THE VIVO PROJECT

EUNIS conference
June 14, 2023

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VIVO Chair

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The RIM/CRIS systems
- Research data should be used by research organizations for strategic decision-making.

- To do this, research organizations have implemented or purchased Research Information Management (RIM) systems or Current Research Information Systems (CRIS), to support the aggregation, curation, and utilization of diverse data on institutional research activities.

- RIM/CRIS systems provide significant value for research institutions: integrate local, internal data with external, global data, with new efficiencies and insights across the organization, as well as the potential for regional, national, and transnational sharing and benchmarking.

- There are several types of RIM/CRIS systems that are designed to support different functions, use cases, and workflows. At the global scale (e.g., ResearchGate, Google Scholar), national scale (e.g., NARCIS), or regional scale (e.g., Florida ExpertNet, Ohio Innovation Exchange), while others serve specific disciplinary communities (e.g., DIRECT2Experts) or individual institutions (e.g., VIVO, DSpace-CRIS, Symplectic Elements, Pure).

- RIM/CRIS systems support several use cases, including reputation management, research assessment, expertise discovery, data reuse, research intelligence and data analytics, and compliance.
VIVO as a CRIS/RIM system, acts as a **hub of data** siloed in local and external systems through four strategies:

1. The consistent use of persistent identifiers (PIDs) for people, objects, and institutions
2. The use of reasonably consistent data models or ontologies across the systems
3. The incorporation of application programming interfaces (API), so that data can be harvested and shared automatically;
4. Community support for the development of a good data governance policies that balances openness and security
The VIVO Community
Open Source Community Supported program

- Software built by, for and with communities to showcase the scholarly activity, manage research discovery, experts finding, network analysis, and assessment of research impact, etc.
- Identifying common needs
- Affordable
- Institutions own and control their data
- Easily extended to support additional domains

https://www.lyrasis.org/Pages/Main.aspx
VIVO Core Values

**OPEN SOURCE**
VIVO and all VIVO components are provided as open source. Download from GitHub.

**OPEN COMMUNITY**
The VIVO community is open to everyone. You can follow the work of VIVO at the VIVO wiki.

**OPEN DATA**
VIVO produces Linked Open Data which is easily shared and combined across VIVO sites.

VIVO and all components of VIVO are open source. **Download from GitHub.**

The VIVO community is open to everyone. You can follow VIVO’s work on our wiki.

VIVO produces linked open data that can be easily shared and combined across all VIVO sites.
Member-Supported Community

VIVO Service providers:

VIVO Strategic partner (MOU):

Other partners:
Community Organisation

Leadership Group
Define the strategic direction (+officers)

Committers Group
Developers in charge of the maintenance and evolution of the VIVO base code.
Technical Lead

Users Groups
Community-created groups with common interests, grouped by region or zone:
- North American User Group
- German User Group
- Iberoamerica User Group

Interest Groups
Groups created by the community to support initiatives but without limited time

Task Forces
Groups created by the community with a specific and finite objective in time
Access the interactive VIVO map and the annual report!
2021-23 Community Events

- VIVO 2021 conference (Virtual) – 252 attendants, most international, from 32 countries worldwide
- North American User Group Meeting
- Launch of the Spanish-speaking User Group Meeting with more than 600 attendants
- VIVO track at the CRIS2022 (15th International Conference on Current Research Information Systems, Dubrovkin, Croatia).
- German VIVO-Workshop, June 2022
- 1st OECD MARIAD Webinar: Data Information Models for Scientific Research, June 2022
- VIVO Talks: a webinar series at the Berlin University Alliance
Software evolution

- New versions are released periodically with relevant improvements such as multilanguage, accessibility and gender perspective, performance improvements, security, etc.
- VIVO core refactoring

Usability and Utility

- Dynamic API

Interoperability

- CERIF2VIVO mapping - Collaboration with EuroCris to align CERIF model to VIVO ontology. (ongoing)
  https://wiki.lyrasis.org/display/VIVO/Ontology+Interest+Group
- Integrating Dspace and VIVO: (ongoing)
  https://wiki.lyrasis.org/display/VIVO/DSpace-VIVO+integration+task+force
**Goal:** Dynamic API would lead to decoupling frontend and backend, would enable easier customization of VIVO.

- Dynamic custom entry forms
- New web interfaces
- Better integration with external application.

Source: [https://zenodo.org/record/6652252#.YrAjguxBxPY](https://zenodo.org/record/6652252#.YrAjguxBxPY)
VIVO Roadmap. CERIF2VIVO mapping

MOU with EuroCRIS, Jul 2021

Takes advantage of mutual interests

Goals:

- Promote the use of VIVO in Europe
- Collaborate on interoperability: Align euroCRIS CERIF framework and VIVO ontology
- Communications between the communities
- Attend mutual conferences and events

Benefits of the mapping:

- Interoperability between VIVO platforms and CERIF-compatible CRIS systems
- Knowledge transfer
- Improvement of CERIF model and VIVO ontology by analyzing the other side
- Extensions of the data models
- Addition of descriptions and annotations
- Machine-executable mapping for various purposes and in various notations, for example, for a CERIF-compliant data export from VIVO

Goal: consider using VIVO as a frontend for one or multiple DSpace instances at the institution

- A new presentation of DSpace items and semantic web aspect to existing DSpace repositories
- DSpace-VIVO migration assigns a unique ID to the researchers and subjects (keywords)
- The ‘Capability Map’ allows an expertise mapping across data sources

Project information:
https://github.com/vivo-community/DSpace-VIVO
https://wiki.lyrasis.org/display/VIVO/DSpace-VIVO+Technical+Documentation
The VIVO software
VIVO is an example of an application built entirely with Semantic Web technologies promoted by the World Wide Web Consortium.

- Implements an Ontology based on standard international ontologies
- Stores data as RDF expressed in terms of vocabularies called ontologies
- Provides persistent URIs for data.
- Represents the expertise of people engaged in the creation, transmission, and preservation of knowledge and creative works.
- Contains FAIR data, complying with Linked Open Data Standards

**System requirements:** VIVO may be hosted on one or more physical servers, on virtual servers, or in the cloud. Components:
  - Recommended installation (*): 4 cores x64 (min 2), 32 Gb RAM (min 2GB), 500 GB SDD (min 100 GB HDD)
  - OS Linux
  - TomCat Web application
  - MySQL database (with the default Jena SDB triple store)
  - Apache Solr search index.

(*) SIGMAAIE recommendations for a standard VIVO installation
The VIVO Ontology leverages the following ontologies in a unified, semantic structure:

- Geopolitical.owl, from the U.N. Food and Agriculture Organization
- SKOS (Simple Knowledge Organization System) – [http://www.w3.org/2004/02/skos/](http://www.w3.org/2004/02/skos/)
- vCard – [http://www.w3.org/TR/vcard-rdf/](http://www.w3.org/TR/vcard-rdf/)
- SPAR ontologies, including FABIO, CiTO, and C4O: [https://purl.org/spar/fabio](https://purl.org/spar/fabio)
VIVO use cases
Some examples

https://vivo.weill.cornell.edu/

https://scholars.duke.edu/
Lynn Rothschild
Adjunct Professor of Molecular Biology, Cell Biology and Biochemistry

Overview

Prof. Rothschild is an astrophysicist/synthetic biologist at NASA Ames specializing in molecular approaches to evolution, particularly in microbes, and the application of synthetic biology to NASA’s mission. With a foundation in prototology and evolution, research interests include the early evolution of life, life in extreme environments and the search for life in the universe. In 2008 she established a program in synthetic biology for NASA and represented the Agency on the DP15 synthetic biology working group. Flight experience includes high altitude ballooning for astrobiology, the PI on the PowerCell payload on DLR’s EUREOS satellite (launched December 2018), and Co-PI on ESA’s BROMIX experiment on ISS.

Extensive outreach including lectures worldwide, documentaries and a TEDx talk. Teaching experience includes “Astrobiology and Space Exploration”, Stanford, 2004-13 (astrobiology.stanford.edu), directing theses (current Ph.D. students from Columbia, Tu Delft, and UC Santa Cruz), and the faculty advisor of the award-winning Brown-Stanford iGEM team. iGEM projects included synthetic biology for Mars Exploration (2011), Synthetic biology for astrobiology, including bioengineering (2012), Synthetic bio-communication (2013), Towards a Biodegradable UAS (2014), BioMars (2015) for which the team won “Best Manufacturing”, and “Biodoor” (2016) for which the team won “Best Measurement” and runner up for “Best Manufacturing.” “Mars: getting there and staying there” (2017), Stanford-Brown-IRIS iGEM team, “Myco for Mars” (2018) for which the team was the runner up for the best new composite part and for best in manufacturing. In 2010 we joined forces with Princeton to form the Brown-Stanford-Princeton team, which won the iGEM’s Prize. During the pandemic, Prof. Rothschild is supervising students remotely.

Brown Affiliations
- Molecular Biology, Cell Biology and Biochemistry

Research Areas
- astrobiology
- evolution
- microbiology
- prototology
- space exploration
- synthetic biology

On the Web
- Profile, Motherboard/VICE Spring 2017
- TED talk 2015, ‘‘The living tech to support life on other planets’’
- Isaac Asimov Award Lecture
- NASA zoom podcast, urban biowaving
- NASA 360 podcast, Metatrust
- Wikipedia page
- https://vivo.brown.edu/

Cahill, Brian
Positions
- Mitarbeiter, Nachwuchsforschungsgruppe Learning and Skill Analytics, Programmbezirk C - Forschung und Entwicklung 2021

selected publications

academic article

article
- C. M. Langdon et al. “Creating Research Environments that Foster Mental Health and Well-Being.” x

blog posting
- C. M. Langdon et al. “How MScA is changing under Horizon Europe.” Research Professional Europe. 2021

chapter

https://vivo.tib.eu/fis/
VIVO as a network

To boost collaborations

Co-authors (CSV file)

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**To boost collaborations**

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Innovation in the VIVO Community
VIVO for Open Science

Open Datasources
- Organisations
- Researchers
- Research Output

ROR
Research Organization Registry

ORCID
Open Researcher and Contributor ID

DOI
Digital Object Identifier

Report Tool
Reports (in Excel, Word,...)

IMPORT

EXPORT
Drittmittel 2022

1. Query Tool
2. Import Tool
3. Reporting Tool

https://projects.tib.eu/tapir/en
Research intelligence as emerging use case

Research Intelligence: Establish, execute, and evaluate institutional research strategy & evaluation

- Principle Investigators
- College and Department Program Reviews
- Vice President of Research

Takes advantage of linked data!

Water-Related Research at Texas A&M

- Persistent Identifiers
- Consistent Ontology
- APIs for automated data sharing
- Data Governance

VIVO as Semantic System

Emerging Knowledge Graph
NORA, National Open Research Analytics, is a national initiative to enable robust and open insights and analytics of Danish research. NORA is focused on national level insights, and thus NORA supplements rather than replaces existing institutional systems, offering deep and detailed insights at various levels inside the institution, and existing global databases and research intelligence systems, offering insights and advanced analytics at the global level.

**Nora** project from DTU – Denmark

Using the VIVO ontology to find research insights (from Global datasources & Danish CRIS)
National/regional Research Portals. BrCRIS

- Information System on the Ecosystem of the Brazilian Scientific Research with VIVO. Aggregation of different national and international data bases (Lattes Platform, LA Referencia Platform(*) , etc. (exports to VIVO, APIS and visualizations).

- Entities and relationships recommended by the OpenAIRE Guidelines for CRIS Managers (CERIF-based)

- Using technologies such as Elasticsearch and Kibana for search and visualization over VIVO instance.

(*) Latin American open access science repository network.
National/regional Research Portals. BUA platform

- Research information Platform for the Berlin University Alliance (BUA)
- Platform for 3 German universities + Charité (large university hospital) with VIVO
- Within the framework of Berlin University Alliance, a platform for a structured and transparent presentation of research information
- Data linking: Semantic Web technology of the “VIVO” software

☑ Connect researchers to their work beyond boundaries
☑ Improve the visibility and discoverability of expertise
☑ Facilitate new research collaborations across disciplines

Start: May 2021
Runtime: Dec. 2023
Conclusions
Conclusions

- VIVO has a great community behind, has strengthened its governance and is working on a roadmap that will allow it to evolve in line with new trends, focused on open Science and data sharing, reusing, etc.

- Working on fostering partnerships with relevant organizations with which important collaborations can be made.

- Focus on the interoperability though projects like the mapping between the interoperability standard CERIF with the VIVO ontology; and the integration with Dspace.

- Relevant ongoing projects and product evolution led by a great group of developers, coordinated by a technical leader.

- Because VIVO is a semantic system with linked, open data, it helps support the creation of emerging knowledge graphs, in this way, there are innovative projects and success use cases examples in the community that offer VIVO-based solutions focused on research intelligence and knowledge graphs.

- There is a clear trend to use VIVO as a research portal at regional or national level, as an aggregator of data from different RIM/CRIS systems, to provide relevant information to governments, for decision making or policy definition.
- VIVO offers versatility and adaptability of the software and advantages given by an ontology based on international standards that provides linked open data, to discover, use and share information.

- A system such as VIVO allows the organization to own its data and at the same time make it accessible (FAIR data).

- These systems support the transparent aggregation, curation, and utilization of heterogenous data about institutional research activities that can be used to promote researcher identity and reputation, reporting and compliance, or research intelligence.

- Enables improved science assessment and evaluation and can be easily aligned with open science standards and policies.

- A RIM/CRIS system such VIVO, can be useful for the country's policies for research and innovation, mapping investment in Science & Technology versus Innovation results, creating a fairer Science evaluation system, in view of Open Science precepts and connecting the entire scientific ecosystem, allowing quick visualisation of complex variables, generating information for decision-makers, among others.
Interested in learning more?

Get involved in the VIVO community!

- Visit vivoweb.org
- Read more at wiki.duraspace.org
- Follow @vivocollab on Twitter
- Join VIVO mailing lists
- Email anna.guillaumet@sigmaaie.org or beherbert@tamu.edu
Thank you very much!