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Crosswalk of Functional and Activity Models: InterPARES, OAIS, PAIM, Tufts/Yale

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Introduction

In order to determine necessary activities in the pre-ingest, ingest, preservation and access phases of electronic records preservation, the activities in the InterPARES 2 Chain of Preservation (CoP) Model, Open Archival Information System (OAIS) and Producer-Archive Interface Methodology (PAIM) were mapped to determine necessary activities for a Fedora-based electronic records preservation system for the National Library of Medicine, Archives and Modern Manuscripts Program (AMMP). As a published model for the management of electronic records in a Fedora repository, the system model from the Tufts/Yale Fedora and the Preservation of University Records Project (Tufts/Yale) was then mapped to first three models, to see if any significant gaps existed.

The workflow of AMMP was then mapped against the four published models to identify if any gaps existed in AMMP's current practices. If the identified gaps are perceived to be significant enough, then adjustments will be made in the forthcoming functional model.

A reversed mapping of the InterPARES, OAIS and AMMP models was also performed, to check the results of the first crosswalk.

Reading the Crosswalk

The table consists of six columns. The first four contain activities and functions taken from published models: InterPARES 2 Chain of Preservation Model (InterPARES); Open Archival Information System (OAIS); Producer-Archive Interface Methodology (PAIM); and Fedora and the Preservation of University Records Project (T/Y). The fifth column maps the acquisition, management and preservation workflows of AMMP to the models, identifying gaps in the workflows. The sixth column identifies tools that may be used to perform (and, ideally, automate) each of the activities/functions. The seventh column contains any explanatory notes. The eighth column includes the citation for the activity/function listed. Included in footnotes are definitions of terms and expansions of concepts found in the activity/function statements.

Only sections A1 and A4 of the InterPARES model were mapped. Because AMMP acquires private records and, therefore, has no control over the creation or non-permanent storage of electronic records, sections A2 and A3 (Managing Records in a Record-making System and Managing Records in a Recordkeeping System, respectively) were not included in the exercise.

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Further Reading

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Appendix A: Crosswalk

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
A1 Managing the Framework for the Chain of Preservation							
A1.1 Develop Management Framework							
A1.1.1 Analyze Records Creator	4.1.1.5 Administration—Negotiate Submission Agreement[2]	P-1 Identify the Contact Persons and Work Organization P-2 Exchange of general information[3]	A1 Establish Relationship A1.2 Identify Producer A1.6 Collect and document information about Producer A9 Assess Recordkeeping System A9.1 Has Archive documented recordkeeping system as supporting feasible and trustworthy transfer? A9.2 Can recordkeeping system support feasible and trustworthy transfer? A9.3 Are records in Ingest Project managed according to rules of the recordkeeping system? A9.4 Is Archive or Producer willing to take extraordinary measures to transfer records?	A1 Contact initiated with Records Creator		For the crosswalk, the majority of PAIM activities in the Preliminary Phase were mapped to A1.1 Develop Management Framework of the InterPARES model, because the Preliminary Phase is primary an information-gathering phase. Much of the information gathered, however, is applicable to activities in A1.2, Design Framework, of the InterPARES model, as well as A4.2, Appraise Records for Permanent Preservation.	• InterPARES (7–8) • OAIS (4-10–4-11) • PAIM (3-3, 3-15) • T/Y (8–9, 43–44)
A1.1.2 Analyze Creator's Existing Records	4.1.1.5 Administration—Negotiate Submission Agreement	P-2 Exchange of general information P-3 Identify the Content Information to be preserved	A2 Define Project A2.1 Identify records at issue, agreeing upon scope of survey	A3 Pre-visit made to Records Creator	• Interview questionnaire • Survey forms • Inventory forms		• InterPARES (8) • OAIS (4-10–4-11) • PAIM (3-3, 3-

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[1] Information for this column are taken from three sources: Software tools are taken from the Vancouver Digital Archives Wiki and CAIRO, while other tools are taken from Simon Fraser University's eRecords Research Report 2. Indications of whether activities are supported in Fedora are from the Tufts/Yale Project's

[2] The Negotiate Submission Agreement function of OAIS includes the collection of archival information necessary to negotiate Submission Agreements with Producers.

[3] General information includes the type of information to be preserved, its context, its schedule and its constraints.

Color Coding: ▢ High-level COP activity, mapped at lower levels; ▢ No match; ▢ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
		P-4 Identify the complementary information P-5 Identify the Designated Community P-7 Assess the planned duration of the preservation of this information by this Archive P-8 Assess the feasibility and costs P-9 Make a preliminary identification of the Data Objects related to the different categories of information to be archived P-21 Assess the permanent data volume to store	A2.2 Does Producer have custody/authority over the records? A3 Collect Information and assess Value of Records A3.1 Conduct Records Survey, note attributes of records A4 Assess Record Types A4.1 Are all records identified as a record type? A4.2 Identify new Record Type, create new Record Type Record A5 Assess Formats A5.1 Are any records in file formats that are not a preservation format?		• File format registry • Metadata standards and templates • Advice sheets for private donors		5–3-7, 3-9, 3-15) • T/Y (12, 16, 20, 23)
A1.1.3 Analyze Designated Records Preserver	4.1.1.5 Administration—Negotiate Submission Agreement	P-1 Identify the Contact Persons and Work Organization P-2 Exchange of general information P-21 Assess the storage capability needed for the ingest process P-31 Address Archive certification	A1 Establish Relationship A1.4 Is this the appropriate Archive?	A2 Determine suitability of Archives to acquire records			• InterPARES (8) • OAIS (4-10–4-11) • PAIM (3-3, 3-9, 3-12, 3-14–3-15) • T/Y (9)
A1.1.4 Establish Management Policies	4.1.1.5 Administration—Negotiate Submission Agreement	P-6 Define Consumer access to the information P-7 Assess the planned duration of the preservation of this information by this Archive P-23 Identify the requirements for confidentiality and	**Not in T/Y**	A4. Schedule pick-up of records			• InterPARES (8) • OAIS (4-10–4-11) • PAIM (3-5, 3-10–3-12, 3-14, 3-15)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
		authentication between Producer and Archive P-24 Identify requirements for security P-25 Identify requirements for confidentiality and authentication between Archive and Consumer P-28 Define the nature of the relationships between the Archive and the Producer P-29 Assess the problem of intellectual property P-30 Define the conditions for access to data P-41 Define a preliminary schedule P-45 Draw up a summary document P-46 Make a preliminary agreement to proceed to the next phase					
A1.1.5 Establish Design Requirements	4.1.1.5 Administration—Negotiate Submission Agreement	P-10 Define the rules and standards related to these objects that are accepted by the Archive P-11 Define the tools available for the application of rules and standards known by the Archive P-14 Assess the compatibility and study solutions P-15 Assess the efforts and associated costs P-16 Draw up an inventory of the information on the existing identification rules	**Not in T/Y**	*See note.*		As the Fedora-based repository being built by NLM will be used for all of NLM's digital collections, decisions on systems design will be made at a higher level and will not be fonds-specific. Before the ingest of electronic records into the repository, AMMP should determine how multi-level hierarchies are to be represented within the Fedora system.	• InterPARES (8) • OAIS (4-10–4-11) • PAIM (3-8–3-9, 3-12–3-14)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
		or nomenclature within the domain, legal provisions, and standards P-17 Define the rules that could or should be applied within the context of the Producer-Archive project P-22 Assess the associated costs [of storage needs] P-26 Identify standards and tools P-32 Provide the standards and tools used P-33 Assess the associated costs P-34 Make a preliminary definition of the SIPs P-35 Exchange of the requirements and constraints with respect to the transfer of Data Objects and identify possible solutions P-36 Assess associated costs [of transfer] P-37 Supply the Producer with information on the SIP validation procedures, the reject procedures, and the tools that are applied by the Archive P-38 Study the development or modification of the validation tools required P-40 Assess associated costs [of validation]					
A1.2 Design Framework							
A1.2.3 Design Permanent							

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
Preservation System							
A1.2.3.1 Develop Preservation System Administrative Infrastructure							
A1.2.3.1.1 Develop Preservation System Policies[4]	4.1.1.5 Administration— Establish Standards and Policies	F-1 Setup the management of the formal definition phase F-2 Specify points to be made explicit F-3 Define the general project context F-36 Draw up the Submission Agreement	**Not in T/Y**	*See note.*		Same as A1.1.5	• InterPARES (11) • OAIS (4-11) • PAIM (3-19–3-21, 3-31–3-32)
A1.2.3.1.2 Develop Preservation System Strategies[5]		F-36 Draw up the Submission Agreement	**Not in T/Y**	*See note.*			• InterPARES (11) • OAIS (4-11) • PAIM (3-31–3-32)

A1.2.3.1.3 Develop Preservation System Rules and Procedures[6]		F-8 Write a description of the Information Objects
		F-13 Draw up legal and contractual agreements
		F-19 Write a description of the transfer procedures[7]
		F-25 Write a description of the validation procedures[8]
		F-26 Define a reference delivery schedule
		F-27 Define the procedures to implement in the event of the schedule not being followed
		F-32 Define and execute
			A7 Assess Copyright
			  A7.1 Determine copyright status of records in Ingest Project
			  A7.2 Does Archive need to acquire copyright or license for records?
			  A7.3 Undertake negotiations with copyright holder
			  A7.4 Create and endorse agreement with copyright holder
			A8 Assess Access Rights
			  A8.1 Determine records'
				See note.		Largely same as A1.1.5
						
						The Deed of Gift utilized by NLM transfers copyright to NLM.
							• InterPARES (12)
							• OAIS (4-11)
							• PAIM (3-21, 3-23, 3-25, 3-27, 3-28, 3-30, 3-31–3-32)
							• T/Y (32–33, 38–39, 53–54)

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[4] Policies=high-level statements of direction or guidance
[5] Strategies=plans for implementing policies
[6] Rules=authoritative statements of what to do or not do; Procedures=Body of rules governing conduct of transactions, or, formal steps taken to carry out transactions
[7] Includes activities F-14–F-18
[8] Includes activities F-20–F-25.

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InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
		[Change Management] action plan[9] F-36 Draw up the Submission Agreement	Records Security Profile A8.2 Does current security component meet the access control needs of the records? A8.3 Conduct access controls gap analysis A8.4 Define steps necessary to close security gap and close gap A8.5 Can Archive successfully renegotiate access control needs or scope of records? A11 Finalize Submission Agreement A11.2 Add description of Transfer Procedures to Submission Agreement A11.3 Add description of Validation Procedures to Submission Agreement A11.4 Add Transfer Schedule to Submission Agreement A11.5 Add SIP Creation Procedures to Submission Agreement				
A1.2.3.1.4 Develop Preservation System Instruments[10]	4.1.1.4 Data Management—Administer Database[11]	F-4 Define the formats, coding rules, and standards F-6 Define the references F-7 Choose the tools	A11 Finalize Submission Agreement A11.1 Add description of Metadata Encoding Rules to Submission	*See note.*		The Instruments utilized by AMMP will be largely based on best practice and published standards. These may include	• InterPARES (13) • OAIS (4-9) • PAIM (3-7–3-8) • T/Y (53)

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[9] Includes activities F-28–F-31.

[10] Preservation System Instruments include preservation metadata [schema], records transfer registration and accession schemes, preservation reporting schemes and controlled vocabularies/thesauri.

[11] This function is responsible for creating any schema or table definitions required to support Data Management functions.

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InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			Agreement			the use of the PREMIS metadata scheme and DACS and EAD for archival description.	
A1.2.3.2 Establish the system's functional requirements[12]							
A1.2.3.2.1 Determine Preservation System Performance Requirements	4.1.1.5 Administration—Establish Standards and Policies	**Not in PAIM**	**Not in T/Y**	*See note.*		Same as A1.1.5	• InterPARES (13) • OAIS (4-11)
A1.2.3.2.2 Determine Preservation System Monitoring Requirements	4.1.1.5 Administration—Establish Standards and Policies	**Not in PAIM**	**Not in T/Y**	*See note.*		Same as A1.1.5	• InterPARES (13) • OAIS (4-11)
A1.2.3.2.3 Determine Preservation System Technological Requirements	4.1.1.5 Administration—Establish Standards and Policies	F-4 Define the formats, coding rules, and standards F-7 Choose the tools F-9 Define the object classes and their attributes F-11 Define the model of the data to be delivered F-12 Draw up a model representation F-18 Identify the tools that may be used during the transfer phase	**Not in T/Y**	*See note.*		Same as A1.1.5	• InterPARES (13) • OAIS (4-11) • PAIM
A1.2.3.3 Establish the system's performance requirements[13]	4.1.1.5 Administration—Establish Standards and Policies	**Not in PAIM**	**Not in T/Y**	*See note.*		Same as A1.1.5	• InterPARES (13) • OAIS (4-11) • PAIM

A1.2.3.4 Design the system's functional infrastructure	4.1.1.5 Administration—Establish Standards and Policies	F-14 Define the communication procedures
		F-15 Define the Packaging Information of delivered objects
			A5 Assess Formats
			  A5.2 Should Archive transform or natively handle these formats?
			  A5.3 Identify needed Representation Information for new preservation format
				See note.		Same as A1.1.5	• InterPARES (13)
							• OAIS (4-11)
							• PAIM (3-12–3-25)
							• T/Y (23–24)

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[12] These requirements include performance requirements, monitoring requirements and technological requirements.
[13] This involves developing operational benchmarks or standards for the operation of the system.

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InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			A5.4 Choose appropriate format A5.4 Choose appropriate rules and standards to apply to format				
A1.3 Implement Framework	4.1.1.5 Administration—Manage System Configuration	F-13 Draw up legal and contractual agreements F-19 Write a description of the transfer procedures F-25 Write a description of the validation procedures F-32 Define and execute action plan F-36 Draw up the Submission Agreement	A11 Finalize Submission Agreement A11.1 Add description of Metadata Encoding Rules to Submission Agreement A11.2 Add description of Transfer Procedures to Submission Agreement A11.3 Add description of Validation Procedures to Submission Agreement A11.4 Add Transfer Schedule to Submission Agreement A11.5 Add SIP Creation Procedures to Submission Agreement A11.6 Finalize Submission Agreement A11.7/A11.9 Does Archive and Producer agree to and approve (revised) Submission Agreement? A11.8 Revise Submission Agreement addressing concerns preventing approval	A4. Schedule pick-up of records *See note.*		Largely same as A1.1.5	• InterPARES (13) • OAIS (4-11) • PAIM (3-23, 3-25, 3-27, 3-30, 3-31–3-32) • T/Y (53–55)
A1.4 Maintain Framework	4.1.1.4 Data Management—Administer Database 4.1.1.4 Data	**Not in PAIM**	**Not in T/Y**	*See note.*		Same as A1.1.5	• InterPARES (14) • OAIS (4-9–4-10)

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InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
	Management—Receive Database update						
A4 Manage Records in a Permanent Preservation System							
A4.1 Monitor Performance of Permanent Preservation System	4.1.1.5 Administration—Manage System Configuration	**Not in PAIM**	**Not In T/Y**				• InterPARES (29) • OAIS (4-11)
A4.2 Appraise Records for Permanent Preservation							
A4.2.1 Monitor Performance of the Preservation Selection System	**Not in OAIS**	**Not in PAIM**	**Not in T/Y**	*See note.*		Because AMMP acquires private records, rather than the records of an organization or public body, this step is unnecessary.	• InterPARES (29)
A4.2.2 Analyze Kept Records for Preservation							

A4.2.2.1 Analyze Information About Records	4.1.1.5 Administration—Negotiate Submission Agreement	*See A1.1.2 Analyze Creator's Existing Records*	A3
			  A3.1 Conduct Records Survey, notes attributes of records
			 A4
			  A4.1 Are all records identified as a Record Type?
			  A4.2 Identify new Record Type, create new Record Type Record
			 A5
			  A5.1 Are any records in file formats that are not a preservation format?
				A3 Pre-visit made to Records Creator
				 C1 Conduct Records Survey
					• File Information Tool set (FITS), *file format identification*[14]
					 • DROID, *file format identification*[15]
					 • JHOVE, *file format identification*[16]
					 • NLNZ Metadata Extractor, *file format identification*[17]
					 • ***Format Validation Service not***
							• InterPARES (29)
							 • OAIS (4-10–4-11)
							 • PAIM 3-6
							 • T/Y 2.1 (15, 16, 19, 20, 22, 23)
							 • T/Y 3.3 (16, 20, 23)

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[14] http://code.google.com/p/fits/
[15] http://sourceforge.net/apps/mediawiki/droid/index.php?title=Main_Page
[16] http://hul.harvard.edu/jhove/index.html
[17] http://meta-extractor.sourceforge.net/

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InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
					supported by Fedora		
A4.2.2.2 Assess Value of Records							
A4.2.2.2.1 Assess Continuing Value of Records	4.1.1.5 Administration—Negotiate Submission Agreement	P-3 Identify the Content Information to be preserved	A3.3 Should Archive accession at least some of the records?	C3 Determine continuing value or electronic records			• InterPARES (30) • OAIS (4-10–4-11) • PAIM (3-5) • T/Y 2.1 (17)
A4.2.2.2.2 Assess authenticity of the appraised records							
A4.2.2.2.2.1 Compile Evidence Supporting the Presumption of Authenticity	4.1.1.5 Administration—Audit Submission	**Not In PAIM**	A3 Collect Information and Assess Value of Records A3.2 Judge Authenticity of Records	C2 Assess authenticity of electronic records			• InterPARES (30) • OAIS (4-11–4-12) • T/Y 2.1 (16)
A4.2.2.2.2.2 Measure Evidence Against Requirements for Authentic Records	4.1.1.5 Administration—Audit Submission		A3 Collect Information and Assess Value of Records A3.2 Judge Authenticity of Records	C2 Assess authenticity of electronic records			• InterPARES (30) • OAIS (4-11–4-12) • T/Y 2.1 (16)
A4.2.2.2.2.3 Verify Authenticity	4.1.1.5 Administration—Audit Submission		A3 Collect Information and Assess Value of Records A3.2 Judge Authenticity of Records	C2 Assess authenticity of electronic records	• Md5sum scripts, *checksum generation and verification scripts*[18]		• InterPARES (30) • OAIS (4-11–4-12) • T/Y 2.1 (16)
A4.2.2.2.3 Determine the value of appraised records	4.1.1.5 Administration—Negotiate Submission Agreement	P-3 Identify the Content Information to be preserved	A3 Collect Information and Assess Value of Records A3.3 Should Archive accession at least some of the records?	C3 Determine continuing value of electronic records			• InterPARES (30) • OAIS (4-10–4-11) • T/Y 2.1 (17)
A4.2.2.3 Determine the feasibility of preserving the appraised records							
A4.2.2.3.1 Determine the record elements to be preserved	4.1.1.5 Administration—Negotiate Submission Agreement	**Not in PAIM**	A3 Collect Information and Assess Value of Records A3.4 Determine	C4 Determine record elements and digital components of records to			• InterPARES (30) • OAIS (4-10–4-

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[18] https://help.ubuntu.com/community/HowToMD5SUM

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InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			essential elements of records that should be accessioned	preserve			11) • T/Y 2.1 (17)
A4.2.2.3.2 Identify the digital components to be preserved	4.1.1.5 Administration—Negotiate Submission Agreement	**Not in PAIM**	A3 Collect Information and Assess Value of Records A3.4 Determine essential elements of records that should be accessioned	C4 Determine record elements and digital components of records to preserve			• InterPARES (30) • OAIS (4-10–4-11) • T/Y 2.1 (17)
A4.2.2.3.3 Reconcile the identified preservation requirements with the preserver's preservation capabilities	4.1.1.5 Administration—Negotiate Submission Agreement	P-8 Assess the feasibility and costs P-20 Assess the permanent data volume P-21 Assess the storage capability P-22 Assess the associated costs	A10 Assess Feasibility A10.1 Can Archive feasibly preserve the records? A10.2 Can Producer help Archive feasibly preserve the records?	C5 Assess file formats of electronic records			• InterPARES (30) • OAIS (4-10–4-11) • PAIM (3-9–3-10) • T/Y 2.1 (49)
A4.2.3 Making Appraisal Decisions[19]	4.1.1.5 Administration—Negotiate Submission Agreement	P-7 Assess the planned duration of the preservation of this information by this Archive	A3 Collect Information and Assess Value of Records A3.3 Should Archive accession at least some of records? A10 Assess Feasibility A10.3 Exclude infeasible records from Ingest Project	A3 Pre-visit made to Records Creator C6 Make appraisal decision			• InterPARES (31) • OAIS (4-10—4-11) • PAIM (3-6) • T/Y 2.1 (17, 49)
A4.2.4 Monitoring Appraisal Decisions	4.1.1.5 Administration—Negotiate Submission Agreement	**Not in PAIM**	**Not in T/Y**	C6 Make appraisal decision			• InterPARES (31) • OAIS (4-10–4-11)
A4.3 Acquiring Selected Records							
A4.3.1 Monitoring the Performance of the Preservation Acquisition System	4.1.1.6 Preservation Planning—Monitor Designated Community 4.1.1.6—Preservation Planning—Monitor Technology	T-1 Initial transfer test T-2 Ensure the proper execution of the data transfer operation from both the Producer and Archive sides	A9 Assess Recordkeeping System A9.1 Has Archive documented recordkeeping system as supporting feasible and	B4. Monitor performance of transfer system			• InterPARES (32) • OAIS (4-13–4-14) • T/Y (43)

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[19] This includes determining and documenting the retention and disposition of selected records and agreeing on and documenting the terms and conditions of transfer.

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
		V-1 Initial validation test	trustworthy transfer? A9.2 Can recordkeeping system support feasible and trustworthy transfer?				
A4.3.2 Processing Records Transfers							
A4.3.2.1 Register the transfer	4.1.1.2 Ingest—Receive Submission	T-2 Ensure the proper execution of the data transfer operation	B2 Validate B2.1 Archive receives SIP from the Producer	B1 Register transfer			• InterPARES (32) • OAIS (4-5) • T/Y 2.1 (63)
A4.3.2.2 Confirm the authorization for the transfer	4.1.1.5 Administration—Audit Submission	**Not in PAIM**	B2 Validate B2.4 Is submitter authorized to submit SIP to Archive? B2.7 Reject records in SIP affected by validation failure B2.8 Notify Producer of records rejection, Producer will reattempt creation of SIP	B3 Quarantine electronic records			• InterPARES (32–33) • OAIS (4-11–4-12) • T/Y 2.1 (64–65)
A4.3.2.3 Verify the content of the transfer	4.1.1.2 Ingest—Quality Assurance 4.1.1.5 Administration—Audit Submission	V-2 Apply the validations V-3 Manage the results of the validation	B2 Validate B2.2 Is SIP well-formed? B2.3 Does SIP contain malicious code? B2.5 Does SIP contain all necessary record components? B2.7 Reject records in SIP affected by validation failure B2.8 Notify Producer of records rejection, Producer will reattempt creation of SIP B5 Assess AIPs B5.1 Are all records in the AIP part of accession described by Submission Agreement?	B3 Quarantine electronic records			• InterPARES (33) • OAIS (4-5, 4-11–4-12) • T/Y 2.1 (62–65)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			B5.2 Reject records not described by Submission Agreement B5.3 Notify Producer of records rejection. Producer will create new SIP for affected records				
A4.3.2.4 Confirm the authenticity of the records in the transfer	4.1.1.2 Ingest—Quality Assurance 4.1.1.5 Administration—Audit Submission	V-2 Apply the validations V-3 Manage the results of the validation	B2 Validate B2.6 Do record components in SIP validate? B2.7 Reject records in SIP affected by validation failure B2.8 Notify Producer of records rejection, Producer will reattempt creation of SIP	B3 Quarantine electronic records	• Hashdeep, *compute, match and audit hashsets during transfers*		• InterPARES (33–34) • OAIS (4-5, 4-11–4-12) • T/Y 2.1 (64–65)
A4.3.2.5 Confirm the feasibility of preserving the transfer[20]	**Not in OAIS**	**Not in PAIM**	**Not in T/Y**	*See note.*		With the exception of InterPARES, confirming the feasibility to preserve records is performed only in the Appraisal function. InterPARES includes this activity again within the transfer activity to ensure appraisal decisions continue to reflect the abilities of the archives to store and preserve the electronic records in the transfer. Because it is anticipated that appraisal and transfer of electronic records will occur within a relatively short period	• InterPARES (34–35)

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[20] This step serves to verify appraisal decisions, to ensure that the archives still has the capacity to preserve the records selected for long-term preservation.

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
						of time, this step is not necessary within the context of AMMP.	

A4.3.3 Accessioning Records	4.1.1.2 Ingest—Coordinate Updates	T-2 Ensure the proper execution of the data transfer operation	B3 Transform and Attach Metadata
			   B3.2 Perform transformation on records that require transformation
			   B3.4 Attach to records the records security profile defined by Submission Agreement
			B4 (B4.1) Formulate AIPs
			B6 Formally Accession
			   B6.1 Submit AIPs into Preservation Repository
			   B6.2 Formally notify Producer that Archive has accepted and accessioned records described by Ingest Project
				E3 Ingest AIPs into Fedora-based repository			• InterPARES (35)
							• OAIS (4-6)
							• T/Y

A4.4 Preserving Accessioned Records							
A4.4.1 Managing Information About Preserved Records							
A4.4.1.1 Monitor the performance of the preservation information system	**Not in OAIS**	**Not in PAIM**	**Not in T/Y**	F1. Monitor storage system			• InterPARES (37)

A4.4.1.2 Compile information for preservation activities	4.1.1.2 Ingest—Generate AIP
	4.1.1.2 Ingest—Generate Descriptive Information
		Not in PAIM	B3 Transform and Attach Metadata
			   B3.3 Attach to records metadata inferred from Submission Agreement
			   B3.4 Attach to records security profile defined by Submission Agreement
				A1 Contact initiated with Records Creator
				A3 Pre-visit made to Records Creator
				C1 Conduct Records Survey
				C5 Assess file formats of electronic records
						OAIS's Generate AIP function may issue reports of information needed to produce Descriptive Information. Generate Descriptive Information, meanwhile, extracts the descriptive information from the	• InterPARES (37–38)
							• OAIS (4-6)
							• T/Y 2.1 (68–69)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
						AIPs, as well as other sources.	
A4.4.2 Managing the Arrangement of Preserved Records	**Not in OAIS**	**Not in PAIM**	A6 Assess Identifier Rules A6.1 Is there a Producer naming/identification scheme that needs accommodation? A6.2 Does Archive already use naming/identification scheme? A6.3 Adopt this naming/identification scheme as an Archive naming/identification scheme A6.4 Determine appropriate naming/identification scheme(s)	D1 Determine arrangement of electronic records		Under T/Y, Identifier Rules includes path names and directory names, which are considered in this crosswalk to relate to arrangement.	• InterPARES (38) • T/Y 2.1 (28–29)
A4.4.3 Managing the Description of Preserved Records							
A4.4.3.1 Monitor the performance of the preservation description system	4.1.1.4 Data Management—Administer Database[21]	**Not in PAIM**	B5.4 Is proper metadata attached to the records?				• InterPARES (38) • OAIS (4-9) • T/Y (76)
A4.4.3.2 Describe the preserved records	4.1.1.2 Ingest—Generate Descriptive Information 4.1.1.2 Ingest—Coordinate Updates[22]	**Not in PAIM**	A6 Assess Identifier Rules A6.1 Is there a Producer naming/identification scheme that needs accommodation? A6.2 Does Archive already use naming/identification scheme?	D2 Ensure appropriate metadata is attached to electronic records		OAIS's Coordinate Updates function transfers Descriptive Information to Data Management.	• InterPARES (38–39) • OAIS (4-6) • T/Y 2.1 (76)

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[21] Function is responsible for providing internal validation of the contents of the database.
[22] Transferring the Descriptive Information to Data Management

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			A6.3 Adopt this naming/identification scheme as an Archive naming/identification scheme A6.4 Determine appropriate naming/identification scheme(s) B3.3 Attach to records metadata inferred from Submission Agreement B3.4 Attach to records the records security profile defined by Submission Agreement B5 Assess AIPs B5.4 Is proper metadata attached to records in the AOP?				
A4.4.3.3 Develop description instruments	4.1.1.2 Ingest—Generate Descriptive Information 4.1.1.4 Data Management—Administer Database 4.1.1.4 Data Management—Generate Report	**Not in PAIM**	**Not in T/Y**	D3 Develop appropriate descriptive tools for records		Although PAIM and T/Y both include metadata in the submission agreement, this metadata applies to actions taken on the record during the custody of the Producer. Metadata generated during ingest and during preservation and access are not addressed.	• InterPARES (40) • OAIS (4-6, 4-9)
A4.4.4 Managing the Storage of Preserved Records							
A4.4.4.1 Monitor the performance of the preservation storage system	4.1.1.6 Preservation Planning—Monitor Designated Community 4.1.1.6—Preservation	**Not in PAIM**	**Not in T/Y**	F1 Monitor storage system			• InterPARE S • OAIS (4-13–4-14) • PAIM (3-33–3-34)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
	Planning—Monitor Technology						
A4.4.4.2 Place preserved records in storage[23]	4.1.1.2 Ingest—Coordinate Updates[24] 4.1.1.2 Ingest—Generate AIP 4.1.1.3 Archival Storage—Receive Data	T-2 Ensure the proper execution of the data transfer operation	B3.2 Perform transformation on records that require transformation B4 Formulate AIPs B4.1 Formulate AIPs B6 Formally Accession B6.1 Submit AIP's into Preservation Repository B6.2 Formally notify Producer that Archive has accepted and accessioned records described by Ingest Project	E1 Create preservation copies of electronic records E2 Create AIPs E3 Ingest AIPs into Fedora-based repository	• BagIt, *packaging*[25] • Xena, *transformation* [26] • PAWN, *bulk ingest*[27]		• InterPARES (40) • OAIS (4-6–4-7) • PAIM (3-33–3-34) • T/Y 2.1 (79)
A4.4.4.3 Maintain the records in the permanent preservation storage system							
A4.4.4.3.1 Monitor the preserved records in storage	4.1.1.3 Archival Storage—Error Checking	**Not in PAIM**	• Verify AIP Consistency • Verify Records Components • Check Access and Retention Status • Report on Media Life • Hardware Test and Maintenance Window • Security Audit	F2 Monitor electronic records in storage			• InterPARES (40) • OAIS (4-8) • T/Y (7–8)
A4.4.4.3.2 Back-up the permanent preservation system	4.1.1.3 Archival Storage—Disaster Recovery[28]		• Incremental Backup of Administrative Metadata	F1 Monitor storage system	• ***Not supported in Fedora***		• InterPARES (40–41) • OAIS (4-8) • T/Y (6–7)

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[23] COP (A4.4.4.2) includes any modifications made to records in preparation for storage. Thus, this activity covers T/Y B3.1 (Perform transformation), in addition to B6.2 (Submit AIPs).
[24] Transferring the AIPs to Archival Storage
[25] http://www.digitalpreservation.gov/library/challenge/data-transfer.html
[26] http://xena.sourceforge.net/
[27]

[28] Mechanism for duplicating the digital contents of the archive collection and storing the duplicate in a physically separate facility.

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			• Full Backup of Administrative Metadata • Incremental Backup of Records Component Store • Full Backup of Records Component Store				• T/Y 3.3 (4)
A4.4.4.3.3 Correct problems with the preserved records in storage	4.1.1.3 Archival Storage—Error Checking A4.1.1.4 Data Management—Administer Database		• Respond to Checksum Failure • Respond to Data Loss: Record component Store • Respond to AIP Consistency Failure • Respond to Unintentional Data Damage	F2 Monitor electronic records in storage			• OAIS (4-8–4-9)
A4.4.4.3.4 Update preserved records in storage	4.1.1.5 Administration—Archival Information Update		• Format Transform Request • Remove Record Component Request • Add Additional Representation Information	F2 Monitor electronic records in storage	• ***Not supported in Fedora***		• InterPARES (42) • OAIS (4-11) • T/Y 3.3 (5–6)
A4.4.4.3.5 Refresh storage media for preserved records in storage	4.1.1.3 Archival Storage—Replace Media 4.1.1.5 Administration—Manage System Configuration		• Preservation Application Hardware Environment Replacement • New AIP Format and/or New Preservation Application • New Records Component Store • Change Standard	F1 Monitor storage system			• InterPARES (42) • OAIS (4-7–4-8, 4-11)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
			Computing Platform • Refresh Records Component Media • Respond to Media Failure: Record Component Store • Respond to Data Loss: Record Component Store				
A4.5 Outputting Records							
A4.5.1 Monitoring the Performance of the Permanent Preservation Access System	4.1.1.6 Preservation Planning—Monitor Designated Community 4.1.1.6—Preservation Planning—Monitor Technology	**Not in PAIM**	**Not in T/Y**	G8 Monitor access system			• InterPARES (42) • OAIS (4-13–4-14)
A4.5.2 Facilitating the Discovery of Preserved Records and/or Information	4.1.1.5 Administration—Customer Service 4.1.1.7 Access—Coordinate Access Activities			G1 Facilitate access of electronic records	• **Request Service Manager supported in Fedora**		• InterPARES (42) • OAIS (4-12, 4-15) • T/Y 3.3 (10)
A4.5.3 Managing Requests for Preserved Records and/or Information							
A4.5.3.1 Process requests for preserved records and/or information							
A4.5.3.1.1 Register preservation access requests	4.1.1.5 Administration—Activate Requests 4.1.1.7 Access—Coordinate Access Activities	**Not in PAIM**	**Not in T/Y**		• **Request Service Manager supported in Fedora** • **Search Service supported in Fedora**		• InterPARES (43) • OAIS (4-12, 4-15)
A4.5.3.1.2 Retrieve information to process preservation access	4.1.1.4 Data Management—Perform Queries			G1 Facilitate access to electronic records G2 Determine access	• **Request Service Manager**		• InterPARES (43) • OAIS (4-9, 4-

Color Coding: ▢ High-level COP activity, mapped at lower levels; ▢ No match; ▢ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
requests	4.1.1.7 Access—Coordinate Access Activities			status of electronic records G7 Receive request for 508-compliant access copies of electronic records	**supported in Fedora** • **Search Service supported in Fedora**		15)
A4.5.3.1.3 Generate preservation retrieval requests	4.1.1.7 Access—Coordinate Access Activities			G1 Facilitate access of electronic records	• **Request Service Manager supported in Fedora**		• InterPARES (43) • OAIS (4-15)
A4.5.3.1.4 Generate preservation request specifications	4.1.1.7 Access—Coordinate Access Activities			G2 Determine access status of electronic records G6 Receive request for 508-compliant access copies of electronic records	• **Request Service Manager supported in Fedora**		• InterPARES (43) • OAIS (4-15)
A4.5.3.2 Retrieve requested records and/or information	4.1.1.4—Data Management Provide Data 4.1.1.7 Access—Generate DIP			G3 Create access copies of electronic records G4 Generate 508-compliant access copies of electronic records	• **Request Service Manager supported in Fedora**		• InterPARES (43) • OAIS (4-8, 4-15–4-16)
A4.5.3.3 Verify the retrieved records and/or information	4.1.1.7 Access—Generate DIP			G4 Verify access copies of electronic records	• **Request Service Manager supported in Fedora**		• InterPARES (44) • OAIS (4-15–4-16)
A4.5.3.4 Provide access to retrieved preserved records and/or information							
A4.5.3.4.1 Reconstitute preserved records and/or information	4.1.1.7 Access—Generate DIP	**Not in PAIM**	**Not in T/Y**	G3 Create access copies of electronic records	• **Request Service Manager supported in Fedora**		• InterPARES (44–45) • OAIS (4-15–4-16)
A4.5.3.4.2 Manifest preserved records and/or information[29]	4.1.1.7 Access—Deliver Response			G3 Create access copies of electronic records	• **Request Service**		• InterPARES (45–46) • OAIS (4-15–4-

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[29] Presents users copies of the requested records and/or information about the records

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

InterPARES	OAIS	PAIM	Tufts/Yale	AMMP	Tools[1]	Notes	References
					Manager supported in Fedora		16)
A4.5.3.4.3 Package preserved records and/or information for output	4.1.1.7 Access—Generate DIP			G5 Create DIPs	• **Request Service Manager supported in Fedora**		• InterPARES (47) • OAIS (4-15–4-16)

Color Coding: ☐ High-level COP activity, mapped at lower levels; ☐ No match; ☐ AMMP Functions and Activities

Appendix B: Crosswalk (Reverse Mapping)

OAIS	COP	AMMP	Notes	References
4.1.1.1 Common Services				
Operating system services	A1 Managing the Framework for the Chain of Preservation	*See note.*	These common services will be determined for the Fedora-based repository as a whole, not tied to specific fonds.	• OAIS (4-3)
Network services				• OAIS (4-4)
Security services				• OAIS (4-4–4-5)
4.1.1.2 Ingest				
Receive Submission	A4.3.2.1 Register the Transfer	B1. Register transfer B2. Copy electronic records from storage media onto Archives server		• OAIS (4-5)
Quality Assurance	A4.3.2.3 Verify the Content of the Transfer	B3. Quarantine electronic records		• OAIS (4-5)
Generate AIP	A4.4.1.2 Compile Information for Preservation A4.4.4.2 Place Preserved Records in Storage	E1. Create preservation copies of electronic records E2. Create AIPs		• OAIS (4-6)
Generate Descriptive Information	A4.4.1.2 Compile Information for Preservation A4.4.3.2 Describe the Preserved Records A4.4.3.3 Develop Description Instruments	D2. Ensure appropriate metadata is attached to electronic records D3. Develop appropriate descriptive tools for electronic records		• OAIS (4-6)
Coordinate Updates	A4.3.3 Accession Records A4.4.4.2 Place Preserved Records in Storage A4.4.3.2 Describe the Preserved Records A4.4.3.3 Develop Description Instruments	E3. Ingest AIPs into Fedora-based repository		• OAIS (4-6)
4.1.1.3 Archival Storage				
Receive Data	A4.4.4.2 Place Preserved Records in Storage	E3. Ingest AIPs into Fedora-based repository		• OAIS (4-7)
Manage Storage Hierarchy	A4.4.2 Manage the Arrangement of Preserved Records	D1. Determine arrangement of electronic records		• OAIS (4-7)
Replace Media	A4.4.3.5 Refresh Storage Media for Preserved Records in Storage	E1. Monitor storage system		• OAIS (4-7–4-8)

Color Coding: ▢ High-level OAIS entity, mapped at functional levels; ▢ No match

OAIS	COP	AMMP	Notes	References
Error Checking	A4.4.3.1 Monitor Preserved Records in Storage A4.4.4.3.3 Correct Problems with Preserved Records in Storage	E2. Monitor electronic records in storage		• OAIS (4-8)
Disaster Recovery	A4.4.3.2 Back-Up Permanent Preservation System	E1. Monitor storage system		• OAIS (4-8)
Provide Data	A4.5.3.4.1 Reconstitute Preserved Records and/or Information	G1. Facilitate access of electronic records		• OAIS (4-8)
4.1.1.4 Data Management				
Administer Database	A1.2.3.1.4 Develop Preservation System Instruments A4.4.3.1 Monitor Performance of Preservation Description System A4.4.3.3 Develop Description Instruments A4.4.4.1 Monitor Performance of Permanent Preservation Storage System A4.4.4.3.1 Monitor Preserved Records in Storage A4.4.4.3.3 Correct Problems with Preserved Records in Storage A4.5.1 Monitor Performance of Preservation Access System	B4. Monitor performance of transfer system F1. Monitor storage system F2. Monitor electronic records in storage G8. Monitor access system		• OAIS (4-9)
Perform Queries	A4.5.3.2 Retrieve Requested Records and/or Information	G1. Facilitate access of electronic records		• OAIS (4-9)
Generate Report	A4.4.3.3 Develop Description Instruments A4.5.3.2 Retrieve Requested Records and/or Information	G1. Facilitate access of electronic records		• OAIS (4-9)
Receive Database Updates	A4.3.3 Accession Records A4.4.1.2 Compile Information for Preservation A4.4.1.3 Update Information on Preservation Actions A4.4.3.2 Describe Preserved Records A4.4.3.2 Develop Description Instruments	E3. Ingest AIPs into Fedora-based repository F1. Monitor storage system F3. Document actions taken on records		• OAIS (4-9–4-10)

Color Coding: ☐ High-level OAIS entity, mapped at functional levels; ☐ No match

OAIS	COP	AMMP	Notes	References
4.1.1.5 Administration				
Negotiate Submission Agreement	A1.1.1 Analyze the Records Creator A1.1.2 Analyze Creator's Existing Records A1.1.3 Analyze Designated Records Preserver A1.1.4 Establish Management Policies A1.1.5 Establish Design Requirements A1.2.3.1.1 Develop Preservation System Policies A1.2.3.1.2 Develop Preservation System Strategies A1.2.3.1.3 Develop Preservation System Rules and Procedures A1.2.3.1.4 Develop Preservation System Instruments	A1. Contact initiated with Records Creator A3. Pre-visit made to Records Creator A4. Schedule pick-up of electronic records		• OAIS (4-10–4-11)
Manage System Configuration	A1.3 Manage Strategic Framework	*See note.*	This function properly maps to the monitoring of the system as a whole—thus, this function will be performed for NLM's entire digital repository and would map to a higher level than available in AMMP's Functions and Activities.	• OAIS (4-11)
Archival Information Update	A4.4.4.3.4 Update Preserved Records in Storage	F2. Monitor electronic records in storage		• OAIS (4-11)
Physical Access Control		*See note.*	This function exists outside the scope of the project, but is fulfilled by physical access procedures already in place at NLM.	• OAIS (4-11)
Establish Standards and Policies	A1.2.3.1.1 Develop Preservation System Policies A1.2.3.1.2 Develop Preservation System Strategies A1.2.3.1.3 Develop Preservation System Rules and Procedures A1.2.3.1.4 Develop Preservation System Instruments	A4. Schedule pick-up of records		• OAIS (4-11)

Color Coding: ☐ High-level OAIS entity, mapped at functional levels; ☐ No match

OAIS	COP	AMMP	Notes	References
	A1.2.3.2.1 Determine Preservation System Performance Requirements A1.2.3.2.2 Determine Preservation System Monitoring Requirements A1.2.3.2.3 Determine Preservation System Technological Requirements A1.2.3.3 Establish Preservation System Functional Infrastructure			
Audit Submission	A4.3.2.3 Verify Content of Transfers	B3. Quarantine electronic records		• OAIS (4-11–4-12)
Activate Requests	A4.5.3.1.3 Generate Preservation Retrieval Requests	G1. Facilitate access to electronic records		• OAIS (4-12)
Customer Service	A4.5.3.1.1 Register Preservation Access Requests	*See note.*	This function will likely be performed for NLM's entire digital repository and would map to a higher level than available in AMMP's Functions and Activities	• OAIS (4-12)
4.1.1.6 Preservation Planning				
Monitor Designated Community	A4.4.4.3.1 Monitor Preserved Records in Storage	F2. Monitor electronic records in storage		• OAIS (4-13)
Monitor Technology	A4.4.4.1 Monitor Performance of Preservation Storage System A4.4.4.3.1 Monitor Preserved Records in Storage	F1. Monitor storage system F2. Monitor electronic records in storage		• OAIS (4-13–4-14)
Develop Preservation Strategies and Standards	A1.2.3.1.2 Develop Preservation System Strategies	C5. Assess file formats of electronic records F2. Monitor electronic records in storage		• OAIS (4-14)
Develop Packaging Designs and Migration Plans	A1.2.3.1.4 Develop Preservation System Instruments A1.2.3.2.1 Determine Preservation System Performance Requirements A1.2.3.2.2 Determine Preservation System Monitoring Requirements A1.2.3.2.3 Determine Preservation System Technological Requirements	C4. Determine record elements and digital components of electronic records to preserve C5. Assess file formats of electronic records C2. Monitor electronic records in storage		• OAIS (4-14)
4.1.1.7 Access				
Coordinate Access Activities	A4.5.2 Facilitate Discovery of Preserved Records and/or Information	G1. Facilitate access to electronic records G2. Determine access status of		• OAIS (4-15)

Color Coding: ☐ High-level OAIS entity, mapped at functional levels; ☐ No match

OAIS	COP	AMMP	Notes	References
	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 Generation Preservation Retrieval Requests A4.5.3.1.4 Generate Preservation Request Specifications	electronic records		
Generate DIP	A4.5.3.3 Verify Retrieved Records and/or Information A4.5.3.4.1 Reconstitute Preserved Records and/or Information A4.5.3.4.2 Manifest Preserved Records and/or Information	G3. Create access copies of electronic records G4. Verify access copies of electronic records G5. Create DIPs G7. Receive request for 508-compliant access copies of electronic records		• OAIS (4-15–4-16)
Deliver Response	A4.5.3.4.2 Manifest Preserved Records and/or Information	G6. Ingest DIPs to Fedora-based repository G7. Receive request for 508-compliant access copies of electronic records		• OAIS (4-16)

Color Coding: ☐ High-level OAIS entity, mapped at functional levels; ☐ No match