The Clinical and Translational Science Ontology Consortium (CTSOC)

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1. Project Details

- **Project Name**: Clinical and Translational Science Ontology Consortium (CTSOC)
- **Duration**: Spring 2025 – Present
- **Participants and Partners**: 8 Clinical and Translational Science Award (CTSA) hubs, including the University at Buffalo, Medical College of Wisconsin, University of Arkansas for Medical Sciences, University of Florida, UT Health Houston / MD Anderson, University of Michigan, UC San Diego, and UT Southwestern.
- **Funding**: NIH CTSA.
- **Website**: www.ctsontologyconsortium.org

2. Project Objectives

The Clinical and Translational Science Ontology Consortium (CTSOC) was established to advance the goals of the NIH CTSA initiative[1] by promoting ontology-based data interoperability within and between CTSA hubs. Its main objective is to extend ontology coverage to critical, underrepresented areas of clinical and translational science (CTS). The project is structured around four complementary goals:

1) Develop the **Clinical and Translational Science Ontology (CTSO)** with the following specialized branches:
   - **Clinical and Translational Science Organization Ontology (CTSOO)**: it will comprise terms for organizations, organizational roles, and role-related activities;
   - **Clinical and Translational Science Impact Ontology (CTSIO)**: it will cover the milestones on the pathways in which organizations and role-holders are involved;
   - **Social Determinants of Health Ontology (CTSSDHO)** and **Public Health Ontology (PHO)**: intended to facilitate the creation of consistent bodies of data across diverse patient populations;
   - **Ontology for Uses of AI in CTS (CTSAIO)**: aims to enable consistent tracking of AI applications in CTS activities and their outcomes, including successes and failures.
2) Explore how the use of ontologies can improve data usability within CTSA hubs.
3) Explore how the use of ontologies can streamline the exchange and integration of data between CTSA hubs, promoting Findability, Accessibility, Interoperability, and Reuse (FAIRness) of digital assets, as well as a commitment to the CTSA open science principles.

Proceedings of FOIS 2026 Satellite events co-located with the 16th International Conference on Formal Ontology in Information Systems (FOIS 2026), September 21-25, 2026, Vitória, Brazil.
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[1]https://ncats.nih.gov/research/research-activities/ctsa

CEUR Workshop Proceedings ceur-ws.org ISSN 1613-0073
published 2026-11-27
CEUR-WS.org/Vol-4342/abstract2.pdf

4) Conduct translational science on how these ontology-based approaches compare to the approaches based on common data elements (CDEs)[2] that are currently in use by CTSA hubs.

3. Current Status and Anticipated Results

The consortium held a kickoff meeting in September 2025, which brought together domain experts to outline the collaborative roadmap. Currently, the project is actively ongoing in all four fronts. Regarding (1), member hubs are prototyping the core CTSO modules. In particular, we are developing an ontology to represent successes and failures in translational research projects. It is intended to support the integration of data from numerous past experiences in clinical and translational research and enable the search for patterns of translational success, translational failure, and recovery from failure. With that, we expect to help optimize the current clinical and translational research pipeline.

In relation to (2) and (3), the participating CTSA hubs are also responsible for the development and maintenance of other domain ontologies relevant to the translational research projects carried out at those hubs. Both CTSO and these domain ontologies will adhere to the Open Biological and Biomedical Ontologies (OBO) Foundry principles, aiming to build a collection of interoperable ontologies that can be used across multiple hubs, enabling data created in one hub to be reused by other hubs. With that, we intend to create larger data pools that can support, for example, comparative evaluation studies and AI applications. In parallel, the official CTSOC platform website is under development. This online portal will serve as a centralized collaboration space where members can report ontology work, coordinate development, and request assistance.

Finally, regarding (4), we are working to establish a registry of translational research projects that use ontologies. Aggregating information about which projects depend on which ontologies will facilitate collaboration between ontology developers and domain experts by revealing which parts of their ontologies are in use by other organizations, information that is currently difficult for ontology development teams to access. It will also enable the study of the effectiveness of ontology usage in translational research projects.

Overall, we expect the CTSOC methodologies to demonstrate enhanced scalability and interoperability, further cementing a commitment to open science across the CTSA ecosystem. Moreover, we aim to replicate the OBO Foundry's success in paving the way for consistent handling of data from translational research.

Declaration on Generative AI

Grammarly was used in order to check grammar and spelling. The authors reviewed and edited the content as needed and take full responsibility for the publication's content.

Acknowledgments

Research reported in this publication was supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under award number UM1TR005296 to the University at Buffalo. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

[2] A common data element (CDE) refers to a data element that is common to multiple data sets across different studies, surveys, or registries (https://toolkit.ncats.nih.gov/glossary/common-data-element-cde/).