Alignment of VIVO ontology and platform with codemeta schema

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VIVO is an open-source, member-supported software and ontology designed for scholarly representation. It facilitates recording, editing, searching, and visualizing scholarly activities, promoting research discovery, expert identification, network analysis, and research impact assessment. Easily customizable for various scholarly domains, VIVO, when installed and populated with institution-specific data, enables efficient cross-disciplinary discovery of research. Its features include manual content maintenance, automated data importation from local systems (HR, grants, etc.), and compatibility with external databases like publication aggregators and funding agencies. The platform offers a user-friendly interface for browsing and faceted search, enhancing rapid information retrieval.
Research software, being a significant academic outcome, warrants consideration in various evaluation processes such as promotions and project proposal selections. Embracing the diversity of scientific activities and outputs, as advocated in the CoARA agreement (https://coara.eu/app/uploads/2022/09/2022_07_19_rra_agreement_final.pdf), is essential. Notably, the CoARA agreement explicitly recognizes software as one of these diverse outputs.
Hence, research management systems like VIVO should facilitate the cataloging of software. Currently, VIVO supports the cataloging of all academic results, including software, as demonstrated by platforms like BrCRIS (https://brcris.ibict.br/en), which is built upon VIVO and houses over 12,000 cataloged software entries.
However, to enhance the utility and reusability of software outputs, they should adhere to the FAIR principles. Therefore, it's crucial to ensure the proper representation of software records within VIVO catalogs, as well as the establishment of interoperable endpoints with other platforms.

At a high level, the following significant advancements have been made in integrating the VIVO ontology with the CodeMeta schema to better represent software in research:

- Alignment of the VIVO ontology with CodeMeta schema to improve software representation in research.

- Crosswalk definition between VIVO ontology and CodeMeta, ensuring consistent metadata exchange.
- Implementation of a CodeMeta-JSON REST API enabling CRUD operations for the Software class in VIVO.

The following steps outline the detailed process undertaken to achieve the integration:

- Analysis and issue identification: The team conducted an in-depth analysis of the fields in the CodeMeta schema and VIVO ontology. This analysis resulted in the creation of 8 GitHub issues, all available at VIVO Ontology Issues.
- Discussion and collaboration: These tickets were actively discussed during the VIVO ontology calls held on:
  https://wiki.lyrasis.org/display/VIVO/2024-06-19+Ontology+Interest+Group+Call, 2024-08-07, 2024-08-21, 2024-09-04 and 2024-09-18

Implementation results:

Two pull requests (PRs) were merged, resolving 5 tickets:

PR 1: Added the SWHID data property to the Software class.

PR 2: Changed the superclass of the Software class, aligning it with the Software Ontology (SWO) by classifying Software as a subclass of the Information Content Entity. The PR also introduced several properties to the Software class:
Authorship relation (author); Abstract (description); Supported by (funding, funder); DateIssued (datePublished);

One ticket was closed (PR #43), deeming OS requirements and hardware specs irrelevant for software as a research output in a RIS (2024-09-18 call). Two tickets remain under discussion: Relationships (Issue #28) and URLs linked with Software (Issue #40).

A crosswalk between CodeMeta and VIVO ontology has been defined and a PR submitted for feedback: CodeMeta PR 366. The REST API implementing the CodeMeta-JSON endpoint for software in VIVO has been developed. Code is available in the VIVO PR 4014.

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