

Preface

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Abstract

This preface summarizes the ICBO 2025 program, review process, publication statistics, and the contents of the associated CEUR Workshop Proceedings volume published in the IAOA series.

Keywords

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1. Overview of ICBO 2025

This volume constitutes the proceedings of the 16th International Conference on Biological and Biomedical Ontology (ICBO 2025). ICBO is an international forum for research and practice in ontology design, development, evaluation, and application across the biological and biomedical domains. The ICBO 2025 main conference was held online as a virtual event on November 9–11, 2025, and focused on Biological and Biomedical Ontologies in Action for Health, Science, and Sustainability. ICBO 2025 featured keynotes by Mark Musen and Michel Dumontier, an invited industry talk by Giovanni Nisato, and a program of reviewed short talks and other associated events. The program included ICBO-EAST, the first Asian satellite event in ICBO’s history, held on November 1, 2025, with a global online session, an on-site session in Nara, Japan, an on-site session in Harbin, China, and an online regional session in Khon Kaen, Thailand.

2. Review process and publication statistics

All peer-reviewed papers in this CEUR volume were handled in Microsoft CMT within their respective tracks and were revised to satisfy the CEUR formatting and publication requirements (including a Declaration on Generative AI). The review process was single-blind, and no rebuttal phase was used. The five peer-reviewed papers included in this volume each received at least two completed reviews. For the main conference research track, three full-paper submissions were reviewed and one paper was accepted for publication in this volume; the accepted main-track paper received three completed reviews. In addition, 20 short talks were accepted for presentation, with two short talks reported as no-shows. ICBO-EAST received four submissions and accepted two peer-reviewed papers for publication in this volume;

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each of the two included ICBO-EAST papers received two completed reviews. One additional ICBO-EAST submission was moved to the main conference as a short talk and is therefore not republished as a CEUR paper in this volume. The associated workshop “Food, Waste, and Sustainability: Synergizing Ontology Efforts” received six submissions and accepted three contributions for presentation (two full papers and one abstract). The two full papers included in this volume received two and three completed reviews, respectively. The workshop call for papers also anticipated a jointly authored workshop report to cover presentations accepted as abstracts only, which are not eligible as standalone CEUR papers; that invited workshop report is therefore included in this volume as a distinct workshop output. Additionally, the organizers of the panel discussion “AI, Ontologies, and the Next Generation of Researchers” were invited to contribute a summary report, which is also included in this volume as an invited panel report.

In parallel to the CEUR proceedings publication route, ICBO 2025 continued the ICBO Thematic Series of the Journal of Biomedical Semantics (JBMS) as a direct-to-journal track. The JBMS track received six submissions, of which five were accepted. Journal-track articles are published by JBMS and are added to the ICBO Thematic Series collection as they appear; the collection provides up-to-date publication status (<https://link.springer.com/collections/gagejcafef>). These journal-track articles are referenced in the conference program, but are not republished as CEUR papers in this volume. At the time of finalizing this CEUR volume, one ICBO 2025 journal-track article had been published (doi:10.1186/s13326-025-00345-2).

3. Contents of this proceedings volume

The contributions in this volume are published open access in the CEUR Workshop Proceedings as part of the IAOA series. In total, the volume contains five peer-reviewed papers and two invited reports, in addition to the preface. The volume includes contributions from the following components:

- ICBO 2025 (Main conference): 1 full paper.
- ICBO-EAST 2025 (satellite event): 2 papers.
- Food, Waste, and Sustainability: Synergizing Ontology Efforts 2025 Workshop: 2 papers.
- Food, Waste, and Sustainability Workshop Report: 1 invited workshop report.
- Panel Discussion: AI, Ontologies, and the Next Generation of Researchers: 1 invited panel report.

The remainder of the ICBO 2025 program—including short talks, tutorials, and panel sessions—is documented on the conference website (<https://icbo-conference.github.io/icbo2025/program/>) and is summarized below to provide context for the proceedings.

4. ICBO-EAST satellite event

4.1. ICBO-EAST 2025 Satellite Event

Date: November 1, 2025 (distributed hybrid format: global online session; on-site regional sessions in Nara, Japan, and Harbin, China; and an online regional session in Khon Kaen, Thailand).

Organizers: Hiroshi Masuya, Yuki Yamagata, Xiaolin Yang, Liang Cheng, Anuwat Pengput, Yongqun “Oliver” He, Asiyah Yu Lin. Local hosts and partners supported additional regional sessions (Japan/China/Thailand) to broaden participation across time zones.

URL: <https://icbo-conference.github.io/icbo2025/east/>

ICBO-EAST 2025 was held on November 1, 2025, as a distributed hybrid satellite event aligned with ISWC 2025 in Nara, Japan, with additional regional sessions in Harbin, China, and Khon Kaen, Thailand. As the first Asia-based satellite event in ICBO’s history, it aimed to strengthen regional collaboration in biomedical ontology and broaden participation across Asian time zones. The track received four submissions; two peer-reviewed papers were accepted for inclusion in this volume, and one additional contribution was presented in the main conference program as a short talk. The event adopted a

two-layer format: a global English session followed by parallel local sessions. The global session featured keynote and invited talks on AI-enabled methods and semantic integration for biomedical knowledge, including presentations on glycoscience ontologies (Achille Zappa and Yukie Akune-Taylor), LLM-supported causal diagram construction for observational health research (Jian Du), and literature mining with LLMs for protein interactions and vaccine adjuvant research (Junguk Hur), as well as an invited talk on disease-specific ontology-driven intelligent medicine (Bairong Shen). The session also included paper presentations on text-to-SPARQL prompt engineering in Wikidata (Fariz Darari) and ontology-driven exploration of RIKEN Bioresources (Tatsuya Kushida).

Following the global program, local activities broadened participation and enabled region-specific discussions. In Japan (Nara), an in-person session was organized in collaboration with SIGSWO (JSAI) at the Nara Prefectural Convention Center, focusing on hybrid reasoning that connects knowledge graphs with LLMs. In China (Harbin), a full-day on-site session hosted at Harbin Medical University and co-organized with local partners included ontology training and a multi-speaker program spanning Traditional Chinese Medicine ontologies and related semantic methods. In Thailand (Khon Kaen), the OntoThailand session included a keynote on an introduction to biomedical ontology and addressed interoperability and terminology for the healthcare system, as well as ontology-enabled public health policy discussions.

5. Co-located technical workshops and tutorials

ICBO 2025 hosted several associated workshops and tutorials that addressed both foundational and applied topics in ontology engineering, data modeling, and AI-enabled curation. The following summaries are organized as technical workshops and tutorials (where the primary focus is methods, resources, and scientific/engineering content), followed by a separate community-focused panel session .

5.1. Annotating Data with Ontologies: LinkML Can Help

Date: November 5, 2025 (virtual).

Organizers: Sierra Moxon, Kevin Schaper, Matt Brush, Chris Mungall, Melissa Haendel.

URL: <https://linkml.io/workshops/icbo/>

This tutorial introduced LinkML (Linked Data Modeling Language), an open framework designed to simplify the authoring, validation, and sharing of semantically-grounded data models. It emphasized an approachable, architecture-agnostic syntax that supports collaboration across different levels of technical expertise, and it highlighted how LinkML can be used to support data annotation and ontology integration workflows. The tutorial combined conceptual guidance with hands-on practice and pointed participants to online documentation and example repositories for continued learning.

5.2. 14th Vaccine and Drug Ontology Studies (VDOS) 2025 Workshop

Date: November 7, 2025 (virtual).

Organizers: Junguk Hur, Yongqun He, Cui Tao.

URL: <https://vdos-workshop.github.io/>

The 14th VDOS workshop focused on ontology-based methods for representing and analyzing drugs and vaccines, with a special emphasis on the role of artificial intelligence in ontology research and application. Topics included the representation of drug/vaccine components and administration, immune responses, adverse events, drug interactions, and real-world challenges in clinical and research settings. The workshop also explored how AI can enhance literature mining, meta-analysis, and complex data interpretation for ontology-driven studies. Further details and workshop materials are available via the workshop website.

5.3. Food, Waste, and Sustainability: Synergizing Ontology Efforts 2025 Workshop

Date: November 14, 2025 (virtual).

Organizers: Giorgio A. Ubbiali, Ludger Jansen.

URL: <https://sites.google.com/view/fws2025workshop/>

This workshop addressed the intersection of health and sustainability ontologies through the use case of waste in food systems (including food and plastic waste). It highlighted the role of ontologies in strengthening the interconnections among datasets, data sources, and stakeholder communities, and it discussed how to better align existing ontology resources to capture intrinsic links between health and sustainability. The workshop included peer-reviewed paper presentations and community discussion, and it encouraged cross-community coordination as a prerequisite for scalable ontology-driven analysis in complex food-system settings. The workshop outcomes are additionally documented in a separate invited workshop report included in this volume.

5.4. Accelerating Ontology Curation with Agentic AI and GitHub

Date: November 18, 2025 (virtual).

Organizers: Chris Mungall, Sabrina Toro, Nico Matentzoglu, Harry Caufield, Justin Reese, Nomi Harris

URL: <https://icbo-conference.github.io/icbo2025/program/>

This tutorial provided a hands-on introduction to using agent-based AI systems to support ontology development and curation within GitHub-based workflows. It discussed common barriers to AI adoption among ontology developers (including trust and perceived workflow complexity) and argued that, when used carefully, AI agents can accelerate complex curation tasks while preserving human oversight and control. The session drew on examples from large community ontologies and aimed to equip participants to incorporate AI coding agents into day-to-day ontology engineering practice.

5.5. Workshop on the Core Ontology for Biology and Biomedicine (COB)

Date: January 26, 2026 (virtual).

Organizers: Sebastian Duesing, Bjoern Peters, James Overton, Randi Vita, Chris Mungall.

URL: <https://icbo-conference.github.io/icbo2025/program/>

The Open Biological and Biomedical Ontology (OBO) Operations Committee has undertaken a multi-year initiative to implement the Core Ontology for Biology and Biomedicine (COB) as a unified top-level ontology for OBO ontologies. This initiative aligns with the committee's mission to automate the evaluation of ontologies' compliance with OBO principles, including openness, versioning, and documentation. Adopting COB across the OBO Foundry enables the identification of logical inconsistencies among OBO ontologies and facilitates automated interoperability testing by aligning ontologies with COB. The 2026 Workshop was convened to showcase progress in COB implementation, identify obstacles to COB adoption, and develop strategies to address these challenges.

The 2026 COB Workshop featured a series of flash talks on COB alignment tools and case studies involving specific ontologies, followed by a discussion addressing issues raised during the presentations. Topics included COB development and release practices, tool-supported alignment workflows such as ODK and ROBOT-based pipelines, and experiences integrating COB with widely used OBO resources and applied ontologies, including examples from cell line and food-related domains. The discussion centered on identifying and resolving common barriers to COB adoption. An issue was uncertainty regarding which COB files should be imported and aligned with, as well as ambiguity about the criteria for full COB alignment. The group resolved to revise COB release artifacts to clarify their intended use for alignment, establish standards for COB alignment across different project stages, and enhance documentation to support alignment with COB.

6. Community session and future directions

6.1. AI, Ontologies, and the Next Generation of Researchers

Date: November 10, 2025 (virtual).

Organizers: Olga Mashkova, Anthony Huffman.

URL: <https://icbo-2025-workshop.tilda.ws/>

Complementing the technical tracks, ICBO 2025 featured an interactive panel discussion on “AI, Ontologies, and the Next Generation of Researchers.” The session brought together senior researchers to share perspectives on career development, essential skills beyond technical expertise, and strategies for resilience in research. It also discussed how AI and large language models are reshaping ontology development and curation, including opportunities for real-world impact and the need for community governance and ethical responsibility in ontology-driven applications. The organizers were invited to contribute a separate summary report, which is included in this volume as an invited panel report.

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