The Vitro Integrated Ontology Editor and Semantic Web Application

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Overview

• What is Vitro?
• Notable characteristics
• Testing in collaboration with OCRe
• How to get Vitro
• VIVO open source community
What is Vitro?

• A web-based collaborative ontology creation, editing, and population tool
• Provides entry, browsing, and searching of content as a public-facing web application
• Supports iterative ontology development based on data encountered and end user feedback
Notable characteristics

• Create, read and edit OWL 1.1 ontologies
• Generates editing pages for instance data from the ontology
• Class groups provide facets for search results and browsing
• Property groups organize page displays
• Menus can be set up to provide the desired overall application navigation
Ontology for Clinical Research

• OCRe is an OWL 1.1 ontology that focuses on the design and analysis of human studies. Its scope includes human investigations of any design type (e.g., interventional, observational) for any intent (e.g., therapeutic, diagnostic, preventive) in any clinical domain on any type of data (e.g., clinical, imaging, genomics).

• OCRe includes
  – a representation of the structure of human studies and associated entities
  – informational entities (e.g., study protocols)
  – terms for describing study characteristics
  – bindings to standard terminologies (e.g., SNOMED CT).

The Human Studies Database Project: Federating Human Studies Design Data Using the Ontology of Clinical Research. Ida Sim, MD, PhD,1 Simona Carini, MA,1 Samson Tu, MS,2 Rob Wynden,1 Brad H. Pollock, PhD,3 Shamim A. Mollah, MA,4 Davera Gabriel, RN,5 Herbert K. Hagler, PhD,6 Richard H. Scheuermann, PhD,6 Harold P. Lehmann, MD, PhD,7 Knut M. Wittkowski, PhD,4 Meredith Nahm, MS,8 and Suzanne Bakken, RN, DNSc9. AMIA Summits Transl Sci Proc. 2010; 2010: 51–55. Published online 2010 March 1.
Collaboration with OCRe to evaluate Vitro

- Testing population of an extensive modular ontology to support databases of clinical studies
  - at single institutions or across many
- Evaluating data entry, content management, and resulting display
- Discovering areas where change may be needed in the ontology
- Evaluating viability of Vitro for public-facing databases of clinical studies
Home page

Customizable visual theme

Configurable top-level menu

Configurable browse facets with visual indicators of relative population, defined as groups of classes
Individuals are annotated with most specific class

Ability to group properties and navigate to each group

Ability to order property appearance within each group

Editing support within the application for both ontology revisions and content addition
Search faceted by type, with snippets

Search results for 'random'

**random allocation (HPTN058)**  | Random allocation
... Participants will be **randomized** in a 1:1 ratio, with 750 participants in each arm. parallel group study design for HPTN058 Allocation scheme **Random** allocation ...

**block randomization (HIVNET024)**  | Block randomization
... permuted block algorithms with **randomized** block sizes parallel group study design for HIVNET024 Allocation scheme Block **randomization** Random allocation ...

**parallel group study design (HPTN058)**  | Parallel group study design
... phase 3 for HPTN058 open label for HPTN058 **random** allocation for HPTN058 Entity Information entity Interventional study design Parallel group study design ...

**parallel group study design (HIVNET024)**  | Parallel group study design
... phase 3 for HIVNET024 block **randomization** for HIVNET024 investigator blinded for HIVNET024 subject blinded for HIVNET024 Entity Information entity ...

**Drug Treatment Combined With Drug and Risk Reduction Counseling in the Prevention of HIV Infection Among Injection Drug Users (HPTN058)**  | Individual-human study
... A Phase III **randomized** controlled trial to evaluate the efficacy of drug treatment in prevention of HIV infection and death among opiate dependent injectors ...
Individuals can be browsed by class, grouped in class groups, and viewed through an index page.

Display of selected class includes the ability to get a list of the individual URIs for harvesting as linked data.
Site administration

Vitro includes a number of tools for data ingest, web site configuration and management, and user account management.
### Inferred Class Hierarchy

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<th>class</th>
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</table>
Class editing screen
Object property editing screen
Lessons from working to populate an OCRe ontology

• Distinction between singular vs. shared instances
  – People and funding organizations are shared
    • Won’t work to show primary vs. secondary sponsorship of one study as a property of the sponsor
  – Study characteristics typically provide descriptive documentation specific to one study
  – Other instances are generic enough to be shared
    • E.g., study status “completed,” concept definitions
What has worked well in Vitro

• Rapid prototyping
• Jump between the ontology, instance data, and public-facing views in one tool
• Classgroups provide useful flexibility
• Property groups organize pages well
• New menu management structure
Improvements identified for Vitro

- More robust ontology editing needed
  - Updating the editor itself
  - Support for intersections and unions
  - Improved support for creating new axioms
    - E.g., defined classes
- Batch configuration to populate class and property groups by inheritance from parents
  - Not yet clear what is desired behavior
- Ways to select desired data properties of related objects in lieu of manually edited labels
  - E.g., street, city, state, and zip of an address
- Support for custom editing forms and display views by class and/or property
How do I find out more?

- [http://vitro.mannlib.cornell.edu](http://vitro.mannlib.cornell.edu) information page
- Code available through Subversion on Sourceforge
  - svn://svn.code.sf.net/p/vivo/vitro/code
  - Branch to use is maint-demo-07-2011 until we produce a first independent, versioned release of Vitro
Vitro in the VIVO open source community

- [http://vivo.sourceforge.net](http://vivo.sourceforge.net), including a development wiki
  - Vitro documentation often not differentiated
  - VIVO code extends Vitro in ontology-specific ways
- VIVO development listserv
  - [vivo-dev-all@lists.sourceforge.net](mailto:vivo-dev-all@lists.sourceforge.net)
  - List archives available for search
  - Weekly development calls announced via the list
- JIRA issue tracking