and activity directives
A3.2.3.3 Maintain records in recordkeeping storage system	To monitor the storage of kept records and their digital components and metadata, periodically back-up the recordkeeping storage system and, as necessary, correct problems with and update the digital components, and/or refresh storage media to ensure the records in the system remain accessible, legible and intelligible over time
A3.2.3.3.1 Monitor kept records in storage	To keep track of the condition and maintenance requirements of kept records and their digital components—more specifically, their digital components and metadata—and the media on which they are stored in the recordkeeping storage system to identify storage that needs backing-up, digital components and/or metadata that need correcting or updating and media that need refreshing; and to issue reports on maintenance activities
A3.2.3.3.2 Back-up recordkeeping storage system	To routinely make a copy of all digital content in the recordkeeping storage system, including the operating system, the software applications and all digital objects in the system, for the purpose of recovery in the event of a disaster resulting in system failure or corruption, and record information about these back-up activities

(continued)

**Table 4.** (continued)

Activity	Definition
A3.2.3.3.3 Correct problems with kept records in storage	To take the actions prescribed by the recordkeeping storage system strategies, rules and procedures and activity directives, in accordance with the procedures for maintaining authentic records, to eliminate problems in storage, and record information about these correction activities
A3.2.3.3.4 Update kept records in storage	To carry out conversion actions on the digital components of stored kept records in accordance with the procedures for maintaining authentic records and the actions prescribed by the recordkeeping storage system strategies, rules and procedures and activity directives, to ensure the records remain accessible, legible and intelligible over time (such as by migration, standardization or transformation to persistent form), and record information about these updating activities
A3.2.3.3.5 Refresh media for kept records in storage	To copy or transfer the digital components of kept records in storage from one medium to another, or otherwise ensure the storage medium remains sound, in accordance with the procedures for maintaining authentic records and the actions prescribed by the recordkeeping storage system strategies, rules and procedures and activity directives, and record information about these media refreshment activities



**Fig. 6.** Access to kept records.

**Table 5.** Definitions for A3.3 sub-activities.

Activity	Definition
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
A3.3.3.1 Process requests for kept records and/or information	To register access requests for kept records and/or information, translate them, define request specifications, generate retrieval requests and account for any problems with processing requests
A3.3.3.1.1 Register recordkeeping access requests	To record registration information about received requests for access to kept records and/or information about the records and issue notifications of receipt to the persons requesting the records
A3.3.3.1.2 Retrieve information to process recordkeeping access requests	To gather the information, from indexing instruments, record profiles and other recordkeeping tools, needed to process access requests for kept records and/or information about records
A3.3.3.1.3 Generate recordkeeping retrieval requests	To translate access requests for kept records and/or information into requests to the recordkeeping storage and information systems for retrieval of the exact digital components and/or information required to fulfil the access requests
A3.3.3.1.4 Generate recordkeeping requests specifications	To issue instructions to the recordkeeping retrieval and access systems on how to fulfil requests for kept records and/or information about the records based on analyses of the requests and processing information in relation to recordkeeping access system strategies, rules and procedures (including procedures for maintaining authentic records) and access privileges

*(continued)*

**Table 5.** (continued)

Activity	Definition
A3.3.3.2 Retrieve requested kept records and/or information	To output copies of digital components of records, information about digital components of records, rendering information about records and/or content information about records retrieved from storage in the recordkeeping system in response to retrieval requests for components and/or information
A3.3.3.3 Verify retrieved kept records and/or information	To determine whether all components and information necessary to satisfy requests for kept records and/or information about kept records have been received and can be processed for output and, in cases where digital components are encountered that need updating or correcting, redirect them (or information about the problems encountered) to the maintenance function of the recordkeeping storage system
A3.3.3.4 Provide access to retrieved kept records and/or information	To fulfil access requests by either reconstituting the retrieved digital components of kept records and/or information in authentic form and presenting the manifested records or information to users, or by packaging the retrieved digital components with information about how to reconstitute and present the records and/or information with the appropriate extrinsic form and issuing the packaged materials to users, and account for the success or failure of either activity
A3.3.3.4.1 Reconstitute kept records and/or information	To link or assemble all the verified digital components of requested kept records and/or information about kept records as necessary to reproduce and present the records and/or information in authentic form and, if necessary, redact records and/or information to meet privacy and/or copyright requirements
A3.3.3.4.2 Manifest kept records and/or	To present copies of the reconstituted requested kept records and/or requested information about the records with the appropriate extrinsic form and with information about their relationships to one another (archival bond) and, if requested, produce a Certificate of Authenticity for the records copies
A3.3.3.4.3 Package kept records and/or information for output	To combine the digital components of the requested kept records and/or requested information about kept records with information on how to reconstitute and manifest the records or information with the appropriate extrinsic form



Figure 6 [17] depicts A3.3, showing its 3 sub-activities of A3.3.1 Monitor Performance of Recordkeeping Access System, A3.3.2 Facilitate Discovery of Kept Records and/or Information, and A3.3.3 Manage Requests for Kept Records and/or Information. Table 5 provides definitions of these sub-activities including those to A3.3.3.

Figure 7 [17] depicts A3.4, showing its 5 sub-activities of A3.4.1 Monitor Performance of Disposition System, A3.4.2 Identify Kept Records for Disposition, A3.4.3 Destroy Kept Records, A3.4.4 Prepare Kept Records for Transfer to Designated Preserver, and A3.4.5 Transfer Kept Records to Designated Preserver. Table 6 provides definitions for these sub-activities, none of which has sub-activities.

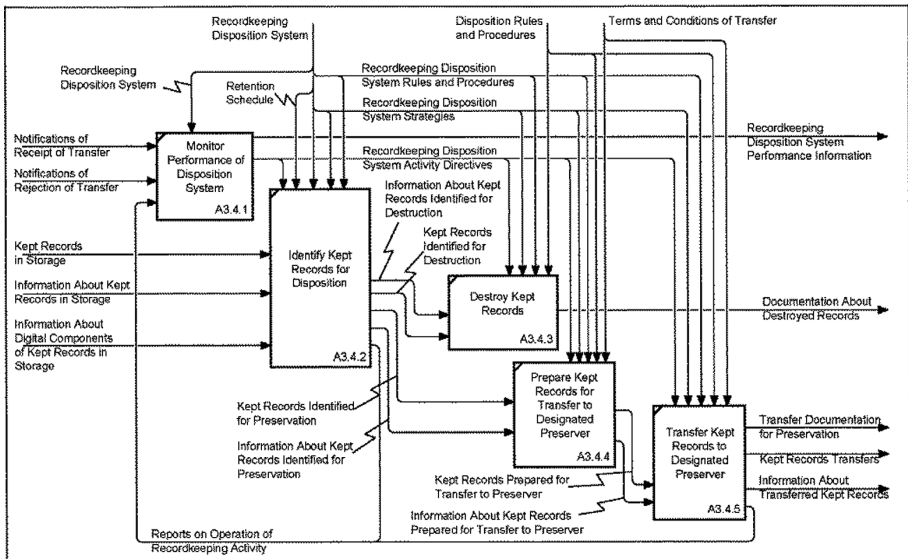


Fig. 7. Disposing of kept records

**Record-Preserving System.** Record-preserving system encompasses both rules governing the permanent intellectual and physical maintenance of acquired records and the tools and mechanisms needed to implement these rules. As the last type of records system in the COP model, it aims to provide 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. To that end, the designated preserver is required to ical and technological stabilization and protecting the intellectual form of acquired/accessioned records, thus enabling records’ “continuing, enduring, stable, lasting, uninterrupted and unbroken chain of preservation” [17]. Figure 8 [17] depicts the permanent preservation system, showing its 5 activities of A4.1 Monitor

Performance of Permanent Preservation System, A4.2 Appraise Records for Permanent Preservation, A4.3 Acquire Selected Records, A4.4 Preserve Accessioned Records, and A4.5 Output Records, with the later 4 containing their own sub-activities. Table 7 provides definitions for these activities.

**Table 6.** Definitions for A3.4 sub-activities.

Activity	Definition
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

Figure 9 [17] depicts the 4 sub-activities of A4.2: A4.2.1 Monitor Performance of Preservation Selection System, A4.2.2 Analyze Kept Records for Preservation, A4.2.3 Make Appraisal Decisions, and A4.2.4 Monitor Appraisal Decisions, with A4.2.2 showing to contain its own sub-activities. Table 8 provides definitions for these sub-activities including those to A4.2.2.2, A4.2.2.3, and A4.2.2.2.2.

Figure 10 [17] depicts the 3 sub-activities of A4.3: A4.3.1 Monitor Performance of Preservation Acquisition System, A4.3.2 Process Records Transfers, and A4.3.3 Accession Records, with A4.3.2 showing to contain its own sub-activities. Table 9 provides definitions for the sub-activities.

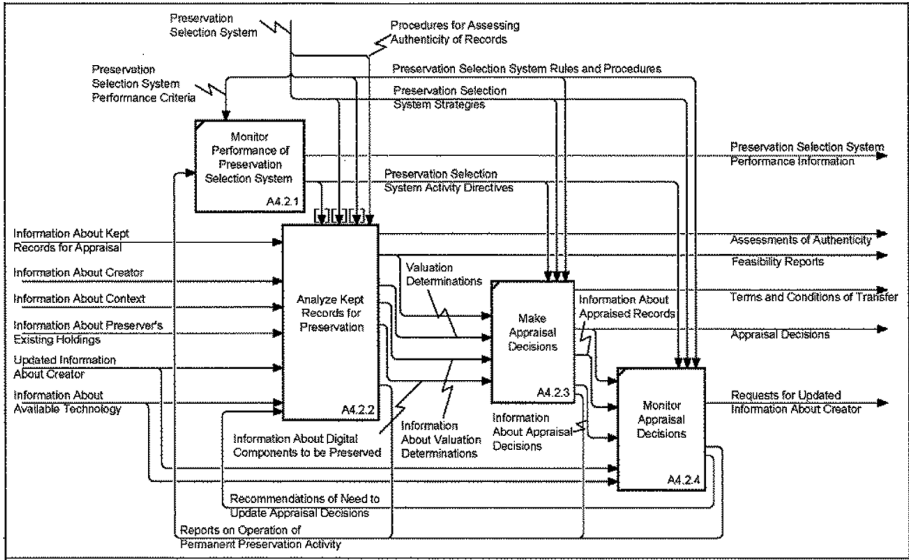


Fig. 8. Record-preserving system/records permanent preservation system.

Table 7. Definitions for A4 sub-activities.

Activity	Definition
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
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

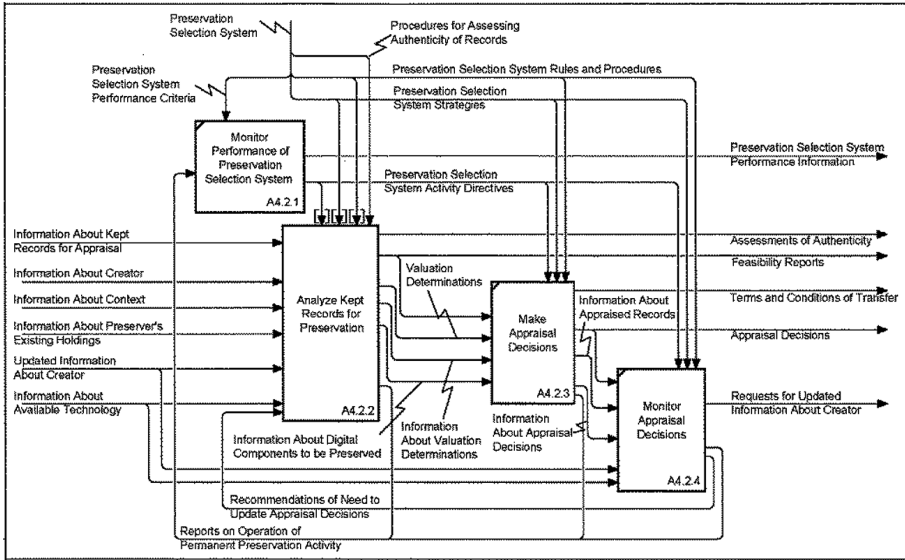


Fig. 9. Appraising records for permanent preservation.

Table 8. Definitions for A4.2 sub-activities.

Activity	Definition
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
A4.2.2.1 Analyze information about records	To collect, organize, record and assess relevant information from the kept records being appraised and about their juridical-administrative, provenancial, procedural, documentary and technological contexts
A4.2.2.2 Assess value of records	To analyze and judge: (1) the capacity of records being appraised to serve the continuing interests of their creator and society; and (2) the grounds for presuming the records to be authentic

(continued)

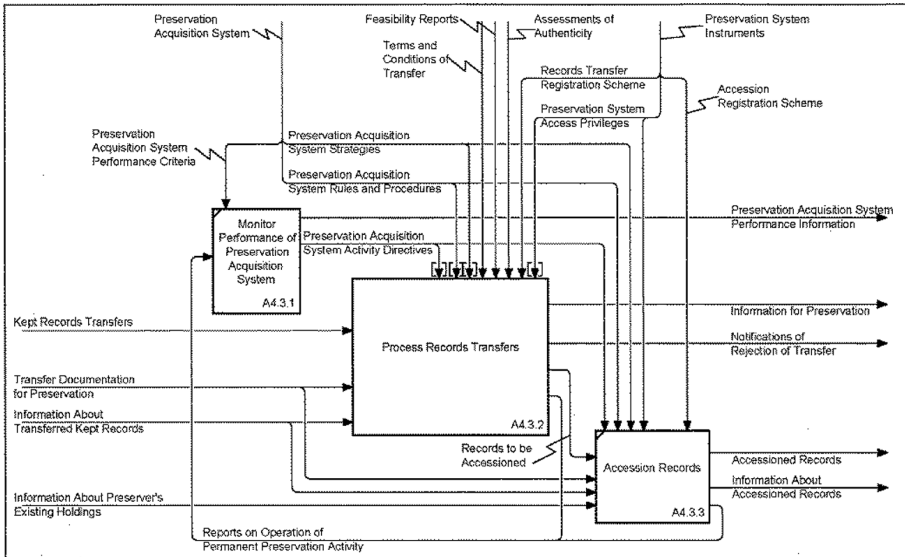
**Table 8.** (continued)

Activity	Definition
A4.2.2.2.1 Assess continuing value of records	To analyze and judge the capacity of records being appraised to serve the continuing interests of their creator and society
A4.2.2.2.2 Assess authenticity of records	To analyze and judge the grounds for presuming records being appraised to be authentic
A4.2.2.2.2.1 Compile evidence supporting the presumption of authenticity	To collect, organize and record evidence of the identity and integrity of records being appraised and about the procedural controls applied to them, to support the presumption of authenticity of those records
A4.2.2.2.2.2 Measure evidence against requirements for authentic records	To compare the evidence compiled about the identity, integrity and procedural controls of the records being appraised with the requirements for authentic records
A4.2.2.2.2.3 Verify authenticity	To use verification methods to determine the authenticity of records being appraised in cases where there is insufficient evidence to meet the requirements for presuming the authenticity of records
A4.2.2.2.3 Determine value of records	To establish the value of records being appraised based on assessments of their continuing value and their authenticity
A4.2.2.3 Determine feasibility of preservation	To identify the elements and digital components of the records being appraised, reconcile their preservation requirements with the preserver's current and anticipated preservation capabilities, and provide documentation about the digital components to be preserved and the feasibility of preservation
A4.2.2.3.1 Determine record elements to be preserved	To identify the necessary documentary components (e.g., record profile, attachments, annotations, etc.) and elements of form (e.g., author, date, subject line, etc.) of records to be preserved to determine which record elements must be preserved to protect the authenticity of those records
A4.2.2.3.2 Identify digital components to be preserved	To identify the digital components that manifest the record elements that need to be preserved to protect the authenticity of records selected for permanent preservation

(continued)

**Table 8.** (continued)

Activity	Definition
A4.2.2.3.3 Reconcile preservation requirements with preservation capabilities	To determine whether the digital components manifesting the record elements that need to be preserved to protect the authenticity of records selected for permanent preservation can in fact be preserved given the preserver's current and anticipated 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



**Fig. 10.** Acquiring selected records.

**Table 9.** Definitions for A4.3 sub-activities.

Activity	Definition
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
A4.3.2.1 Register transfers	To record registration information about received transfers and issue notifications of receipt to the persons transferring the records
A4.3.2.2 Confirm authorization for transfers	To verify the authority for transfer of records selected for preservation and, in cases of unauthorized transfers, issue notifications of rejection of transfer to the persons transferring the records
A4.3.2.3 Verify content of transfers	To determine whether transfers of records selected for preservation have been successfully transmitted (i.e., are not corrupted) and include all records and aggregates of records specified in the terms and conditions of the transfers and, in corrupted or unverified cases, issue notifications of rejection of transfer to the persons transferring the records
A4.3.2.4 Confirm authenticity of records	To determine whether the assessment of the authenticity of the creator's records being transferred, which was conducted as part of the appraisal process, is still valid by verifying that the attributes relating to the records' identity and integrity have been carried forward with them along with any relevant documentation
A4.3.2.5 Confirm feasibility of preservation	To confirm that the determinations of the feasibility of preservation made during the process of appraisal are still valid and, in unconfirmed cases, issue notifications of rejection of transfer to the persons transferring the records
A4.3.3 Accession records	To formally accept records selected for permanent preservation into custody and document transfers in accessions documentation

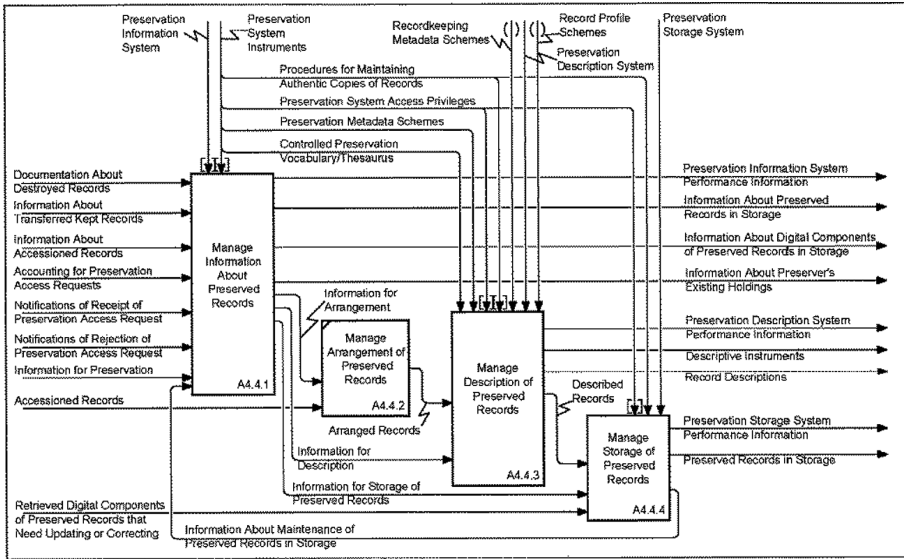


Fig. 11. Preserving accessioned records.

Table 10. Definitions for A4.4 sub-activities.

Activity	Definition
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
A4.4.1.1 Monitor performance of preservation information system	To assess the efficacy of the performance of the permanent preservation information system by analyzing reports on the operation of preservation activities, and issue activity directives for information activities and information on the performance of the permanent preservation selection system for use in continued maintenance of the permanent preservation system
A4.4.1.2 Compile information for preservation	To collect, organize and record relevant appraisal, acquisition, accession and preservation information about acquired records for their preservation, description, storage, retrieval and output
A4.4.1.3 Update information on preservation actions	To record information about actions taken to back-up, correct, update and refresh digital components of records acquired for permanent preservation or their storage

(continued)



**Table 10.** (continued)

Activity	Definition
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
A4.4.3.1 Monitor performance of preservation description system	To assess the efficacy of the performance of the permanent preservation description system by analyzing reports on the operation of preservation activities, and issue activity directives for description activities and information on the performance of the permanent preservation selection system for use in continued maintenance of the permanent preservation system
A4.4.3.2 Describe preserved records	To record information about the nature and make-up of records acquired for permanent preservation and about their juridical-administrative, provenancial, procedural, documentary and technological contexts, as well as information about any changes they have undergone since they were first created
A4.4.3.3 Develop description instruments	To prepare tools that provide intellectual and physical control over the records in the preservation system, such as guides, inventories, indexes, repository locators and related finding aids
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
A4.4.4.1 Monitor performance of permanent preservation storage system	To assess the efficacy of the performance of the permanent preservation storage system by analyzing reports on the operation of preservation activities, and issue activity directives for storage activities and information on the performance of the permanent preservation selection system for use in continued maintenance of the permanent preservation system
A4.4.4.2 Place preserved records in storage	To place the digital components of preserved records and their metadata into storage in accordance with the procedures for maintaining authentic copies of records and the actions prescribed by the preservation storage system strategies, rules and procedures and activity directives

(continued)

**Table 10.** (continued)

Activity	Definition
<p>A4.4.4.3 Maintain records in permanent preservation storage system</p>	<p>To monitor the storage of preserved records and their digital components, periodically back-up the permanent preservation storage system and, as necessary, correct problems with and update the digital components, and/or refresh storage media to ensure the records in the system remain accessible, legible and intelligible over time</p>
<p>A4.4.4.3.1 Monitor preserved records in storage</p>	<p>To keep track of the condition and maintenance requirements of preserved records—more specifically, their digital components and metadata—and the media on which they are stored in the permanent preservation storage system to identify storage that needs backing-up, digital components and metadata that need correcting or updating and media that need refreshing; and to issue reports on maintenance activities</p>
<p>A4.4.4.3.2 Back-up preservation storage system</p>	<p>To routinely make a copy of all digital content in the preservation storage system, including the operating system, the software applications and all digital objects in the system, for the purpose of recovery in the event of a disaster resulting in system failure or corruption, and record information about these back-up activities</p>
<p>A4.4.4.3.3 Correct problems with preserved records in storage</p>	<p>To take the actions prescribed by the preservation storage system strategies, rules and procedures and activity directives, in accordance with the procedures for maintaining authentic copies of records, to identify and eliminate problems in storage to ensure that the records remain accessible, legible and intelligible over time; and record information about these correction activities</p>
<p>A4.4.4.3.4 Update preserved records in storage</p>	<p>To carry out conversion actions on the digital components of preserved records in storage in accordance with the procedures for maintaining authentic copies of records and the actions prescribed by the preservation storage system strategies, rules and procedures and activity directives, to ensure the records remain accessible, legible and intelligible over time (such as by migration, standardization or transformation to persistent form), and record information about these updating activities</p>
<p>A4.4.4.3.5 Refresh media for preserved records in storage</p>	<p>To copy or transfer the digital components of preserved records in storage from one medium to another, or otherwise ensure the storage medium remains sound, in accordance with the procedures for maintaining authentic copies of records and the actions prescribed by the preservation storage system strategies, rules and procedures and activity directives, and record information about these media refreshment activities</p>

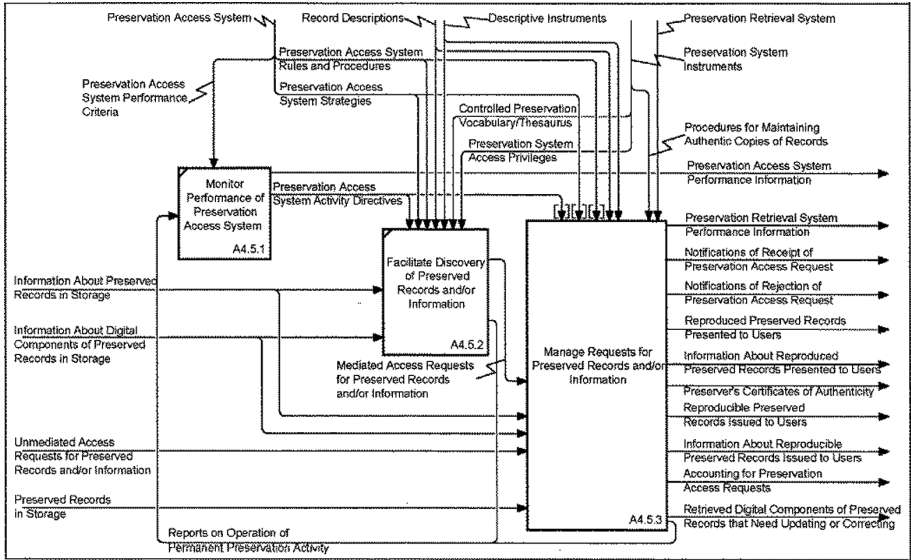


Fig. 12. Outputting records.

Table 11. Definitions for A4.5 sub-activities.

Activity	Definition
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

(continued)

**Table 11.** (continued)

Activity	Definition
A4.5.3.1 Process requests for preserved records and/or information	To register access requests for preserved records and/or information, translate them, define request specifications, generate retrieval requests and account for any problems with processing access requests
A4.5.3.1.1 Register preservation access requests	To record registration information about received requests for access to preserved records and/or information about the records and issue notifications of receipt to the persons requesting the records
A4.5.3.1.2 Retrieve information to process preservation access requests	To gather the information, from description instruments and other preservation information, needed to process access requests for preserved records and/or information about records
A4.5.3.1.3 Generate preservation retrieval requests	To translate access requests for preserved records and/or information translated into requests to the permanent preservation storage and information systems for retrieval of the exact digital components and/or information required to fulfil the access requests
A4.5.3.1.4 Generate preservation requests specifications	To issue instructions to the preservation retrieval and access systems on how to fulfil requests for preserved records and/or information about the records based on analyses of the requests and processing information in relation to preservation retrieval and access systems' strategies, rules and procedures (including procedures for maintaining authentic copies of records) and access privileges
A4.5.3.2 Retrieve requested preserved records and/or information	To output copies of digital components of records, information about digital components of records, rendering information about records and/or content information about records retrieved from storage in the permanent preservation system in response to retrieval requests for components and/or information and in accordance with any request specifications
A4.5.3.3 Verify retrieved preserved records and/or information	To determine whether all components and information necessary to satisfy access requests for preserved records and/or information about the records have been received and can be processed for output and, in cases where digital components are encountered that need updating or correcting, redirect them, along with information about the problems encountered, to the maintenance function of the permanent preservation storage system for further action

(continued)

**Table 11.** (continued)

Activity	Definition
A4.5.3.4 Provide access to retrieved preserved records and/or information	To fulfil access requests by either reconstituting the retrieved digital components of preserved records and/or information in authentic form and presenting the manifested records or information to users, or by packaging the retrieved digital components with information about how to reconstitute and present the records and/or information with the appropriate extrinsic form and issuing the packaged materials to users, and account for the success or failure of either activity
A4.5.3.4.1 Reconstitute preserved records and/or information	To link or assemble all the verified digital components of requested preserved records and/or information about preserved records as necessary to reproduce and present the records and/or information in authentic form and, if necessary, redact information to meet privacy and/or copyright requirements
A4.5.3.4.2 Manifest preserved records and/or information	To present copies of the reconstituted requested preserved records and/or requested information about the records with the appropriate extrinsic form and with information about their relationships to one another (archival bond) and, if requested, produce a Certificate of Authenticity for the records copies
A4.5.3.4.3 Package preserved records and/or information for output	To combine the digital components of the requested preserved records and/or requested information about preserved records with information on how to reconstitute and manifest the records or information with the appropriate extrinsic form

Figure 11 [17] depicts the 4 sub-activities of A4.4: A4.4.1 Manage Information About Preserved Records, A4.4.2 Manage Arrangement of Preserved Records, A4.4.3 Manage Description of Preserved Records, and A4.4.4 Manage Storage of Preserved Records, with A4.4.1, A4.4.3, and A4.4.4 showing to contain their own sub-activities. Table 10 provides definitions for these sub-activities including those to A4.4.4.3.

Figure 12 [17] depicts the 3 sub-activities of A4.5: A4.5.1 Monitor Performance of Preservation Access System, A4.5.2 Facilitate Discovery of Preserved Records and/or Information, and A4.5.3 Manage Requests for Preserved Records and/or Information, with A4.5.3 showing to contain sub-activities. Table 11 provides definitions for these sub-activities including those to A4.5.3.1 and A4.5.3.4.

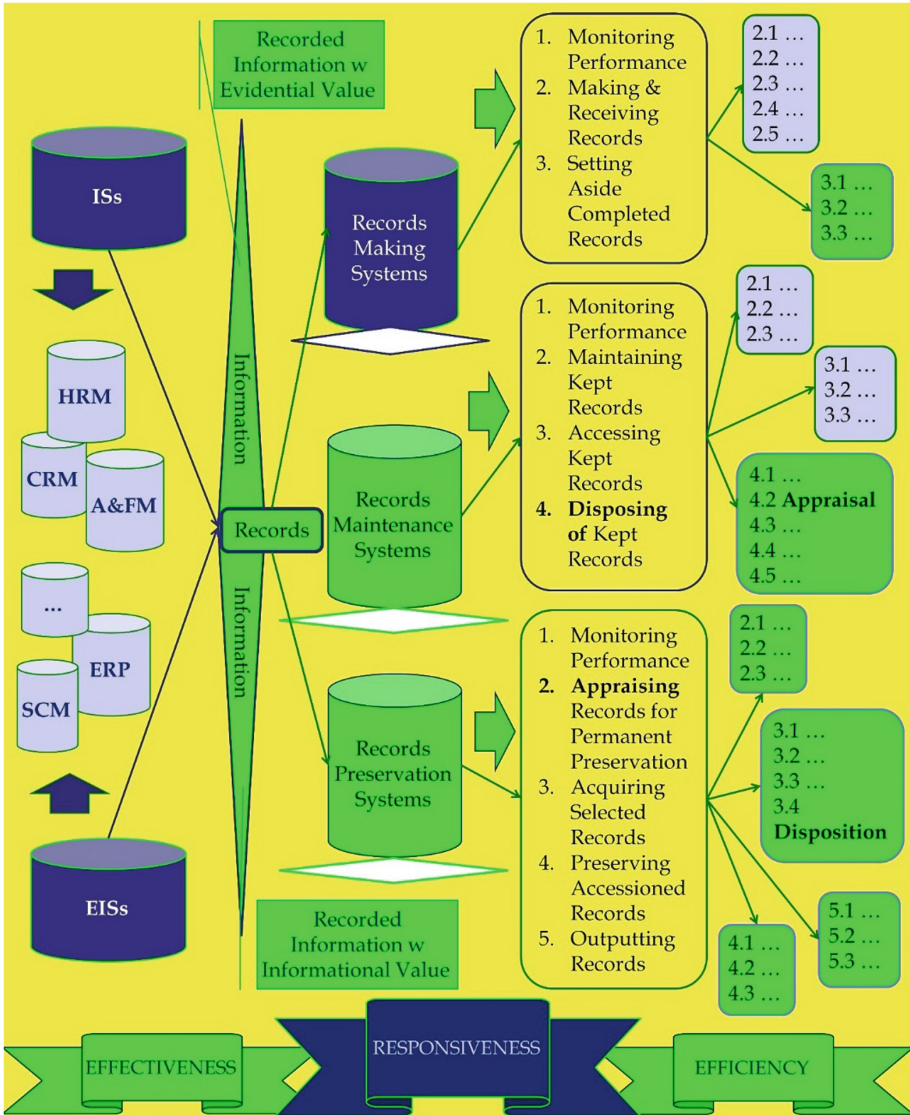


Fig. 13. ISs/EISs and records systems.

## 5 Conclusion

From the above illustration, it can be concluded that for the digital records management field, ISs and EISs are record-making systems. These systems handle data and information flows to support business operations and are motivated by efficiency and convenience. Depending on the specific designs and/or clients' customization requirements, such primarily record-making systems may incorporate certain record-

keeping functionalities, yet it can hardly be said that ISs and EISs are sufficient in satisfying the requirements of organizational records management. For records to be managed as records, the control of records must go beyond individual information systems and the understanding of the value of the records must be from the viewpoint of the entire enterprise, taking into considerations of both internal and external requirements. The design and the articulation of the three types of records systems as depicted in the COP model are driven by this holistic view. ISs and EISs are designed to streamline the conduct of business activities and are equipped with standard features of control and security. They may very well be sufficient for current operation and immediate usage but inherently, they are not ready for such complicated processes as records appraisal and disposition – the hallmarks of records management. Figure 13 depicts the high-level relationships between records systems and ISs/EISs.

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 MoReq 2010 Specification, to manage their unstructured digital records. However, transaction-oriented ISs and certainly EISs are normally left out of the control of organizational digital records management program, an issue that is not fully acknowledged by the ISs and EIS fields. ISs and EISs have been continuously advancing, and with the increasingly wide deployment of cloud infrastructure/services, they are becoming more powerful and ubiquitous. Still, these systems lack typically the functionalities that focus on systematic and consistent management of organizational information in the form of records, a stance that views the enterprise as a whole and as an integral part of society. As such, future research needs to focus on concrete cases and specific types of information systems for the purpose of establishing principles and guidelines for system designs and implementations that take into considerations of all relevant factors. It is a call by this chapter, therefore, to forge meaningful collaborations between the records profession and the ISs/EISs field so that the joint force can collectively ensure the trustworthiness of organizational digital records, maximize their value realization, and guarantee records accessibility for as not only long as the enterprise exists but also as society needs them.

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