CUAHSI – Unidata Collaboration Opportunities

David Tarboton

CUAHSI HIS

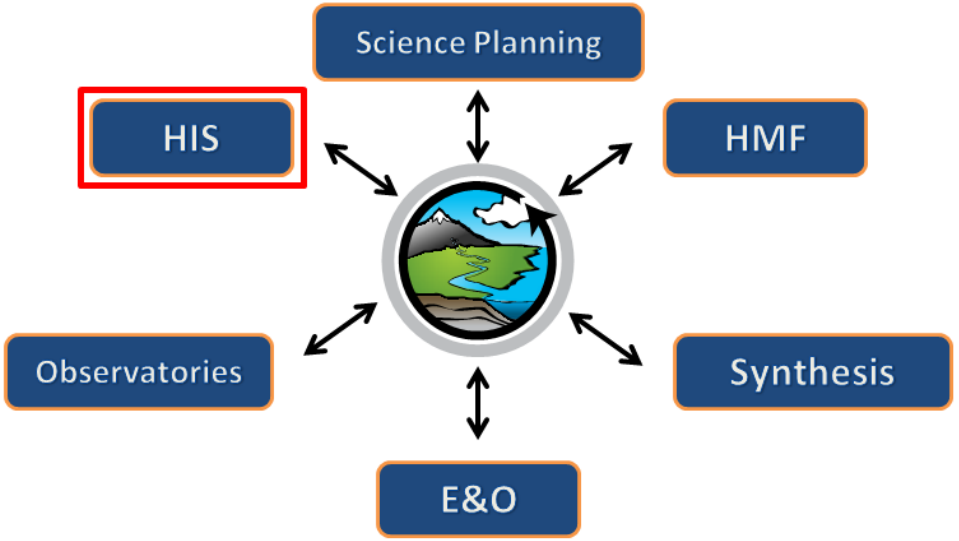
Sharing hydrologic data

http://his.cuahsi.org/

Support
EAR 0622374

What is CUAHSI?

Consortium of Universities for the Advancement of Hydrologic Science, Inc.



- 112 US University members
- 7 affiliate members
- 16 International affiliate members

(as of May 2011)

Infrastructure and services for the advancement of hydrologic science and education in the U.S.

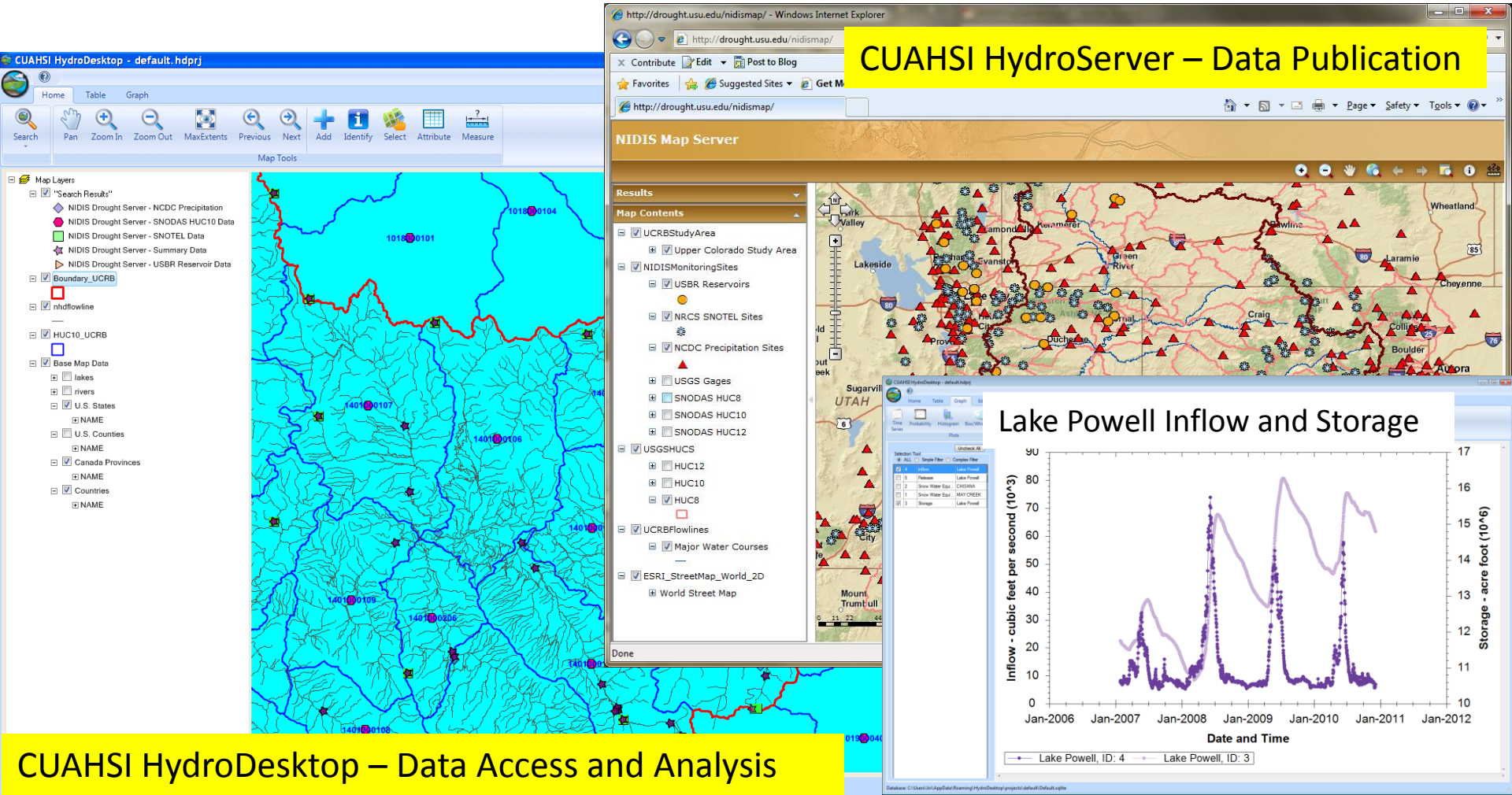
CUAHSI
universities allied for water research

http://www.cuahsi.org/

NSF
Support
EAR 0753521

CUAHSI HIS

The CUAHSI Hydrologic Information System (HIS) is an internet based system to support the sharing of hydrologic data. It is comprised of hydrologic databases and servers connected through web services as well as software for data publication, discovery and access.



HIS Team and Collaborators

- University of Texas at Austin – David Maidment (PI), Tim Whiteaker, James Seppi, Fernando Salas, Jingqi Dong, Harish Sangireddy
- San Diego Supercomputer Center – Ilya Zaslavsky, David Valentine, Tom Whitenack, Matt Rodriguez
- Utah State University – David Tarboton, Jeff Horsburgh, Kim Schreuders, Stephanie Reeder, Edward Wai Tsui, Ravichand Vegiraju, Ketan Patil
- University of South Carolina – Jon Goodall, Tony Castronova
- Idaho State University – Dan Ames, Ted Dunsford, Jiri Kadlec

- CUAHSI Program Office – Rick Hooper, Yoori Choi, Conrad Matiuk
- Drexel University/CUNY – Michael Piasecki
- ESRI – Dean Djokic, Zichuan Ye
- USGS – Catherine Lins, David Briar, Scott McFarlane, Nate Booth
- NCDC – Rich Baldwin

HIS Goals

- **Data Access** – providing better access to a large volume of high quality hydrologic data;
- **Hydrologic Observatories** – storing and synthesizing hydrologic data for a region;
- **Hydrologic Science** – providing a stronger hydrologic information infrastructure;
- **Hydrologic Education** – bringing more hydrologic data into the classroom.

Hydrologic Data Challenges

- From dispersed federal agencies
- From investigators collected for different purposes
- Different formats
  - Points
  - Lines
  - Polygons
  - Fields

Meteorology comparison

- Real time assimilation less imperative
- Long Records

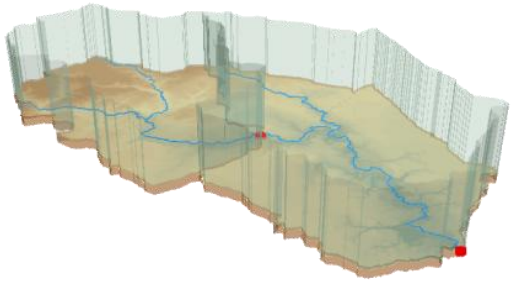
Water quality

Water quantity

Rainfall and Meteorology

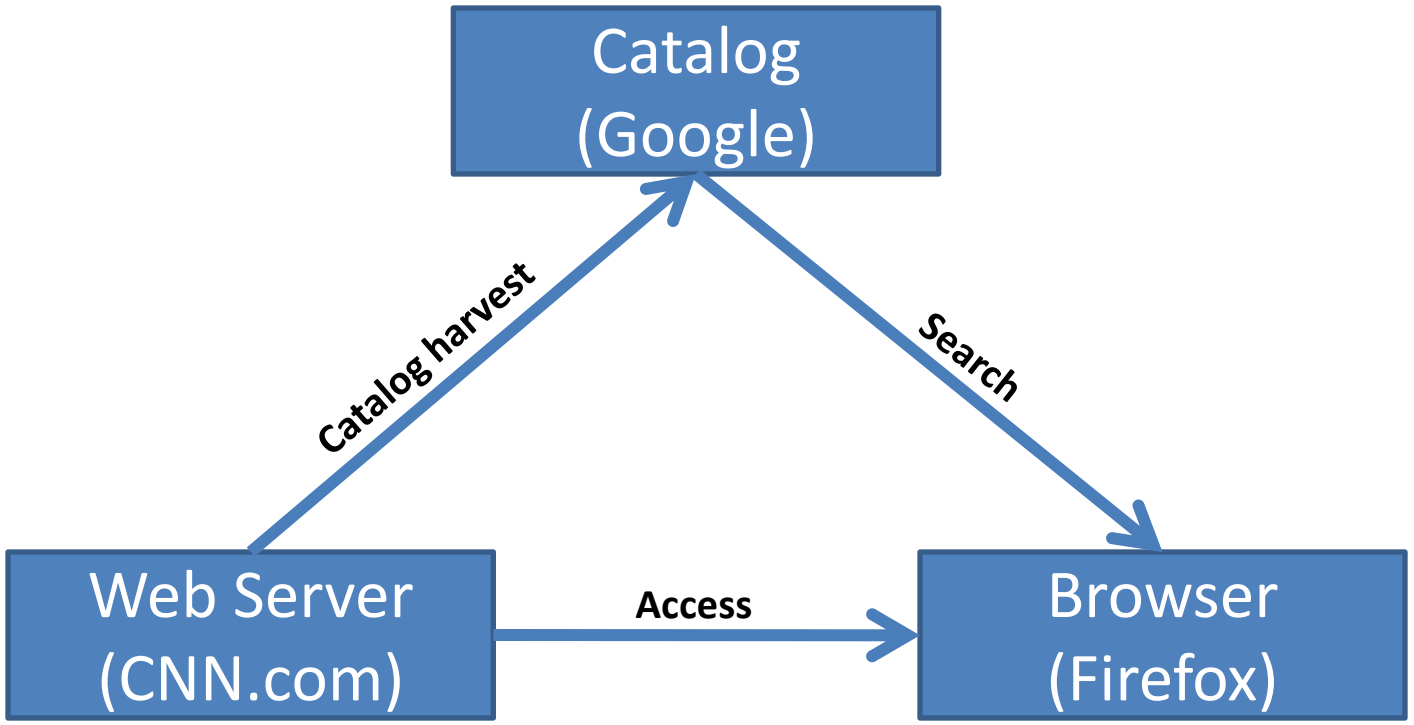
Soil water

GIS

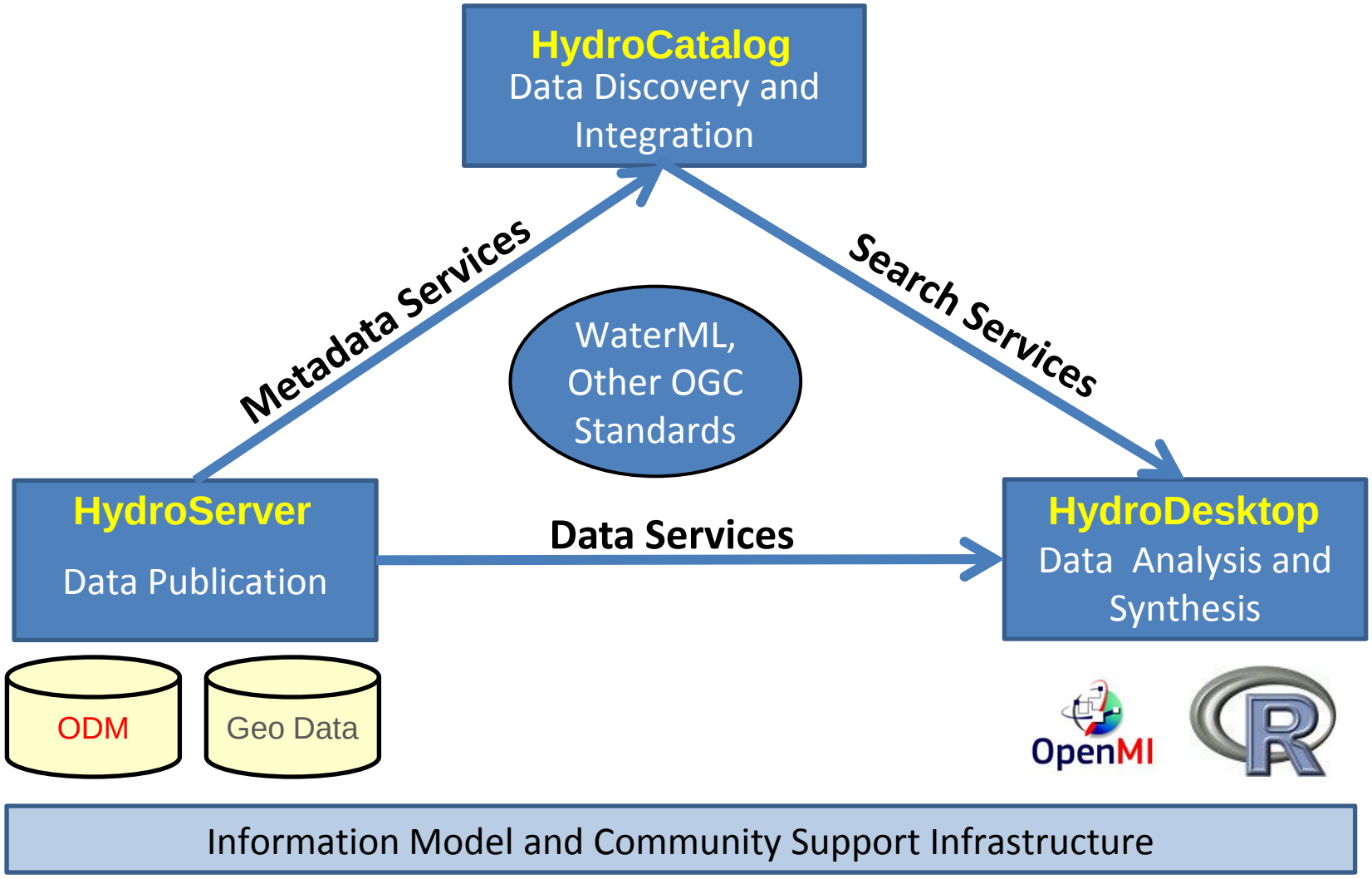


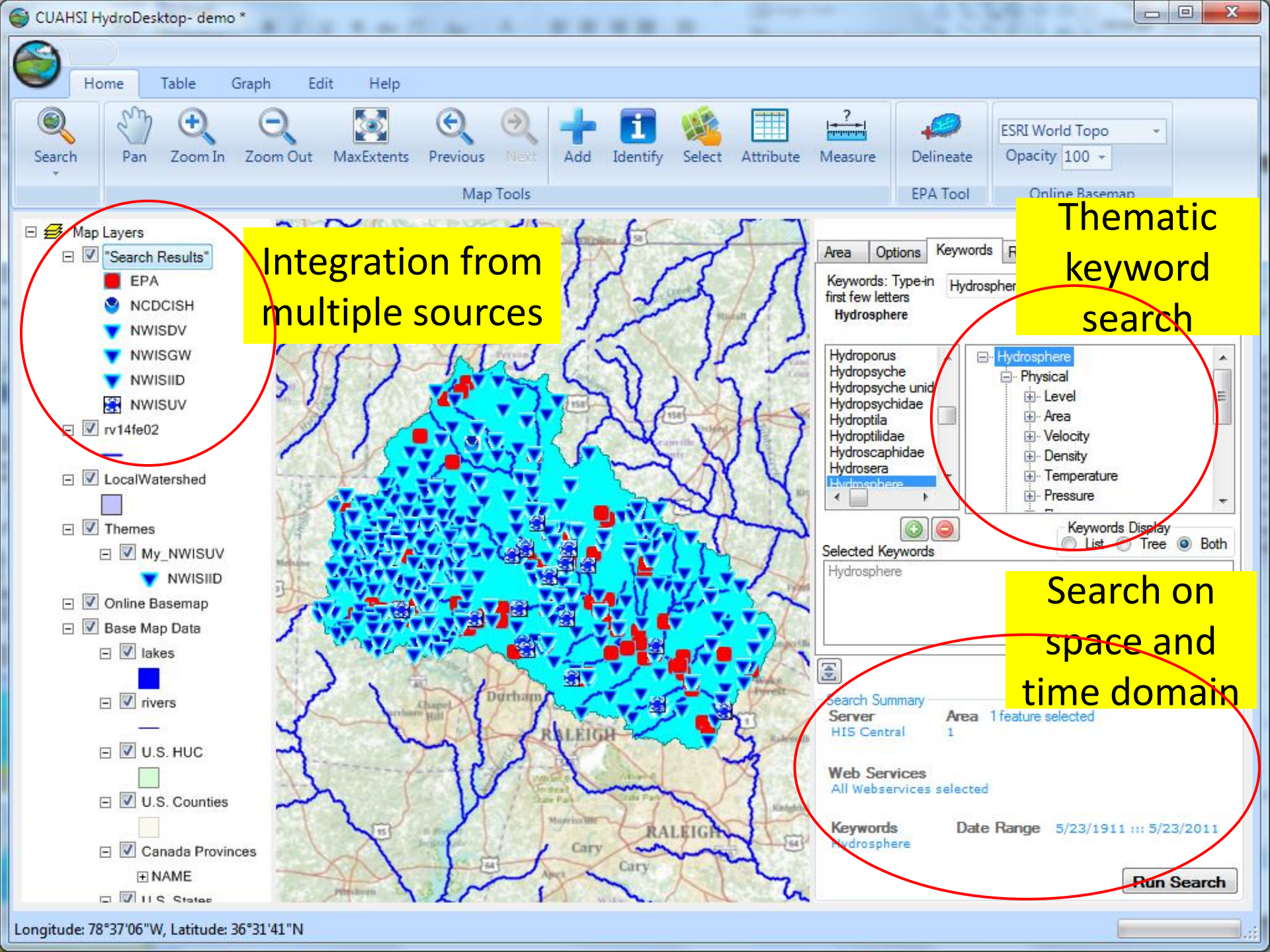
Groundwater

General Approach Web Paradigm

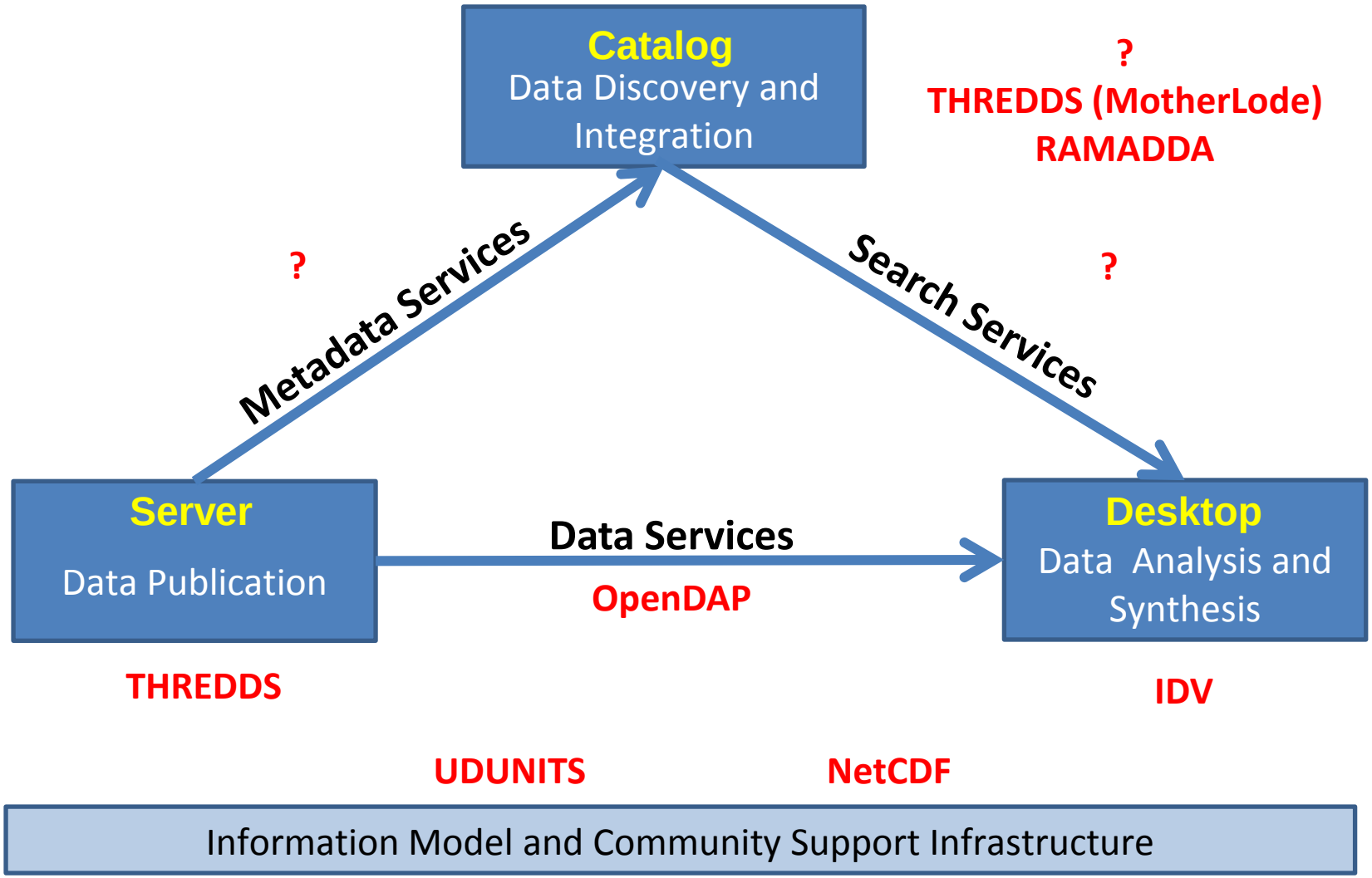


CUAHSI Hydrologic Information System Services-Oriented Architecture




CUAHSI HydroDesktop- demo *
Home
Table
Graph
Edit
Help
Search
Pan
Zoom In
Zoom Out
MaxExtents
Previous
Next
Add
Identify
Select
Attribute
Measure
Map Tools
Delineate
EPA Tool
ESRI World Topo
Opacity 100
Online Basemap
Map Layers
"Search Results"
EPA
NCDCISH
NWISDV
NWISGW
NWISIID
NWISUV
rv14fe02
LocalWatershed
Themes
My_NWISUV
NWISIID
Online Basemap
Base Map Data
lakes
rivers
U.S. HUC
U.S. Counties
Canada Provinces
NAME
Integration from multiple sources
Area
Options
Keywords
Keywords: Type-in first few letters
Hydrosphere
Hydroporus
Hydropsyche
Hydropsyche unid
Hydropsychidae
Hydroptila
Hydroptilidae
Hydroscaphidae
Hydrosera
Hydrosphere
Physical
Level
Area
Velocity
Density
Temperature
Pressure
Thematic keyword search
Keywords Display
List
Tree
Both
Selected Keywords
Hydrosphere
Search on space and time domain
Search Summary
Server
HIS Central
Area
1 feature selected
1
Web Services
All Webservices selected
Keywords
Hydrosphere
Date Range
5/23/1911 ::: 5/23/2011
Run Search
Durham
RALEIGH
Cary
Longitude: 78°37'06"W, Latitude: 36°31'41"N

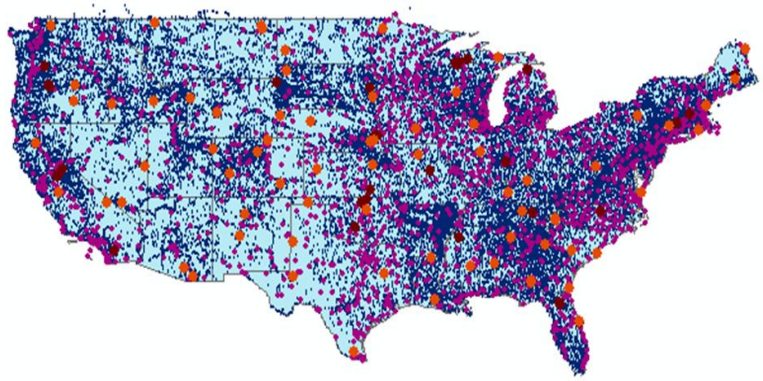
Unidata Parallels



Open Geospatial Consortium Web Service Standards

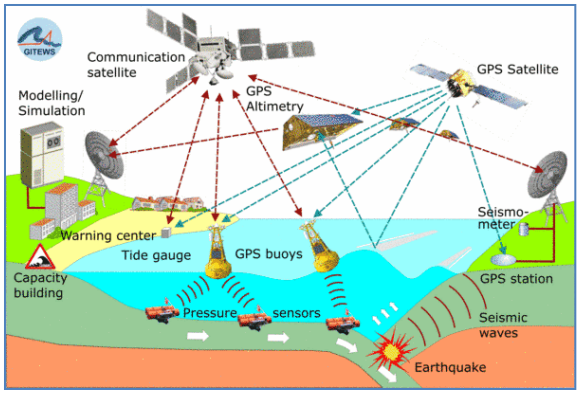
These standards have been developed over the past 10 years ….
…. by 400 companies and agencies working within the OGC

- Map Services



- Web Map Service (WMS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Catalog Services for the Web (CS/W)

- Observation Services



- Observations and Measurements Model
- Sensor Web Enablement (SWE)
- Sensor Observation Service (SOS)

OGC Hydrology Domain Working Group evolving WaterML into an International Standard
http://www.opengeospatial.org/projects/groups/waterml2.0swg

Open Source Development

- http://hydrodesktop.codeplex.com
- http://hydroserver.codeplex.com
- http://hydrocatalog.codeplex.com

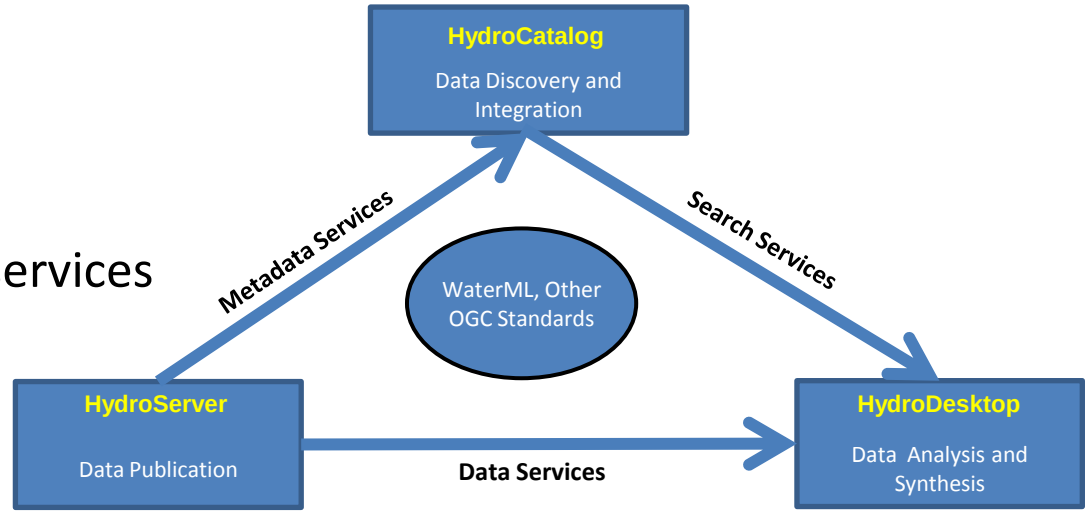
Summary

- **Data Storage** in an *Observations Data Model* (ODM) and publication through HydroServer
- **Data Access** through internet-based *Water Data Services* using a consistent data language, called WaterML from HydroDesktop
- **Data Discovery** through a *National Water Metadata Catalog* and thematic keyword search system at HIS Central
- **Integrated Modeling and Analysis** within HydroDesktop

The combination of these capabilities creates a common window on water observations data for the United States unlike any that has existed before.

Architecture

- Standards-based
  - Semantic and structural mediation over distributed services
  - New hydrologic information products usable in analysis and modeling



- Data integration across environmental disciplines
  - Compatible services infrastructure for time series, spatial data, geochemical and other formats
- Long-term preservation of hydrologic data
  - Working with libraries, archives and publishers; archivable forms, data curation and provenance management
- Extending hydrologic information models to the cloud

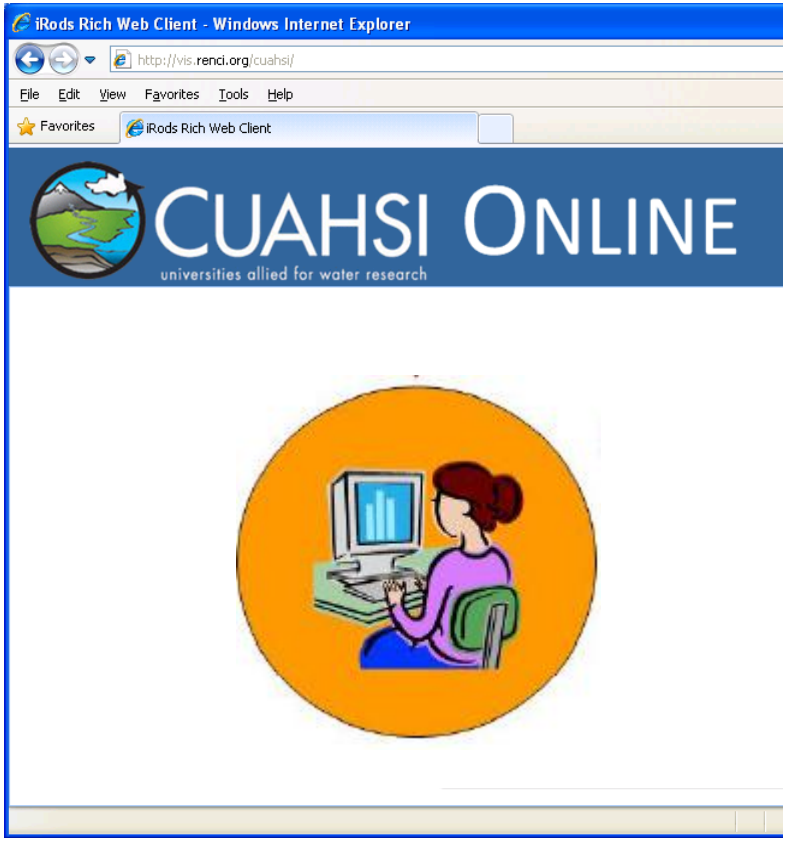
CUAHSI HIS 2.0

Share your work with others

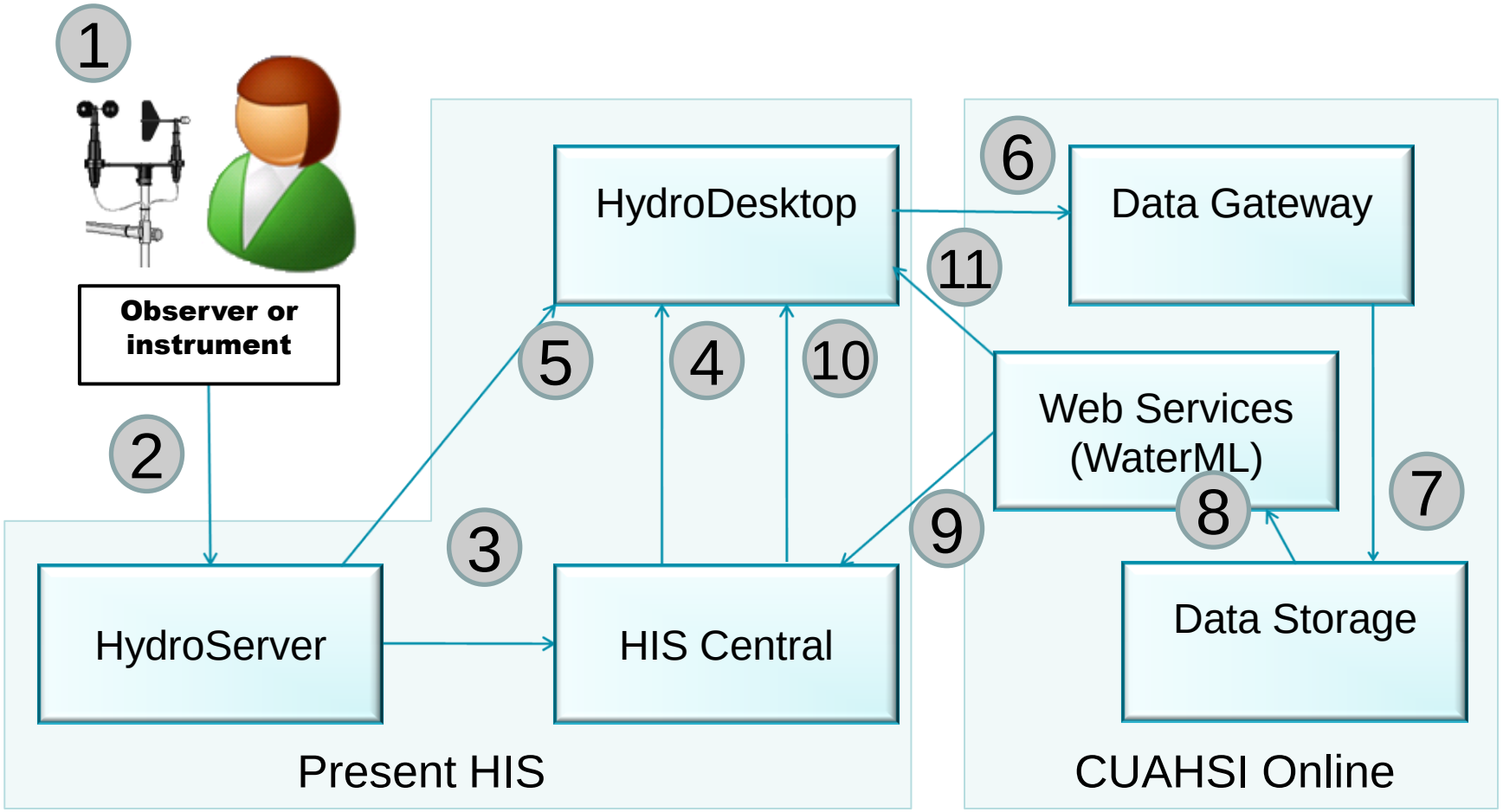
Share, Find, Create, Model, Innovate, Transform

CUAHSI Online Network

- A collaborative data and model sharing “social” network for hydrologic science
- Simple and easy to use
- Find, create, share, connect, integrate, work together online
- Archive data collections accompanying research publications in easily accessible way
- Integration and synthesis across data collections



CUAHSI Online Data analysis and publication use case



Unidata Collaboration Opportunities

- NetCDF for gridded data
- THREDDS + HydroServer
- OpenDAP, WaterML, OGC Web Services
- Metadata Catalogs (OGC CSW) for Data Discovery (Ontologies and thematic keyword search)
- Interactive Data Social Networking (RAMADDA)

- Suggestion for a simple proof of concept exercise to start with
  - Gridded variable (field) published from THREDDS server wrapped with Metadata to fill required HydroCatalog entries
  - Discovery, Download and Display in HydroDesktop

- Learn about the CUAHSI-HIS System
- Share your work with information systems and large scale datasets
- Share your use of hydrologic data for teaching
- Interact with other users
- Share your work linking data and modeling
- Show science enabled by HIS
- Hands-on workshops
- Contribute to the future of HIS

For information on presenting or attending see:

http://his.cuahsi.org/conference2011

Contact: David.Tarboton@usu.edu

Demo if time

- Live
- Video
  - http://his.cuahsi.org/
  - http://his.cuahsi.org/movies/JacobsWellSpring/JacobsWellSpring.html
  - http://his.cuahsi.org/documents/JacobsWellExercise.pdf