Appendix 5

A Model of the Preservation Function
version 6.0

Preservation Task Force

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i) Model Diagram Descriptions

Purpose: The purpose of this model is to articulate the functions, information, and resources required to preserve authentic electronic records.

Definition: The "Preserve Electronic Records" model describes the processes required to transmit electronic records over time and over generations of information technology and to produce authentic copies of those records. The model is articulated on the basis of the recognition that it is literally impossible to preserve an electronic record as a physical object that exhibits all the required elements of the documentary form of the record. Physically, it is only possible to preserve digital components that contain binary representations of the contents of electronic records and the information necessary to translate the content from the stored representation into the structure and presentation prescribed for the record.

Viewpoint: The model is constructed from the viewpoint of the person responsible for preservation of authentic records. The same person or organization may have other roles or responsibilities, such as appraisal or reference, but coincidental activities are excluded from the "Preserve Electronic Records" model.

When it is determined that a body of electronic records has long-term value, information about those records needs to be provided to the person who will be responsible for preserving them in order for the preserver to determine how the records will be preserved. Feedback from the preserver to the appraiser leads to the articulation of terms and conditions for the transfer of the records. Except in the case of a body of records that will be transferred all at once to the preserver, this feedback loop may extend in time for as long as the records creator continues to create or maintain records belonging to the body of records selected for preservation. During that time, changes in the creator's record keeping may entail changes in the terms and conditions for transfer. One term for transfer is the stipulation of when records should be transferred to the preserver. The preserver's active involvement with the records begins at that point.

The preserver also has a role in responding to requests for copies of records and for information about the records, even though the viewpoint of this model does not include the responsibility for determining access rights, providing information informing potential users about records that may be of interest to them, or otherwise communicating with users. Requests for records and for information about records held in the preservation system are directed to the preserver through the intermediary of the person responsible for reference and access. Nonetheless, the process of reproducing an electronic record from its stored digital components may fail to produce an authentic copy of the record. Therefore, the person responsible for preserving the record must exercise control over reproduction in order to ensure that the record is effectively transmitted over time in authentic form.

Scope: The "Preserve Electronic Records" model encompasses activities from the point where it is determined that a body of electronic records has long-term value to the production of a copy of a preserved electronic record. This scope needs to be subdivided into two parts: the first covers information about the records; the second, the records themselves. The role of preserving records includes all of the activities necessary to ensure the transmission of authentic electronic records over time. First, there is interaction with the process by which aggregates of records are selected for preservation. At this stage, the person responsible for preservation needs to determine whether the records can be preserved and given established capabilities and capacities, or alternatively to plan actions to expand those capabilities and capacities. The role of preserving extends to the delivery of copies of preserved records to end-users. At this end stage, the person responsible for preservation needs to control production of copies, because only end-

to-end preservation control—include transfer from the records creators through delivery to end-users—can ensure the authenticity of copies.

The "Preserve Electronic Records" model operates at two different levels. Some of the activities in the model—for example, Bring in Electronic Records—operate on sets of electronic records. Other activities, such as Output Electronic Record, operate at the level of individual records.

The level of detail in the description of processes in the model is limited by the fact that it is intended to apply to any and all electronic records that may be selected for preservation, and that it is intended to be valid for all preservers. Thus, the model provides for the operation of external—legal, societal, stakeholder—requirements as controls on preservation process. It assumes that the preserver is responsible to a specific institution and that external requirements are interpreted by the institution to determine how they apply to the preservation of electronic records. The model does not detail the impact of any specific institutional controls, although it does indicate where such controls impact the process. Similarly, the model does not detail the preservation of any specific record, body of records, class of records, or class of digital component of electronic records. At present, the model does not detail the operation of any specific technique (such as migration, technology preservation, or persistent object preservation) for overcoming technological obsolescence or for maintaining the capability of producing authentic copies of electronic records. However, it does delineate the process both for selecting the approach to be taken in any case and where the technique should be applied.

Source: The "Preserve Electronic Records" model was developed by the Preservation Task Force of the InterPARES Project based primarily on the knowledge of the multidisciplinary experts who were members of the task force, supplemented by information gathered from the members' institutions, by a survey of digital preservation projects, and by the products of the InterPARES Authenticity and Appraisal Task Forces.

IDEF(0) Diagrams

A0, Preserve Electronic Records.
Given Information about Electronic Records Selected for Preservation, and the Transfer of those records, the "Preserve Electronic Records" model transmits electronic records over time. In response to a Request for a Record and/or Information about the Records, the process produces copies of those records and, if requested, certifies the authenticity of the copies. The preservation process can also output the digital components of an electronic record and relevant information enabling the recipient to reproduce the record from those components. If a request is only for information about a record, the available information is delivered. The process also outputs information about how the preservation function has been exercised.

The records preservation function is controlled by Archival Requirements, the State of the Art of Information Technology, Institutional Requirements. It is accomplished by Persons Responsible for Preservation, using Information and Communications Technologies in appropriate Facilities.

Preserve Electronic Records.
The process, Preserve Electronic Records, involves four sub-processes: Manage the Preservation Function, Bring in Electronic Records, Maintain Electronic Records, and Output Electronic Record. The first of these functions controls the other three; the other three provide feedback to the "Manage" function.

Manage the Preservation Function.
Managing the preservation function involves analyzing Information about Electronic Records Selected for Preservation and about Electronic Records Transferred and Accessioned Records to Determine Preservation Requirements, to Select Preservation Technologies suitable for the Specified Requirements for Preservation; Specify a

Preservation Strategy which determines precisely how and when selected preservation technologies will be used to preserve a target body of records; and related procedures and controls. These processes produce the Preservation Strategies which control all other preservation processes: bringing records in, maintaining them, and outputting them, the Technological Infrastructure necessary to carry out these processes, and the Targeted Preservation Methods applied to the objects within the scope of each Preservation Strategy. In addition, managing the preservation function entails evaluating execution of the three other preservation processes and using the results of this evaluation to improve the management process.

A1.1, Determine Preservation Requirements.
Determining preservation requirements consists of four distinct processes: determining technical specifications for transfer and for storage of records in logical and physical files, determining the specific archival properties of records that must be preserved, determining how these properties are instantiated in the digital components of the records, and producing a synthesis of the requirements articulated in these analyses. There is also an ancillary process of determining the actual basis for presuming that the records creator maintained and transferred authentic records. Its output is also factored into the synthesis of preservation requirements.

The first process considers only archival properties of records and archival aggregates, regardless of how their properties are instantiated in digital objects or what software is needed to execute the methods of each type of digital object. It determines preservation requirements that technology must satisfy and that control the use of technology in preservation. Archival properties are defined for classes of individual records, for archival aggregates, and for the presentation of records and aggregates for use.

The second of the principal processes, determining how archival properties are instantiated, is represented by and decomposed into three sub-processes. First information about classes of records is analyzed to determine how records in each class are composed of their Digital Components. Second, information about how archival aggregates in the body of records are constructed and ordered is reviewed to determine what will be required over time to reinstantiate aggregate structures, with members in proper order. Third, information about how individual records and archival aggregates are presented is analyzed in order to develop specifications for reproducing records. Each of these three steps and also the analysis of the presumption of authenticity produce appropriate requirements for preservation, which are then synthesized in the final process to produce a comprehensive and coherent set of requirements for preserving a body of records.

A2, Bring in Electronic Records.
The process of bringing in electronic records consists of the essentially mechanical step of registering receipt of a transfer, followed by verifying, on the basis of information about the transfer, whether the records purportedly included in the transfer have been selected for preservation. If so, the digital files received are reviewed to ensure that they contain the records authorized for transfer, culminating in a formal decision to accept responsibility for preserving the records.

A2.3, Examine Electronic Records.
Examining electronic records is a process of comparing the records received in a transfer to what was expected about those records, based on information in appraisal and on the documentation received with the transfer, in order to ensure that the transferred records satisfy requirements specified in the applicable Preservation Strategy, to determine if the records can be preserved, and to take any action necessary to ensure their preservation.

A3, Maintain Electronic Records.
Maintaining electronic records entails managing information about them, managing the storage of their digital components, and updating those components when necessary, as indicated by the applicable Preservation Strategy. The process outputs information about

preserved records and the digital components of requested records. If necessary because of updated preservation strategies and methods, it updates the digital components so that records and/or archival aggregates can be reproduced using the updated methods.

A3.1 Manage Information about Records.

Managing information about records entails maintaining information about the records and, on request, retrieving information about the records and, if needed, information about their digital components.

A3.2, Manage Storage of Digital Components of Records.

Managing the storage of the digital components of electronic records starts with putting into storage the components of a body of records accepted for preservation in accessioning. It is completed by retrieving and outputting digital components in response to a request. This process also entails periodically refreshing storage media before current media start to deteriorate and updating the storage system in response to changes in storage technology. This process also involves monitoring stored files to ensure that they are intact, and, if not, taking action to correct any storage problems encountered.

A4, Output Electronic Record.

An electronic record, its digital components, or information about the record are output in response to a request initiated outside of the preservation process. Each request needs to be managed in order to ensure that there is a response and that the response is appropriate. The first step in responding to an external request is to issue a retrieval request for the desired information or digital components. The response to this retrieval request is reviewed to ensure that the retrieved information or components are complete and correct. If the external request was only for information, the requested information is sent to the requester. If the request is for reproduction of a record, the method prescribed in the Preservation Strategy for the records is applied to the digital components and the reconstituted record is then either presented to the external requestor or suitably packaged for delivery via telecommunications. If specified in the request for a copy of the record, the process produces a certificate attesting to the authenticity of a reproduced copy. Alternatively, if the external request was only for digital components, the process reviews for complete and correct retrieval of those components, then packages them for delivery without reproducing the record.

The Output Electronic Record process may also be invoked when records in a transfer are being examined, in order to verify that the records in the transfer can be preserved and reproduced.