



NATIONAL LEADERSHIP GRANTS FOR LIBRARIES

Sample Application LG-260101-OLS-26
Project Category: National Implementation

Purdue University Libraries and School of Information Studies

Amount awarded by IMLS:	\$284,730
Amount of cost share:	\$0

The Purdue University Libraries and School of Information Studies will design a multi-agent architecture in which coordinated artificial intelligence agents analyze metadata records, identify gaps, retrieve authoritative vocabularies, generate standards aligned enhancements, validate schema compliance, and document provenance and confidence measures. The system will be prototyped across four data ecosystems, including Purdue University Research Repository, Illinois Data Bank, Amazon Web Services Open Data, and National Aeronautics and Space Administration Open Data. The project seeks to transform how libraries convert records into actionable knowledge by developing a multi-agent intelligence infrastructure that prepares metadata and digital collections to be AI-ready and agent-ready for emerging discovery, research, and service ecosystems. This project will focus on establishing a multi-agent architecture composed of coordinated artificial reasoning agents. These agents will analyze existing records, identify metadata gaps, retrieve authoritative vocabularies and ontologies, generate standards aligned enhancements, validate outputs against established schemas, and document provenance, confidence measures, and decision traces.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of completion

When preparing an application for the next deadline, be sure to follow the instructions in the most recent Notice of Funding Opportunity for the grant program to which you are applying.

From Records to Knowledge: An Agentic AI Infrastructure for Metadata Intelligence (AIMI)

Introduction:

Purdue University Libraries and School of Information Studies in collaboration with Purdue Rosen Center for Advanced Computing request \$284,730 from the Institute of Museum and Library Services (IMLS) National Leadership Grants for Libraries (NLG-L) for a 3-year implementation program to design, implement, and evaluate the Agentic AI Infrastructure for Metadata Intelligence (AIMI). The project aligns with NLG-L's Objective 1.3 by enhancing Artificial Intelligence (AI) applications in digital collections and access. AIMI will transform how libraries convert records into actionable knowledge by developing a multi-agent intelligence infrastructure that prepares metadata and digital collections to be AI-ready and agent-ready for emerging discovery, research, and service ecosystems.

This project addresses a critical national challenge in digital knowledge stewardship: the notable gap between the scale and complexity of modern digital collections and the capacity of existing metadata systems to effectively describe, manage, and govern them. Libraries and research repositories now curate not only traditional bibliographic materials, but also scientific research data, software code, computational notebooks, audiovisual media, digitized cultural heritage collections, and emerging forms of AI generated content. As digital scholarship and research data stewardship expand across the United States, metadata has evolved from a descriptive layer into a core knowledge infrastructure that supports discovery, interoperability, and responsible reuse. In response to this growing demand, a variety of metadata automation approaches have been developed to replace or assist manual cataloging and improve consistency across records and repositories. However, most existing automation methods remain rule based, narrowly scoped, and limited in their ability to reason across heterogeneous data formats, disciplinary standards, and evolving metadata schemas.

To address these limitations, AIMI will establish a multi-agent architecture composed of coordinated AI reasoning agents. These agents will analyze existing records, identify metadata gaps, retrieve authoritative vocabularies and ontologies, generate standards aligned enhancements, validate outputs against established schemas, and document provenance, confidence measures, and decision traces. Beyond strengthening traditional descriptive metadata, the framework will support dataset level information extraction, multimodal semantic interpretation of image and spatial materials, research software documentation, and governance metadata for AI systems deployed within library environments.

Intended results include the development of a scalable open-source infrastructure for metadata modernization; pilot implementations across multiple collection types; and a transferable toolkit including technical documentation, evaluation metrics, governance guidance, and implementation models adaptable to libraries of varying sizes and capacities. By repositioning metadata as intelligent, adaptive infrastructure supported by transparent human-in-the-loop AI systems, this project advances ethical, interoperable, and sustainable approaches to AI-enabled knowledge stewardship and strengthens libraries' leadership role in the evolving digital research ecosystem.

Project Justification:

Needs and Challenges

Libraries increasingly recognize the need for “AI-ready metadata”, which is highly structured, machine-actionable, and contextual information to allow intelligence systems and models to understand and process data without or with minimum manual human interactions. This vision aligns with FAIR principles and emphasizes persistent identifiers, licensing clarity, structured provenance, and computational reuse [1]^{1*}. However, two interrelated challenges persist: (1). AI readiness efforts remain uneven and often locally defined, lacking shared operational models and infrastructure level standardization. (2). Existing systems are typically implemented as isolated services with limited service to service integration, minimal structured communication, and constrained flexibility for policy evolution or technological updates. Without coordinated integration and adaptable governance mechanisms, metadata systems struggle to evolve alongside rapidly advancing AI capabilities.

Professional standards communities have acknowledged the implications of AI for metadata practice. Guidance from the Library of Congress’s Program for Cooperative Cataloging (PCC) addresses AI-assisted cataloging workflows, emphasizing transparency, bias awareness, and disclosure of AI-generated elements [2][3]. These discussions represent important progress in governance thinking. However, they focus largely on bibliographic and authority metadata environments.

Research data metadata and digital collections introduce additional technical and policy complexities. Dataset-level provenance, computational lineage, versioning, machine-actionable rights, and integration with analytical workflows are central concerns. Unlike traditional catalog records, research data metadata must support downstream computation, reproducibility tracking, and incorporation into AI training and reasoning systems. Yet governance models, evaluation frameworks, and interoperable infrastructure for AI-enabled research data metadata remain underdeveloped.

A recent comparative study conducted by UC San Diego Library analyzed metadata for machine learning (ML) objects across generalist and specialist repositories further illustrates these structural gaps. The study found that generalist repositories tend to provide stronger provenance metadata (such as persistent identifiers, citation guidance, licenses, and related resources) and specialist repositories emphasize ML-specific descriptive fields (such as task type, number of instances, and attributes). However, neither repository type consistently integrates both sets of strengths [4], which indicates the fragments of metadata practice and the need for unified systems across the data lifespan.

Several national initiatives demonstrate that AI-assisted metadata generation is feasible. With the support by IMLS National Leadership grant in 2024, Northwestern University Libraries exemplifies an LLM-era model of AI-ready metadata: metadata is embedded into a vector database, retrieved via semantic search, and used to ground large language model responses in a retrieval-augmented generation (RAG) workflow [5][6]. A CNI case study describes the development of metadata augmentation agents within Northwestern’s Meadow repository, integrating Anthropic tools, AWS infrastructure including Bedrock, and OpenSearch. This case reveals a new requirement: metadata must be vector-indexable and semantically dense to support high-quality inference-time retrieval.

The Boston Public Library frames AI readiness through “AI-enhanced digitization” and releasing collections “as data,” explicitly linking AI integration to transparency, curatorial expertise, and

¹ * Reference is available in Supportingdoc1.pdf

responsible access expansion [7]. Collaboration with Harvard Law School Library's Institutional Data Initiative and support from OpenAI's NextGenAI initiative demonstrate growing convergence between library metadata and AI development ecosystems.

The New York Public Library positions its Digital Collections API as machine-readable data, exposing over one million digitized objects for computational reuse [8]. Its use of structured schemas such as MODS and links to OCR, ALTO, and METS-derived text reflects preparation for computational workflows. NYPL's dedicated Metadata Services Unit underscores that AI readiness requires institutional capacity in interoperability, remediation, and staff training.

Another IMLS National Leadership Grant supported project, Machine Actionable Plans (MAP) Pilot, illustrates ongoing efforts to build scalable, connected research metadata ecosystems [9]. By developing machine-readable data management and sharing plans (maDMSPs) that are interoperable across institutional systems, this project highlights the field's movement toward metadata that supports dynamic coordination, query ability, and lifecycle automation, which are key prerequisites for AI-ready, multi-agent metadata intelligence

These initiatives demonstrate meaningful movement toward AI integrated metadata systems. However, they also reveal a persistent structural limitation. Most current implementations resemble collections of specialized and task-oriented tools and services operating within repository architectures, such as embedding services, augmentation tools, OCR pipelines, and enrichment systems. While innovative, these systems are typically implemented as independent components rather than coordinated intelligence frameworks. They often lack structured service to service pipelines or systematic coordination mechanisms. There is limited shared state awareness across metadata lifecycle tasks, which restricts cross task validation and adaptive decision making. Governance and policy enforcement are generally handled procedurally rather than computationally embedded within workflows. In addition, there is no consistent or standardized representation of AI artifacts such as embeddings, lineage information, confidence scores, and evaluation states. As a result, metadata systems remain augmented by AI tools but are not transformed into integrated, governable, and lifecycle aware infrastructures.

The proposed AIMI framework (Figure 1) directly addresses these needs by establishing a governed multi agent architecture for research data metadata ecosystems. Within AIMI:

- Specialized agents, including diagnostic, normalization, enrichment, rights, provenance, and evaluation agents, operate with defined roles and shared state awareness across the metadata lifecycle.
- Governance rules and policy constraints are computationally embedded within agent workflows rather than applied externally.
- Benchmarking, confidence assessment, and human validation are integrated into continuous feedback loops.
- Existing AI services and repository tools can function as interoperable and pluggable agents within a unified orchestration layer.
- Policy updates and regulatory changes can be implemented through modular agent knowledge updates, allowing the system to adapt without restructuring the overall architecture.

By shifting from isolated tool adoption to orchestrated agent collaboration, AIMI transforms metadata into adaptive, governable, and AI-ready infrastructure, which positions libraries to lead in building scalable, trustworthy, and reusable AI-enabled research data ecosystems. The orchestration framework maintains traceable decision records and explanation views that allow librarians to understand how agents generate metadata recommendations. These features reflect emerging practices in [explainable AI \(XAI\)](#) and interpretable AI and support transparent human oversight.

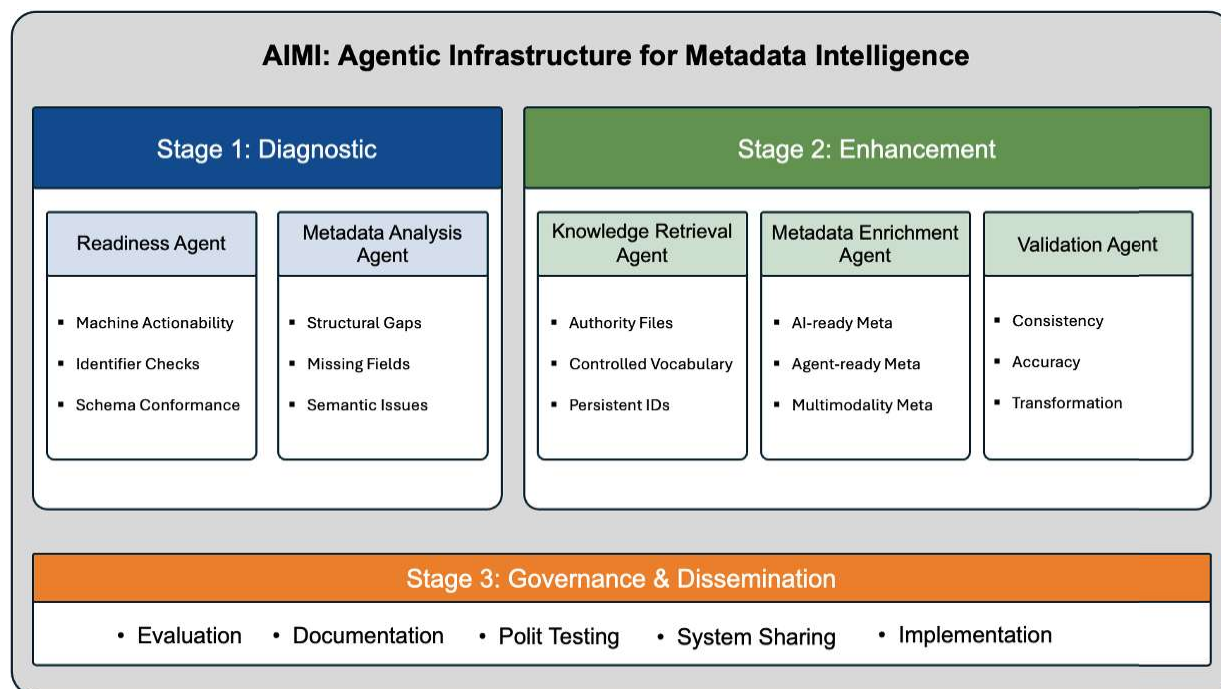


Figure 1. The architecture of AIMI: Agentic Infrastructure for Metadata Intelligence.

Target Beneficiaries

The primary beneficiaries of this project are institutional data repositories and large-scale public data platforms seeking to modernize metadata workflows in preparation for AI-enabled research and discovery environments. Direct beneficiaries in this implementation project include two academic libraries managing research data repositories and two large-scale public open scientific data platforms.

Target academic research data repositories:

- [University Research Repository \(PURR\)](#)
- [Illinois Data Bank](#)

Both repositories support open science, research data management, and the long-term stewardship of scholarly outputs, making them ideal environments for piloting AI-ready metadata enhancement and agent-based metadata intelligence workflows.

Target public open scientific data platforms:

- [AWS Open Data Program](#)
- [NASA Open Data Portal](#)

These platforms host large-scale scientific datasets used by global research communities, where AI-ready metadata can significantly improve dataset discovery, interoperability, and large-scale computational analysis.

Additionally, metadata librarians and digital scholarship professionals will benefit from human-centered AI systems that augment rather than replace professional expertise, providing transparent reasoning pathways, validation mechanisms, and structured review interfaces. Research data managers will gain improved tools for generating machine-interpretable dataset descriptions that support reuse and reproducibility. Institutions adopting AI-powered services will benefit from governance guidance and structured documentation practices that enhance accountability and transparency.

At a national level, the project strengthens the broader research ecosystem by contributing open, transferable infrastructure that supports equitable access, trustworthy AI integration, and sustainable digital stewardship. By advancing metadata practices that are interoperable, machine-actionable, and governance-aware, the project positions libraries as leaders in responsible AI-enabled knowledge infrastructure and ensures that collections remain accessible and meaningful within increasingly automated research environments.

Project Work Plan:

Project Team

The team combines expertise in metadata systems, research data management, artificial intelligence, and scalable computing infrastructure. The project team includes two library faculty members; one graduate assistant; two research computing staff members.

Key personnel: library faculty members and graduate students

Gang Shao at Purdue Libraries and School of Information Studies will be the principal investigator (PI) as team lead and product manager. Shao is an associate professor and data science specialist with expertise in artificial intelligence, data literacy and research data management. Shao has successfully led several external and internal grants, including an IMLS Laura Bush 21st project ([RE-258994-OLS-25](#)) that provides AI training for academic libraries (including modules on Agentic AI development and Agent MCP framework), and serves as co-PI on a 10-million [USDA project](#) focusing on digital data infrastructure development for environmental science. He is also the faculty lead in research data management at Purdue libraries collaborating Purdue research data repository ([PURR](#)) and supporting [research data consultation](#) campus wide. Myung-Ja (MJ) Han at the University of Illinois Urbana-Champaign will serve as metadata consultant leading the metadata standard alignment and governance components of the project. Han is Andrew S.G. Turyn Professor and Metadata Librarian at UICU with expertise in metadata design, cataloging workflow, semantic web technologies, and interpolation in digital collections and research repositories. She and her team have developed several metadata automation tools including the [Metadata Maker](#) project. Han also published numerous peer-reviewed research on metadata practices and has contributed to professional communities engaged in metadata application profiles and linked open data. One graduate assistant, supervised by PI, will support research implementation, evaluation analysis, and documentation development throughout the project.

Key personnel: research computing staff

Lan Zhao will be a co-PI who supervises and coordinates the cyberinfrastructure and system development in the project. Zhao is a Senior Research Scientist in the Scientific Solutions Group in Purdue Rosen Center for Advanced Computing (RCAC). She has more than twenty years of experience in software engineering, cyberinfrastructure, and scientific data management. She has served as software architect and technical lead in multiple cyberinfrastructure projects funded by NSF, NASA, USDA, DOE, and NIH across disciplines. Xiao Liu will be the technical consultant who is a senior research software engineer in RCAC with expertise in high performance computing (HPC), machine learning, and information systems. She has extensive experience in designing computational workflows and integrating advanced analytics within research environments. Both Zhao and Liu will contribute to system design, technical development, orchestration integration, and prototype implementation using Purdue's on campus research computing resources (e.g. [AnvilGPT](#) on the Anvil cluster and Geddes composable system). Their combined experience in cyberinfrastructure, HPC, and applied computational systems will help ensure scalable development, deployment, and testing of the AIMI framework.

Platform and Computing Services

Agent development platforms and computing services are important components in this project as we propose to build cutting-edge multi-agent systems that work with digital collections at scale. The AIMI project will leverage a combination of national and institutional HPC infrastructure and cloud-based development environments to support system prototyping, testing, and evaluation. This hybrid approach enables flexible experimentation during early development while ensuring that computational workflows can be deployed and tested within a stable research computing environment.

The project will utilize Geddes and Anvil HPC resources provided by Purdue's Rosen Center for Advanced Computing (RCAC). RCAC maintains and operates advanced research computing infrastructure that supports data intensive and computationally complex research across the university. Geddes is a composable campus cloud platform funded by the [NSF CC* program](#) providing a composable infrastructure to deliver container-based applications with Kubernetes. Geddes enables the project team to configure scalable environments for running agent coordination experiments, metadata processing tasks, and evaluation workflows. Anvil is a NSF funded HPC system within the ACCESS program hosted at Purdue. Anvil provides large scale CPU and GPU resources along with high performance storage and data transfer capabilities. The AIMI agentic AI frontend interface and backend workflow pipeline will be containerized and deployed on Geddes with computation intensive tasks running on Anvil. These resources will support large scale testing of metadata processing pipelines, evaluation experiments, and computational workloads associated with the AIMI prototype. A Continuous Integration/Continuous Deployment (CI/CD) pipeline will be created that ensures new code, workflows, and container builds are automatically tested, packaged, and deployed. This project will also leverage the AnvilGPT service to integrate and test powerful AI models in the AIMI agentic AI workflow in a secure and on-premises environment.

For rapid prototyping and experimentation with emerging agent frameworks, the project may also leverage commercial cloud-based AI development environments. Early development and testing may be conducted using services such as Google Cloud Vertex AI Agent Builder and Amazon Web Services Bedrock AgentCore. These platforms provide managed environments for experimenting with agent

orchestration, model integration, and workflow automation before deploying stable components within institutional infrastructure. As a preliminary demonstration, we have developed a three-agent AIMI prototype using Google Cloud Vertex AI to load, evaluate, and enrich sample metadata records from the Illinois Data Bank repository. Additional details of this demonstration are provided in Supporting Document 2 (Figure 2).

Project Architecture Overview

Rather than functioning as a single generative AI tool, AIMI is designed as a staged workflow in which agents perform complementary roles to transform existing records into AI-ready and agent-ready metadata. AIMI is organized around a coordinated set of metadata agents operating in three structured stages: 1). Diagnostic assessment, 2). Structured enhancement, and 3). Governance and dissemination (Figure 1).

Stage 1: Diagnostic and Readiness Agents.

Stage 1 establishes the foundational assessment framework for AIMI by developing a systematic approach to evaluating metadata readiness within research data repositories. This stage focuses on defining measurable criteria, implementing diagnostic agents, and validating assessment outputs. The purpose is to create a reliable baseline that identifies structural strengths and weaknesses in metadata records prior to enhancement and orchestration in subsequent stages.

Activity 1: Operationalization of Machine-Actionable and Agent-Ready Metadata Criteria

This activity will formalize a structured diagnostic specification grounded in established metadata standards and quality assessment practices. Drawing from FAIR principles and widely adopted schemas such as [Dublin Core](#) and [DataCite](#), the project team will define measurable indicators across several dimensions, including identifier presence, schema completeness, structured field usage, controlled vocabulary alignment, and provenance documentation.

In addition to machine readiness indicators, this activity will incorporate a focused set of agent ready criteria to support coordinated automation. These criteria will include explicit field level edit permissions, documentation of decision traceability, structured confidence recording, and output formats suitable for downstream agent processing. Together, these elements will form a concise and computationally actionable evaluation model capable of assessing both metadata quality and its suitability for coordinated agent interaction.

Activity 2: Design and Implementation of Diagnostic Agents.

Building upon the defined criteria, this activity will design and implement two complementary diagnostic agents (Figure 2). The Readiness Agent will evaluate repository records against the established indicators and generate structured readiness assessments based on identifier presence, schema conformance, vocabulary alignment, and provenance completeness. The Metadata Analysis Agent will conduct deeper structural inspection to detect missing required elements, inconsistent field usage, semantic ambiguity, and schema misalignment.

Both agents will generate structured outputs that include identified issues, relative severity, and recommended remediation priorities. Outputs will be formatted to support interoperability within the broader AIMI orchestration architecture. Development will include schema parsing routines, standards

validation logic, scoring mechanisms, logging processes, and report generation components to ensure consistency and reproducibility of assessments.

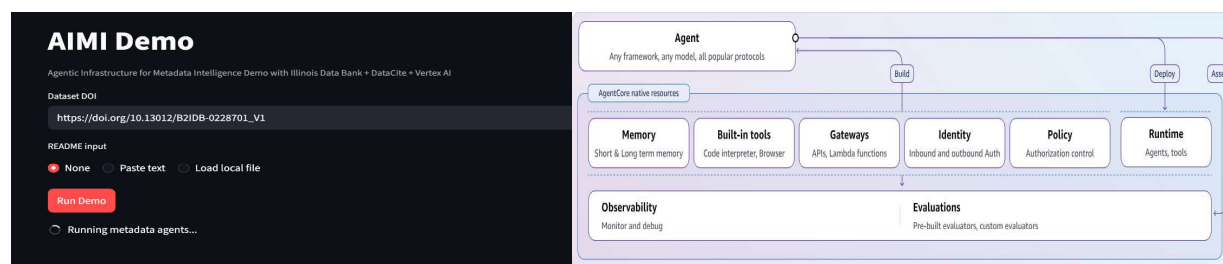


Figure 2. An AIMI demo and the overview chart of agent development (The demo reference is available in Supporting Document 2; Overview chart image credit by AWS)

Activity 3: Pilot Testing and Implementation of Diagnostic Agents.

This activity will apply the diagnostic agents to selected datasets among various repository collections to evaluate accuracy, usability, and interpretability of outputs. Current selected repositories include the [Purdue University Research Repository \(PURR\)](#), the [Illinois Data Bank](#), the [AWS Open Data Program](#), and the [NASA Open Data Portal](#). These repositories represent diverse research data environments, including institutional research data repositories and large-scale public data collections.

PURR and the Illinois Data Bank provide structured institutional research datasets with established metadata standards such as DataCite, supporting evaluation of schema conformance, identifier presence, and provenance practices. AWS Open Data and the NASA Open Data Portal introduce heterogeneous public datasets that vary in metadata consistency, disciplinary coverage, and structural maturity. Including these collections allows the project to assess diagnostic performance across varied metadata contexts without requiring full scale deployment.

Automated assessments will be compared with librarian review to evaluate alignment and identify discrepancies. Findings will inform refinement of evaluation thresholds, scoring logic, and reporting formats prior to enhancement activities in Stage 2.

Stage 2: Enhancement and Generation Agents.

Stage 2 advances AIMI from diagnostic assessment to structured metadata improvement. Building on the readiness baseline established in Stage 1, this stage implements coordinated agents that enhance semantic precision, strengthen standards alignment, and expand metadata completeness across research data repositories. The focus is controlled generation, authoritative alignment, and iterative refinement to improve interoperability and computational usability.

Activity 4: Development of the Knowledge Retrieval Agent.

This activity will develop the Knowledge Retrieval Agent to improve semantic alignment and interoperability of repository records. Using the diagnostic outputs from Stage 1, the agent will connect metadata fields to authoritative vocabularies, controlled term lists, ontologies, and persistent identifier systems. It will retrieve standardized subject headings, entity identifiers, and domain relevant concepts to replace or supplement inconsistent local terms.

The agent will prioritize alignment with established standards rather than indiscriminate field expansion. Development will include vocabulary disambiguation routines, identifier matching processes, semantic mapping logic, and reproducible alignment strategies. By grounding enhancements in authoritative sources, this activity ensures that metadata improvements are interoperable across systems and consistent with professional standards.

Activity 5: Development of the Metadata Enrichment Agent and Validation Agent.

Building upon the outputs of the Knowledge Retrieval Agent, this activity will develop and implement the Metadata Enrichment Agent to generate structured and standards aligned metadata enhancements. The agent will populate missing descriptive elements, establish explicit relationships among entities, and generate schema compliant field values guided by the diagnostic findings from Stage 1.

All generated content will be constrained by defined schema rules and validated against applicable metadata standards with the Validation Agent to ensure structural consistency and prevent uncontrolled generation. The enrichment process will operate iteratively, allowing refinement through validation feedback and human review. This activity represents the primary generative component of AIMI and transforms diagnostic findings into actionable metadata improvements.

Activity 6: Development of Specialized Metadata Agents for Research Data (additional activity).

If time and funding permit, the project may develop additional specialized agents to address the diversity of content commonly found in modern research repositories. A Dataset Metadata Agent could generate structured variable level descriptions, units of measurement, coordinate reference information, and detailed provenance aligned with established research data standards. Where appropriate within the project scope, additional modules may include a Multimodal Metadata Agent to produce structured semantic descriptions for images, spatial materials, and audiovisual objects, and a Code Metadata Agent to document software dependencies, execution environments, and reproducibility parameters. These specialized agents would extend the AIMI framework, supporting structured metadata enhancement across a wider range of digital research objects.

Activity 7: Integrated Pilot Testing and Implementation of AIMI.

This activity will conduct integrated pilot testing and implementation of AIMI across selected collections as in Activity 3 to represent multiple object types. The evaluation will measure improvements in metadata completeness, vocabulary alignment, schema conformance, and computational usability. Quantitative analysis will assess increases in structured field population and reductions in ambiguity, while qualitative assessment will examine librarian interpretability, trust, and usability of generated enhancements. Findings from this pilot and implementation will inform refinement of agent logic, alignment strategies, and validation thresholds to fine-tune the whole system.

Stage 3: Governance Consolidation, Validation, and Dissemination

Stage 3 consolidates governance safeguards, validates system outputs, and prepares the AIMI framework for responsible adoption and knowledge sharing. While governance principles are embedded throughout Stage 1 and Stage 2, this stage formalizes and strengthens those mechanisms rather than introducing new agent development. The emphasis is on refining policy structures, evaluating system reliability, and documenting implementation guidance to ensure transparency, accountability, and transferability. The governance framework will also incorporate principles from explainable and interpretable AI to ensure

that metadata transformations and recommendations produced by agents can be inspected, traced, and understood by librarians. Explanation views and decision trace documentation will support transparency and responsible use of AI assisted metadata processes.

Activity 8: Governance Framework Refinement

This activity will formalize governance rules that regulate agent mediated metadata workflows. Building on safeguards developed in earlier stages, the project team will refine policies for field level modification permissions, decision traceability requirements, confidence reporting standards, and criteria for human review. Audit logging practices and explanation interfaces will be reviewed to ensure interpretability and transparency of system outputs. The result will be a clearly articulated governance framework embedded within the orchestration model.

Activity 9: Validation and External Review

This activity will conduct structured validation of diagnostic and enhancement outputs across selected collections. The project team will assess reliability, consistency, and clarity of readiness scoring and metadata improvements. An external advisory collaborator will review system documentation, sample outputs, and governance practices to evaluate adaptability within a different institutional context. Feedback will inform final refinements and strengthen evidence of transferability.

Activity 10: Documentation, Open Release, and Targeted Dissemination

The final activity will prepare comprehensive documentation to support adoption. This will include technical guidance, governance guidelines, readiness criteria definitions, and evaluation summaries. The project team will release system code and documentation through open access channels and conduct targeted dissemination through webinars and conference presentations. This activity emphasizes responsible knowledge sharing and realistic implementation pathways.

Project Results:

As a national implementation project, AIMI will move beyond conceptual design to produce operational AI tools, validated workflows, and measurable improvements in metadata quality. By the conclusion of the project, AIMI will deliver:

- A functioning diagnostic-to-enhancement metadata pipeline composed of five interoperable agents: Readiness, Metadata Analysis, Knowledge Retrieval, Metadata Enrichment, and Validation.
- Enhanced metadata extension apps for selected data repositories and digital collections.
- An open-source release of the AIMI framework, including source code, containers, and configuration documentation.
- A practical implementation guide outlining governance safeguards, workflow integration strategies, and adoption considerations.

Project results will be shared through national conference presentations, webinars, and submission of a peer reviewed article describing the methodology and evaluation findings. The prototype code and documentation will be released through open access channels such as github.com to support review, adaptation, and reuse by other institutions.

