DCPAPERS

DCMI 2026

Proceedings of the International Conference on Dublin Core and Metadata Applications 2026

ISSN: 1939-1366

Ontology for Meaning-Driven AI: Grounding, Interpretability, and Trust

Myung-Ja K. Han[1], **Josh Falconer**[2], **Sumin Leem**[3], and **Inkyung Choi**[4]

[1] University of Illinois at Urbana-Champaign. Library, [2] Bloomberg, [3] University of Calgary, [4] Sungkyunkwan University

Abstract

Ontologies play a critical role in organizing, connecting, and enabling the reuse of information across memory institutions and other knowledge domains. As AI systems increasingly generate and consume metadata, ontologies are emerging as essential mechanisms for grounding meaning, supporting interoperability, and building trust. Yet ontology development remains uneven and challenging in AI-enabled environments, requiring new approaches that integrate human expertise, machine reasoning, and scalable workflows. This panel brings together researchers and practitioners to examine how ontology practices are evolving, focusing on design strategies, human–AI collaboration, validation, and the role of ontologies in supporting reliable, interpretable, and reusable knowledge in an AI-driven environment.

1. Introduction

Ontologies function as foundational tools for organizing, connecting, and enabling the reuse of information across a wide range of knowledge-organization contexts, including libraries, archives, museums, research infrastructures, data repositories, and other information-intensive domains. In addition to structuring information, ontologies increasingly serve as mechanisms for grounding AI systems, enabling the capture and transfer of meaning in forms that support discovery, interoperability, explainability, and reuse across systems, disciplines, and institutional boundaries [1].

Despite their growing importance, ontology development remains unevenly adopted and often difficult to implement, challenges that are amplified in AI-enabled environments. Effective ontology work now requires not only technical and domain expertise, but also careful consideration of how ontologies interact with large language models, context graphs, and automated metadata workflows. As organizations seek to leverage AI for metadata creation and enrichment, long-standing assumptions about ontology design, inference, and validation are being revisited, and new practices are emerging that emphasize scalability, task-focused context, and human–machine collaboration.

This panel brings together practitioners and researchers working at the intersection of ontology, metadata, and AI to examine how ontology practice is evolving in response to these changes. Panelists will discuss:

- When and why ontology development is necessary in AI-enabled metadata environments, including the use of context graphs and task-focused representations;

Panel

Available Aug 01, 2026

Correspondence to
Myung-Ja K. Han
mhan3@illinois.edu

- Key design considerations for human-and machine-assisted ontology development, and what has changed, and what remains stable, in practice;
- The role of ontologies in making semantic structure explicit to support grounding, interpretation, and trust in AI-enabled systems;
- Reflections on practical successes, failures, and lessons learned from designing, implementing, and maintaining ontologies in AI-driven systems

2. Panel Structure

Panelists will share their experiences working with ontologies, including practical challenges in developing and managing ontologies as part of AI-enabled metadata and knowledge-organization workflows.

Myung-Ja K Han will set the stage by providing a foundational framework and shared context for ontology. Her talk will trace the history and evolving role of ontologies within memory institutions [2] and broader knowledge-organization practices, highlighting how ontologies have supported discovery, interoperability, and reuse. She will also discuss current trends indicating a growing demand for ontologists across information-intensive domains, situating ontology work within contemporary professional and organizational contexts. In addition, she will introduce a selection of well-known and widely used ontologies, examining how AI and related information technologies have influenced their development, implementation, and use.

Josh Falconer will examine how ontology practice must evolve as natural language becomes the dominant medium through which both humans and AI produce and consume knowledge. Drawing on his experience in developing an enterprise-scale knowledge graph at Bloomberg, he will address the critical challenges and opportunities the field now faces: How might we build meaning-representation frameworks designed not just for a human audience but for AI systems as well? How might we overcome the central barriers to trust in AI, including hallucinations, ungrounded assertions, fragmented context windows, loss of systemic coherence, and rapid scalability that outpaces governance? And how might we leverage the expressive and interpretive power of natural language itself as a tool for building, validating, and querying structured knowledge? Ultimately, he will argue that ontology practice must fundamentally adapt if the knowledge produced and consumed by human and AI agents is to achieve grounding, interpretability, and trust.

Sumin Leem will discuss when ontology design can help in AI-enabled workflows. As recent AI tools make it easier to generate semantic structure from documents, including knowledge graphs, the key question is whether that structure can represent the explicit domain logic a task requires. She argues that ontology is especially valuable when machine-generated structure must support such logic. This is particularly relevant in rule-rich settings, where meaning is organized across multiple layers of conditions, dependencies, exceptions, decision structures, entities and relationships. She will also consider what this means in practice for task scoping, validation, and long-term

maintenance, especially when semantic structures are expected to support grounding, interpretation, and trust.

Inkyung Choi will discuss the evolving role of information sciences within materials science, framing data standardization as a sociotechnical negotiation process rather than a purely technical challenge. While celebrating the convergence of domain expertise and computational linguistics through NLP and LLM tools, she will address a critical tension: discovery-driven research tends to prioritize immediate results over long-term data interoperability, producing fragmented information silos even within advanced AI workflows. Drawing from her experiences with FAIRification [3] and Ontology reuses in Material Sciences, she will illustrate how technical sophistication alone does not guarantee community-level standardization, and how we build the capacity to both negotiate shared conceptual agreements and translate them into implementable artifacts such as application profiles and validation constraints. She will propose a community-driven restandardization methodology positioning metadata experts as strategic partners who mediate between formal logic and community knowledge structures from the earliest stages of the AI-driven research lifecycle.

3. Moderator/Speaker Bios

Inkyung Choi is an Assistant Professor in the Department of Library and Information Science at Sungkyunkwan University. She served as a Teaching Assistant Professor at the University of Illinois Urbana-Champaign and an Associate Research Scientist at OCLC, followed by professional experience as a Senior Consultant at Samsung SDS. As a current FAIR Fellow, she specializes in metadata architecture, ontology engineering, and knowledge organization, with a focus on implementing FAIR principles to enhance data interoperability and reuse. Her current research focuses on developing a standard-based Knowledge Graph platform for next-generation secondary battery materials and metal health clinical data profiling, aiming to transform fragmented domain information into sustainable, machine-actionable knowledge infrastructures for AI-driven scientific discovery.

Josh Falconer is Senior Ontologist at Bloomberg, where he collaborates with a team of ontologists in semantic modeling for an enterprise knowledge graph. Previously, he was an Ontologist at Indeed. For more than a decade, he served in various bibliographic metadata cataloging roles, with a focus on manuscript library collections from the Middle East and North Africa. His recent research interests center on knowledge organization systems, event representation, and cognitive linguistics. He has earned degrees in philosophy, Semitic languages, and library and information science.

Myung-Ja (MJ) K. Han is the Andrew Turyn Professor and Metadata Librarian at the University of Illinois Urbana-Champaign. Her research interests include metadata interoperability, information management, and the application of information technologies in libraries. She has served as Co-PI on research projects funded by the Andrew W. Mellon Foundation and the National Endowment for the Humanities: Exploring the

Benefits for Users of Linked Open Data for Digitized Special Collections and Emblematica Online. She is also the co-author of two textbooks on XML. MJ is a member of the DataCite Metadata Working Group, the HathiTrust Program Steering Committee, and the MODS Editorial Committee. She previously served as Chair of the Program for Cooperative Cataloging (PCC).

Sumin Leem is Algorithm Specialist at Clause Technology and Postdoctoral Associate at the University of Calgary. She works on ontology-driven approaches for AI-enabled metadata and interpretation workflows in policy- and regulation-driven settings. Her interests include task-scoped context graphs, validation and versioning practices, and the boundary between probabilistic generation and governed semantic commitments.

References

[1] T. Seale, "Ontology is having its moment." [Online]. Available: https://www.linkedin.com/posts/tonyseale_ontology-is-having-its-moment-there-was-activity-7400096205990494208-iLxo/

[2] C. Gutiérrez and J. F. Sequeda, "Knowledge graphs," *Communications of the ACM*, vol. 64, no. 3, 2021, doi: 10.1145/3418294.

[3] M. D. Wilkinson and et al., "The FAIR Guiding Principles for scientific data management and stewardship," *Scientific Data*, vol. 3, 2016, doi: 10.1038/sdata.2016.18.