The Butterfly Effect

A proposal for distribution and management for butterfly data programs

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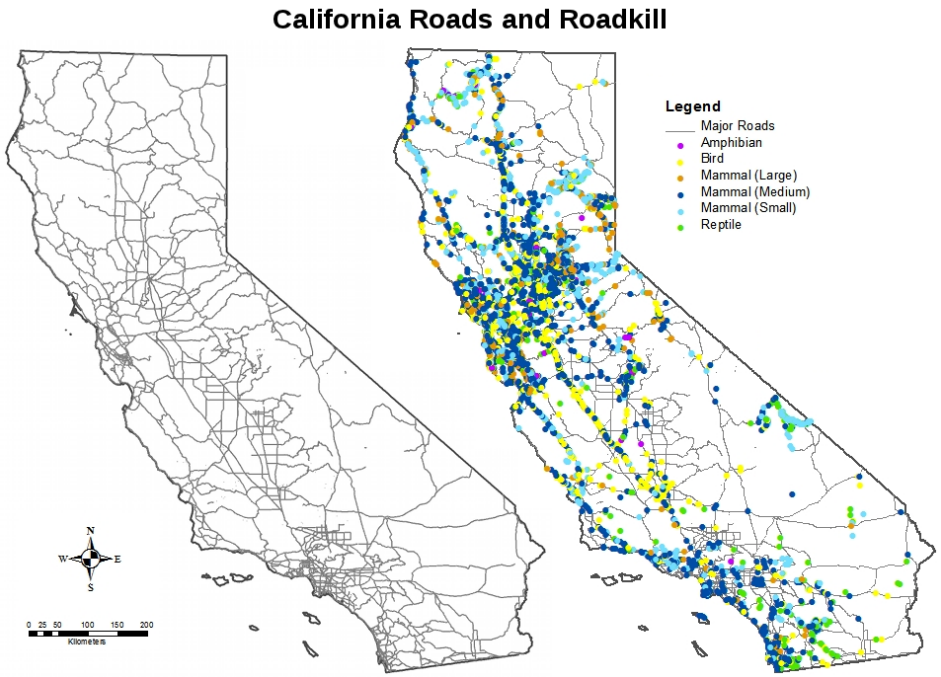
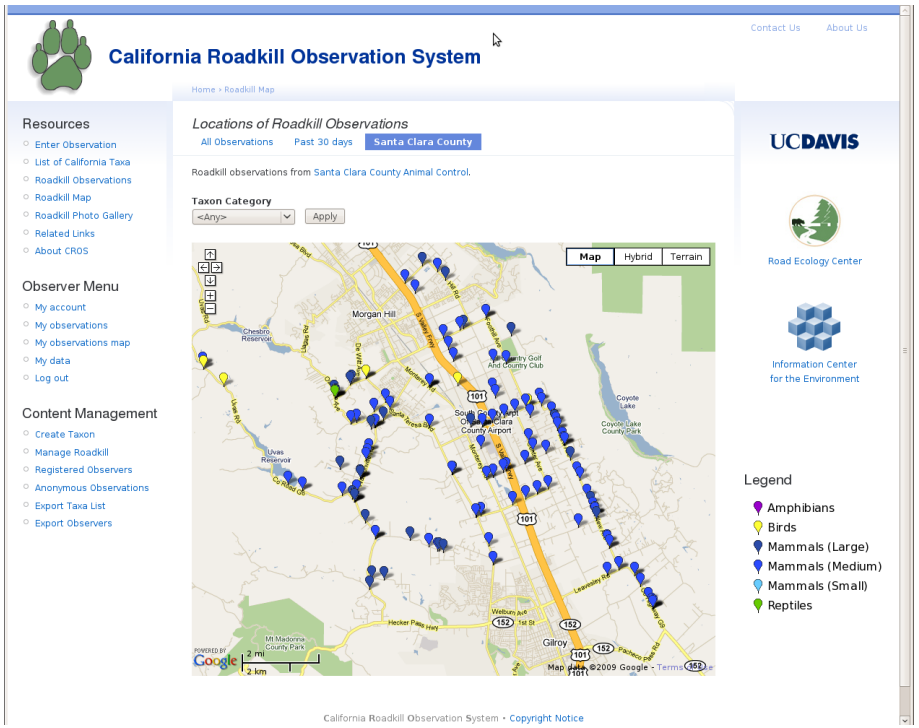
SESYNC Butterfly Workshop
May 10, 2012

http://butterfly.ucdavis.edu

Citizen Science based Observation Network

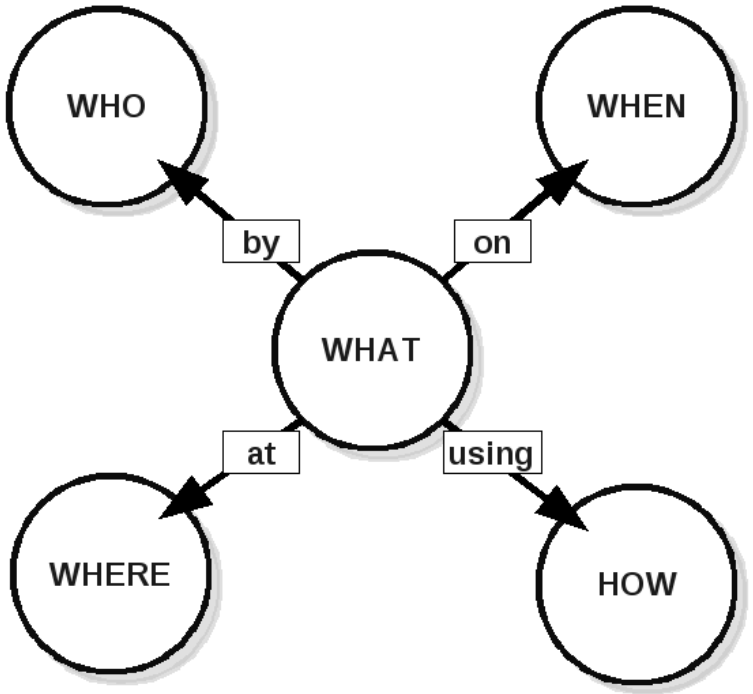
- California Roadkill Observation System (CROS)
  - http://www.wildlifecrossing.net/california/
- Maine Audubon Wildlife Road Watch (MAWRW)
  - http://www.wildlifecrossing.net/maine/





Observations

- Who, What, Where, When, How
- Other data attributes
- Controlled Vocabularies
  - Species list, habitat types, QA vocabularies, Gazetteers



Goals

- Build a standards-based framework for collecting, storing, and sharing data
- Incorporate distributed data sources
- Work at creating a common set of concepts which have well defined semantics (already exist?)
- Be flexible, so that any additional (meta)data can be easily added
- Allow humans and non-human consumers
- Use open source tools so that others can easily duplicate / replicate the system architecture
- Support open science by sharing data

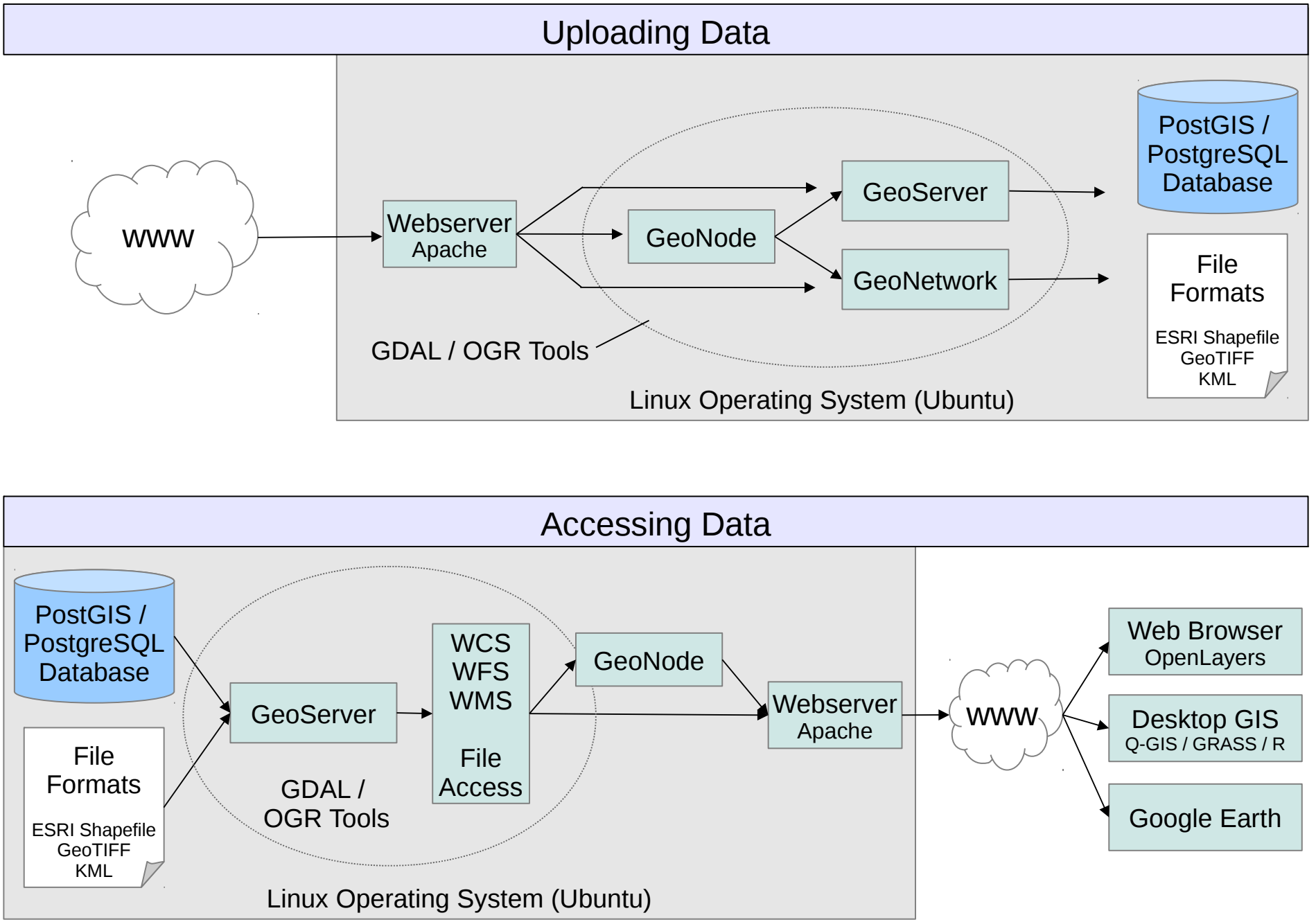
Geospatial Technology Stack

- **GeoNode** – Web application for managing geospatial data, including visualizations and data discovery
- **GeoServer** – Provides Open Geospatial Consortium (OGC) standards for data access including WMS, WFS, WCS
- **GeoNetwork** – Metadata catalog
- **GeoWebCache / TileCache** – Methods to increase performance
- **GDAL / OGR** – Library for, reading, writing, and transforming geospatial data (raster and vector)
- **PostGIS / PostgreSQL** – Spatial and relational database

http://www.osgeo.org/

Data Formats

- Geospatial Data
  - WMS – Web Mapping Service
  - WFS – Web Feature Service
  - WCS – Web Coverage Service
- Tabular Data
  - CSV – Comma Separated Values
- Exchange Formats
  - Darwin Core – exchange animal / museum specimen data
  - Dublin Core – digital resource metadata standard


Uploading Data
WWW
Webserver
Apache
GeoNode
GeoServer
GeoNetwork
GDAL / OGR Tools
Linux Operating System (Ubuntu)
PostGIS /
PostgreSQL
Database
File
Formats
ESRI Shapefile
GeoTIFF
KML
Accessing Data
PostGIS /
PostgreSQL
Database
File
Formats
ESRI Shapefile
GeoTIFF
KML
GeoServer
GDAL /
OGR Tools
WCS
WFS
WMS
File
Access
GeoNode
Webserver
Apache
WWW
Web Browser
OpenLayers
Desktop GIS
Q-GIS / GRASS / R
Google Earth
Linux Operating System (Ubuntu)

Vocabularies

- Controlled vocabularies are a set of predefined terms which have a set domain.
  - Assign categorical variables or the data attribute.
  - examples: habitat types, QA / QC terms, statewide species list
- Natural language vocabularies allow for additions to the vocabulary by users
  - examples: tag clouds
- Vocabularies and their terms can be encoded as an *ontology*, where links can be made to authoritative sources and “meaning” can be assigned to the terms.

Semantic Web Linkage

- The purpose of the semantic web is to establish (unambiguous) “meaning” to digital objects by encoding data and metadata is a specialized way.
  - This includes building a network of assertions that contain a subject, object, and predicate and these three “entities” are mapped to URL's which can help define their authoritative meaning.
- These databases are called triple stores, and there are a set of tools (SPARQL) to query these data.

Representing Observations

Subject	Predicate	Object
Painted Lady (*Vanessa cardui*)	observed at	Rancho Cordova
Painted Lady (*Vanessa cardui*)	observed on	April 25, 2009
Painted Lady (*Vanessa cardui*)	observed by	Arthur M. Shapiro

- Encode observations in RDF (Turtle format)

```
@prefix taxa:
  <http://ecoinfo.ice.ucdavis.edu/taxa/> .
  @prefix ex: <http://www.example.com/observe/> .

taxa:Vanessa_cardui
  ex:observedAt "Rancho Cordova";
  ex:observedOn "2009-04-25:T14:30-07:00";
  ex:observedBy "Arthur M. Shapiro".
```

Welcome to the Maine Audubon Wildlife Road Watch

April 4, 2012 - 3:55pm -- BarbaraCharry

Information about where wildlife attempt to cross roads, what animals are involved, on what kinds of roads are collisions frequent, and other data can help inform policy, management, and financial investment in reducing road-kill and habitat fragmentation. Maine Audubon scientists will use the data to improve our collective understanding of where wildlife attempt to cross roads and what we can do to reduce road-kill and increase safety for people and wildlife.

Start contributing your own observations:

1. Create an account to help us identify observations from specific observers.
2. Add observations by specifying what you saw, pinpointing its location on the map, and even uploading your photos (if you took any).
3. Then review your observation markers, and see where other citizen scientists are finding road-side wildlife, by browsing our online wildlife observations map.

Maine Audubon, state agencies, and researchers will use the data you share on this site in order to better understand how roads affect wildlife. Thanks for participating!

read more

Citizen Science for Wildlife-Friendly Roads

March 15, 2012 - 1:44pm -- BarbaraCharry

The Maine Audubon Wildlife Road Watch is a web-based map and database designed to record your observations of road-side and road-killed wildlife.

NEW: Endangered Species Roadwatch seeking volunteers in southern Maine.

Want to do something that is both good for you and good for Maine's wildlife?

Maine Audubon is recruiting volunteers to take part in a special survey for endangered species along roads in southern Maine. Walk a one-mile survey stretch in spring and summer, look for wildlife, and help endangered species.

read more add new comment

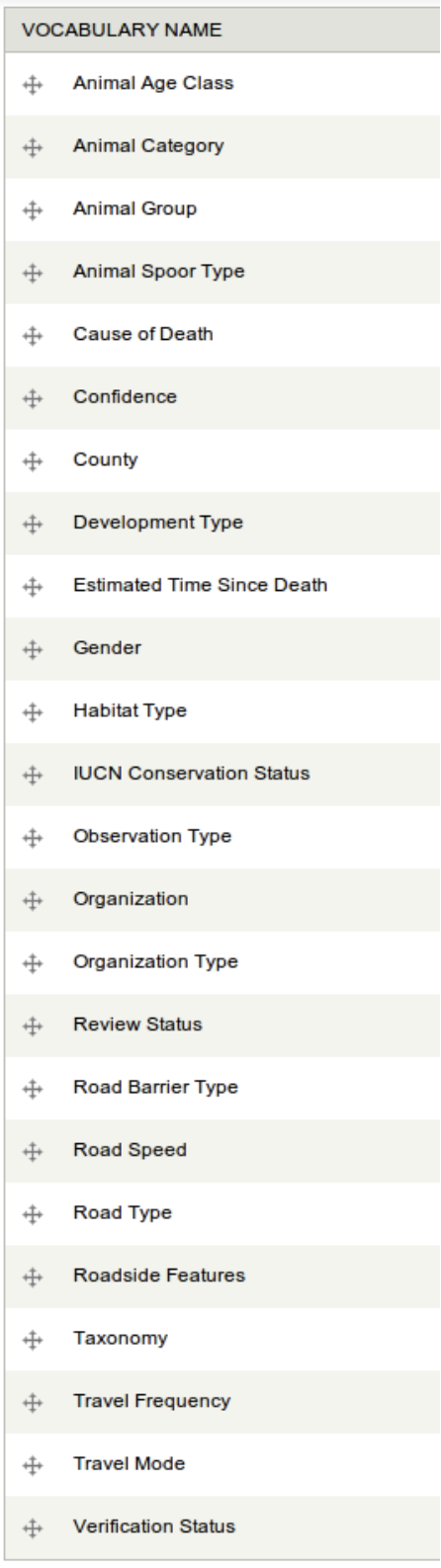
Observer Menu

- My account
- Enter Observation
  - Live Wildlife Observation
  - Dead Wildlife Observation
  - No Wildlife Observation
  - Wildlife Spoor Observation
- Add Adopt a Road Route
- Add Field Blog
- Logout

Drupal 7 with a Responsive HTML5 base theme. This allows one to build their website for small screen sizes (smartphones and tablets).

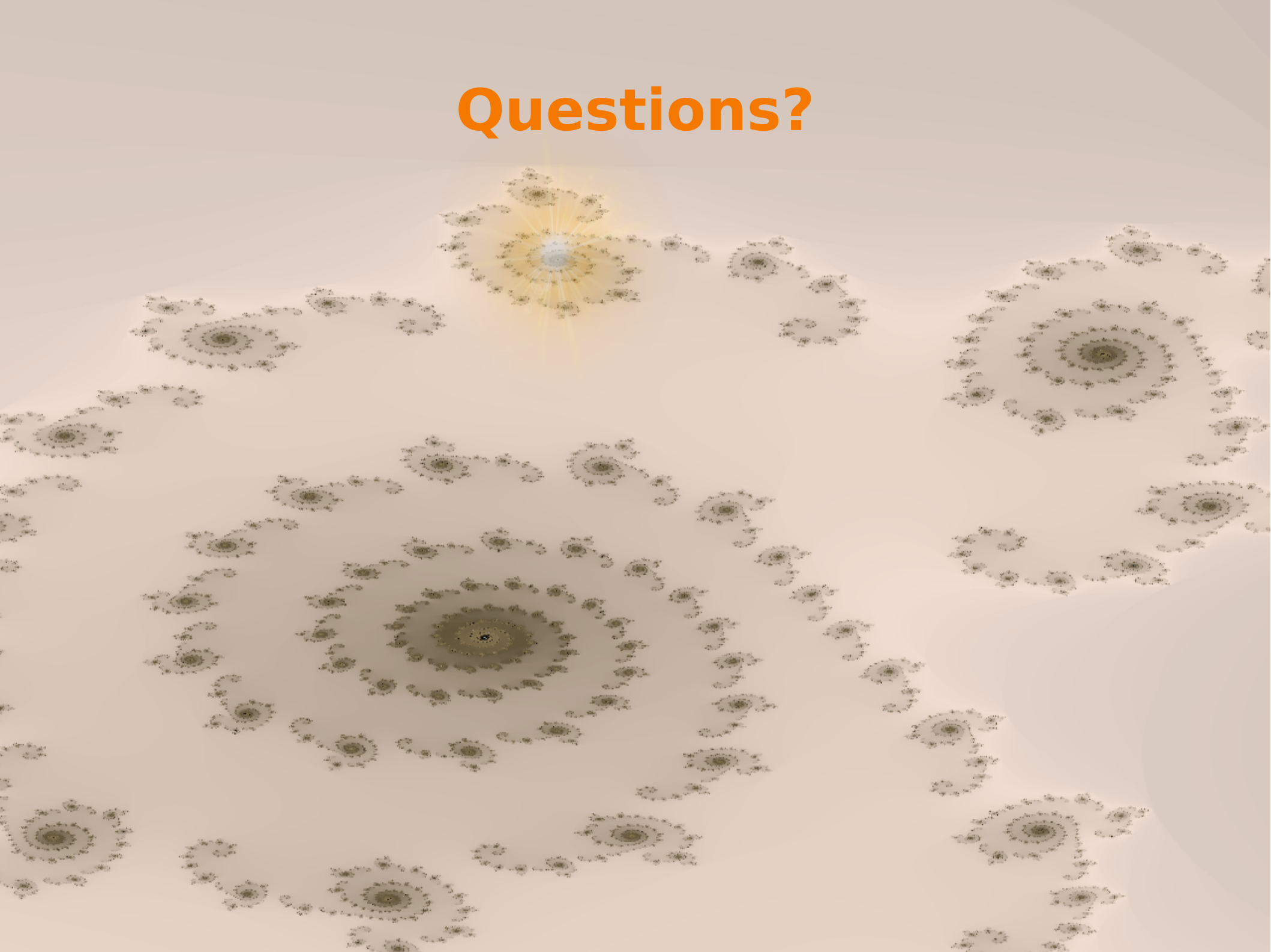
Drupal 7 version

- Improved modules / core improvements
- Features module – bundle an instance of Drupal as a “generic” system which can be tailored and customized, yet maintain many core observation elements and vocabularies.
- OpenLayers module – pull in WMF / WFS maps. Support for “Behaviors”
- Omega Theme – micro first... opens door for all handheld devices to utilize the website interface to enter observations



From Data Management to Knowledge Procurement

- Gathering – (knowledge discovery) collection, mining
- Organizing – (knowledge classification) indexing, classifying, cataloging
- Refining – (knowledge improvement) collaboration, contextualization
- Representing – (knowledge representation) semantic networks, schemas
- Disseminating – (knowledge communication) communication, publishing, decision support

Oluić-Vuković (2001)

Questions?