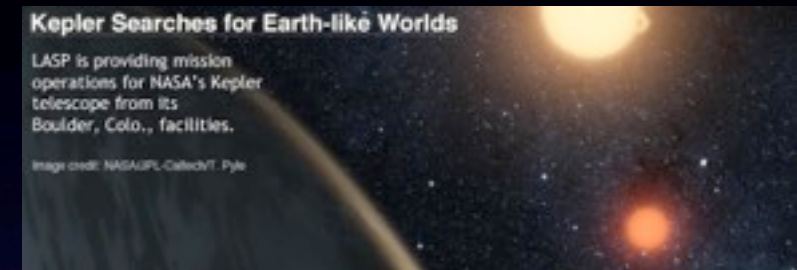


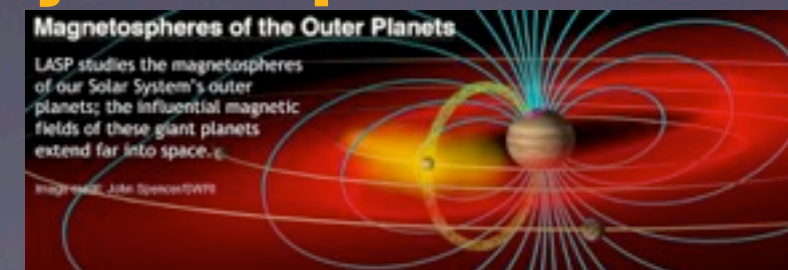
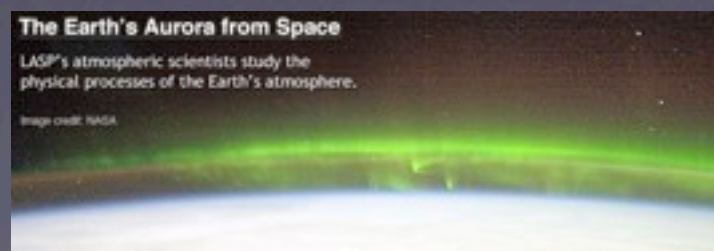
Using VIVO at the Laboratory for Atmospheric and Space Physics (LASP)

Anne Wilson and the LASP Web Development Team
VIVO 2016 Panel on Using VIVO for Scientific Applications
Friday, 08.19.16

Laboratory for Atmospheric and Space Physics



- University of Colorado, Boulder
- ~100 scientists performing atmospheric and space research
- Scientists work with engineers to design and build instrumentation
- Operate spacecraft
- Provide data to scientific community and public



The Problem

- Many projects ongoing at any time
- Information (metadata) about projects and datasets ‘managed’ on per project basis
 - Information embedded in HTML
 - Not machine readable
 - Repeated, but not managed, across multiple web sites
 - Discrepancies

Driving Project: LISIRD

- LASP Interactive Solar Irradiance Data Center
 - < 100 datasets
- A web site to deliver solar irradiance and related data products to the public
- Same HTML encoding of information



(LISIRD 2)



Infrastructure Decision

- Implement a database of metadata about LISIRD data products
 - SSOT, vetted, managed
- Use semantic technology
 - LOD improves discovery
 - Important to support inferencing, which enables further discovery and deeper understanding
 - The future of the web

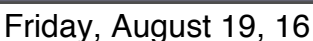
~2012, VIVO at LASP

- Don Elsborg was using VIVO to manage information and generate reports about hardware usage for LASP IT

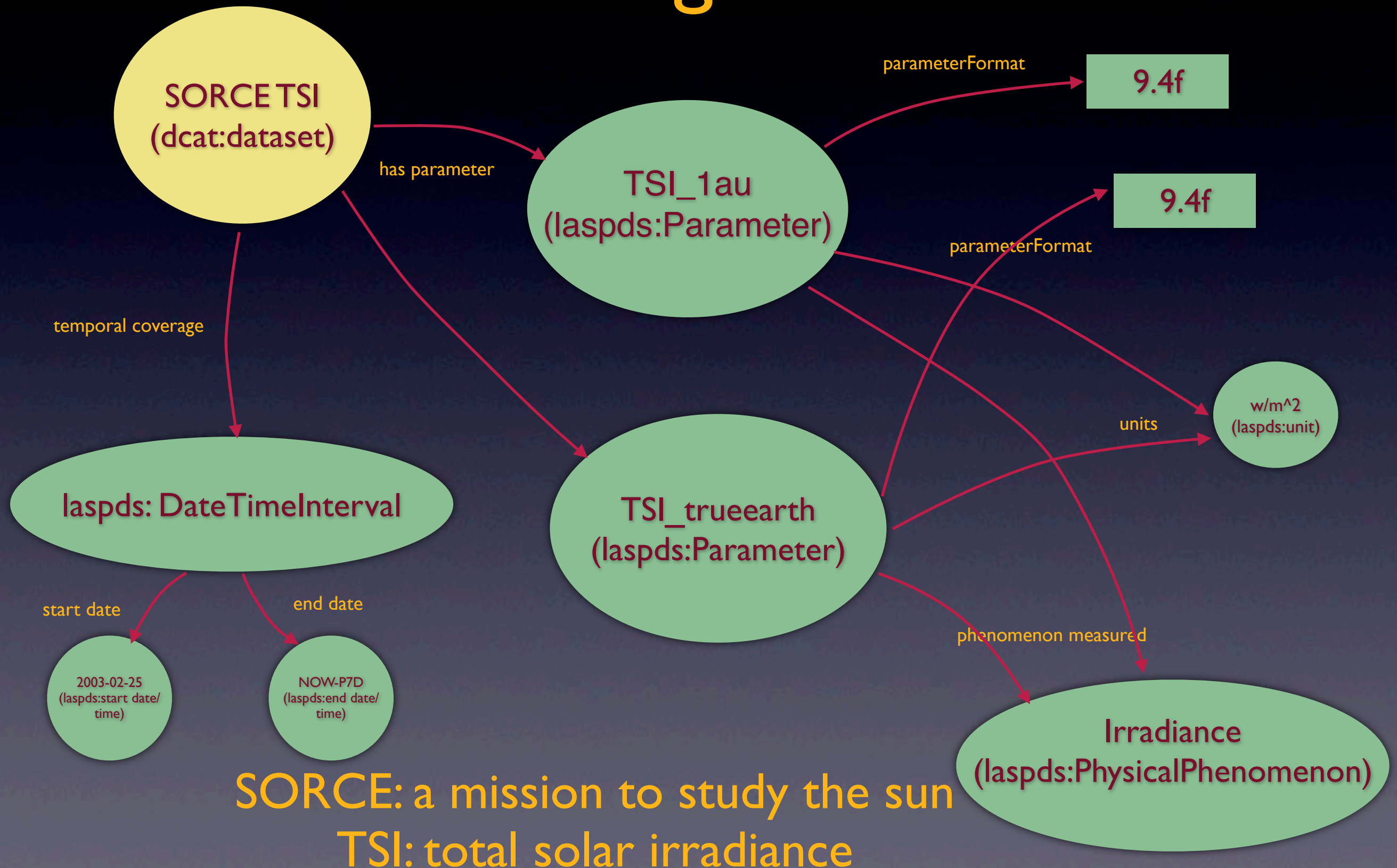
Using VIVO to create and link ontologies

- Ontology needed to describe the domain of data products
- Integrated Virtual Solar Terrestrial Ontology (VSTO)
- Considered SWEET Ontology
- Created 'laspsds', extending DCAT

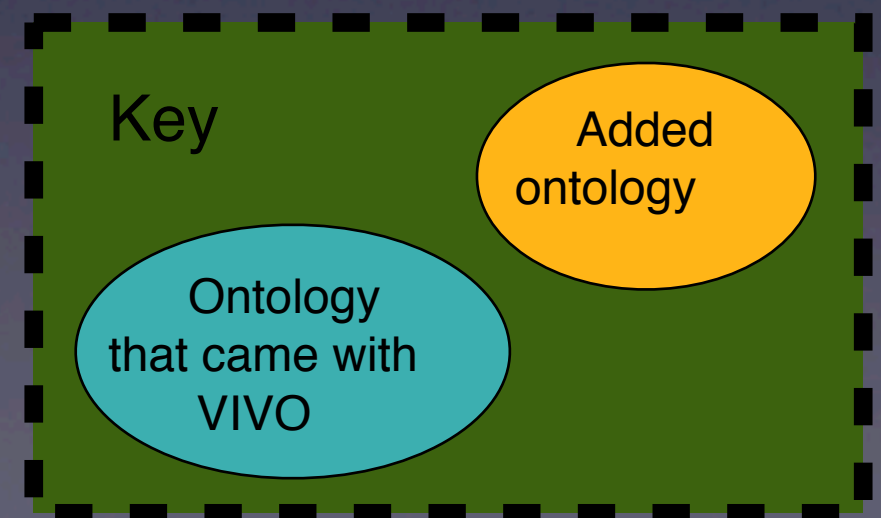
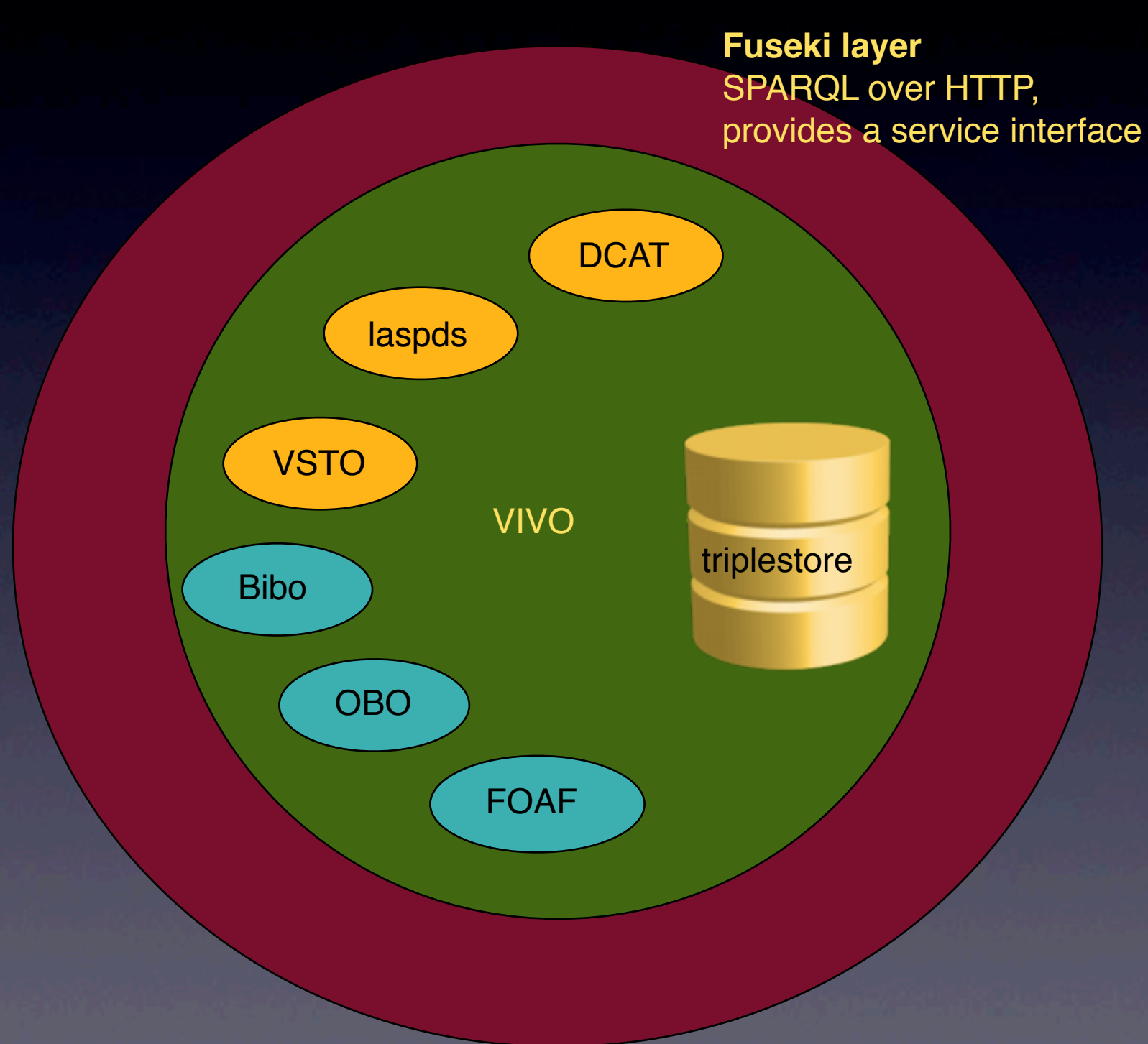
Out-of-date image, but demonstrates ontology linking



Database Populated Manually Using VIVO

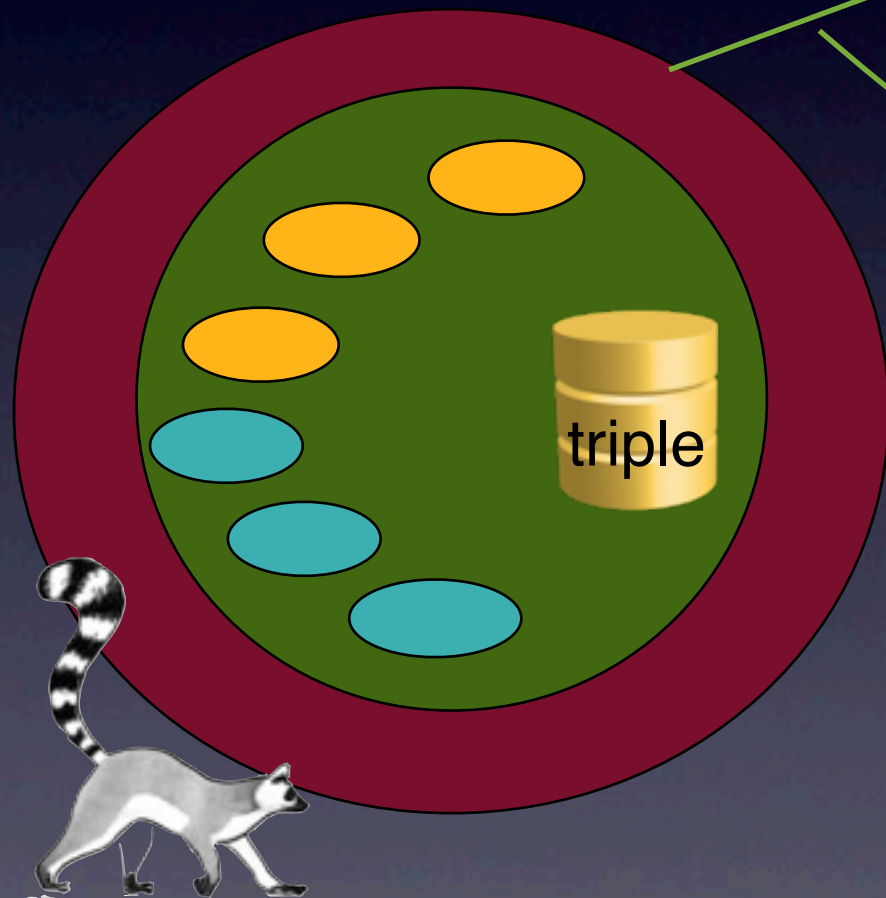


LEMR (LASP Extended Metadata Repository)



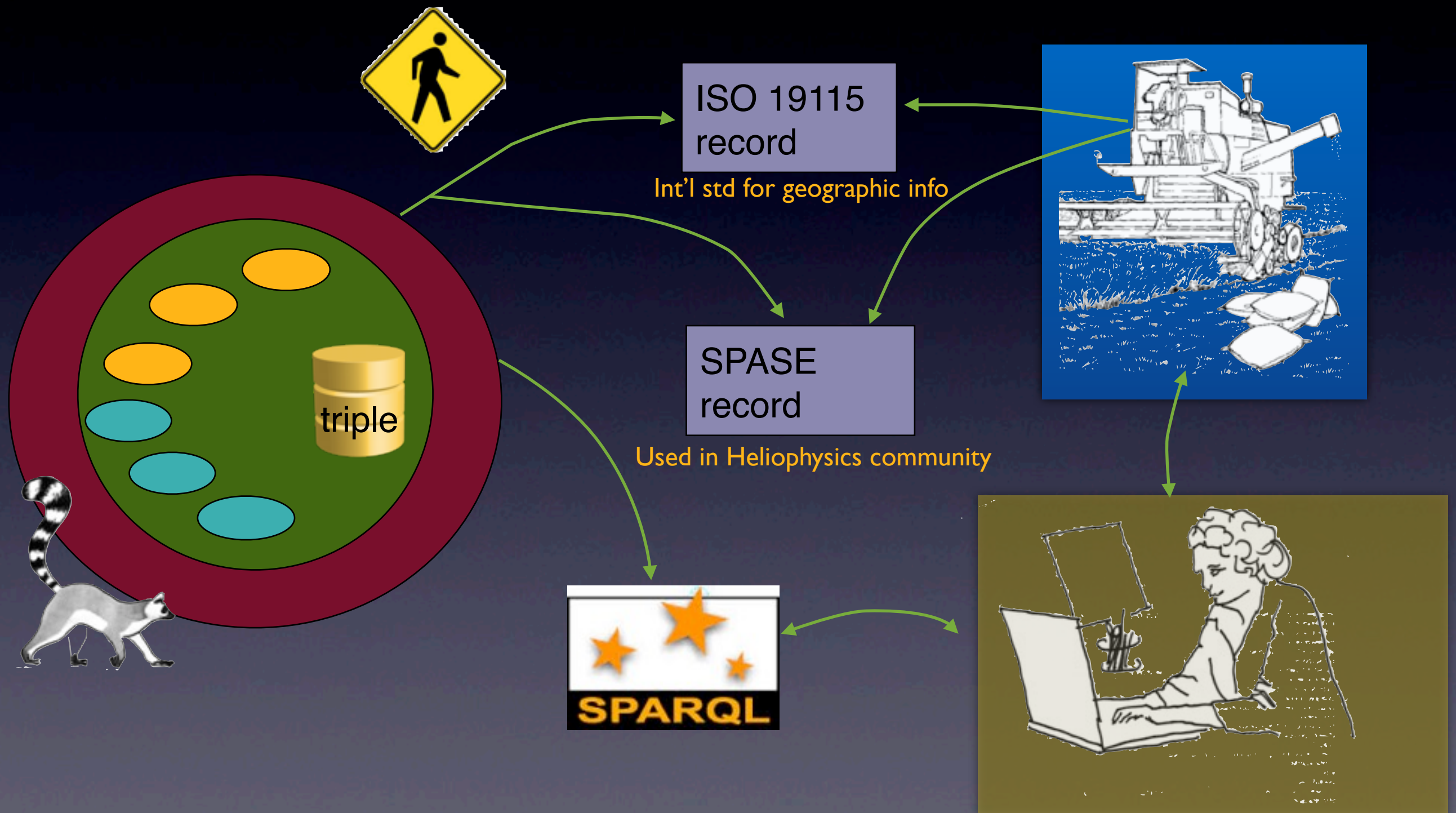
LISIRD Gets Content from LEMR

Dynamic web content: Web page templates make dynamic SPARQL queries to Fuseki server



(new version: LISIRD 3)

Enabling Discovery



VIVO Benefits

- Provided a big lift in getting going with semantic technology
- Ontology editing, knitting capabilities
- Some CRUD (create, read, update, delete) capabilities for database instances

Challenges

Caveat: Pleading ignorance

- Learning curves! Trial and error.
 - Ontology design
 - Administration via VIVO interface
 - Must be able [willing to pay the price] to evolve!
 - Designing ontology to reflect admin and access needs rather than modeling [perceived] reality
- We are using VIVO very differently than seems to occur in people/publications/grants domain
 - Dataset information entered mainly manually
 - A small number of instances in dataset

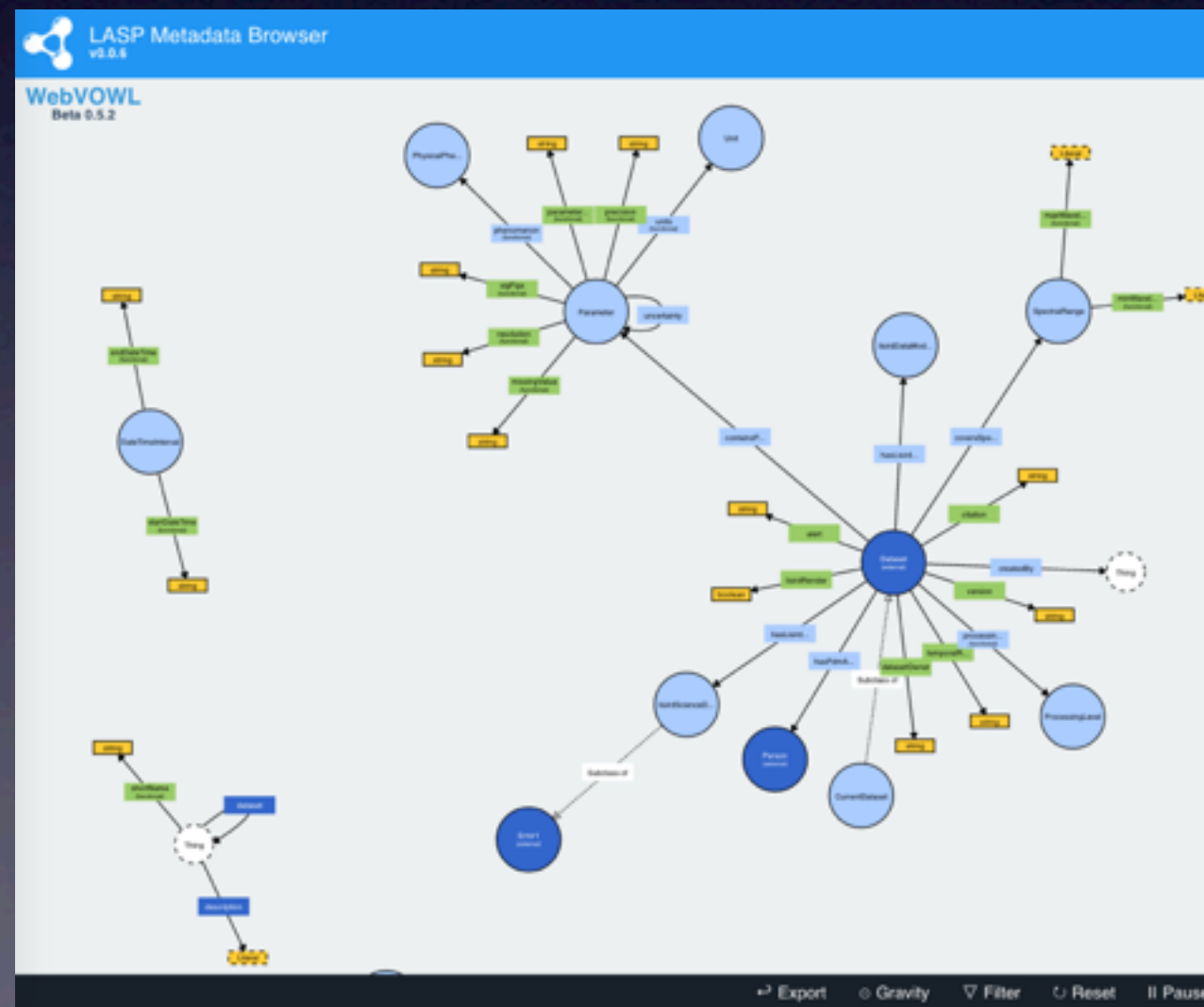
Admin Difficulties

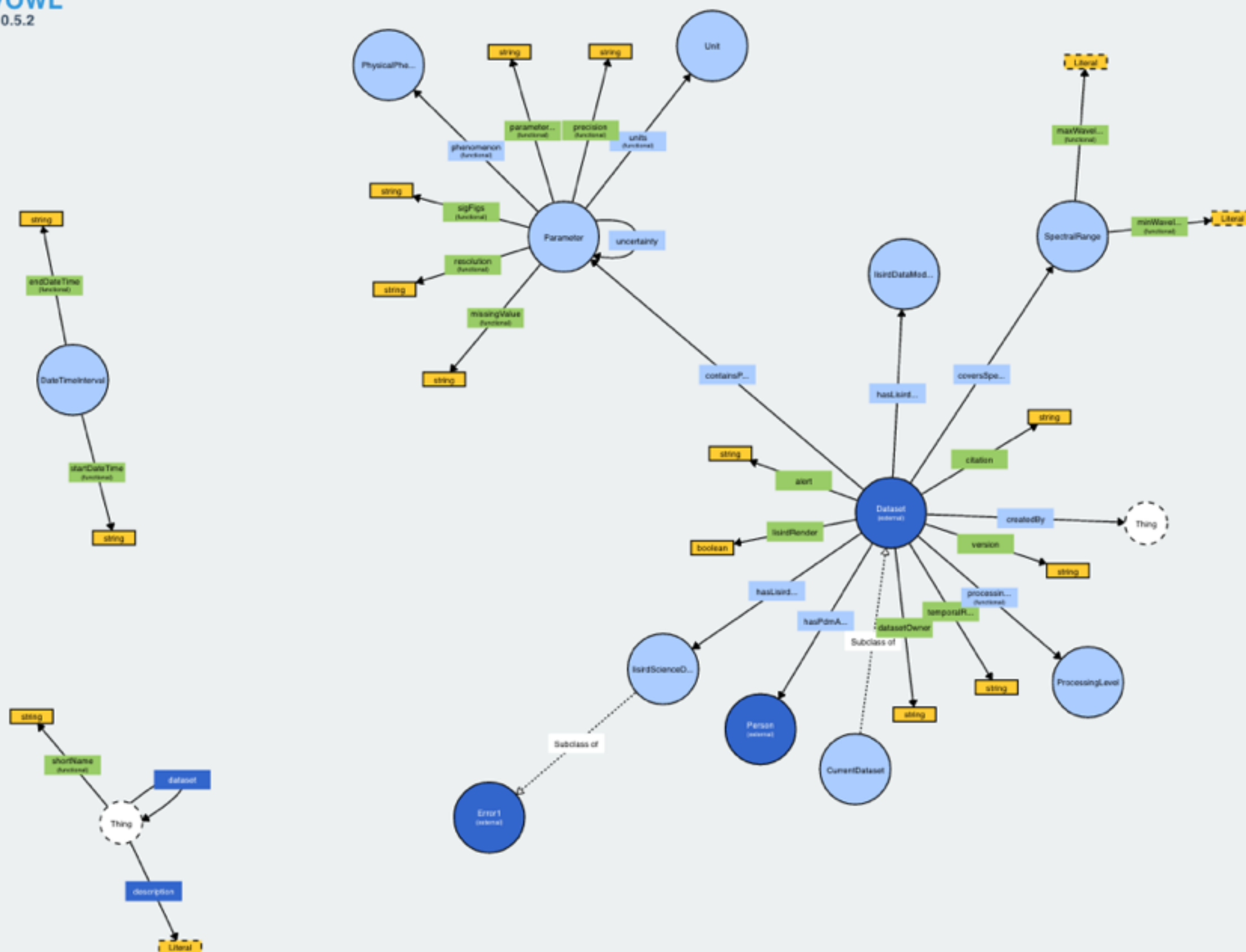
It was hard to:

- See information about many instances at once
- Compare two instances
- Visualize the added ontologies
- See the mapping between ontologies and objects
- Distinguish and understand consequences around duplicating objects versus sharing objects
- Know when two objects share another object
- Some admin capabilities, e.g., copy and edit
- Deal with orphans

Tools Layer: Browser

- Irfan leveraged WebVOWL
- See the ontology exported from VIVO





See all instances of a class

LASP Metadata Browser
v0.0.6

WebVOWL
Beta 0.5.2

Dataset (external)

Subclass of

CurrentDataset

Person (external)

hasLisird...

temporalR...

lisirdRender

processin... (functional)

covers

datasetOwner

version

citation

createdBy

alert

containsP...

ncertainty

string

boolean

Export

Gravity

dcat#Dataset
(53 instances)

Enter Search Terms

American Sunspot Number	↔	>
Bremen Composite Mg Index	↔	>
CA II K-Line	↔	>
Composite Magnesium II Core-to-Wing Index	↔	>
Composite Solar Lyman-alpha	↔	>
Debrecen Photoheliographic Sunspot Data	↔	>
FISM Daily	↔	>
FISM Flare	↔	>
GOME Mg II Index	↔	>

Lots of Parameters

LASP Metadata Browser v0.0.6
laspsds#Parameter (241 instances)

WebVOWL
Beta 0.5.2

Q Enter Search Terms

Instrument Precision in TSI at 1-AU, 1 sigma	↔	>
International Sunspot Number	↔	>
irradiance	↔	>
irradiance	↔	>
irradiance	↔	>
irradiance	↔	>
irradiance	↔	>
irradiance	↔	>
irradiance	↔	>

↗ Export
○ Gravity
▼

many with identical names

See an instance's parents and children

The screenshot shows a web application titled "dcat#Dataset" with a subtitle "(53 instances)". On the left, there is a search bar labeled "Enter Search Terms" and a list of datasets. The "American Sunspot Number" dataset is highlighted in blue. To the right of the list, the details for the "American Sunspot Number" dataset are displayed. The details include a URL, a "Child Nodes" section with a link to the "LISIRD render landing page", a "Parent Nodes" section, and a "Contains Parameter" section with links to "Sunspot Number" and "time".

dcat#Dataset
(53 instances)

Q Enter Search Terms

American Sunspot Number [↗](#)

Bremen Composite Mg Index [↗](#)

CA II K-Line [↗](#)

Composite Magnesium II Core-to-Wing Index [↗](#)

Composite Solar Lyman-alpha [↗](#)

Debrecen Photoheliographic Sunspot Data [↗](#)

FISM Daily [↗](#)

FISM Flare [↗](#)

GOME Mg II Index [↗](#)

American Sunspot Number
<http://lemr-dev.lasp.colorado.edu/8080/vivo/individual/n14393>

Child Nodes

[LISIRD render landing page](#)

true

[Has LISIRD Data Model Type](#)

Time Series

[Has LISIRD Science Dataset Type](#)

Sunspot Number

[Temporal Resolution](#)

PT24H

[Contains Parameter](#)

Sunspot Number

time

Parent Nodes

Identify orphans

LASP Metadata Browser v0.0.1

WebVOWL Beta 0.5.2

The diagram shows a central node 'Dataset (external)' with several outgoing properties:

- ProcessingLevel (string)
- containsP... (string)
- temporalR... (string)
- createdBy (Thing)
- coversSpe... (SpectralRange)
- datasetOwner (string)
- hasLisid... (string)
- hasPdmA... (Person (external))
- version (string)
- alert (string)
- hasLisid... (LisidDataMod...)
- isidRender (LisidDataMod...)
- isidScienceD... (LisidScienceD...)

The 'SpectralRange' property is highlighted in red, indicating it is an orphan. The instances of 'SpectralRange' are listed on the right:

Instance	Value
0.05 - 39.95 nm	
0.1 - 7 nm	
0.1 - 122 nm	
0.1 - 190 nm	
0.1 - 2400	
0.1-27 nm	
0.1-34 nm	
0.5 - 190.5 nm	
0.5 - 194.5	
115 - 100000 nm	
115 - 425 nm	
115-310 nm	

Manual deletion via VIVO interface

Tools Layer: Editor

- It would not be suitable to expose the VIVO interface to metadata owners, who are often non technical
- Created an editing capability on top of the database

LISIRD
LASP INTERACTIVE SOLAR IRRADIANCE DATACENTER

DATA MISSIONS CATALOGS TOOLS ABOUT

EDIT DATASET DETAILS

OVERVIEW:

Dataset Label: Historical Total Solar Irradiance Reconst

Identifier: historical_tsi

Version: 17 Processing Level: 3

Keyword(s): none

Alert: none

ACCESS & CITATION:

Landing Page: http://lasp.colorado.edu/lisird/tsi/historic

Citation: none

DATA COVERAGE:

Spectral Coverage: none nm to none nm

Temporal Coverage: 1610 to 2014

Temporal Resolution: PTB760H

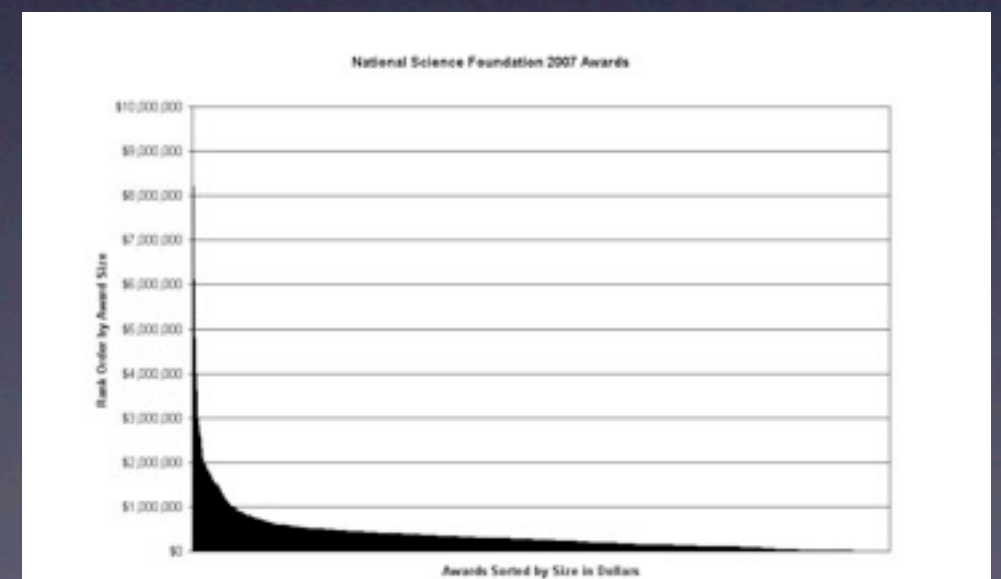
Provide Feedback

Cultural Impact: Metadata Roles and Responsibilities

- ‘Owners’ of scientific/dataset specific metadata
 - Generally non technical
 - Requires authentication and authorization, security model
 - Certain properties editable by this role
- ‘Admin’, e.g., management of properties needed for housekeeping purposes
- Envisioned: ‘curator’ role
- Cultural change is always interesting

The Vision

- Grow and evolve the ontology to serve all LASP datasets, which cover many domains in space: atmospheric, solar, planetary, space weather
- Serve more datasets across those domains
- “Publish scientific data in a box” ideas for ‘long tail’ scientists...



Conclusions

- VIVO gave us a big lift on creating and managing a semantic database
- The VIVO interface meets some of our needs
- We have needed and built additional tools on top of the database created by VIVO

Thank you to the Web LASP Development Team!

anne.wilson@lasp.colorado.edu



Acknowledgments

This work was supported with contributions from the NASA projects: Solar Radiation and Climate Experiment (**SORCE**), Multi-Satellite Ultraviolet Solar Spectral Irradiance Composite (**MUSSIC**), Total Solar Irradiance Center (**TSIS**), and Magnetospheric Multiscale (**MMS**).