Joint Proceedings of the 16th Workshop on Ontology Design and Patterns (WOP 2025) and the 1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025)

Abstract

This volume contains the joint proceedings of the 16th Workshop on Ontology Design and Patterns (WOP 2025) and the 1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025), held in conjunction with the International Semantic Web Conference (ISWC 2025) in Nara, Japan. WOP 2025 focuses on quality and reuse in knowledge engineering through Ontology Design Patterns (ODPs), particularly in the context of knowledge graphs. HAIBRIDGE 2025 explores the intersection of Hybrid Intelligence (HI) and the Semantic Web to enhance human-AI collaboration and create more explainable, trustworthy systems. The collection of papers herein reflects the synergy between these foundational and applied domains.

Keywords

Ontology Design Patterns, Hybrid Intelligence, Human-AI Collaboration, Semantic Web, Knowledge Graphs, Explainable AI (XAI)

Preface

This volume contains the joint proceedings of the *16th Workshop on Ontology Design and Patterns (WOP 2025)* and the *1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025)*. These workshops were co-located with the 24th International Semantic Web Conference (ISWC 2025), which took place in Nara, Japan, from November 2 to 6, 2025.

16th Workshop on Ontology Design and Patterns (WOP 2025). The Workshop on Ontology Design and Patterns (WOP) is an annual event that covers issues related to quality in ontology design and the use of ontology design patterns (ODPs) for data and knowledge engineering in the Semantic Web. The workshop aims to provide a forum for researchers and community members to discuss and exchange ideas on patterns, pattern-based ontologies, systems, and datasets. It also seeks to broaden the pattern community by fostering a discourse for describing relevant problems and their solutions, particularly in the context of emerging trends like knowledge graphs.

1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025). The principled integration of Hybrid Intelligence (HI), which combines human and artificial intelligence, with neurosymbolic systems presents novel opportunities for enhancing decision-making. The aim of this inaugural workshop is to address recent challenges and present new approaches that link these different paradigms. A special focus is placed on the human factors element, human-in-the-loop (HIL) techniques, and how humans interact with knowledge-augmented agents, with the goal of fostering interdisciplinary collaboration toward more robust, transparent, and ethical AI-driven systems.

The two workshops received 14 submissions in total. All submitted papers underwent a peer-review process, where each paper was reviewed by at least two experts from the respective program committees. This volume contains these papers, which are distributed across the workshops as follows:

- 9 submissions were received for WOP 2025, of which 8 were accepted;
- 6 submissions were received for HAIBRIDGE 2025, of which 5 were accepted.

Joint Proceedings of the WOP 2025 and HAIBRIDGE 2025 Workshops, co-located with the International Semantic Web Conference (ISWC 2025), November 2-6, 2025, Nara, Japan

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The workshops were held on November 2, 2025 (HAIBridge 2025), and November 3, 2025 (WOP 2025). Each workshop featured paper presentations, keynote addresses, and plenary discussions. We sincerely thank all authors, presenters, and participants for their contributions that fostered engaging and insightful conversations.

Editors

Hande Küçük McGinty, Kansas State University, US
Cogan Shimizu, Wright State University, US
Valentina Presutti, University of Bologna, IT
Eva Blomqvist, Linköping University, SE
Pascal Hitzler, Kansas State University, US
Aryan Singh Dalal, Kansas State University, US
Alexis Ellis, Wright State University, US
Subashini Ganapathy, Wright State University, US
Fjollë Novakazi, Örebro University, SE

Thread I: 16th Workshop on Ontology Design and Patterns (WOP 2025)

Workshop Organisation of WOP 2025

General Chairs

- Hande Küçük McGinty, Kansas State University, US
- Cogan Shimizu, Wright State University, US
- Valentina Presutti, University of Bologna, IT
- Eva Blomqvist, Linköping University, SE
- Pascal Hitzler, Kansas State University, US

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- Miguel Ceriani, National Research Council, IT
- Antrea Christou, Wright State University, US
- Aryan Dalal, Kansas State University, US
- Joseph Zalewski, Kansas State University, US

Keynote

From Zoo to Marketplace: Toward a Connected Ontology Ecosystem for the Semantic Web
Toward a Connected Ontology Ecosystem for the Semantic Web The Semantic Web community has developed a rich collection of ontologies that describe overlapping domains with remarkable precision. Yet these resources often exist in isolation, with limited interoperability, discoverability, or mechanisms for comparison and reuse. The result is a fragmented ontology landscape, a "zoo" of valuable but disconnected artifacts. This talk examines the structural and sociotechnical barriers that sustain this fragmentation, including the lack of provenance standards, inconsistent versioning and metadata practices, and insufficient incentives for ontology maintenance and reuse. It argues for a shift from static cataloging toward an active, community-driven infrastructure, a marketplace for ontologies, where discovery, evaluation, and collaboration are supported by measurable indicators such as reuse metrics, provenance tracking, and peer review. By framing ontology engineering as an evolving ecosystem rather than a series of isolated efforts, we can strengthen interoperability, foster cumulative knowledge development, and enhance the Semantic Web's role as a foundation for trustworthy, reusable, and explainable AI.

Jason Koo, Neo4j, United States Jason Koo is the Developer Advocate Manager at Neo4j, where he focuses on Python and graph technologies. He previously built mobile apps for marketing and fintech, then worked on computer vision and real-time messaging before moving into developer relations. He speaks frequently on GraphRAG and data-centric engineering, co-organizes the San Diego Graph Database Meetup, and has presented at PyCon US and regional conferences. He contributes to the Neo4j developer community and is based in San Diego.

Presentations

- *Is SHACL Suitable for Data Quality Assessment?*, by Caroline Cortés, Lisa Ehrlinger, Lorena Etcheverry, and Felix Naumann. This work evaluates SHACL for data quality assessment across

constraint types and domains, outlining when SHACL's validation model is effective and where it falls short for nuanced quality checks.

- *AISHIP: An Ontology for Extended Vessel Representation and Multimodal Data Integration*, by Simon Burbach, Lennart Mackert, and Maria Maleshkova. The authors extend VesselAI with modules for enhanced vessel traits, trajectories, contextual data, propulsion systems, and multimodal representations, reusing QUDT, GeoSPARQL, and OWL-Time to improve interoperability and analytics.
- *BEAR: A Value-First Ontology Engineering Framework for Business Ecosystem Analysis and Representation*, by Alican Tüzün, Nick Bassiliades, Herbert Jodlbauer, and Georgios Meditskos. This framework centers ontology work on measurable business value, emphasizing stakeholder goals, iterative feedback, and reusable patterns to align models with real-world operations.
- *ARGOS: Ontology Design Patterns for Governing Dynamic Data Operations in LLM-Powered Applications*, by Nipun D. Pathirage, Oshani Seneviratne, and Deborah L. McGuinness. ARGOS formalizes the semantics of LLM-generated queries, linking action meaning to data schemas so policies can be enforced at operation scope rather than surface syntax, with runtime reasoning for fine-grained violations.
- *MQTT4SSN: An Ontology for the MQTT Message Protocol*, by Niklas Doerner and Maria Maleshkova. The ontology bridges MQTT's transport semantics with SSN/SOSA sensing semantics, aligning with MQV and modeling brokers, clients, control packets, topics, and payload metadata to enable end-to-end traceability.
- *Capturing Requests and Context for ODRL-based Access and Usage Control*, by Beatriz Esteves, Wout Slabbinck, Yassir Sellami, Andrea Cimmino, Víctor Rodríguez-Doncel, and Ruben Verborgh. The paper proposes ontology design patterns for evaluation requests and "state of the world" context so ODRL evaluators can deterministically interpret and enforce policies.
- *Incentivizing Sustainable Data Exchanges through Unique Contextualization of History and Destiny*, by Wout Slabbinck, Beatriz Esteves, Maarten de Mildt, Ruben Dedecker, Julián Rojas Meléndez, Sofie Verbrugge, Didier Colle, Pieter Colpaert, and Ruben Verborgh. The authors introduce the Trust Envelope model, encapsulating a data unit with provenance (history) and usage policies (destiny) to reduce risk and enable auditable, purpose-specific exchanges.
- *An Ontology Design Pattern for Representing Temporal Indirection*, by Yulia Svetashova. This method models time via temporal indirection and rolling futures, enabling compact history representation and snapshot semantics without duplicating evolving facts.

Acknowledgments

We would like to sincerely thank all the authors for their valuable contributions and the members of the Program Committee for their diligent work in the review process.

Declaration on Generative AI

During the preparation of this preface, the editors may have used AI-powered tools for assistance with language and formatting. After using these tools, the editors reviewed and edited the content as needed and take full responsibility for the content of this publication.

Thread II: 1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025)

Workshop Organisation of HAIBridge 2025

The 1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025) was organized jointly by the KASTLE Lab from Wright State University and the Machine Perception and Interaction Lab from Örebro University. The HAIBRIDGE workshop series emerged from common efforts between the organizing institutions in the area of human-centric ontology design.

General Chairs

- Alexis Ellis, Wright State University, US
- Subashini Ganapathy, Wright State University, US
- Fjollë Novakazi, Örebro University, SE
- Cogan Shimizu, Wright State University, US

Program Committee

- Hadi Banaee, Örebro University, SE
- Jennifer Renoux, Örebro University, SE
- Unal Artan, Örebro University, SE

Keynote

Bias in Humans and AI – What To Do About It?
The rise in popularity of general-purpose large language models (LLMs) raises questions around bias and fairness. Do these models reflect the biases and stereotypes present in the data they have been pre-trained on? What should we do about that? In this talk, reviewing recent research we conducted at The University of Queensland, we will discuss issues of bias in human data using as an example gender bias in Wikipedia and issues of bias in AI using as an example political bias in LLMs. We will then discuss how to explore and manage such bias that exists in data and in LLMs, how these models can be used for sensitive tasks, and how users tend to trust and over-rely on AI agents, even for high-risk tasks.

Gianluca Demartini, University of Queensland, Australia

Gianluca Demartini is a Professor in Data Science and an ARC Future Fellow at the School of Electrical Engineering and Computer Science at the University of Queensland, Australia. He is also a Dieter Schwarz Fellow at the Technical University of Munich, Germany. His main research interests in Data Science include Information Retrieval, Semantic Web, and Responsible Artificial Intelligence. He received multiple Best Paper awards and has published more than 200 scientific papers at major computer science venues.

Presentations

- *A Transparent and Adaptive AI Assistant for Teaching Knowledge Engineering*, by Stefani Tsaneva, Laura Waltersdorfer, Majlinda Llugiqi, and Marta Sabou. This work proposes a transparent and adaptive AI assistant framework designed to support students in Knowledge Engineering education, particularly with modeling logical ontology constraints. The system follows hybrid intelligence principles by combining multiple LLMs based on their strengths and incorporates an audit layer to ensure transparency and encourage critical engagement.

- *Using Large Language Models and Law-Based Rules for the Analysis of VAT Chain-Transaction Cases in Austrian Tax Law*, by Marina Luketina, Lukas Knogler, and Christoph Schuetz. The authors present a hybrid system for analyzing VAT chain-transaction cases in Austrian tax law. An LLM is used to convert natural language case descriptions into a structured knowledge graph, while a separate rule-based system performs the legal reasoning to ensure verifiable and correct decisions.
- *rapid-triples: Customisable and Dynamic Forms for Semi-automatic Knowledge Collection*, by Mario Scrocca, Alessio Carenini, Valentina Anita Carriero, and Irene Celino. This work presents rapid-triples, a customizable and dynamic form-based interface for human-in-the-loop collection of structured knowledge in RDF format. The tool abstracts away the complexities of RDF by using a JSON Schema to generate user-friendly forms, supporting both manual knowledge entry and the validation of AI-driven extractions.
- *Towards Adaptive Knowledge Structuring by Multi-Agent Consensus*, by Takahiro Kobayashi and Makoto Nakatsuji. This work proposes a method for improving multi-agent collaboration by enabling agents to adaptively structure their shared knowledge. The framework allows agents to autonomously extract knowledge from their interactions, integrate it into an evolving knowledge graph, and refine this graph through a consensus-based protocol to ensure consistency and accuracy.
- *From Black Box to Data Contract: Engineering Accountable AI Agents with Up* by Karthik Gomadam Rajagopal, Pablo Mendes and Andrew Rabinovich. This work introduces UpFormat, a communication protocol designed to make multi-agent systems more reliable and accountable. Instead of unstructured text, agents use structured ”data contracts” with explicit coordination signals, separating the operational state of an agent from its content payload to prevent uncertainty cascades and enable deterministic orchestration.

Acknowledgments

We wish to thank the authors for their valuable contributions, the Program Committee and Organizing Committee members for their rigorous peer reviews, and all the participants for making the first HAIBRIDGE workshop an engaging and successful event.

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Table of Contents

16th Workshop on Ontology Design and Patterns (WOP 2025)

1st Workshop on Bridging Hybrid Intelligence and the Semantic Web (HAIBRIDGE 2025)

Presented Papers