

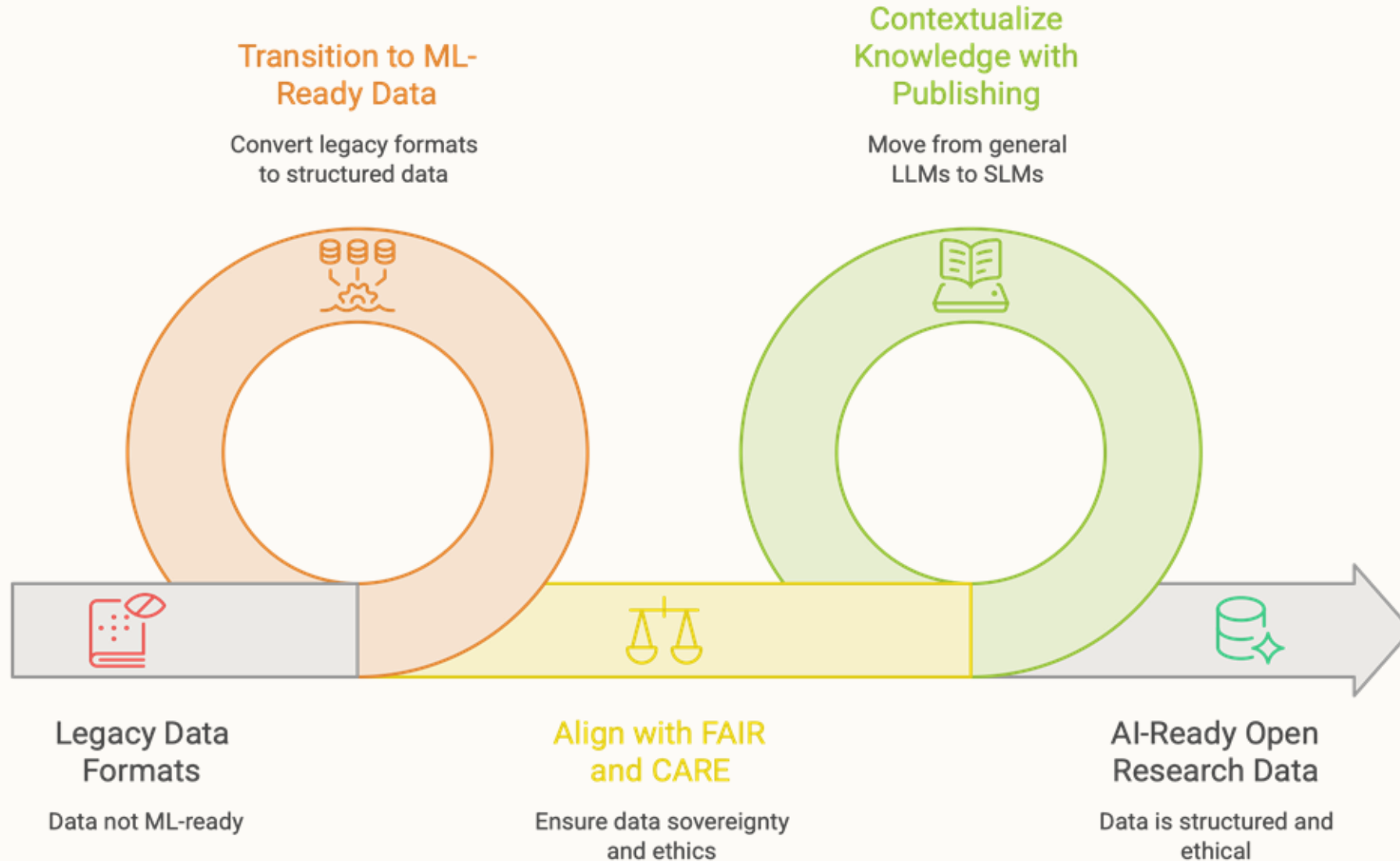
Establishing Ethical Guidelines for Use of AI Tools in KOS and Metadata Services: A Framework of Human-Supervised Automation Workflows

NKOS@DCMI2026

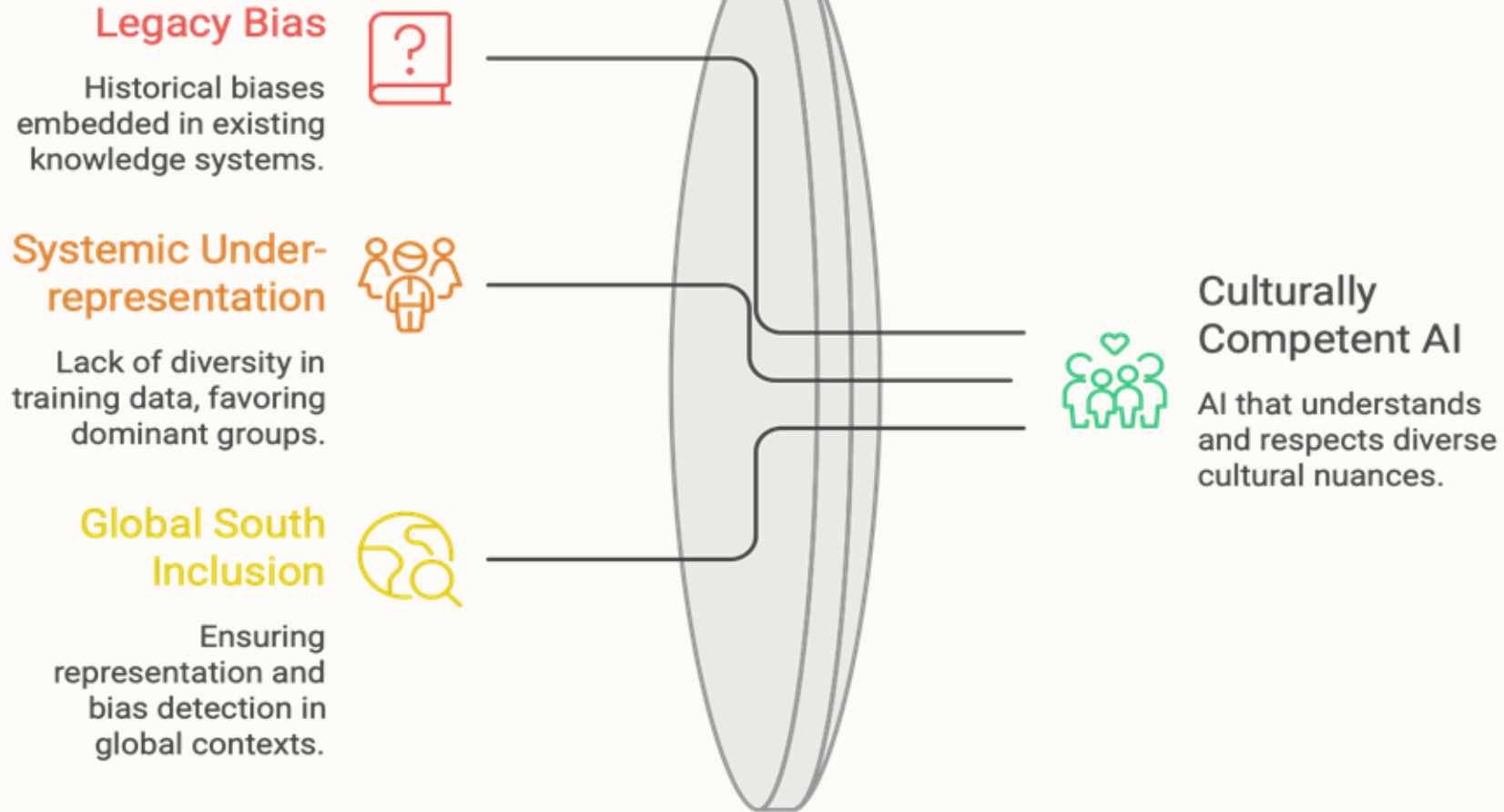
Ying-Hsang Liu, Junzhi Jia, Seungmin Lee,
Charlene Chou, Shu-jun (Sophy) Chen

August 3, 2026

AI-Ready Open Research Data

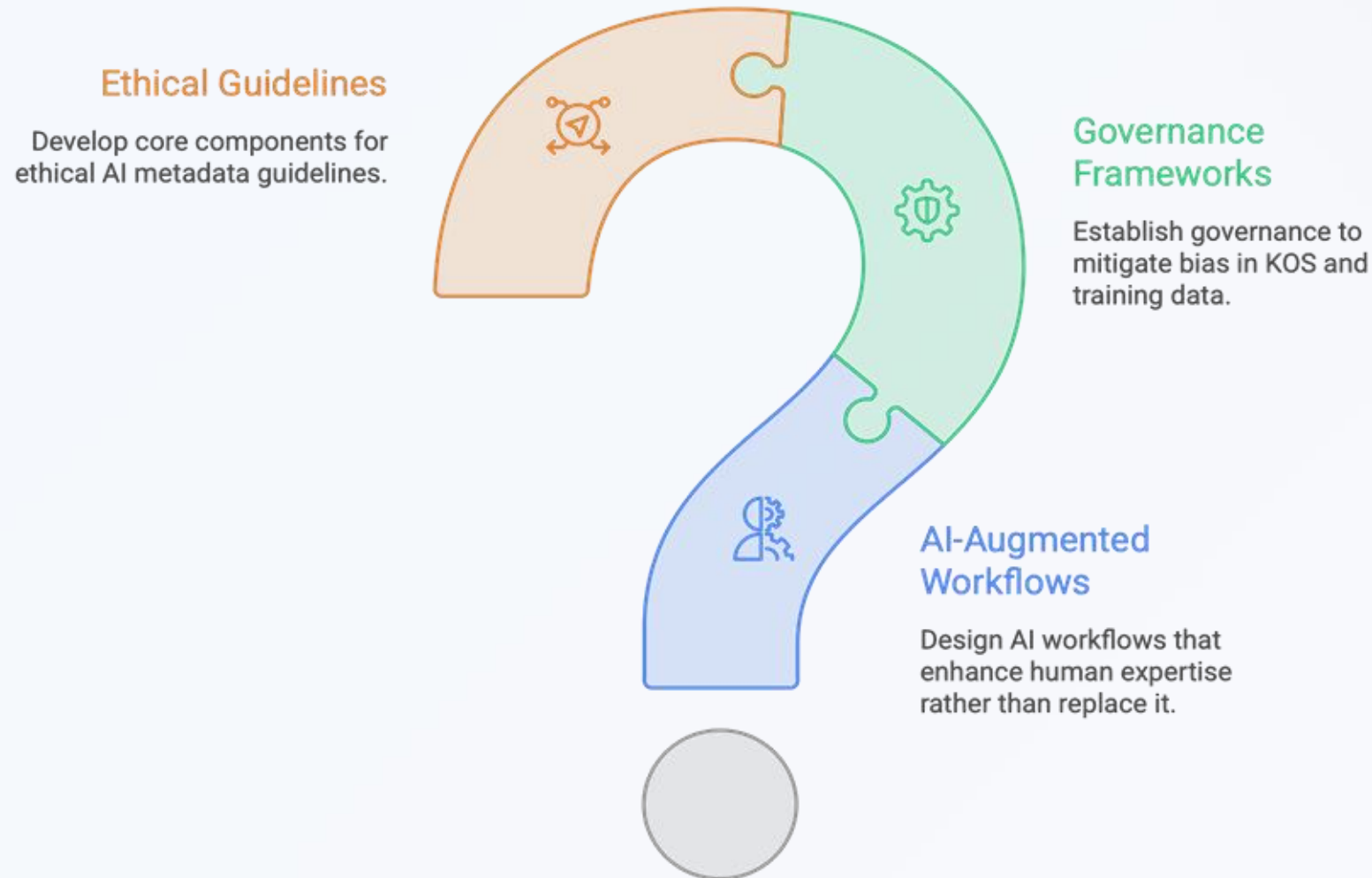


Addressing Bias in AI



Panel Agenda

How to design and implement AI for knowledge organization and metadata services?



General exploration of AI for Knowledge Organization and metadata services, rather than being limited specifically to KOS mapping.

AI-Augmented Metadata Workflows in library cataloguing

Panel Theme: Toward a Competency Framework for AI Literacy, Ethical Governance and Human-Supervised Automation in Metadata Services

Junzhi Jia
Renmin University of China
2026.8.4



0 Contents

- Evolution and application phases of artificial intelligence in library cataloguing
- The adaptability of generative AI in the cataloguing
- AI-Augmented Metadata Workflows in library cataloguing

實求是

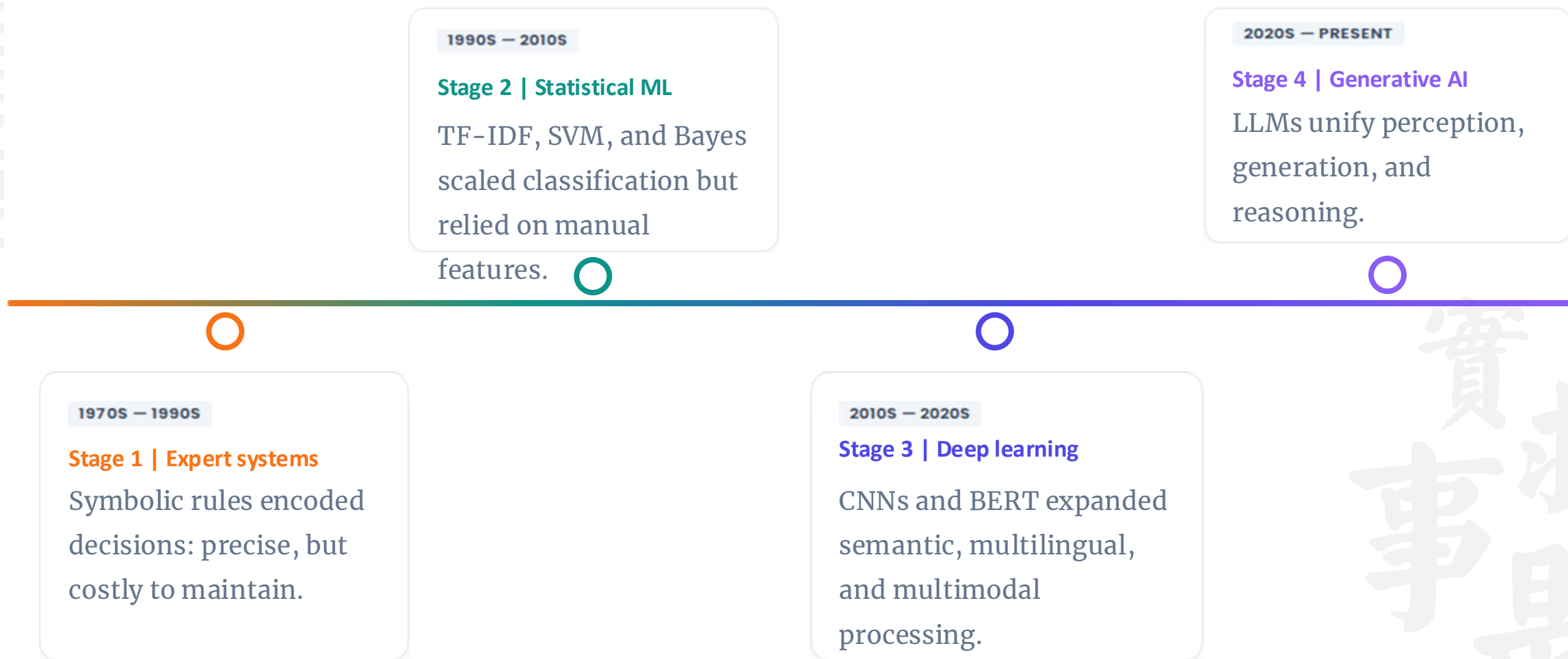
1 Evolution and application phases of artificial intelligence in library cataloguing

The expansion of library collections has also generated demand for automated cataloging. Starting from 1972, experts have kept discussing the integration of artificial intelligence into the automation of cataloging workflows.

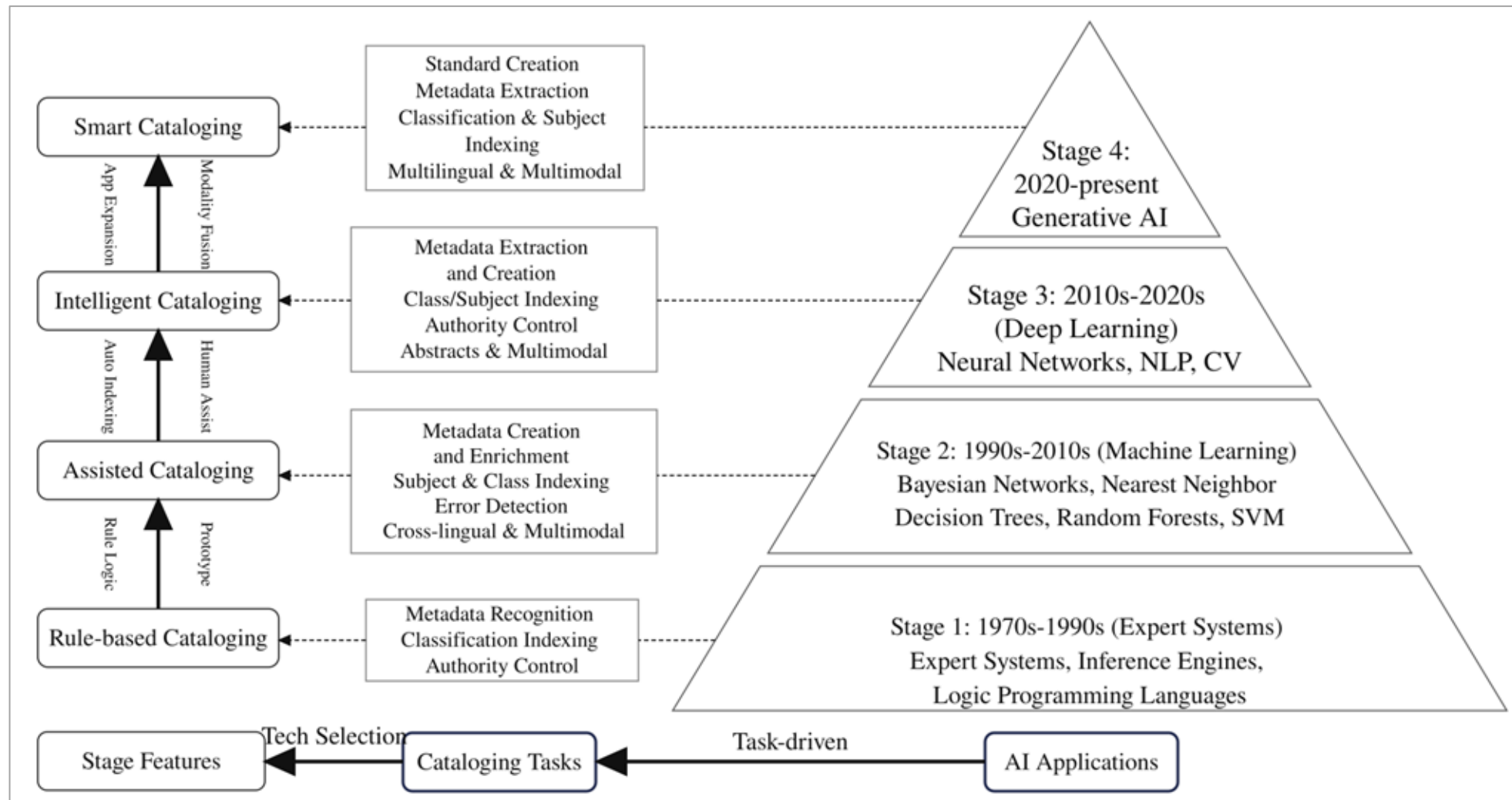
Based on an investigation of domestic and international research findings, and combined with the evolutionary trajectory of AI—from expert systems, statistical machine learning, deep learning and generative AI, we divide the practice of AI cataloging in libraries into four distinct stages.

實求是

1 Four stages of AI cataloging



1 Four stages of evolution of library AI cataloging

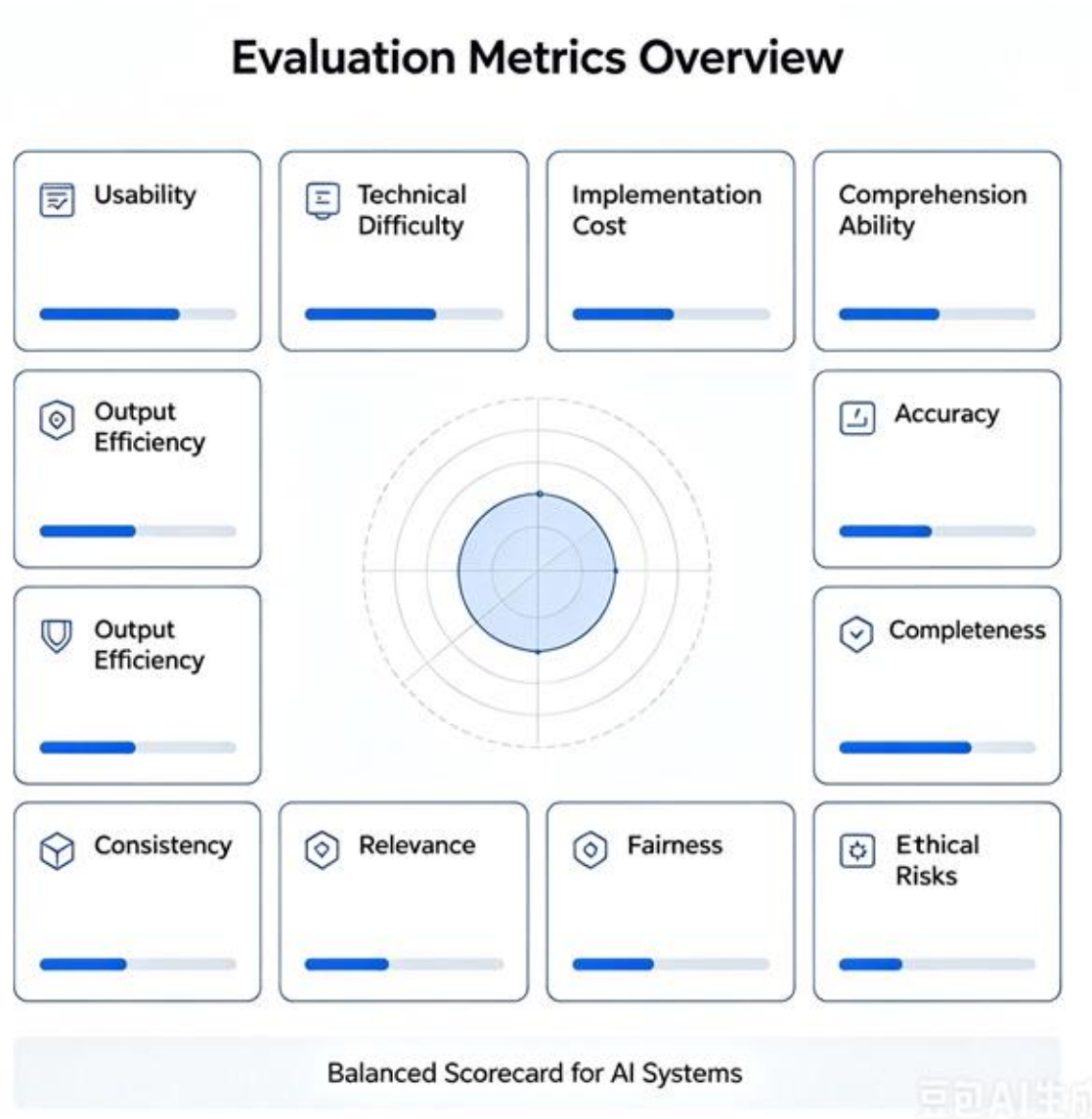


Evolution of Library AI Cataloging

2 The adaptability of AI-driven library cataloging

- Source: 540+ papers retrieved from Web of Science, CNKI, and Google Scholar (cutoff: April 2025), filtered to 240 valid papers.
- Unit of Analysis: Sentence-level segmentation of abstracts, targeting keywords like "AI in cataloging", "neural network classification", and "intelligent indexing".
- Leverage the DeepSeek-V3 large language model to process complex academic texts and extract nuanced attitudinal patterns.
- Identify and analyze researchers' attitudinal discrepancies toward AI cataloging adaptability.

2 The adaptability of AI in the cataloguing



實求是

2 The adaptability of AI-driven library cataloging

Indicators	Positive	Neutral	Negative	Total
Output Efficiency	196 (75.68%)	56 (21.62%)	7 (2.70%)	259
Accuracy	174 (67.44%)	70 (27.13%)	14 (5.43%)	258
Technical Difficulty	107 (51.94%)	96 (46.60%)	3 (1.46%)	206
Comprehension Ability	92 (54.76%)	68 (40.48%)	8 (4.76%)	168
Usability	35 (56.45%)	20 (32.26%)	7 (11.29%)	62
Completeness	15 (83.33%)	3 (16.67%)	0 (0.00%)	18
Ethical Risks	3 (17.65%)	11 (64.71%)	3 (17.65%)	17
Consistency	5 (31.25%)	8 (50.00%)	3 (18.75%)	16
Relevance	5 (45.45%)	6 (54.55%)	0 (0.00%)	11
Implementation Cost	4 (57.14%)	3 (42.86%)	0 (0.00%)	7
Fairness	0 (0.00%)	2 (100.00%)	0 (0.00%)	2

3 AI-Augmented Metadata Workflows in library cataloguing

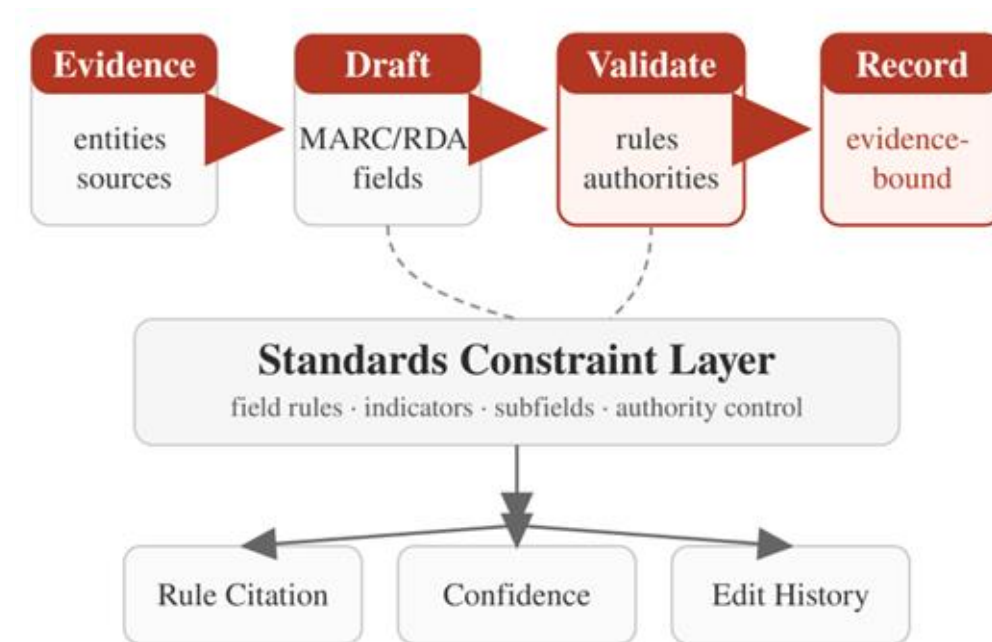
Cataloging tasks are subdivided into multiple standardized operational modules, which enhances the professionalism and interpretability of model outputs, and facilitates manual traceback, validation and iterative correction.



- **Metadata extraction** — perceive title pages, covers, contents, and publisher data.
- **Bibliographic description** — map entities and relationships to MARC/RDA fields.
- **Subject indexing** — conduct thematic analysis and allocate class numbers and subject terms following controlled vocabularies.
- **Quality control** — validate syntax, semantics, consistency, provenance, and exceptions.

3 AI-Augmented Metadata Workflows in library cataloguing

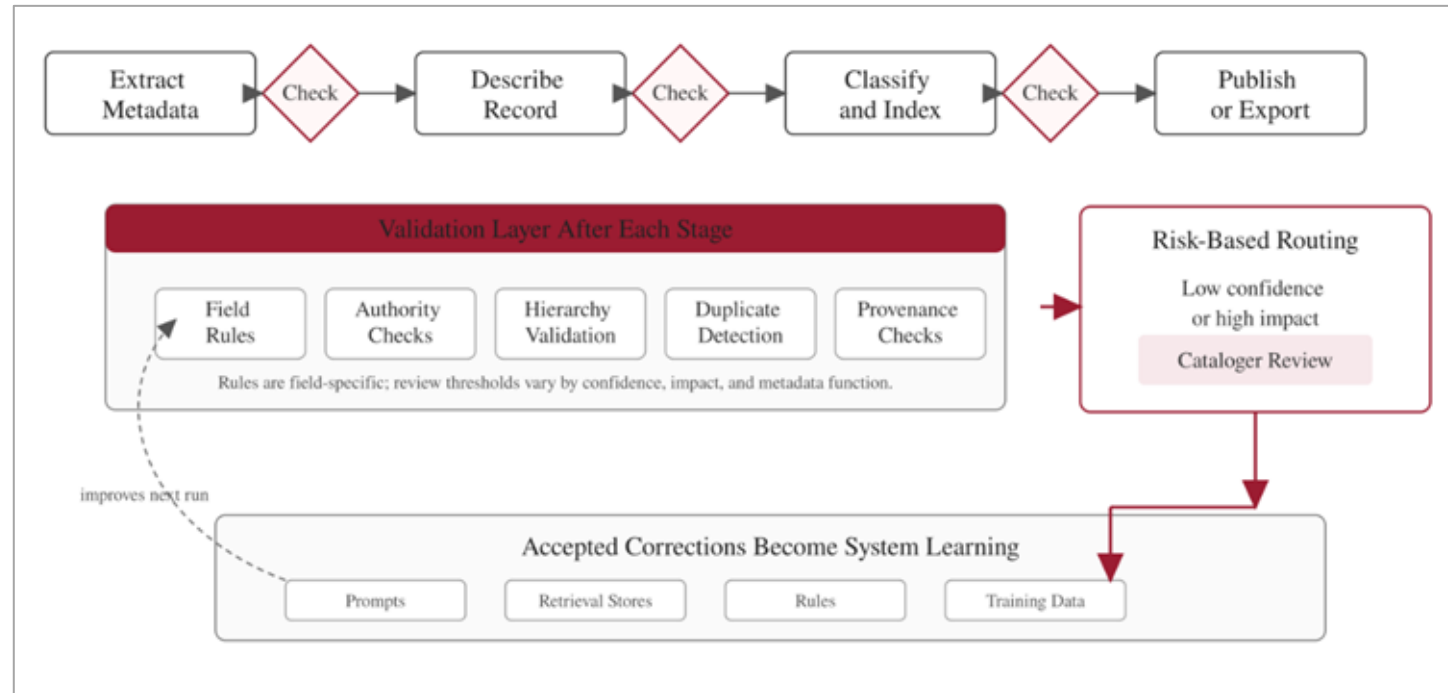
- LLMs transform extracted entities into MARC/RDA-style and normalize fields.
- Rule retrieval and field-level validation are essential: fluent output can still omit subfields, misuse indicators, or invent data.
- Link sources, rules, confidence and edit history to each output field.



Generation + rule validation

AI-Augmented Metadata Workflows in library cataloguing

Validation is part of the workflow—not just a final checkbox.



- Run field rules, authority checks, hierarchy validation, duplication detection, and provenance checks after each stage.
- Route low-confidence or high-impact cases to catalogers; one review threshold cannot fit every field.
- Feed accepted corrections back into prompts, retrieval stores, rules, and training data to enhance the model's learning capabilities.

Quality control links production, expert judgment, and system learning.

實求是

3 Governance by design

■ Risk-tiered human supervision

- ◆ Auto-accept only low-risk, high-confidence outputs supported by deterministic checks.
- ◆ Require expert review for ambiguous identities, rare classes, sensitive terms, and conflicting evidence.

■ Governance by traceability

- ◆ Log sources, prompts, models, evidence, rule versions, confidence, edits and accountability.
- ◆ Monitor bias, privacy, provenance, model drift, and error distribution.

Thank you for listening



Beyond Accuracy: Validating the Trustworthiness of AI-Generated Metadata

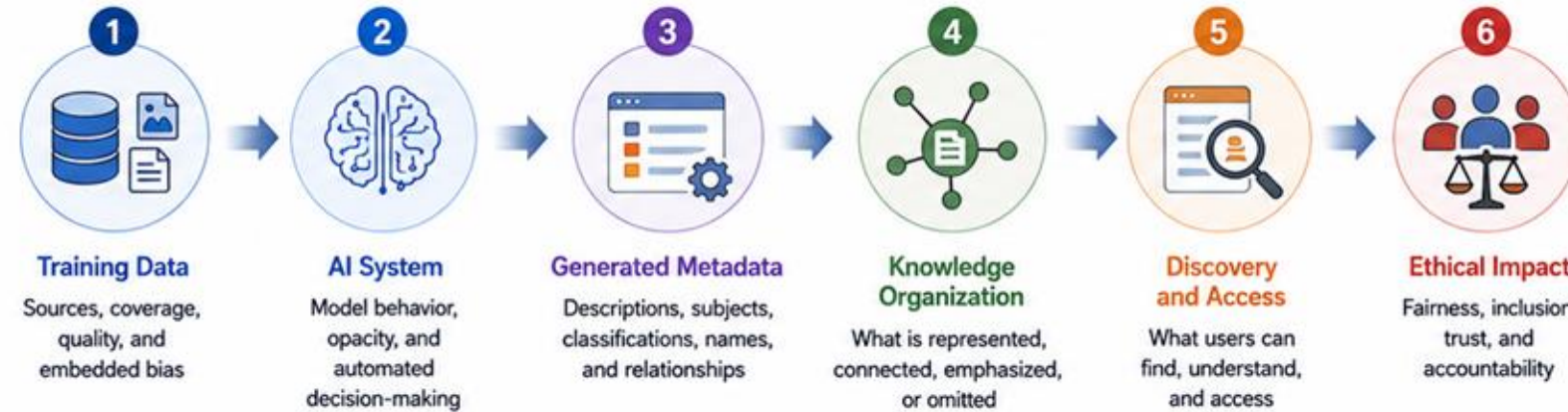
Seungmin Lee

Department of Library and Information Science

Chung-Ang University, South Korea

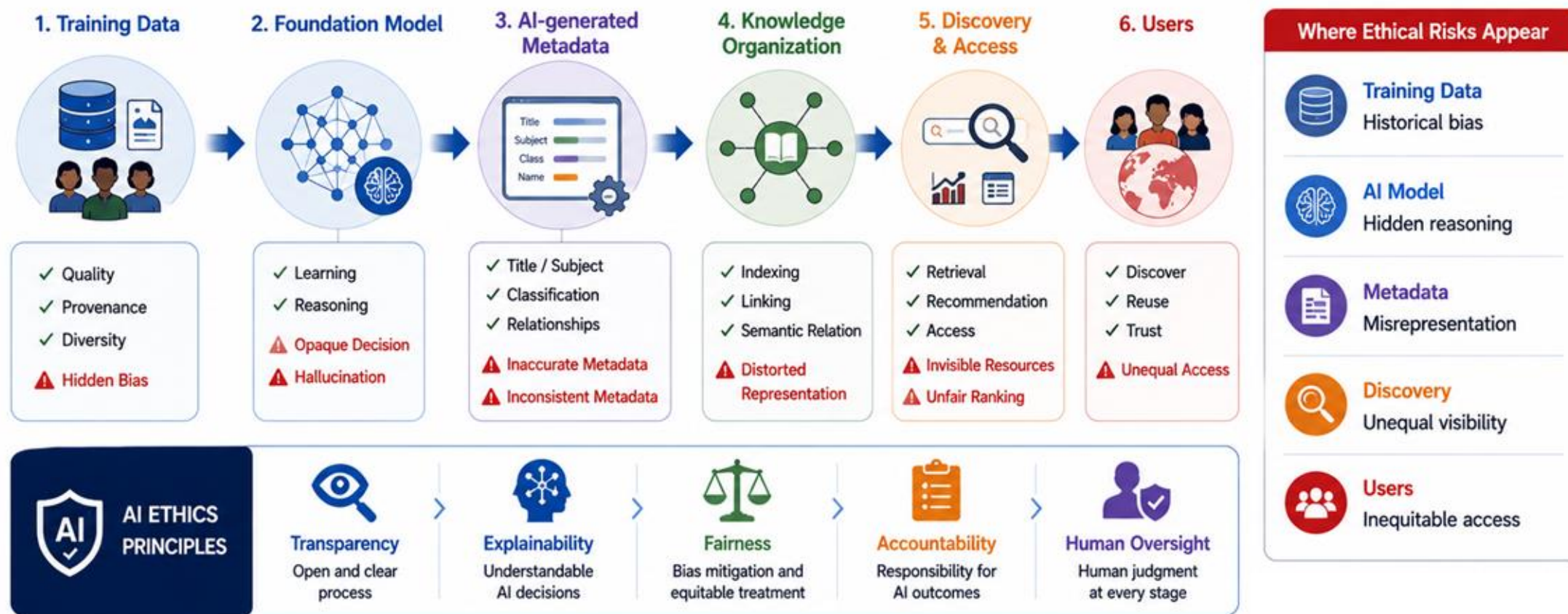


Why Ethics Matters in AI-Generated Metadata



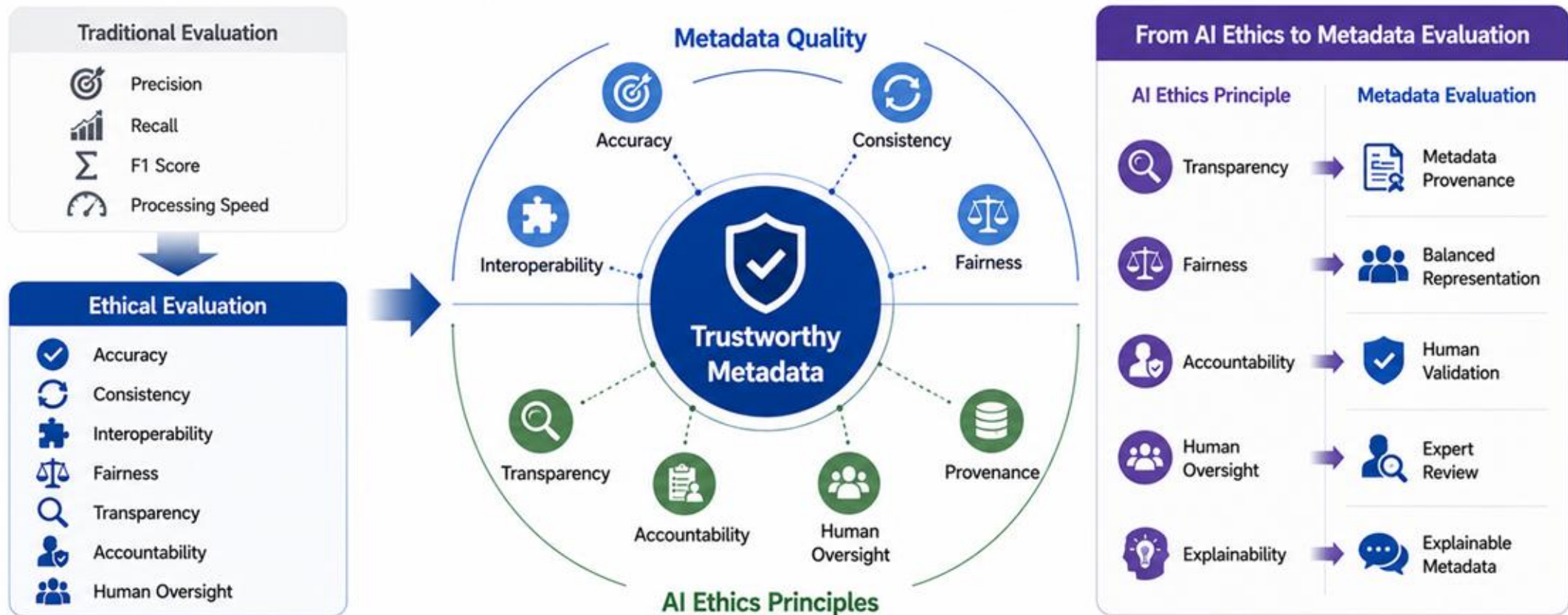
Metadata quality is an ethical issue because metadata determines what becomes visible, findable, and accessible

Ethical Risks in AI-generated Metadata



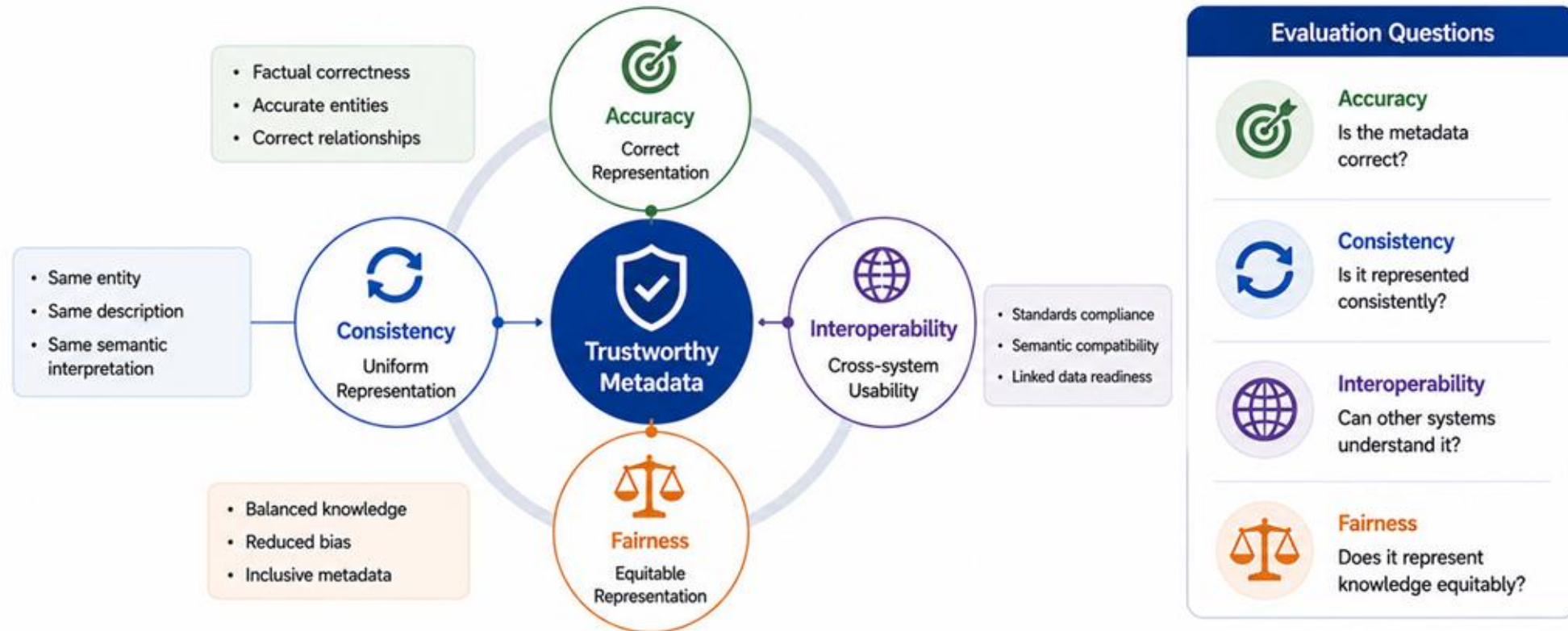
Ethical AI begins long before metadata is generated and its impact continues long after metadata is published

Ethical Principles for Trustworthy AI-Generated Metadata



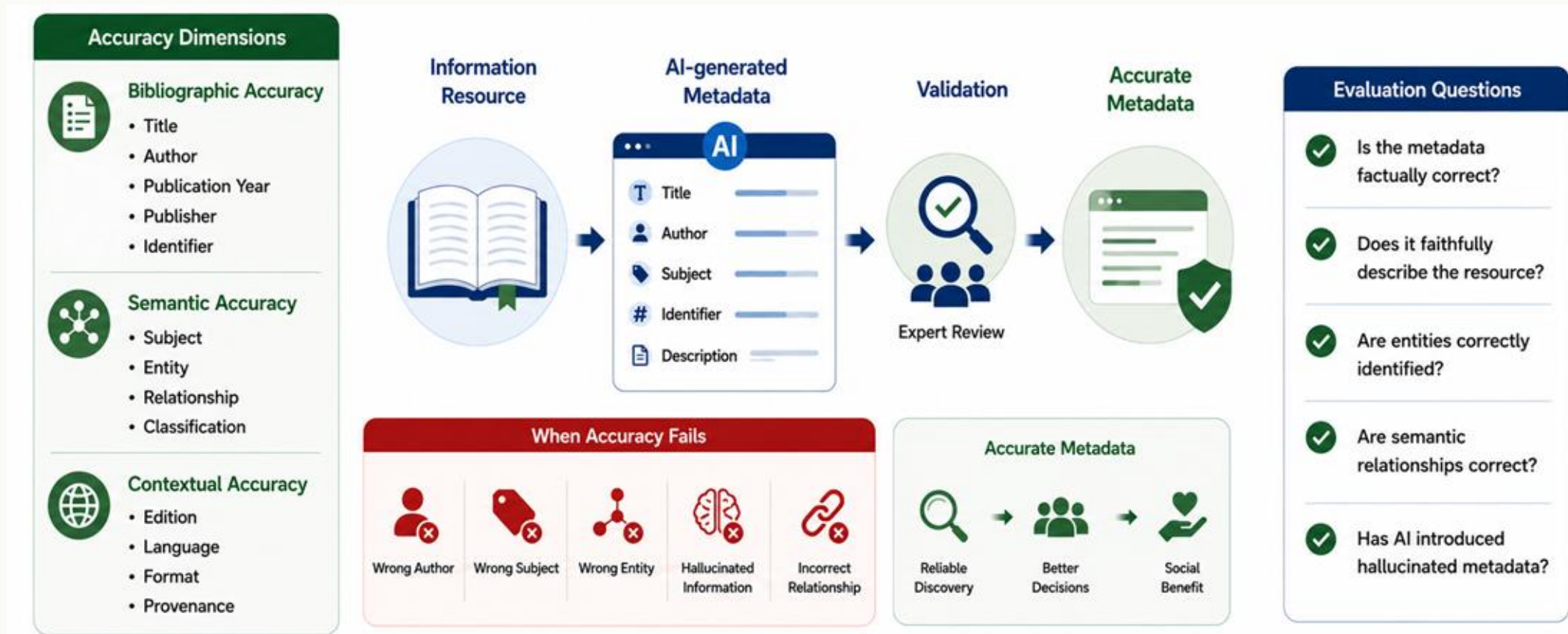
Trustworthy metadata is achieved when technical quality is guided by ethical AI principles

Four Core Validation Criteria for Trustworthy Metadata



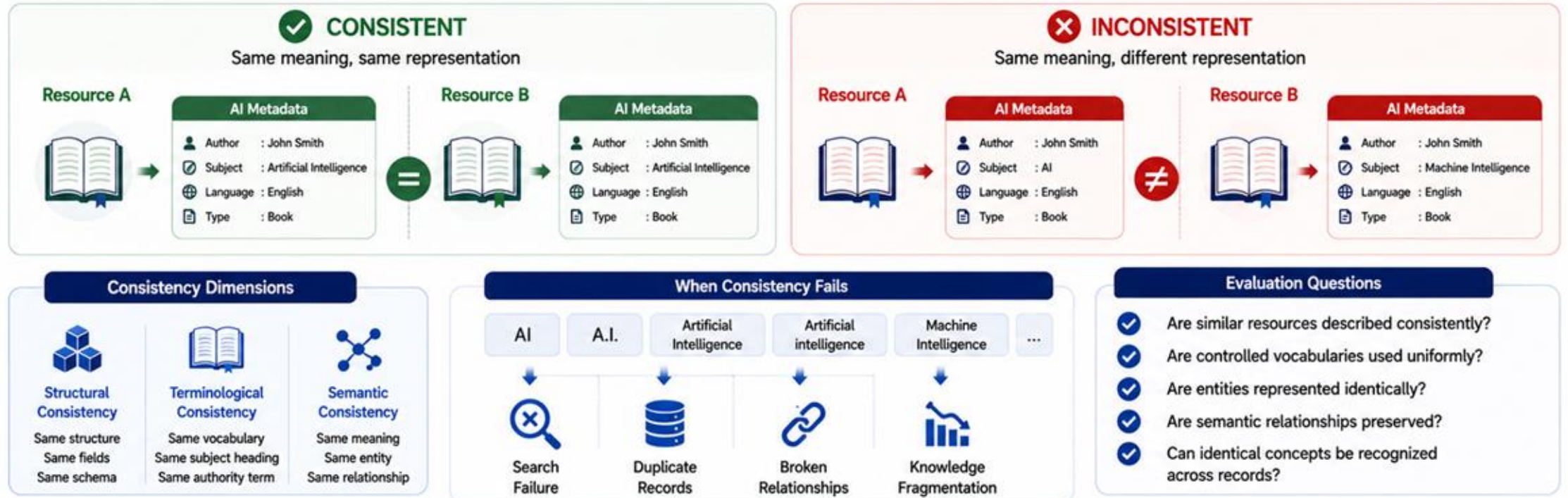
Trustworthy metadata emerges only when all four dimensions are satisfied

Accuracy: Does AI-generated metadata faithfully represent the resource it describes?



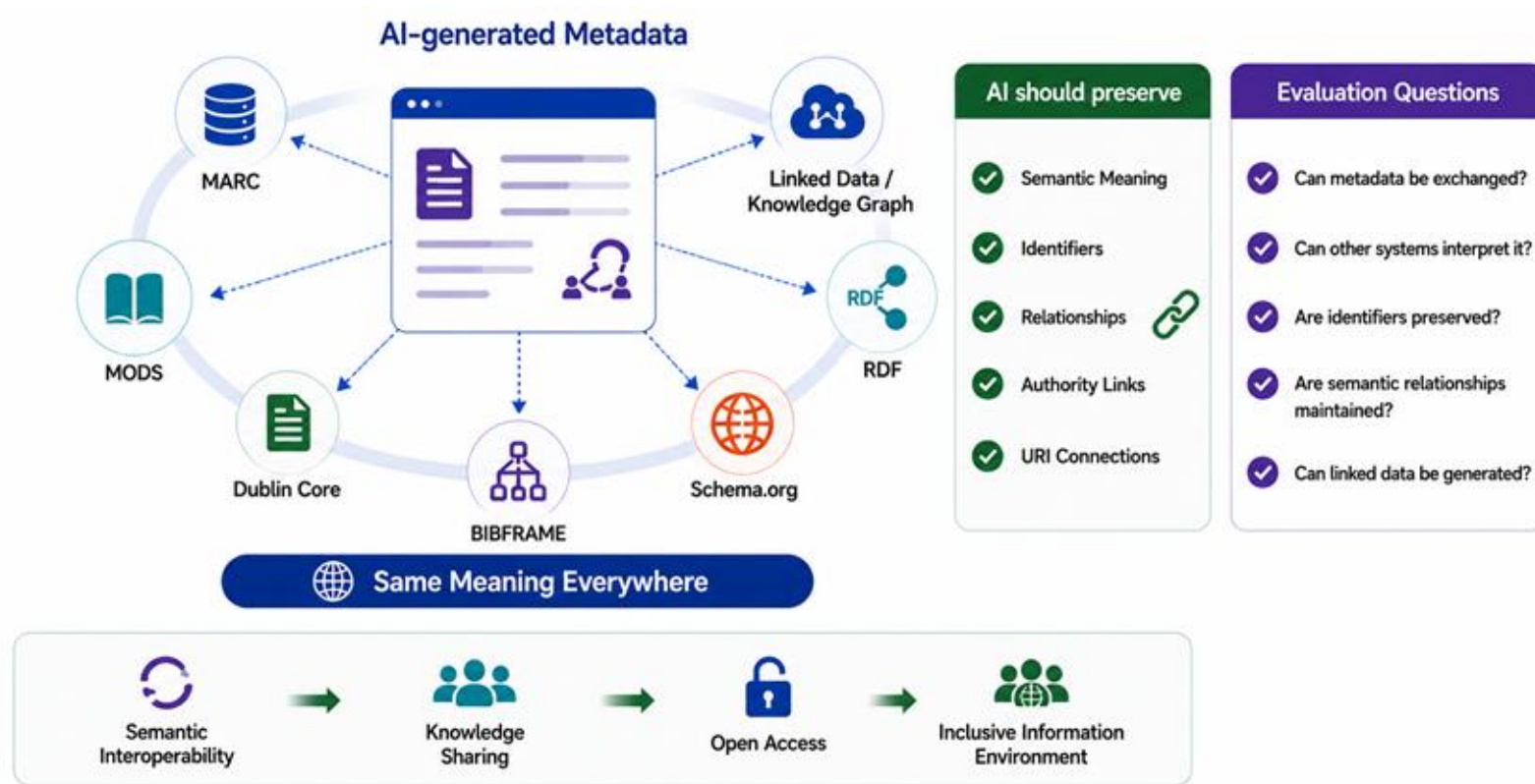
Accurate metadata faithfully represents both the facts and the meaning of the resource

Consistency: Does AI generate metadata in a semantically coherent manner?



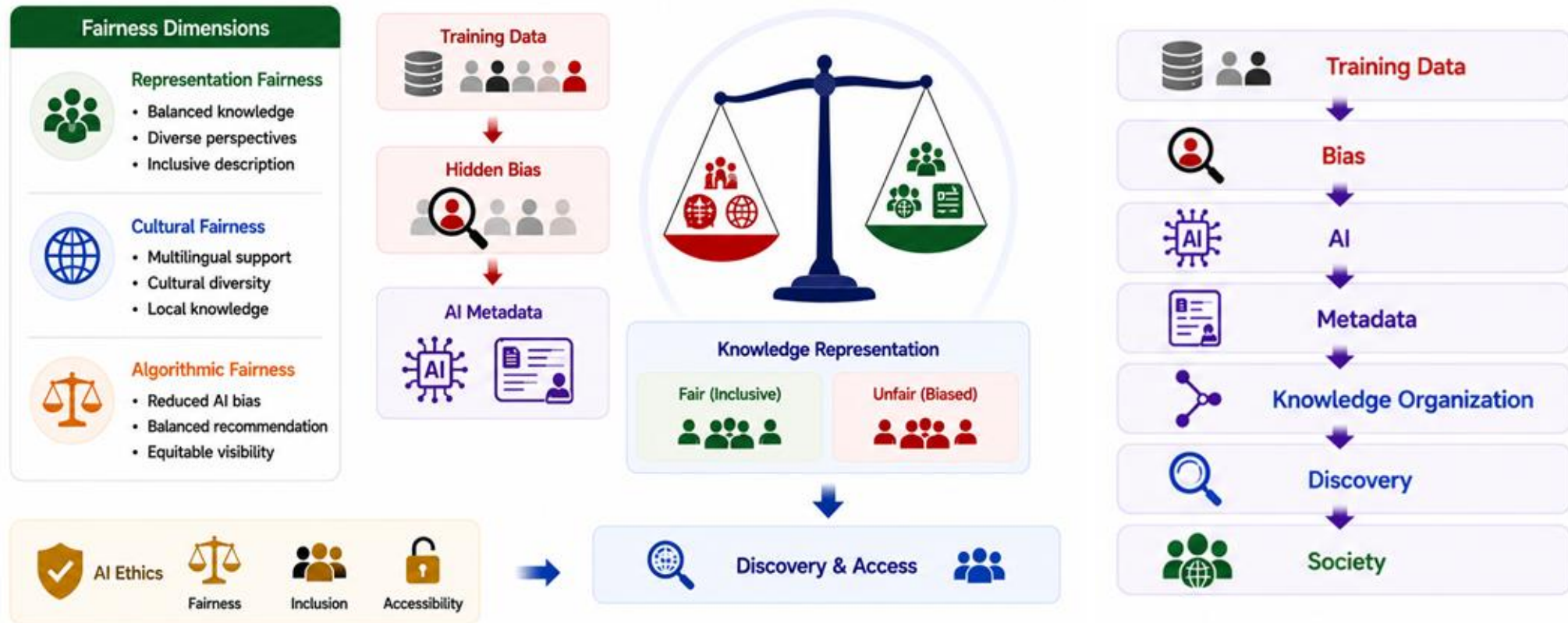
Consistency ensures that the same meaning is represented in the same way

Interoperability: Can AI-generated metadata be interoperable across systems?



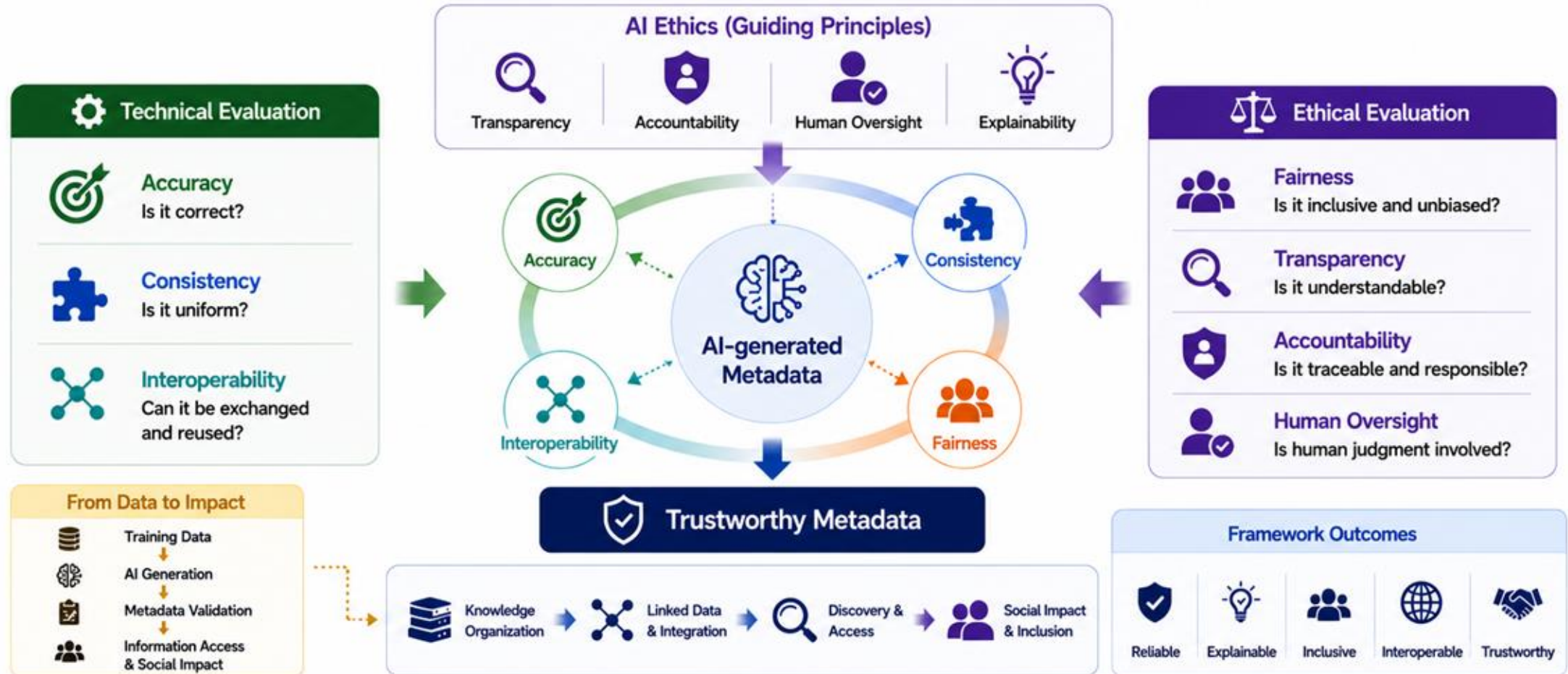
Interoperability is achieved when metadata preserves meaning across systems; not merely when it can be exchanged.

Fairness: Does AI-generated metadata represent knowledge without systematic bias?



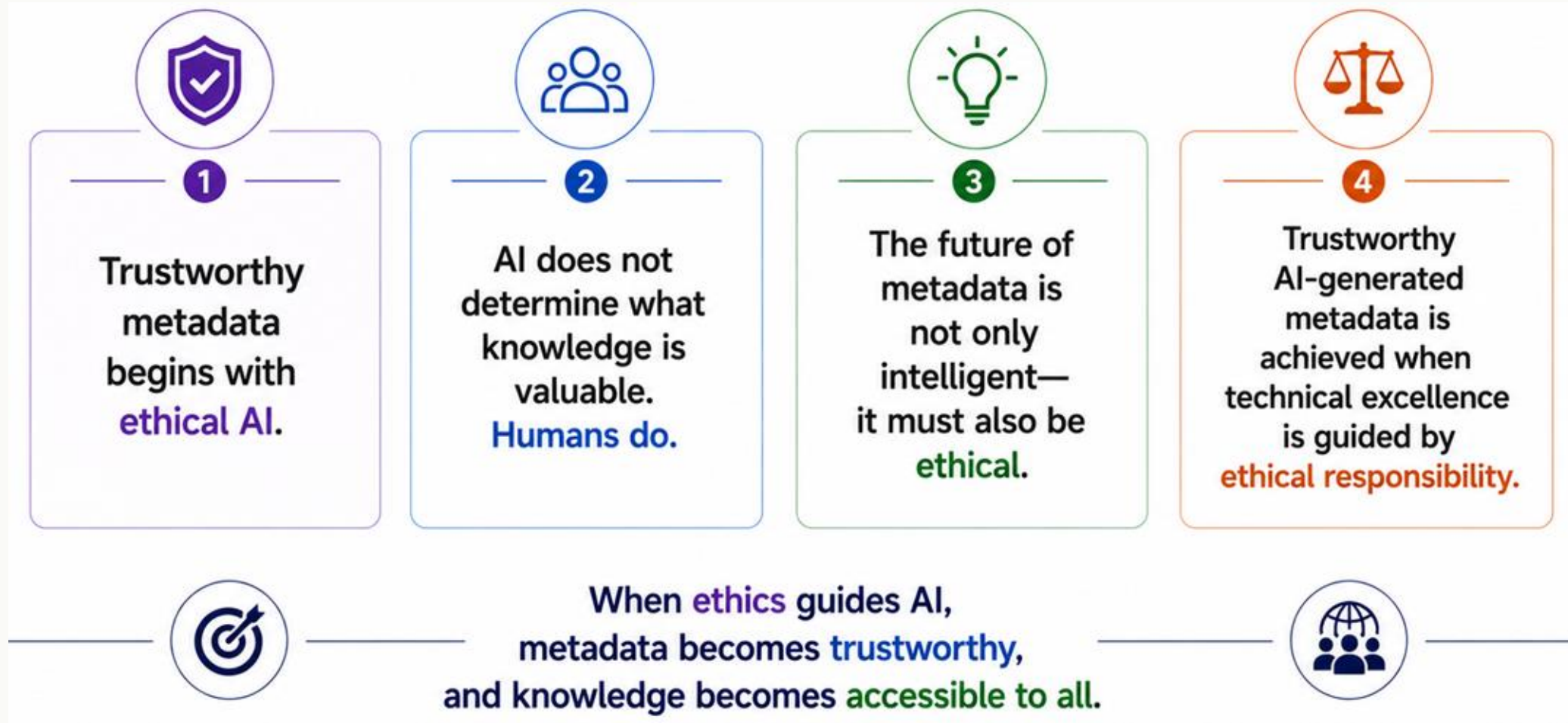
Trustworthy metadata is not only technically correct; it must also be ethically fair

An Ethical Evaluation Framework for Trustworthy AI-generated Metadata



Trustworthy metadata is achieved through the integration of technical validation and ethical governance

Conclusion: Toward Trustworthy AI-generated Metadata



Question?
Comment?

Operationalizing Ethics: NYU Use Case & Governance Model

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NKOS Workshop at DCM2026
August 3, 2026, Seoul, South Korea

| Operationalizing Ethics: NYU Use Case & Governance Model

● Governance

- Transition from pilot groups to a more structured governance model
- **Spring 2026:** [AI Leadership Council](#) (University) → **Libraries** [AI Steering Committee](#) → 4 AI Task Groups: 1) Library Content in AI Training Models; 2) AI-Powered Research and User Services; 3) **AI-Driven Metadata Management and Workflow Automation**; 4) Library Pedagogies in our Current Environment
 - [AI in Action Task Group](#), participating in Ithaka S+R [AI in Action: A Collaborative Cohort to Advance Library Operations](#) initiative
- 2024-present: Pilot groups continue, e.g. KA AI Study Group (Metadata Dept.) and AI Community of Practice (subject librarians)

● Metadata standards and quality, using RDA and PCC best practices

- PCC AI Task Group → Policy Committee will establish a new advisory committee to coordinate AI-related issues.
- [Joint RDA Board and RSC Working Group on AI](#)
 - Define standards for AI-assisted metadata
 - Minimum compliant datasets
 - Transparency & governance
 - Defining how AI-generated metadata can be demonstrably RDA compliant

| Operationalizing Ethics: NYU Use Case & Governance Model (2)

- **Linked data testing and projects**
 - From MARC to linked data: ShareVDE, Bibframe Interoperability Group, RDA/RDF, and NYU institutional repository migration
 - Structured data, research data and metadata (machine-learning ready)
 - LLMs are not enough! (2026 Knowledge Graph Conference)
- **Responsible AI testing, practice and interim policies**
 - Using Alma AI-assisted tool to create brief records: for staff to review
 - Using OCLC macro for subject recommendations: for catalogers to choose and decide
 - Keep human in the loops for quality assessment
 - Prevent our metadata from harmful language and bias
 - Interdisciplinary collaboration and research (next slide)

| Operationalizing Ethics: NYU Use Case & Governance Model (3)

- **Domain-specific data** and **high-quality metadata** needed
 - Participate proactively in ethical AI projects creating quality datasets and metadata
 - Domain knowledge: LLM (AGI) → specialized datasets (SLM)
- **Partnership: Metadata librarians, Domain experts** (e.g. faculty or scholars) and **Data scientists**, especially those with expertise in machine learning and natural language processing
- Redefine and **optimize discovery**
 - Digital platforms in a global context in terms of diverse cultures/languages
 - Scholarly publishing: open access & open education
- [NYU Strategic Pathways](#): ***“Interdisciplinary Impact, leveraging our unique capacity for collaboration and transformation.”***

Operationalizing Ethics: NYU Use Case & Governance Model (4)

Capstone Project: Improving Discoverability of Institutional Repository Resources

 **NYU** | Faculty Digital Archive

The Faculty Digital Archive (FDA) is a highly visible repository of NYU scholarship, allowing digital works—text, audio, video, data, and more—to be reliably shared and securely stored. Collections may be made freely available worldwide, offered to NYU only, or restricted to a specific group.

Full-time faculty may contribute their research—unpublished and, in many cases, published—in the FDA. Departments, centers, or institutes may use the FDA to distribute their working papers, technical reports, or other research material. [Read more...](#)



NYU Libraries | Semantic Search Engine

Sponsor: Charlene Chou | **Faculty Advisors:** Christopher Policastro, Errol Elbasan
Team Members: Craig Dsouza, Linrui Li, Namratha Shivani Nuthi



Sponsor Vision

NYU Libraries' keyword-based systems struggle to support deeper semantic search across mixed formats and inconsistent metadata.

This project prepares library artifacts for future AI-driven discovery by creating clean, structured text and consistent metadata as a foundation for semantic search tools.

Project Scope & Approach

Scope: To provide working proof of a system that could make NYU Libraries' digital collections easier to search and prepare them for future AI use.



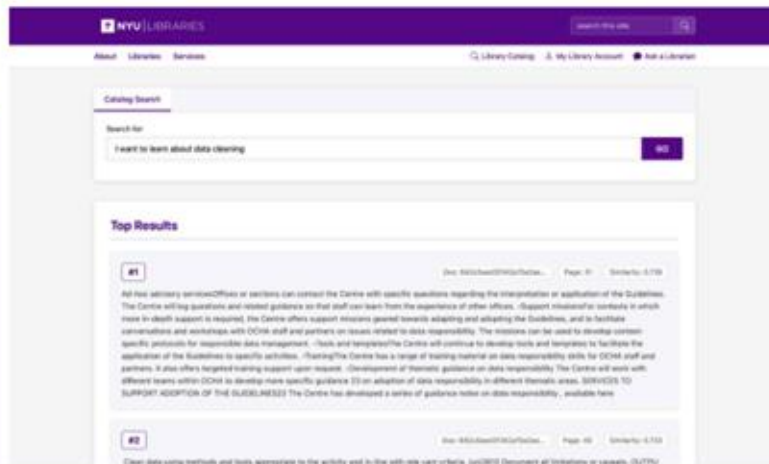
Review NYU Libraries' platforms and compared them with other universities to identify key search and usability issues.

Use these findings to design a process that connects user needs with technical improvements, making library documents AI-ready, and building a working semantic search prototype.

Prepare all findings, workflows, and the prototype for handoff to the next team for further development.

Key Findings & Results

Search Confusion: Users struggle with NYU Libraries' multi-bar search and navigation, making resources hard to find.
Benchmark Insights: Peer universities offer clearer UI and hierarchies, giving us a clearer direction for improvement.
OCR Importance: Clean OCR and basic structure extraction enhance embedding quality and semantic search relevance.
A working prototype that enables semantic search and question-answering over PDFs with page-level context.

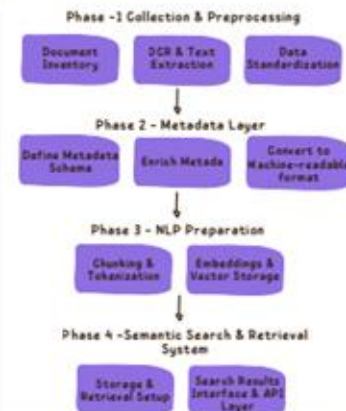


Impact & Implications

Clarified a viable path for turning Faculty Digital Archive's (FDA) legacy data into AI-ready data, giving the sponsor a concrete starting point for future semantic-search development.

Provided a reusable workflow and prototype, enabling next-semester teams to scale the work and integrate stronger metadata into NYU's discovery systems.

Prototype Workflow



Lessons Learned & Acknowledgements

Converting real-world library collections into AI-ready formats requires balancing technical feasibility with metadata realities. Clean OCR and structure matter far more than expected.

Close collaboration with the sponsor is crucial. Frequent feedback shaped our scope and kept the project realistic for a single semester.

We are grateful to our sponsor, Charlene Chou, for her guidance and to Professor Policastro and TA Errol Elbasan for helping refine our direction throughout the semester.

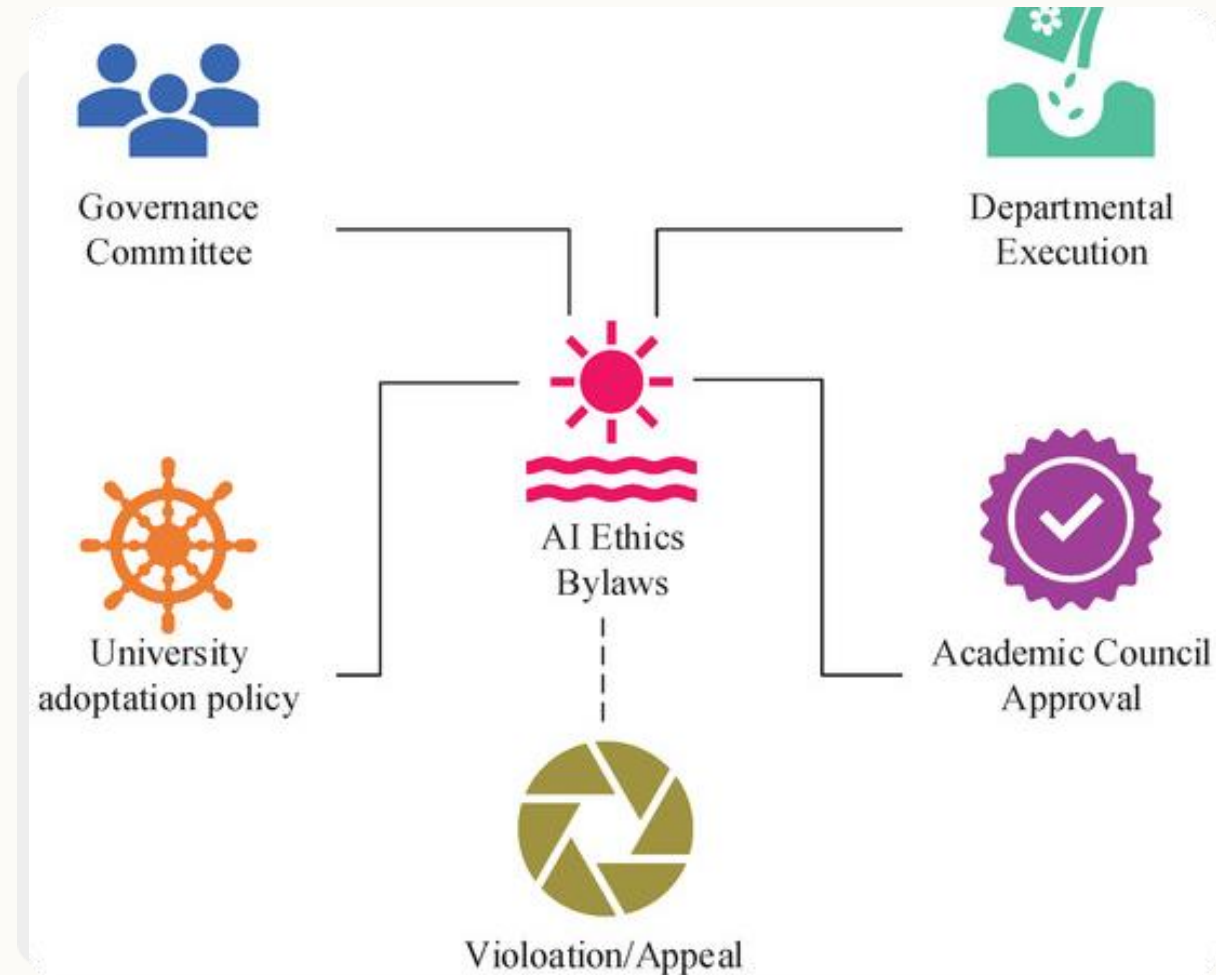
Operationalizing Ethics: NYU Use Case & Governance Model (5)

GenAI and NLP Pilots: Assessing subject indexing for complex multi-lingual resources at NYU; Semantic search platform for OA resources such as ebooks published by NYU Press

Linked Data Alignment: Forging paths between BIBFRAME, RDA, linkable entities in institutional repository, AI-assisted metadata operations and machine learning readiness

Risk Audits: Strategies for vetting automated discovery in live metadata operations.

Synthesis: Ethical AI requires the continuous reconciliation of technical performance with professional accountability.



| Operationalizing Ethics: NYU Use Case & Governance Model (6)

NYU Center for Responsible AI: Our goal is to make “responsible AI” synonymous with “AI.”



AI Competency Framework for Metadata Professionals

A Six-Domain Working Matrix v0.1

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Institute of History and Philology, Academia Sinica

NKOS Workshop at DCMI2026
3 August 2026, Seoul, South Korea

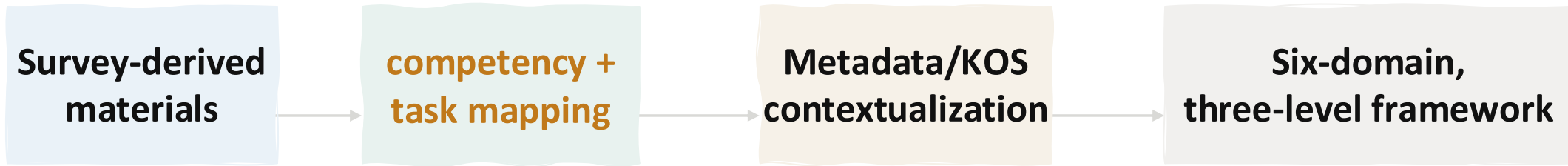
Domain	Foundational	Applied	Design/Gov.
1. AI Literacy	Know tool limits	Select fit-for-purpose tools	Set tool-use guidance
2. Stewardship	Recognize data conditions	Prepare and document inputs	Define stewardship procedures
3. Standards	Recognize schemas/KOS	Apply standards and vocabularies	Design alignment rules
4. Operations	Identify bounded tasks	Use AI in workflows	Design workflow roles
5. Evaluation	Check obvious errors	Assess quality and fit	Define QA thresholds
6. Governance	Recognize rights and risks	Apply policy requirements	Build accountability

6 Domains × 3 Levels

Working Matrix v0.1

Study Basis and Framework Development

From survey-derived materials to a metadata/KOS framework



MATERIALS

Questionnaire · item-level descriptive results · C06/C07 codebooks

C06: AI-use contexts · C07: skills and competencies

EVIDENCE BOUNDARY

Document-based synthesis; not a re-analysis of respondent-level raw data

Materials shared through the DCMI Education Committee Metadata and AI Task Group; acknowledgement to Dr. Ying-Hsang Liu.

The Gap the Framework Addresses

AI as workflow support; metadata as professional responsibility

AI is often framed as

**efficiency
automation
service support**



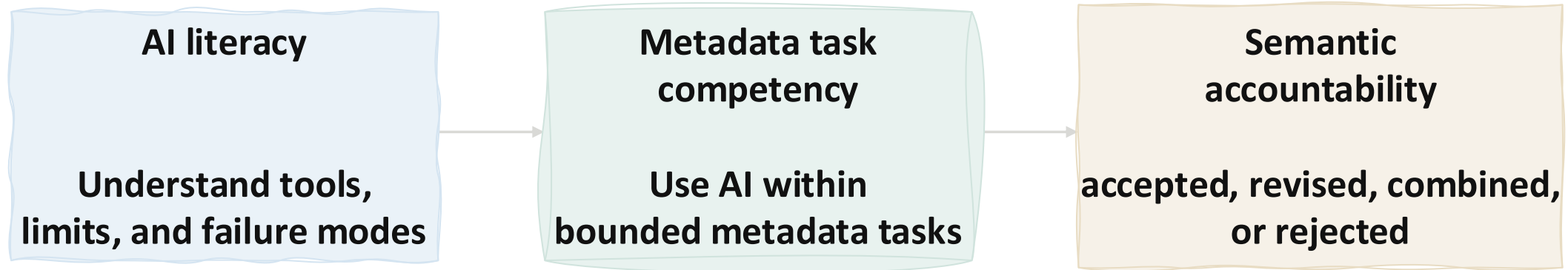
Metadata work also requires

**standards knowledge
semantic judgment
quality review
governance responsibility**

- Existing frameworks—especially the ALA Core Competencies—provide the professional baseline.
- This working matrix adds an AI-specific, task- and responsibility-based operational layer for metadata/KOS workflows.

From AI Competency to Semantic Accountability

A working concept for metadata/KOS responsibility



Can AI output become accountable metadata in a standards-based environment?

Semantic accountability is used here as a working concept, not a validated theory.

Six Domains of the Framework

Connecting tool understanding, metadata practice, and institutional responsibility

ENABLING CONDITIONS

1 AI Literacy and Tool Understanding

2 Data and Metadata Stewardship

PROFESSIONAL METADATA PRACTICE

3 Standards, Semantic Alignment, and Interoperability

4 AI-Assisted Metadata Operations

5 Evaluation, Quality Assurance, and Human Oversight

INSTITUTIONAL RESPONSIBILITY

6 Responsible Governance, Rights, and Risk Management

Six domains organize the move from AI tool use to metadata judgment and accountability.

Three Responsibility Levels

Distributed capacity across an AI-supported metadata workflow

Level	Focus	Question
Foundational Awareness	concepts, risks, limits	What must be recognized?
Applied Practice	bounded metadata tasks	How should outputs be revised and documented?
Design and Governance	workflow rules and accountability	How should criteria and responsibilities be defined?

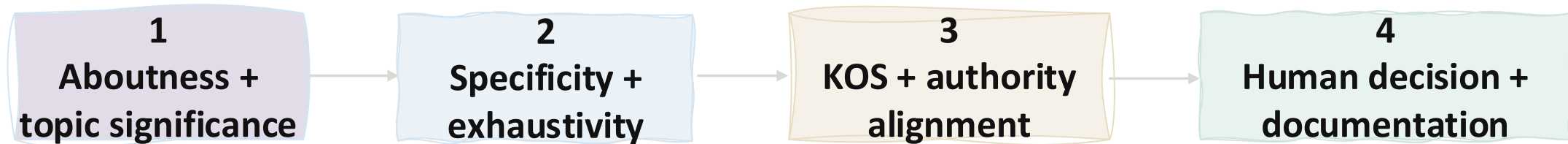
Example domain: Evaluation, Quality Assurance, and Human Oversight

Descriptors	Awareness	Practice	Design & Governance
Illustrative descriptors	Recognize obvious errors, risks, and uncertainty	Validate outputs, document decisions, and escalate exceptions	Define quality criteria, review thresholds, and escalation rules

Example: AI-Assisted Subject Analysis

From candidate concepts to accountable subject access

AI-suggested candidate ≠ approved subject assignment



Metadata implementation context: MARC records · BIBFRAME/RDF
graphs · local application profiles

ILLUSTRATIVE MINI-CASE

AI candidate: “Artificial intelligence”

Resource focus: LLM-assisted cataloging

Illustrative decision: do not accept as-is; revise or combine after reviewing KOS/authority evidence

Decision record: source evidence · authority ID/URI · rationale · reviewer/date

What the Framework Can Support

A discussion tool for education, workflow design, and governance

**Curriculum and
professional development**

**Connect AI literacy with
metadata, KOS, standards,
and QA**

**Workflow and
role design**

**Clarify where AI may assist
and where review is required**

**Governance and
quality assurance**

**Support documentation,
rights, bias review, and
accountability**

A shared language for responsible metadata-AI work.

| Status and Questions for Refinement

From v0.1 working matrix to community-informed revision

Current status

**v0.1 working matrix
for discussion**

Questions for refinement

1. Are the six domains complete and clearly bounded?
2. Do the three levels work across institutional roles?
3. Which metadata/KOS workflow should be used for the first formal test?

NKOS feedback : developmental consultation, not formal validation.

Thank you

Questions and comments are welcome.

AI enhances, not replaces, human metadata expertise.



Critical Thinking



Efficiency Boost



Nuanced
Judgment

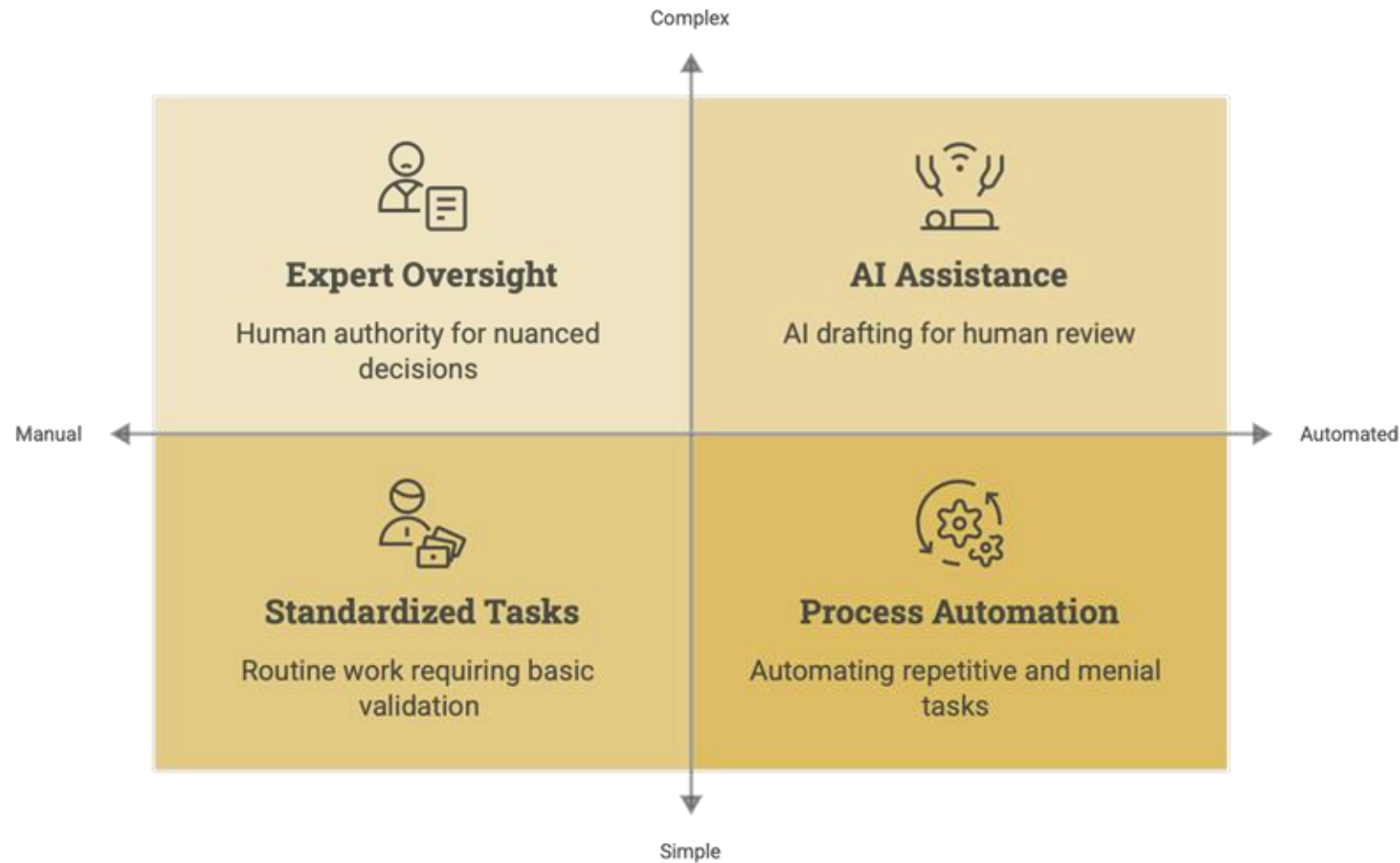


Data-Driven
Insights

Human Expertise

AI Augmentation

Optimize Metadata Workflows



Governance and Ethical Guidelines

Prioritizing transparency, practitioner control, and professional accountability.

Effective governance requires mandating explicit labeling of AI-generated metadata and implementing institutional oversight models like NYU's AI Leadership Council and Steering Committee.

