Texas Conference on Digital Libraries Special Forum: Exploring Linked Data for Libraries (Stadium Room 1.138)



The Design and Development of an Integrated Researcher Profile System at Texas A&M to Enrich Scholarly Identity of Faculty

Dr. Bruce Herbert | Michael Bolton | Doug Hahn | Dong Joon Lee



# Workshop Overview

### Introductions

### VIVO Basics (20 mins)

Implementation at Texas A&M

### Group Discussion: Use Cases & Stakeholders (15 mins)

### VIVO Technical Aspects (30 mins)

Ontologies Data Workflow Next steps

### Group Discussion: Questions (15 mins)

10-minute break: 2:20 PM



## **VIVO** Basics

Dr. Bruce Herbert & Michael Bolton



"The value of scientific knowledge dispersed across the world can increasingly be captured by those who build networks to take the local to global scale and bring the global back for local impact."

> From "The United States Looks to the Global Science, Technology, and Innovation Horizon," E. William Colglazier and Elizabeth E. Lyons, citing The New Invisible College, Caroline S. Wagner, The Brookings Institution Press, 2008



# VIVO

# DÜRASPACE

A semantic-web-based research and researcher discovery tool

People plus information on the research they do

Publicly-visible information, across disciplines

Serves both external and internal audiences

An open, shared platform for connecting scholars, research communities, campuses, and the world using Linked Open Data (LOD)



**VIVO Installations** 

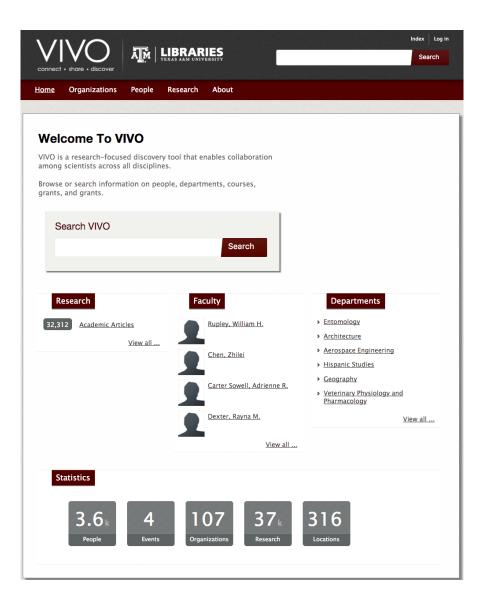


## A Brief History of VIVO

- 2003-2005 First realization as a relational database for the life sciences at Cornell
- 2006-2008 Expansion to all disciplines at Cornell; conversion to Semantic Web
- 2009-2012 National Institutes of Health (NIH) grant VIVO: Enabling the National Networking of Scientists transforms VIVO to a multiinstitutional open source platform
- 2013-2015 VIVO now a community-supported project under DuraSpace with open community development



## Key VIVO Principles



Open software

Open data

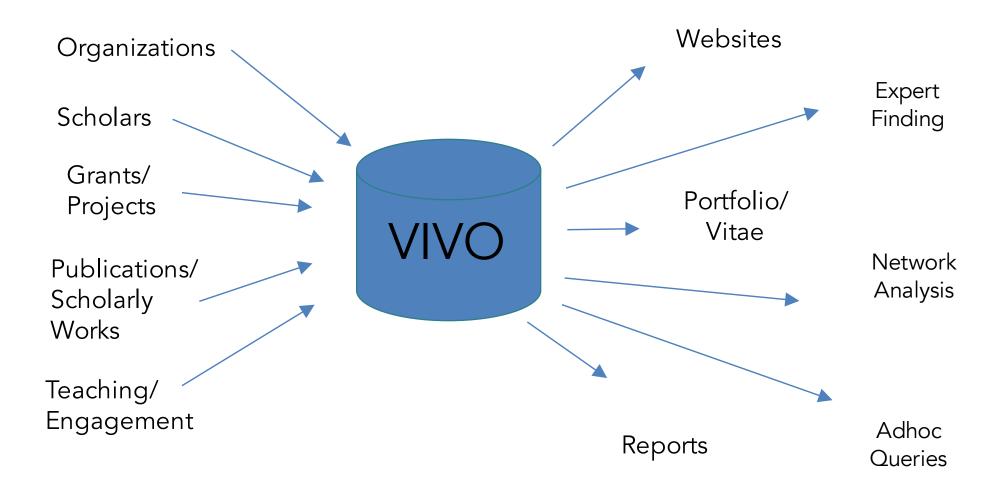
Open ontology

Open community

Local control



# Integrates Institutional Data



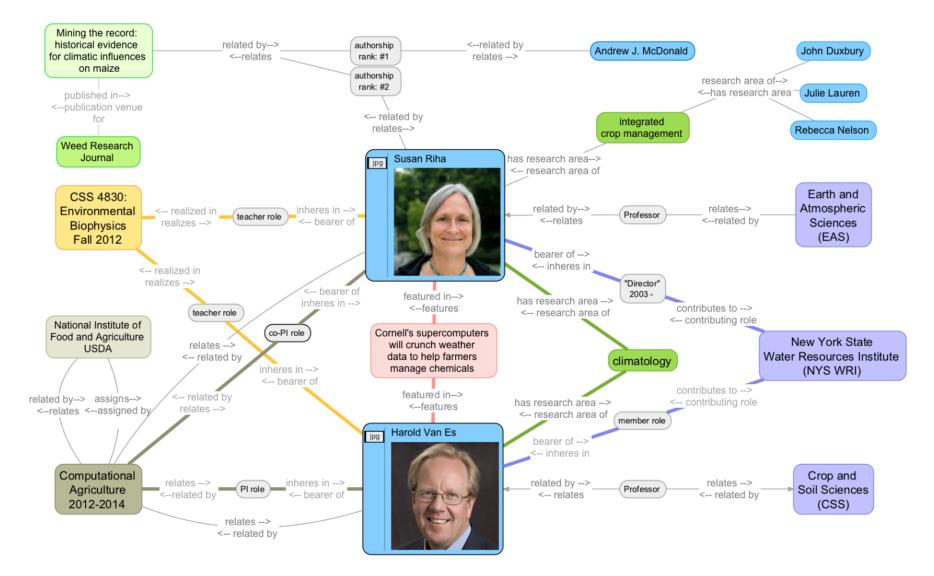


# People

VIVO	Research & Expertise     Log in       Across Cornell     Search			
Home People Or	ganizations Research Events			
6-	Riha, Susan Jean Charles L. Pack Professor in the Department of Searth and Atmospheric Sciences			
	<ul> <li>Director New York State Water, <u>Earth and Atmospheric Sciences (EAS)</u>, <u>College of Agriculture and Life Sciences (CALS)</u></li> <li>I am a professor in the department of Earth and Atmospheric Sciences, and joined the</li> </ul>			
Networks	Cornell faculty in 1980. At that time, I was appointed the Charles L. Pack Research Professor of Forest Soils. My research interests are in the area of the interaction of plants with their physical environment and in dynamic simulation modeling. I work on both environmental and plant production problems on the state, national and international levels. I am a member			
Map of Science	of the graduate fields of Soil and Crop ( <u>more</u> )			
ss <u>Co−investigator</u>	Research Areas			
<u>Network</u>	biocomplexity       biogeochemistry       climatology       computational biology         crop management or crop science       earth science       ecosystem biology         environmental sciences       forest management       hydrology       information science         integrated crop management       integrated pest management       international agriculture         land use       soil and crop science       surface processes, sedimentary basins, & paleontology         sustainable development       weed science			
	Geographic Focus			



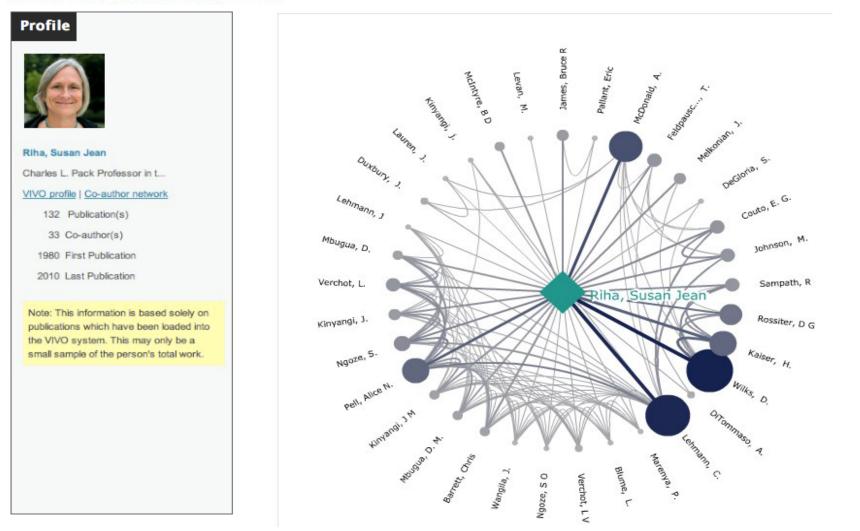
# And How They Connect





## Structured Data for Visualizations

#### Co-Author Network (GraphML File)





## Enter Data Once, Use Many Times

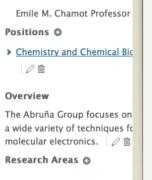


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**Research & Expertise** 

#### Web Pages 🕥 Abruña Group

Chemistry and Chemical Biology profile 🖉



Affiliation	<u>Research</u>	<b>Publications</b>	<u>Teaching</u>
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Cornel	l Fuel Cell In	stitute (CFCI)	00

Index Site Admin Jon



Cornell University Chemistry and Chemical Biology

Research Faculty Undergraduate Graduate Courses Events and News

#### Abruña, Héctor D

#### E. M. Chamot Professor



email: hda1@cornell.edu phone: 607-255-4720 room: Olin Chemistry Research Wing

#### Websites

#### Abruña Group

Department Appointments

 Chemistry and Chemical Biology (CHEM)

#### Graduate Fields

Chemistry and Chemical Biology

Other Affiliations

#### You are here: Chemistry and Chemical Biology > Faculty > Faculty Detail

#### Overview

The Abruña Group focuses on the development and characterization of new materials using a wide variety of techniques for fuel cells, batteries, and molecular assemblies for molecular electronics.

Search

Chemistry and Chemical Biology 
Cornell

Directories

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#### Research

Our research effort takes an interdisciplinary approach to the study of electrochemical phenomena. We employ electrochemical techniques as probes of a variety of chemical systems, and we use other techniques such as x-ray based methods, differential electrochemical mass spectrometry, in-situ FT-IR, scanned probe microscopies, scanning electrochemical microscopy, low temperature conductance and spectroscopic techniques to address problems of electrochemical interest. Current areas of research include:

1. Fuel cells:

 The use of ordered intermetallics, such as BiPt for the electrocatalytic oxidation of formic acid. methanol, ethanol and other small organic molecules of potential utility as fuels in fuel cells.

- Use of Differential Electrochemical Mass Spectrometry (DEMS), in-situ FT-IR in for mechanistic studies related to fuel cells.
- Development of in-situ TEM techniques for the study of fuel cell and battery materials
- 2. Electrical Energy Storage (EES): Batteries and Supercapacitors
- · Computational screening synthesis and characterization of organic molecules for EES
- In-situ testing of battery systems using in-situ x-ray based technique (XRD, EXAFS, XANES)

· Lithium/sulfur batteries

## VIVO Basics: Implementation at Texas A&M

Dr. Bruce Herbert & Michael Bolton



## **VIVO** Implementation

Proof of concept	Analysis	Design	Implementation	Launch	Maintenance	For More Help
Project Management	Establish Governance Resource Identification	Branding Request data feeds Further define scope	Create launch strategy	Oversee publicity campaign Implement assessment plan	Contribute to VIVO community	VIVO Implementation Interest Group vivo-tech@googlegroups.com
Outreach & Engagement	Gather use cases Identify stakeholders	Share prototypes	Identify power users Develop training materials	Publicize VIVO Hold trainings	Find new collaborators Hold user meetings	Outreach and Engagement Interest Group vivo-community@googlegroups.com Information
Data Management	ldentify potential data sources	Map data to ontologies Document data cleanup strategy	Prepare data loads Document data provenance	Route data cleanup requests Support data provisioning	Manage ontology updates Add new data & sources	VIVO Development Interest Group vivo-tech@googlegroups.com
Technical Development	Learn system architecture Identify customizations	Establish data feeds Develop prototypes	Build customized system Test performance	Provide system support	Implement system upgrades Develop new features	Apps & Tools Interest Group vivo-tech@googlegroups.com



## TAMU Use Cases

- Discovery of expertise when building collaborative teams
- Organizational practices for faculty, departments and colleges
- VPR and TEES Proposal development
- Research funding compliance
- Informing Society



### ENHANCING THE EFFECTIVENESS OF TEAM SCIENCE

NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES



# TAMU Data Sources

- HR: people and their positions
- Symplectic Elements Harvester: Faculty Publications
- Registrar: courses
- Faculty reporting: awards, professional service, education, research areas, research blurb
- Institutional Repository: ETDs, publications, grey literature Events calendar
- MARCOMM: internal and external news
- Extension: outreach, technology transfer
- Research administration: grants & contracts



# Data Stewardship

Manage data at its appropriate source with appropriate privacy

HR, grants management, registrar, graduate school, colleges and schools, research centers, extension

Department/agency/division/geographic location/research unit

Consciously derive public data for exchange

Engage stakeholders and build relationships

Recruit power users for training and local knowledge

Data that are visible get corrected!

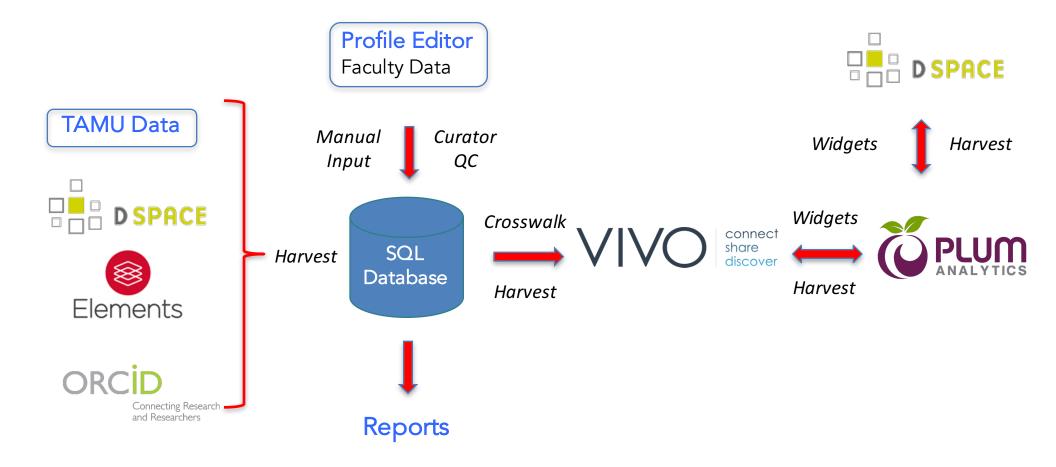


# Policy Issues

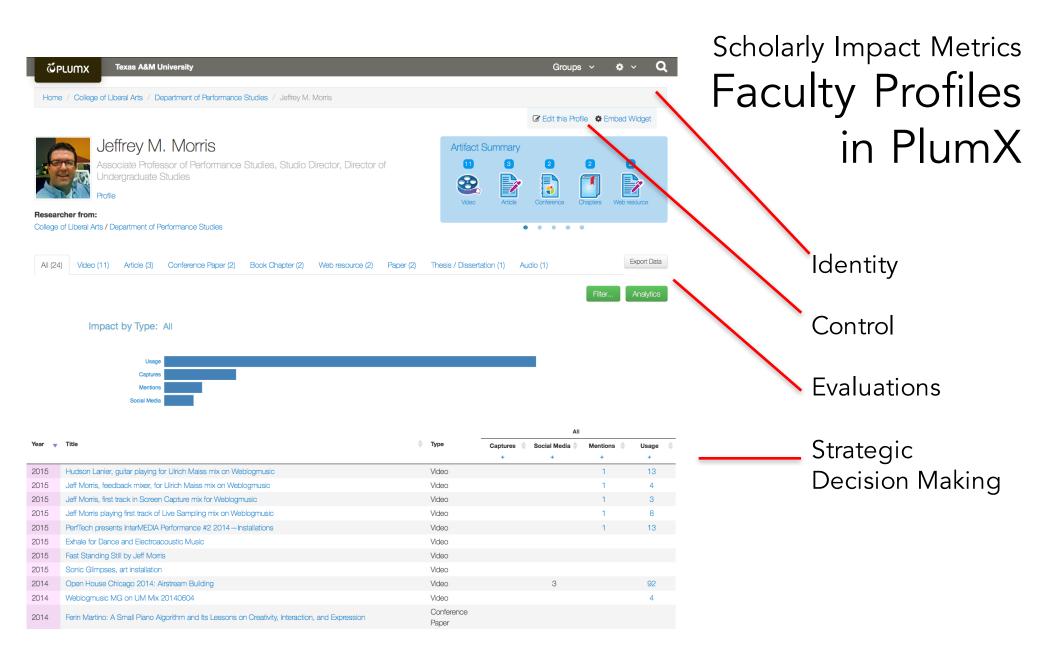
- Representing faculty reputations Dirty data
- Lack of common definitions of organizational structure or who's "faculty"
- Data ownership
- Many dimensions of privacy beyond simple "opt-in vs. opt-out"
- Short-term "go it alone" vs. common good Institutional risk



## Researcher Profile Information Ecosystem









ILIBRARIES

Texas A&M University Libraries / Digital Services & Scholarly Communication / Papers, Presentations & Training Materials / View Item

#### Best Practices for the Use of Scholarly Impact Metrics

Citation analysis and other bibliometric methods help justify your scholarly impact narrative by providing evidence of three characteristics of scholarship: scholarly output, No Thumbnail scholarly impact, and the nature and development of scholarship over time or discipline. This guide provides research-based best practices for the use of scholarly impact metrics and recommendations on strategies to enhance the scholarly identify of researchers. View/Open Guidelines for Scholarly Impact URI Metrics (249.0Kb) http://hdl.handle.net/1969.1/156054 Subject Date scholarly impact metrics, citations, bibliometrics 2016-02-10 Department Author Herbert, Bruce University Libraries Collections Metadata Papers, Presentations & Training Materials [8] Show full item record Citation Herbert, Bruce (2016). Best Practices for the Use of Scholarly Impact Metrics. Available electronically from http://hdl.handle.net/1969.1/156054. The following license files are associated with this item: Creative Commons



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### OAKTrust: TAMU's Institutional Repository



## Discussion: Use Cases & Stakeholders



### VIVO Technical Aspects



# VIVO Technical Aspects: Ontologies

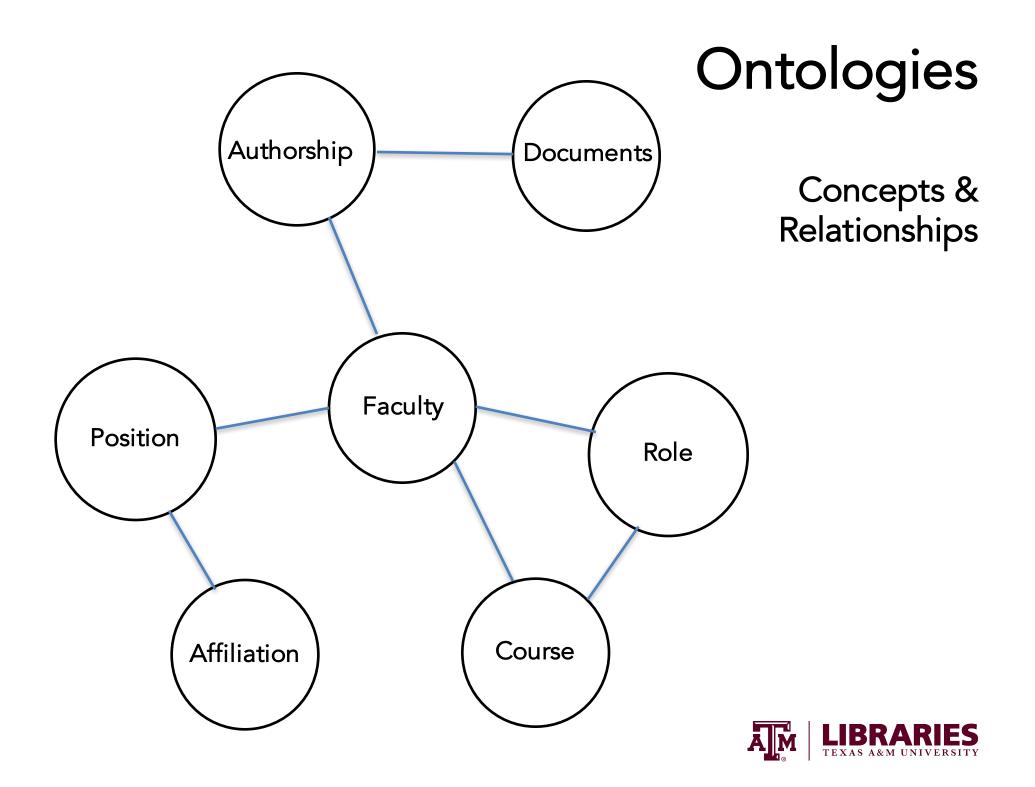


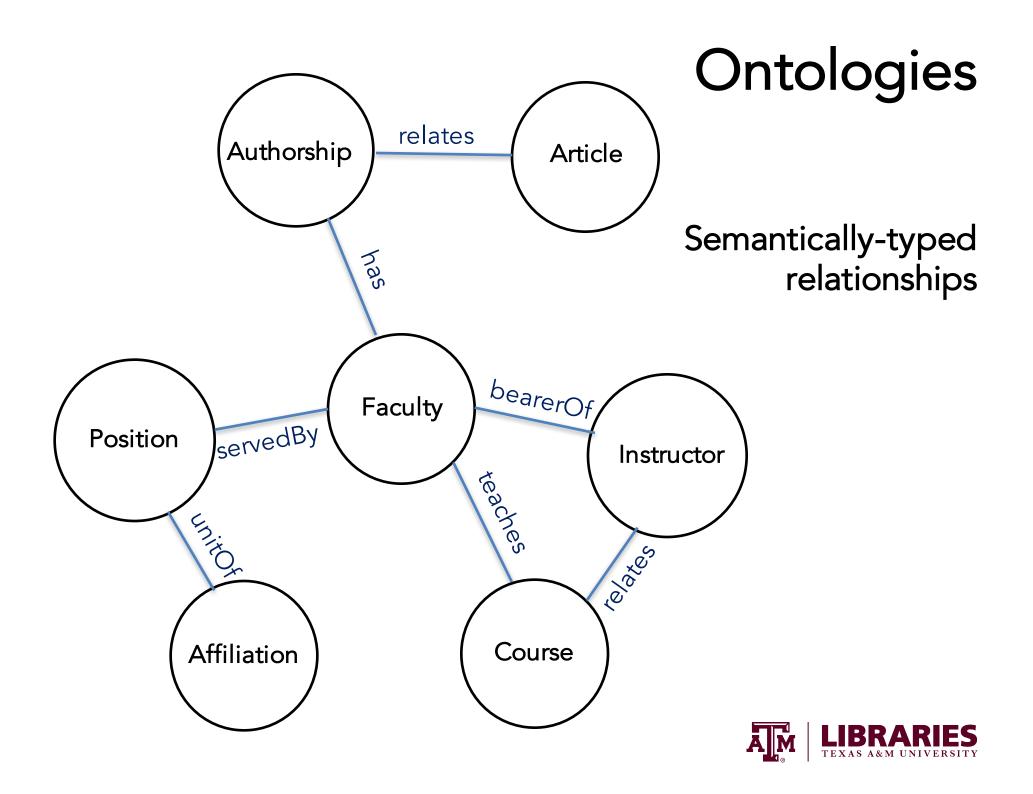
# What is Ontology?

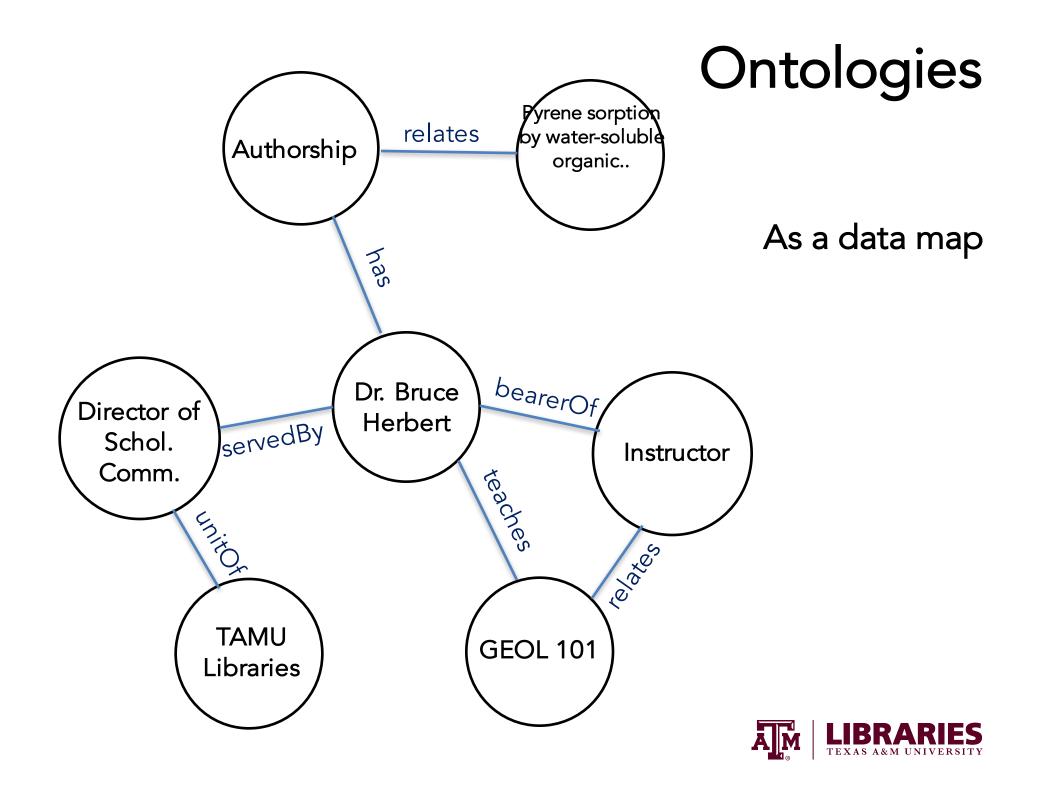
### Ontology

- A framework that defines a particular set of concepts, the relationships among them, and the nature of those relationships (Stewart, 2008)
- An explicit and formal specification of a shared conceptualization (Gruber, 1993)



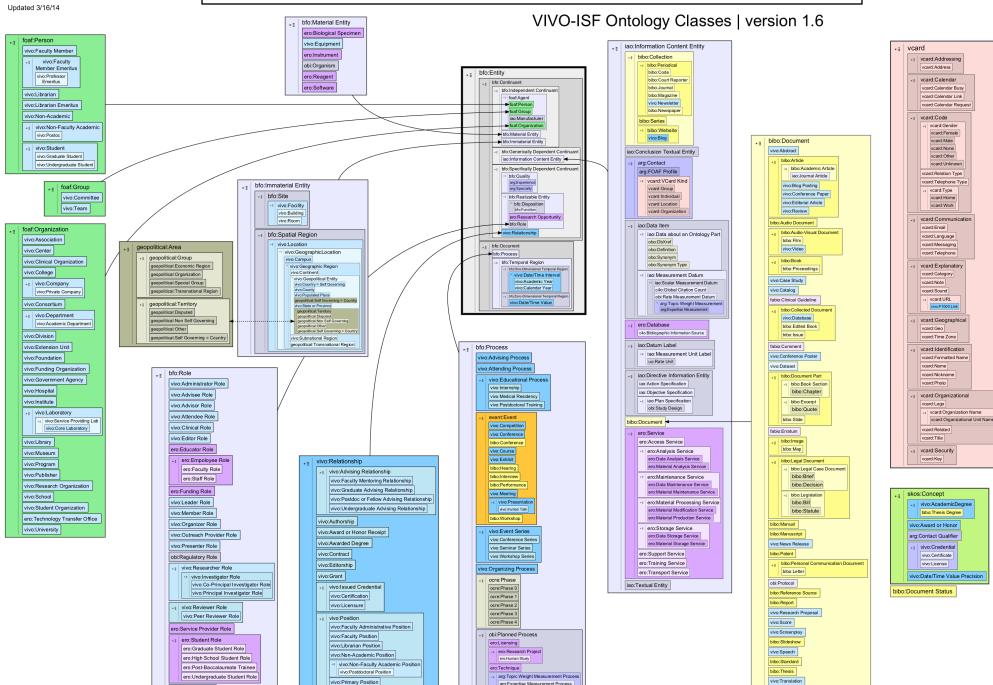


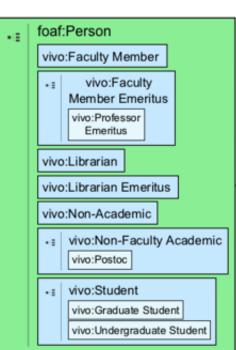


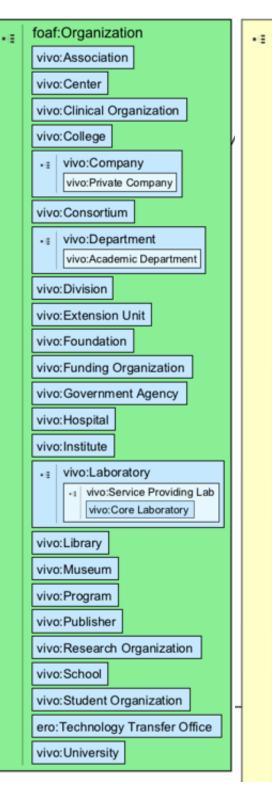


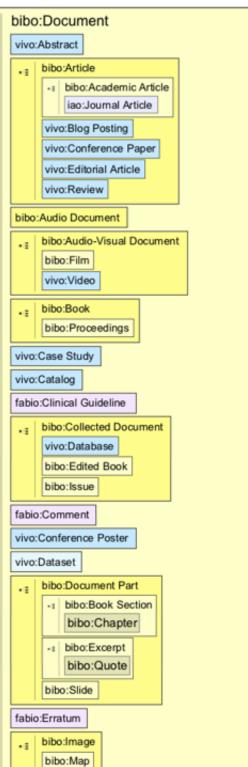
### **VIVO-ISF Ontology Classes**









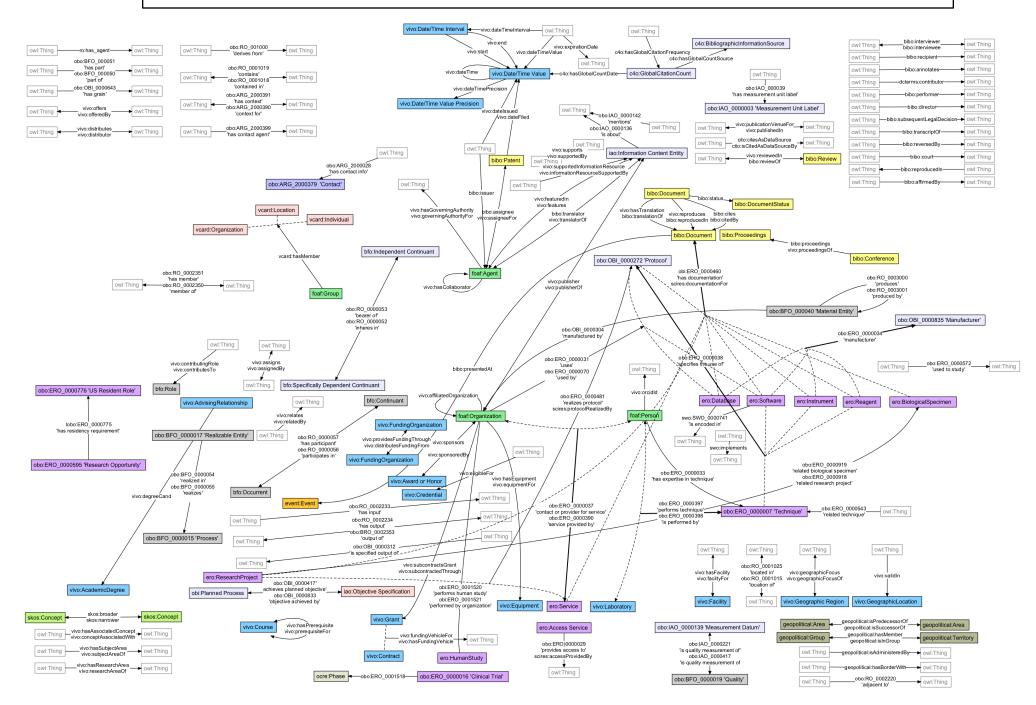


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vivo:Advisor Role			
vivo:Attendee Role			
vivo:Clinical Role			
vivo:Editor Role			
ero:Educator Role			
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ero:Faculty Role			
ero:Staff Role			
ero:Funding Role			
vivo:Leader Role			
vivo:Member Role			
vivo:Organizer Role			
vivo:Outreach Provider Role			
vivo:Presenter Role			
obi:Regulatory Role			
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vivo:Investigator Role			
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### **VIVO-ISF Ontology Object Properties**

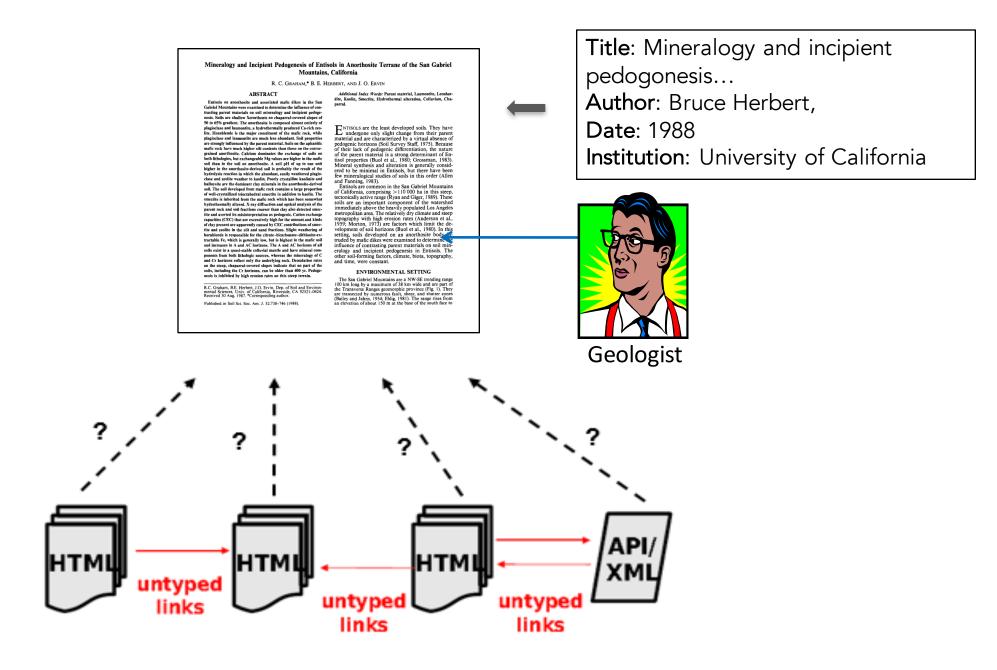
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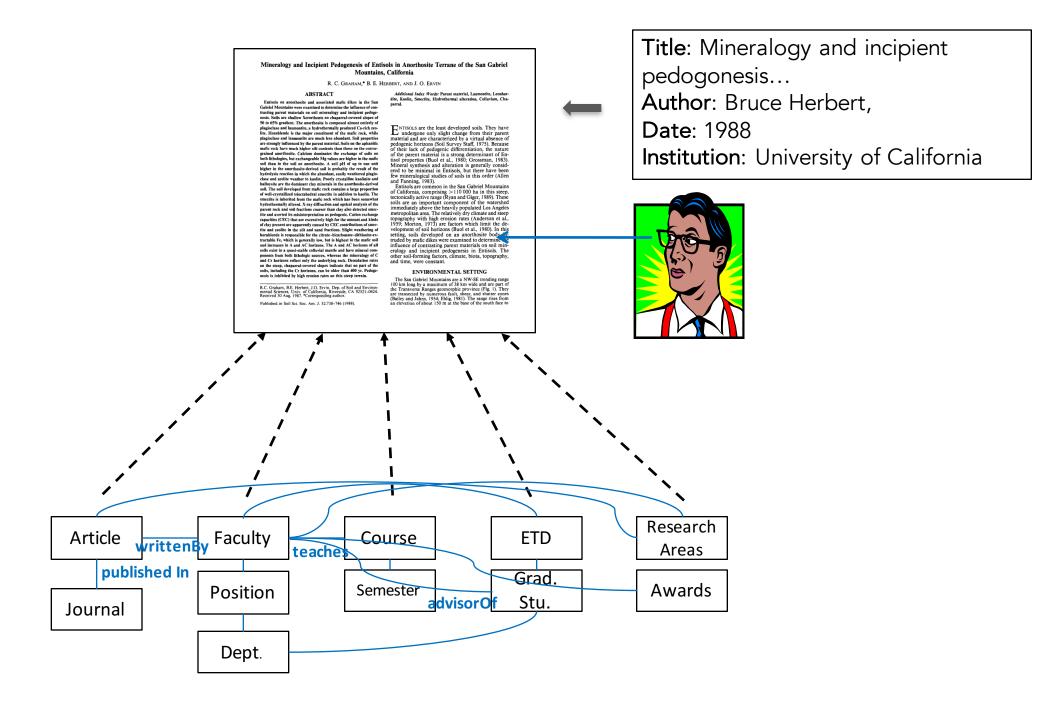


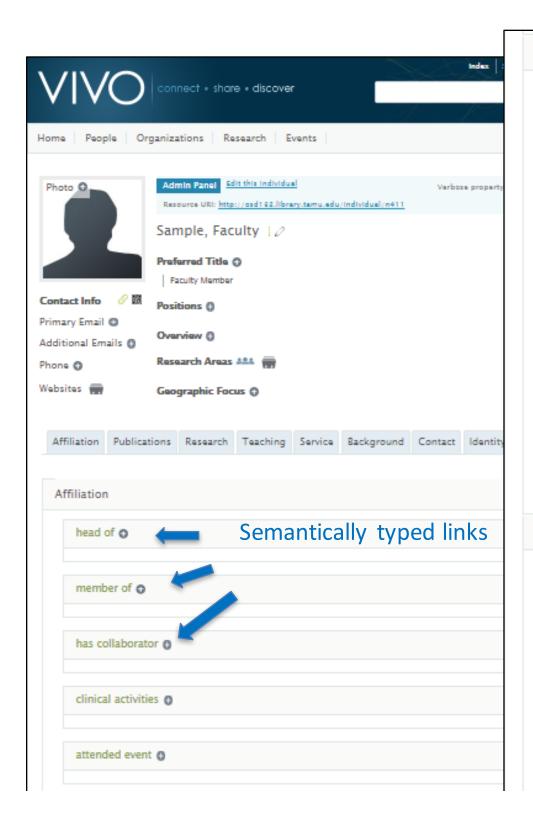
# Why VIVO?

- Machine-readable Web?
- Defined concepts and relationships?
- Semantically-typed links?
- Data map?
- Searchable?

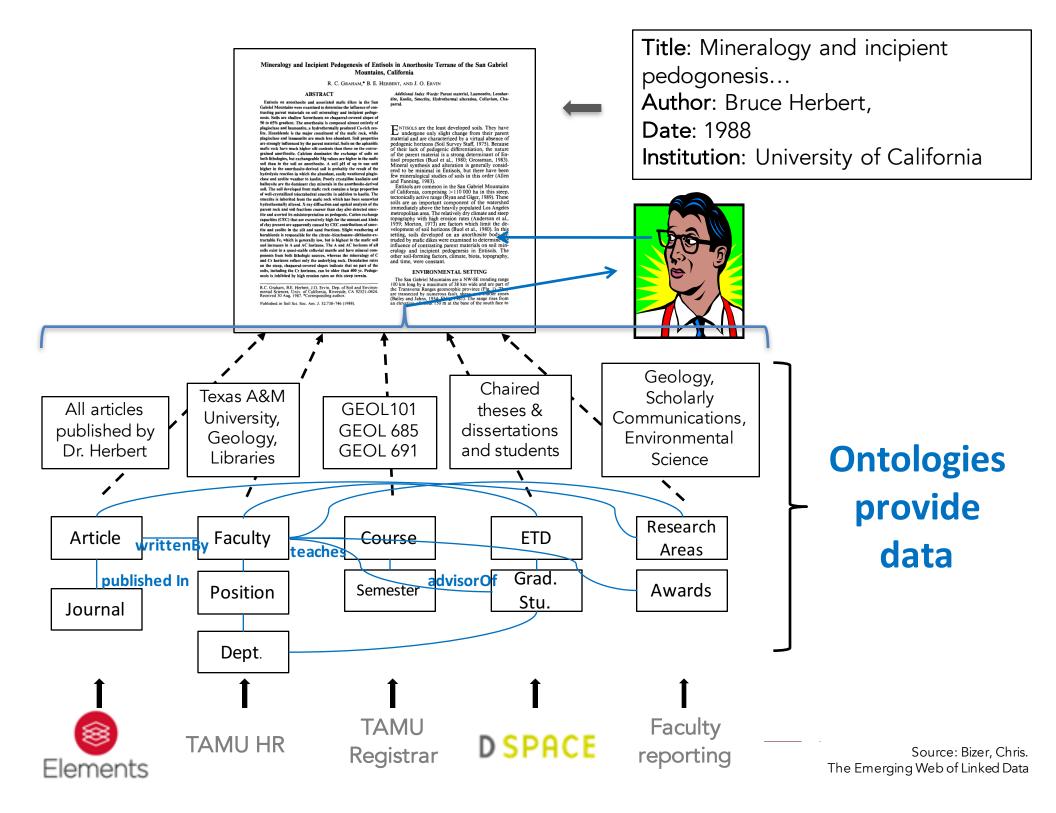






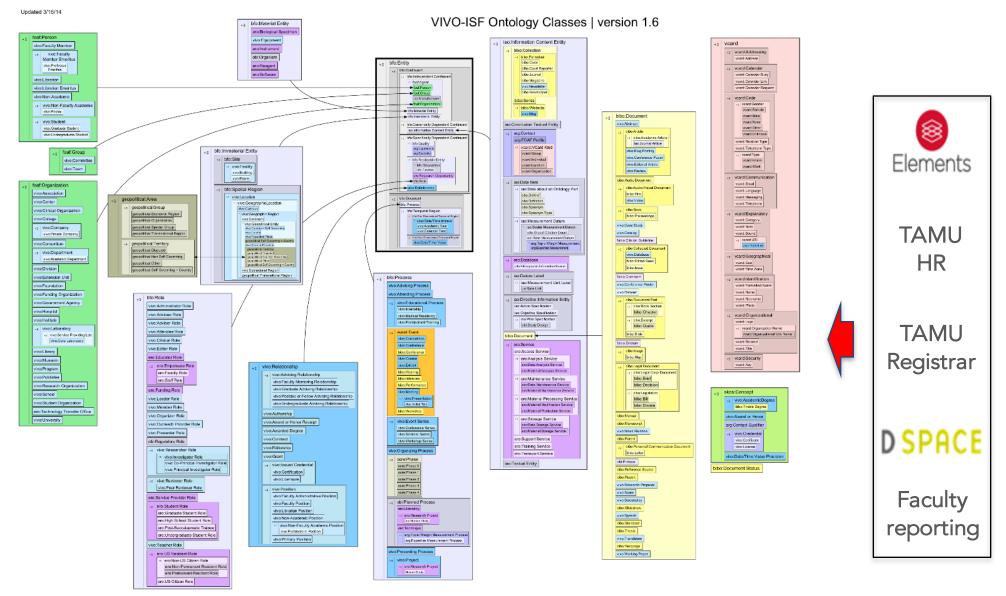


### Publications selected publications g collection or series editor for O editor of O presentations g featured in O assignee for patent () translator of G Research research overview () principal investigator on () co-principal investigator on O investigator on O





#### **VIVO-ISF Ontology Classes**





# Question: Can I modify ontologies for my institution?

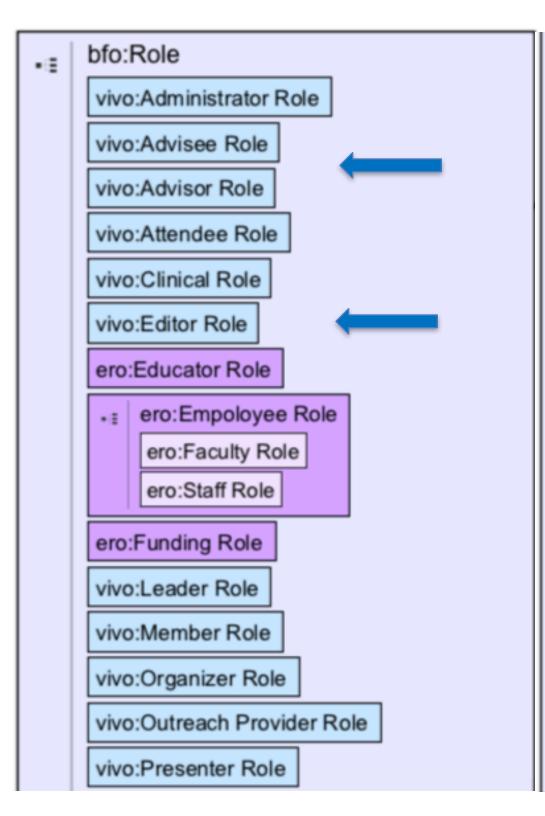
Answer: YES

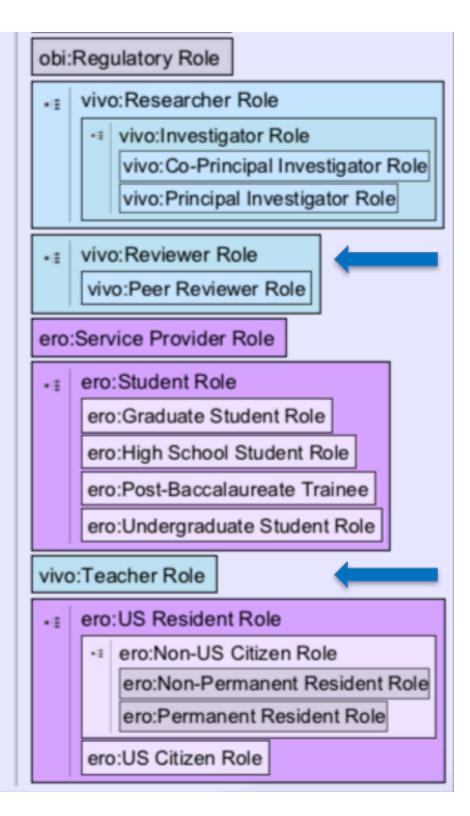


**Scenario:** Faculty wants to have a list of their chaired theses and dissertations with the students' names.

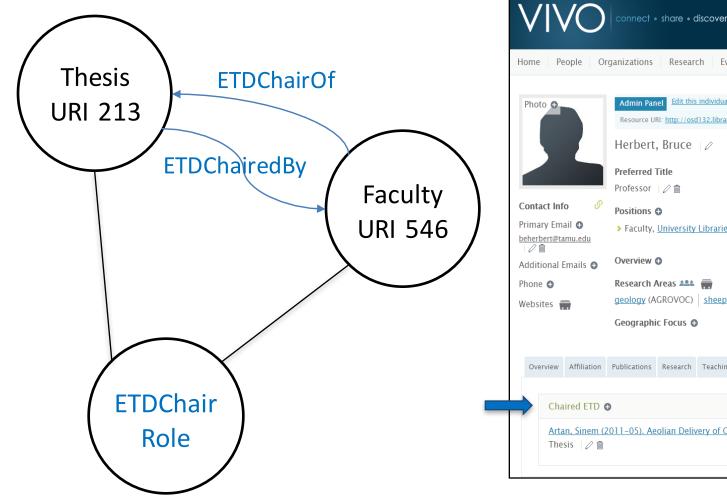
- Relationship between
   Faculty and Theses
- Not a relationship between Faculty and Students
- Faculty's Role on students' theses

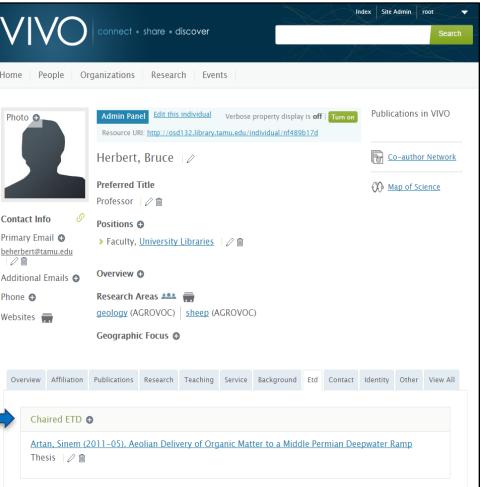






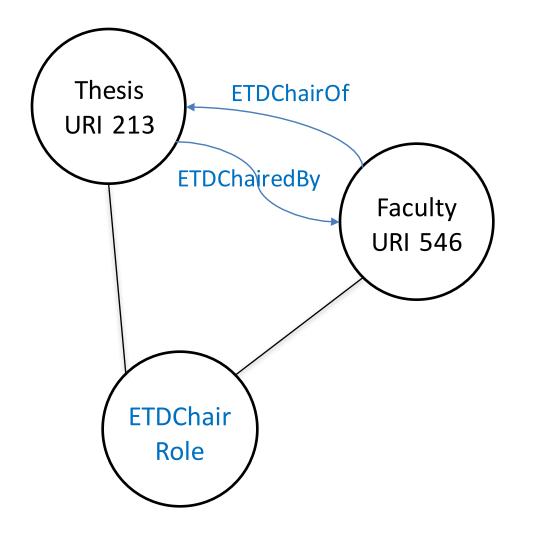
# "ETDChairRole" in your Ontology







# "ETDChairRole" in your Ontology



#### Resource Description Framework (RDF)

- One simple data model for publishing structured data on the Web
- A simple graph-based data model (RDF Triples)



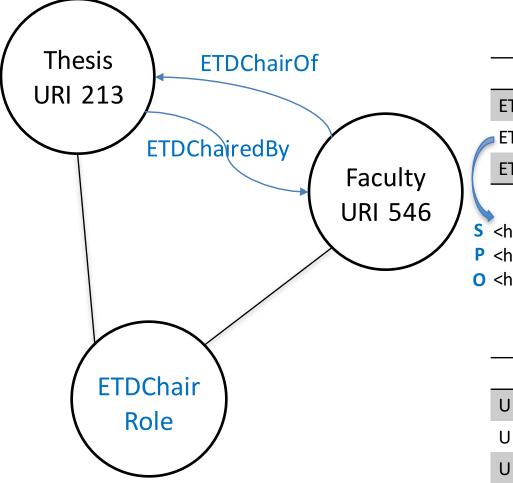
# "ETDChairRole" in your Ontology

#### Resource Description Framework (RDF)

Subject	Predicate	Object
ETDChairRole	label	ETD Chair Role
ETDChairRole	supClassOf	Role (BFO_0000023)
ETDChairRole	type	Class

S <http://vivo.library.tamu.edu/ontology/TAMU#ETDChairRole>
P <http://www.w3.org/2000/01/rdf-schema#subClassOf>
O <http://purl.obolibrary.org/obo/BFO\_000023>

Subject	Predicate	Object
URI_etdChairOf	type	Object Property
URI_etdChairOf	inverseOf	etdChairedBy
URI_etdChairOf	label	Chaired ETD



# Data Modelling

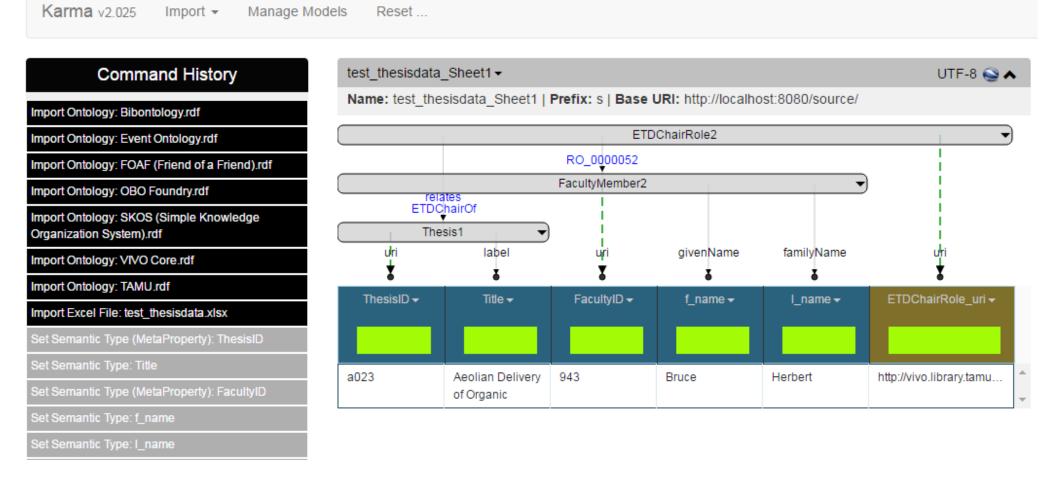
- Using Karma Data Integration Tool
- A semantic modeling tool to visualize data with ontologies

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# Data Modeling

- Using Karma Data Integration Tool
- A semantic modeling tool to visualize data with ontologies



Karma sources: DuraSpace, USC, How-to-use guide



# VIVO Technical Aspects: Data Workflow

Douglas Hahn



#### Manage the unit tasked with helping figure out how to do...

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### A Brief History: Initial Implementation

Currently, we are on our second ramp up of a VIVO installation.

We were introduced to VIVO a few years ago and immediately saw the potential for its use.

So like anyone with a new toy. We started digging up any dataset we could find and load them into VIVO.



#### Initial Datasets



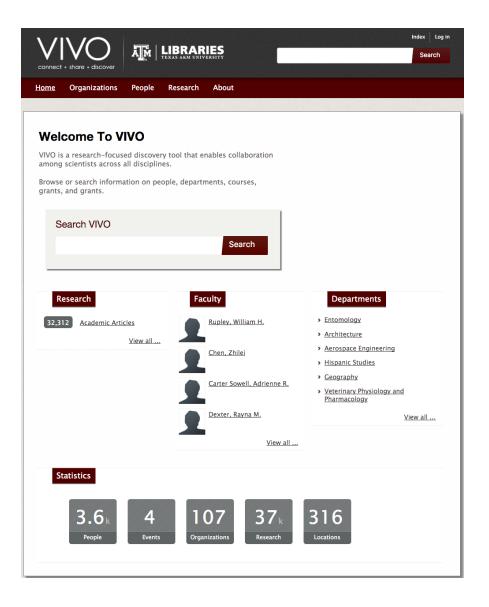
#### People and Organizations Human Resources Data Feeds

#### Academic Analytics

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#### Initial VIVO @ TAMU



Within a short amount of time We quickly had a VIVO instance running.

We had loaded ~ 4K people. 37K publications.

We had no idea how to manage it, or what data was actually loaded in it.



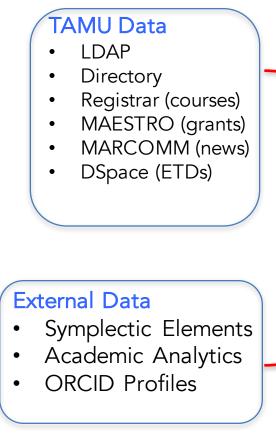
An Opportunity to Start Over Shortly after our initial launch of VIVO we experienced quite a lot of staff turnover.

We took this opportunity to re-evaluate how we were using VIVO and what we wanted out of it.

We wanted quality data, and the ability produce intelligent reports. To ensure this it was determined additional staff would be required.



# Target Specific Data



For the second go round we intend to

- Target specific data.
- Develop tools, and workflows to manage the data.
- Stay focused and not chase new and "exciting" data at the expense of the quality of the existing data.

connect share discover



### Specific Tools: Clean the Data

Clean Up Normalize Data with a variety of tools

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Raw Data



Create various databases with authoritative lists

Use OpenRefine, basic programmatic scripts, and other text manipulating tools for Dirty Data.

The goal is a well documented, and reproducible workflow for dealing with raw data. Producing standardized data sets for working with VIVO.



### Specific Tools: Model the Data

#### Clean Data

4d089ebc4c8	5b43f7162	51	4	jjalonzo Alonzo Juan J jjalonzoĝtamu.edu Faculty English ASSOCIATE PROFESSOR
d9c457563d0	85a68dc57	91	1	nbhattac Bhattacharya Namdini nbhattac@tamu.edu Faculty English PROFESSOR
07b741e3dd3	2aed9dcff	50	1	r-boenig Boenig Robert E r-boenig@tamu.edu Faculty English PROFESSOR
48d864e5a4a	a9e75ff71	BC	3	vbclark Clark William B vbclark@tamu.edu Faculty English PROFESSOR
1455dc6ef43	1f7ea7606	90	1	mikec Collins Michael S mikec@tamu.edu Faculty English ASSOCIATE FROFESSOR
a9fcbf9e7fd	395e91571	82	0	rcooper1 Cooper Rich P rcooper1@tamu.edu Faculty English LECTURER
bbd66da2b1d	e70d81807	20	3	delnegro Delnegro Giovanna P delnegro@tamu.edu Faculty English ASSOCIATE PROFESSOR
74da1438ff5	.55016eb53	BC	2	d-dickson Dickson Donald R d-dickson@tamu.edu Faculty English PROFESSOR
b0a5cd43adf	316e75244	20	3	mmara duPlessis Nicole M nduplessis@tamu.edu Faculty English LECTURER
315db8c7667	ea43909f3	62	0	idworkin 🛛 Dworkin Ira M idworkin@tamu.edu Faculty English ASSISTANT PROFESSOR
818c0a64617	138b291be9	90	5	aearhart Earhart Amy E aearhart@tamu.edu Faculty English ASSOCIATE FROFESSOR
adb20045f5d	e059fb9ee	3(	2	s-egenolf Egenolf Susan B s-egenolf@tamu.edu Faculty English ASSOCIATE FROFESSOR
48b10200127	aacdebd20	50	9	meide Eide Marian meide@tamu.edu Faculty English ASSOCIATE FROFESSOR
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b45431e045b	961e2c2a8	90	0	n-ezell Ezell-Mainzer Margaret m-ezell@tamu.edu Faculty English DISTINGUISHED PROFESSOR
3430dfee109	d9c52c3b0	11	0	rjgriffin Griffin Robert J rjgriffin@tamu.edu Faculty English ASSOCIATE PROFESSOR
27b47818a94	d739e2150	3[	5	j-hannah Hannah James R j-hannah@tamu.edu Faculty English PROFESSOR
5e04e9222d3	c50611e74	72	2	jharris Harris Jason M jharris@tamu.edu Faculty English LECTURER
c54a1e39269	Ic5ae6ff58	40	3	c-hawkins Hawkins Cecelia E c-hawkins@tamu.edu Faculty English INSTRUCTIONAL PROFESSOR

Model the data

Karma

A Data Integration Tool





Produce N-

Triple

Test N-Triple by loading into VIVO

Repeat the Process till you have it right.



#### Semi-automatic Repeatable Process

4d089ebc4c8	5b43f7162	51	4	jjalonzo Alonzo Juan J jjalonzo@tamu.edu Faculty English ASSOCIATE PROFESSOR
d9c457563d0	85a68dc57	91	1	nbhattac Bhattacharya Nandini nbhattac@tamu.edu Faculty English PROFESSOR
07b741e3dd3	2aed9dcff	50	7	r-boenig Boenig Robert E r-boenig@tamu.edu Faculty English PROFESSOR
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1455dc6ef43	1£7ea7606	90	7	mikec Collins Michael 5 mikec@tamu.edu Faculty English ASSOCIATE PROFESSOR
a9fcbf9e7fd	.395e91571	82	0	rcooper1 Cooper Rich P rcooper1@tamu.edu Faculty English LECTURER
bbd66da2b1d	e70d81807	20	3	delnegro Delnegro Giovanna P delnegroŝtamu.edu Faculty English ASSOCIATE PROFESSOR
74da1438ff5	55016eb53	80	2	d-dickson Dickson Donald R d-dickson@tamu.edu Faculty English PROFESSOR
b0a5cd43adf	316e75244	20	3	nmara duPlessis Nicole N nduplessis@tamu.edu Faculty English LECTURER
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adb2004515d	e059fb9ee	30	2	s-egenolf Egenolf Susan B s-egenolf@tamu.edu Faculty English ASSOCIATE PROFESSOR
48b10200127	aacdebd20	50	9	meide Eide Marian meide@tamu.edu Faculty English ASSOCIATE PROFESSOR
b9b0eb57b9f	ce988e8df	42	0	lestill Estill Laura A lestill@tamu.edu Faculty English ASSISTANT PROFESSOR
b45431e045b	@61e2c2a8	90	0	m-erell Erell-Mainzer Margaret m-erell@tamu.edu Faculty English DISTINGUISHED PROFESSOR
3430dfee109	d9c52c3b0	11	0	rjgriffin Griffin Robert J rjgriffin@tamu.edu Faculty English ASSOCIATE PROFESSOR
27547818a94	d739e2150	30	5	j-hannah Hannah James R j-hannah@tamu.edu Faculty English PROFESSOR
5e04e9222d3	c50611e74	72	2	jharris Harris Jason M jharris@tamu.edu Faculty English LECTURER
c54a1e39269	lo5ae6ff58	40	3	c-hawkins Hawkins Cecelia E c-hawkins@tamu.edu Faculty English INSTRUCTIONAL PROFESSOR

Clean Up Normalize Data



Produce N-Triple.





Load N-Triple into VIVO via the SPARQL Endpoint



# VIVO Technical Aspects: Next Steps

Douglas Hahn



# Taking our Process to the Next Step

Empower the Faculty a simple, way to modify professional information. Allow some delegation of rights for departments to modify data.

Allow VIVO administrators to load additional data.





Hoagwood, Terence Professor



Vasilakis, Apostolos Instructional Assistant Professor



Bush. Ruth Vice Dean Academic Affairs



lves. Maura Professor and Interim Head

View all ...



#### **VIVO** Default Permissions

By default VIVO allows for 6 levels of permissions and these are based on broad groups.

Display level	Update level
site admin and root user 🔹	site admin and root user
Publish level	all users who can log in self-editor and above editor and above
all users, including public <ul> <li>Image: The second se</li></ul>	curator and above site admin and root user root user

We needed a simple interface that would allow the modification of user data and the delegation of editing authority without sharing user accounts.



### VIVO Profile Editor

We decided to leverage the existing infrastructure that was developed for some of the ingest process and allow faculty to edit the information there.



#### Herbert, Bruce Professor

#### Positions

- Faculty, <u>Geology and Geophysics</u>
- Faculty, University Libraries

Contact Info | ⊘ 𝔗 ⊠ beherbert@tamu

Place an edit icon on the profile that takes faculty member to the profile editor.



#### **VIVO** Profile Editor

A web front end allows for the editing of various elements in a simple clean user interface.

M	Texas A&M University Libraries
Choose F	ile No file chosen
Delete Poi	trate: 🗆
Last Name	: Herbert
Preferred	Last Name:
(Max Chai	racters 100)
First Name	e: Bruce
Preferred	First Name:
(Max Cha	racters 100)
Title: Profe	essor
Alt Title:	
(Max Cha	racters 255)
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### VIVO Profile Editor

We only expose very specific data elements through this interface.

It allows us for delegated permissions. So a department can assist in updating faculty information.

It also allows for curation of certain information before it goes into VIVO.

Information can be automatically injested into VIVO via the SPARQL endpoint.



#### VIVO Other Uses

We also use the tool for curation / approval of other datasets.

Example: When our Dissertations are processed with VIREO and then published into DSPACE, we track the ETDChair. This allows us to harvest from DSPACE and then load it into our VIVO.





#### **VIVO** Other Uses





#### VIVO Other uses

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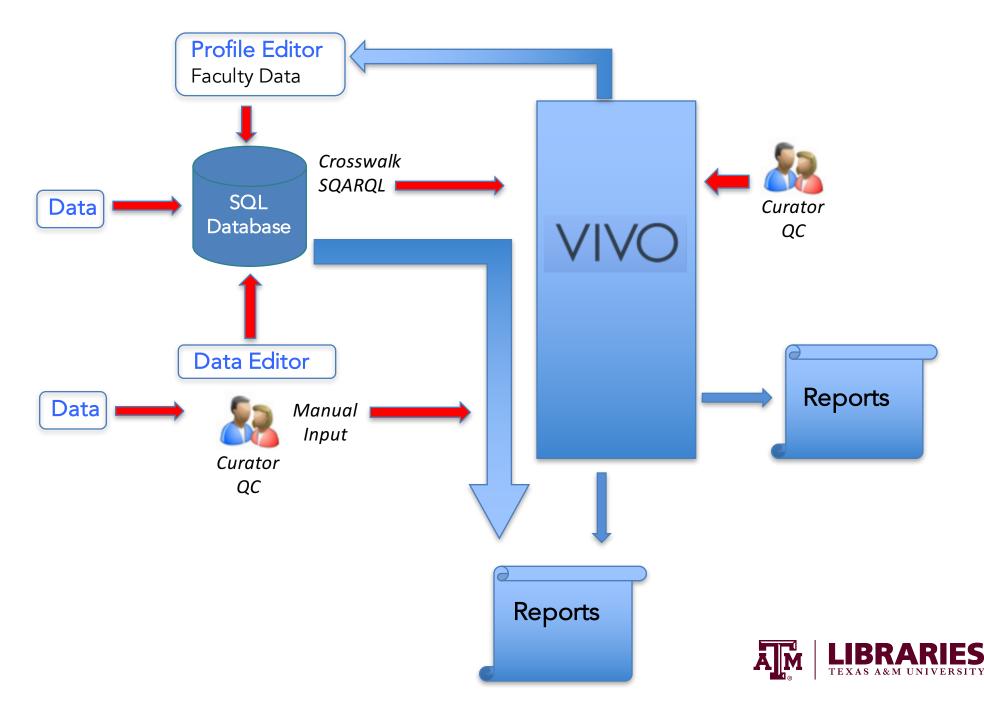








#### Data Workflow Diagram



#### Discussion: Questions for the Panel

