Regional Water Use Estimation and Reporting

Internet of Water

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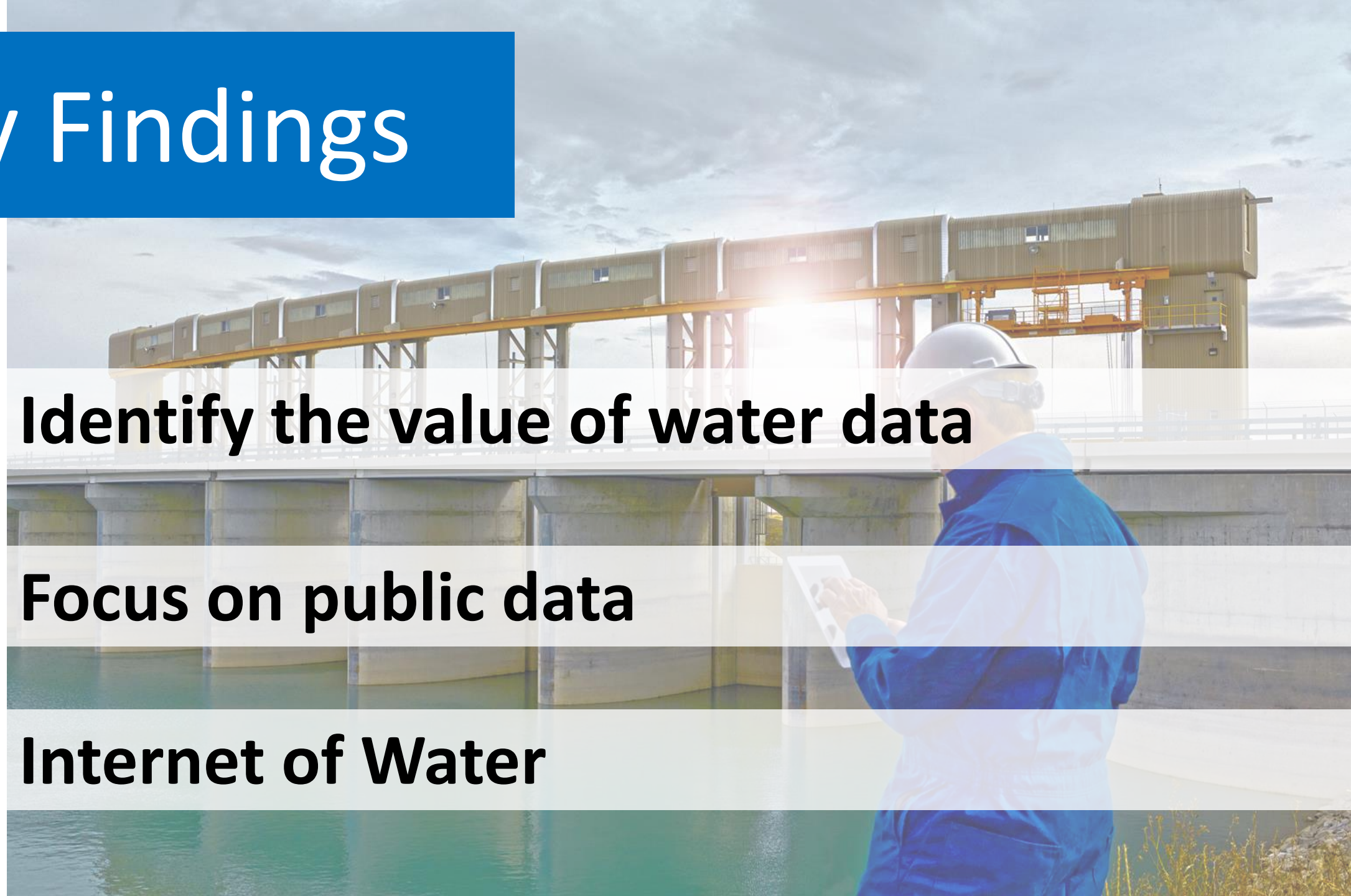
PURPOSE

How to create a national framework for sharing and integrate already existing publicly collected water data?

PARTICIPANTS

The Dialogue Series brought ~27 water experts, managers, policy makers, regulators, and representatives from the private and social sectors.

Key Findings

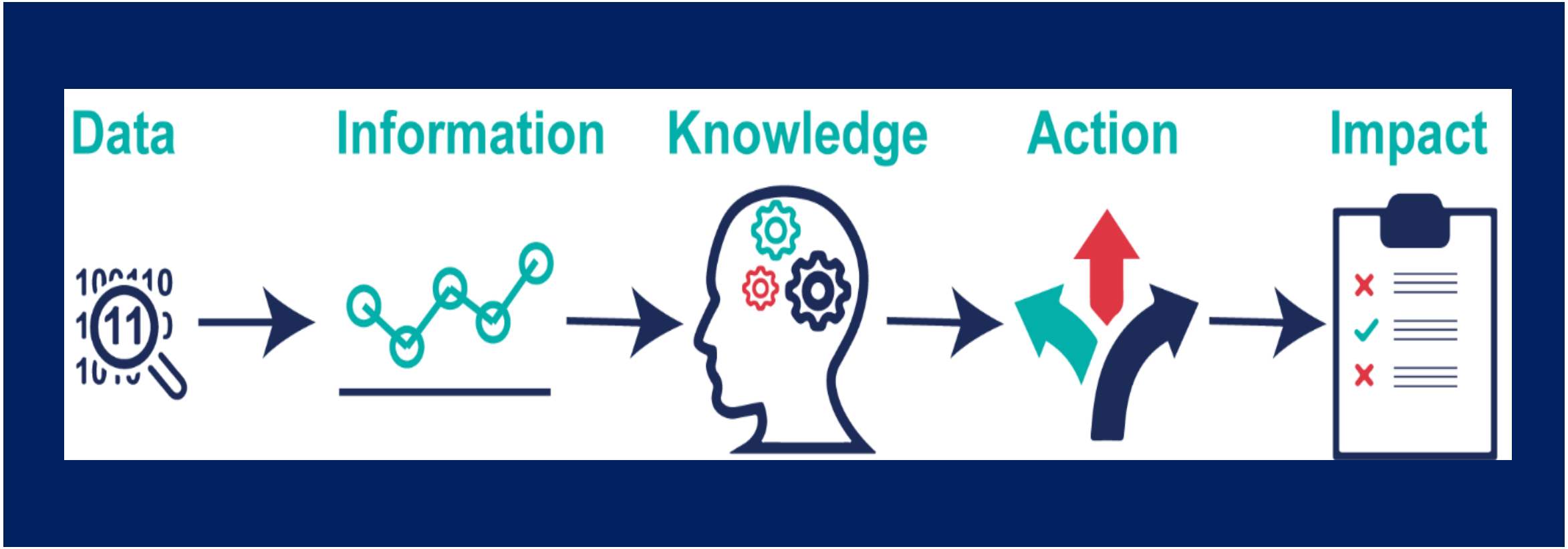


Identify the value of water data

Focus on public data

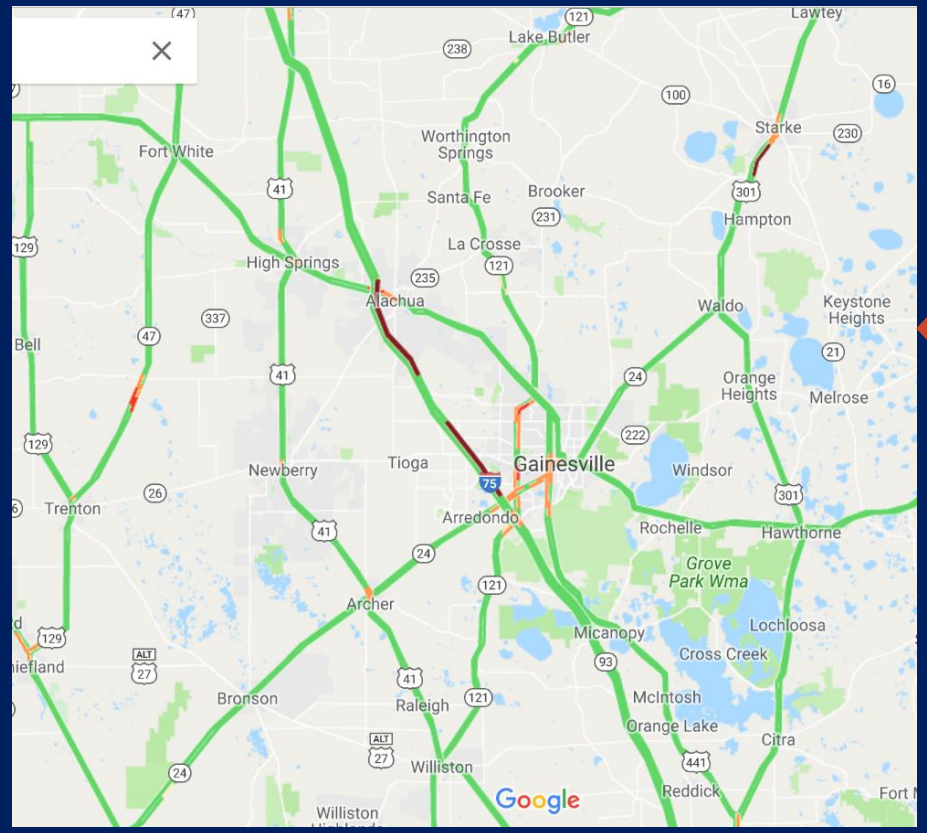
Internet of Water

Identify the value of water data



Focus on public data

We couldn't do this…



Until we had this.

IoW Start-Up Team

- David Bjorkback, Project Coordinator
- Peter Colohan, Executive Director
- Kyle Onda, Data Architect
- Lauren Patterson, Data Analyst
- Ashley Ward, Engagement and Outreach Associate
- Kristen Downs, Policy Associate

IoW Board

- Jared Bales, CUAHSI
- Kelly Bennett, B3
- Al Cho, Xylem
- Peter Colohan, IoW
- Martin Doyle, Duke University
- Greg Gearhart, CA Water Resources Control Board
- Sam Hermitte, TX Water Development Board
- Sara Larsen, Western States Water Council
- Emily Read, USGS
- Dwane Young, EPA

Partner Organizations

Duke
NICHOLAS INSTITUTE
FOR ENVIRONMENTAL POLICY SOLUTIONS

THE ASPEN INSTITUTE
ENERGY & ENVIRONMENT
PROGRAM

S. D. BECHTEL, JR.
FOUNDATION
STEPHEN BECHTEL FUND

REDSTONE

PISCES FOUNDATION

Water
Funder
Initiative

WALTON FAMILY
FOUNDATION

KINGFISHER
FOUNDATION

CUAHSI
universities allied for water research

1965 - 2015
WESTERN STATES
WATER COUNCIL

Water Data
Collaborative

Common Tools

Water data glossary

Water data library - Federated metadata catalogue of water data, to include stream gauge data, volunteer monitoring data

Catalogue of standards for water data, metadata, and advanced sensors

Community Resources

Strategies and best practices for long-term O & M of cloud services

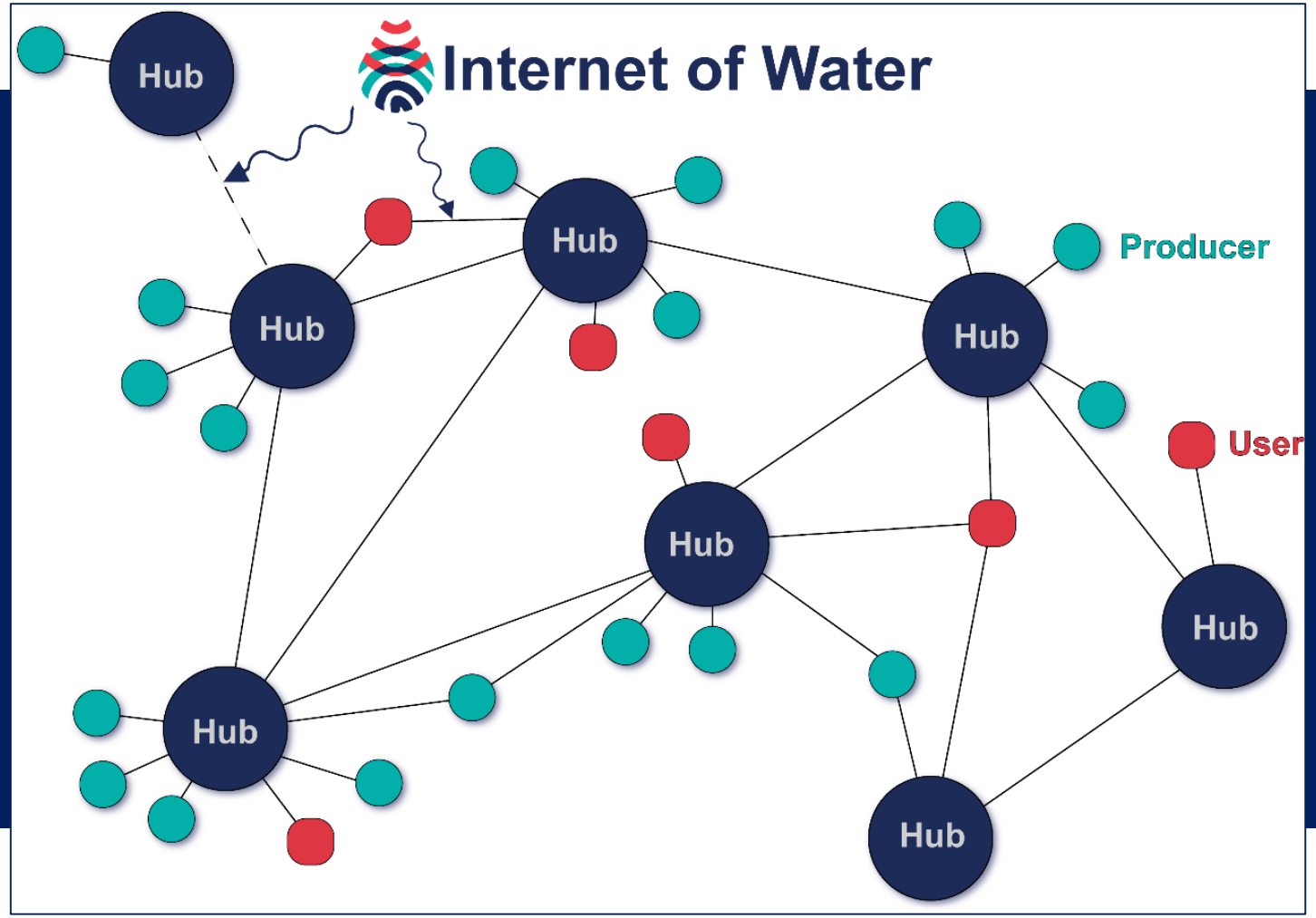
Tutorials and handbooks for building water metadata & water data catalogues

Conceptual approaches to building common data models

Strategies for common cataloguing, connectivity, & interoperability across IoW

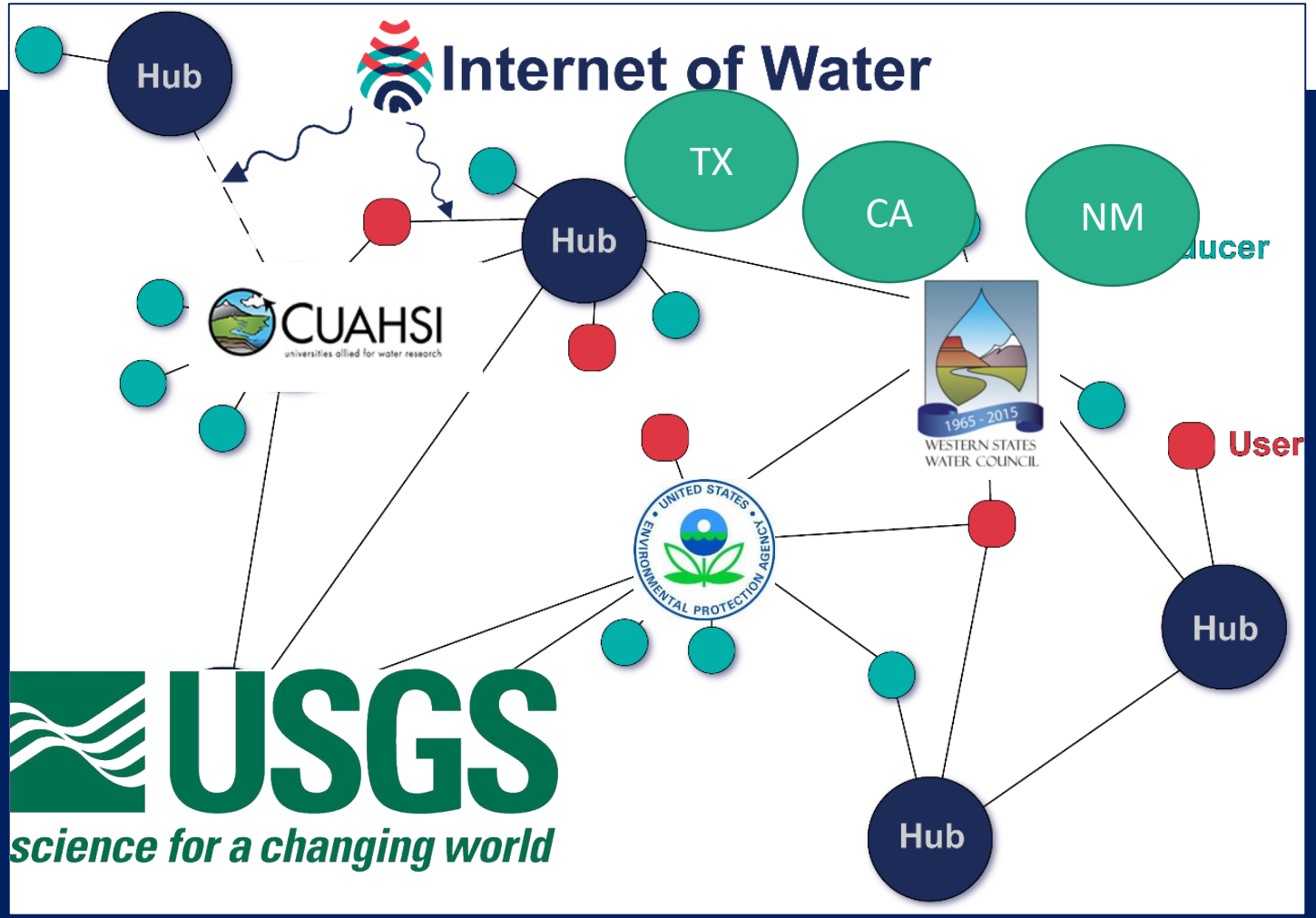
Create an Internet of Water

- Connecting
- Opening
- Discovering
- Empowering



Convening collaborative work groups to enable:

- Cataloging of data dictionaries
- Data indexing to common hydrography
- Data publishing in interoperable formats
- Interfaces for data discovery and accessibility



Helping Your Data to Flow

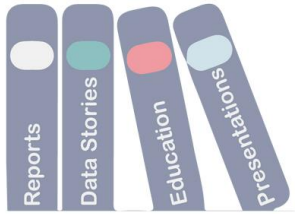
A key finding from the Aspen Institute dialogue series on water data was that *the most necessary step in using water data for sustainability is making public water data open by default, discoverable, and digitally accessible*. We are developing educational materials, resources, and tools for making water data more open. Click on an icon below to learn more. **These resources are actively being developed so be sure to keep checking back!**

Inventory

Explore (1) which public agencies are collecting (2) what types of water data for (3) what purposes, and (4) the openness of those data.

Tools to Make Data Open

Coming Soon: Explore why open data are important, find out how open your data are, and how you can improve openness.



Publications

Coming Soon: Find publications and presentations including reports, white papers, data stories, and educational materials.

Learning Center

Coming Soon: A series of educational materials to explain standards, metadata, cloud services, etc. What they are, why they are important, what tools are available,

Glossary

Coming Soon: Public agencies may have different definitions for the same type of data. Search here to learn who uses what definitions for different types of water data.

Water Budgets

Coming Soon: Explore the workflow and resources for creating water budgets currently adopted by federal and state governments.

Current Inventory Selected: Federal (as of Nov 2018)

Information | Entities Collecting Water Data | Water Data Platforms | Summary of Water Data Collected | Openness Scorecard

The mission of the Internet of Water is to build a dynamic and voluntary network of communities and institutions to facilitate the opening, sharing, and integration of water data and information. This network will connect data producers, hubs, and users to enable the discovery, accessibility, and usability of water data and information.

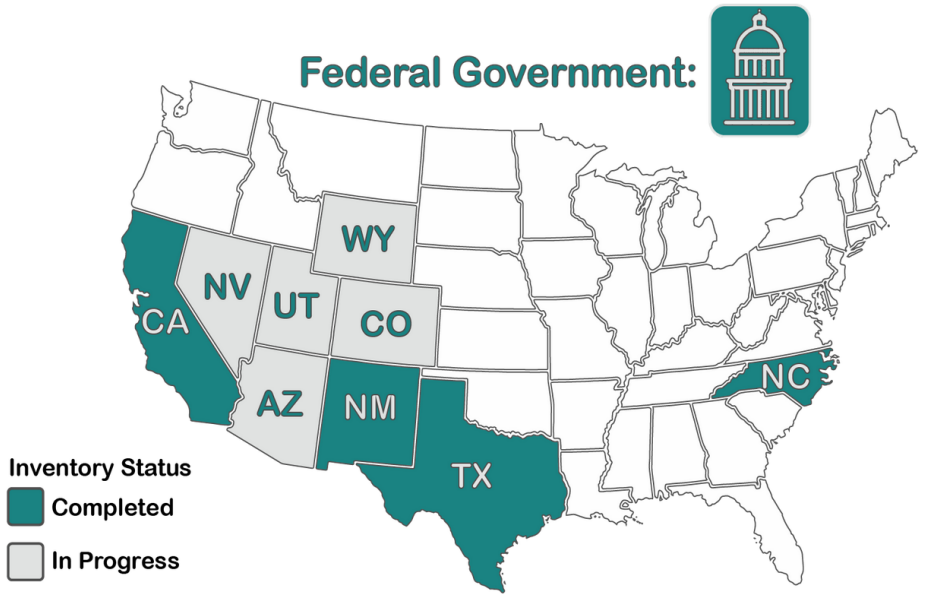
The IoW is inventorying federal and state governments to understand what water data are currently collected and how those data are discovered, accessed, and made usable.

- ***Entities Collecting Water Data*** shows the organizational network of public entities collecting water data and the primary purpose(s) of collecting those data.
- ***Water Data Platforms*** shows which entities are collecting similar types of water data. The network can be filtered by data findability, accessibility, and interoperability metrics.
- ***Summary of Water Data Collected*** highlight which data types are collected by which entities, the types of data most often collected, and which entities provide access to the greatest variety of water data.
- ***Openness Scorecard*** provide a relative score to compare how findable, accessible, interoperable and reusable (FAIR) data are within and across inventories. This scoring can be used as a template for self-diagnostic tools and understanding how to improve openness.

The methods, template, and data are all available for download at the bottom of the website. The inventory is a living document and may be periodically updated.

Select an inventory and click on the above tabs to see results:

Federal Government

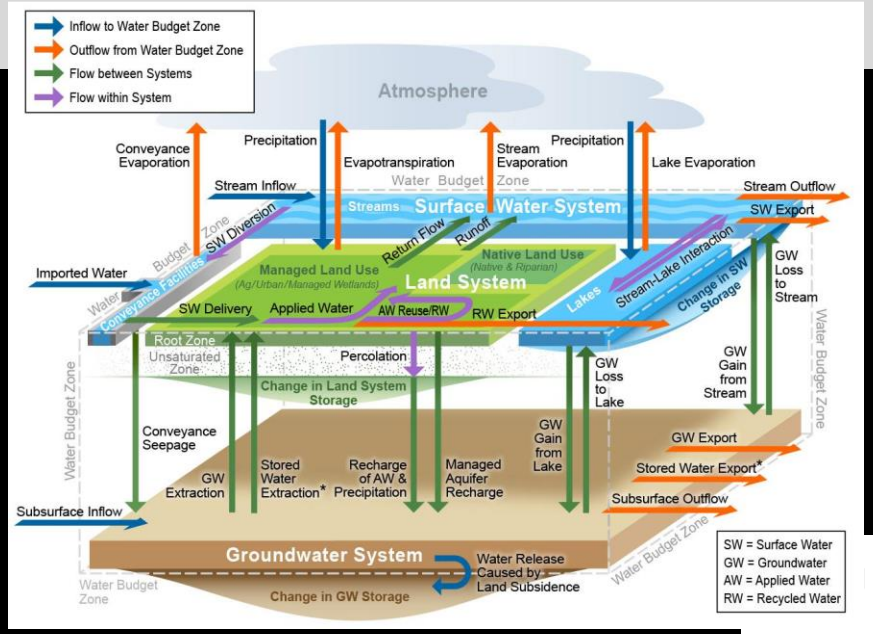


Developing Water Data Hubs

- Providing technical assistance for states to publish water data in formats enabling ingestion or federation to WaDE, CUAHSI, and other regional and national entities

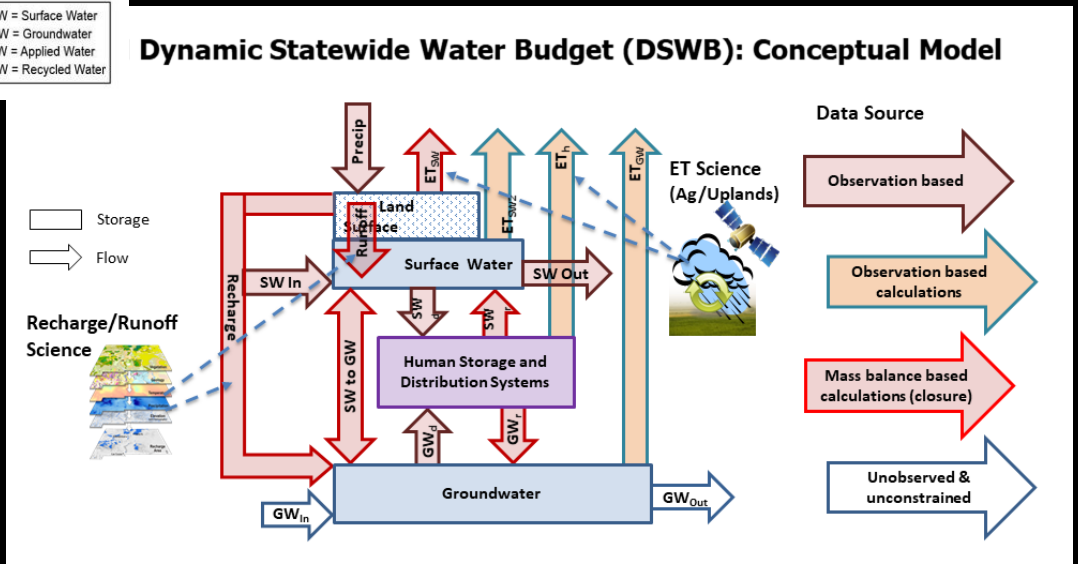
Water Budgeting: States are Different

Figure 1-1 Total Water Budget Schematic



Diverse

- Terminology
- Components
- Estimation methods
- Data sources



Water Budgeting… Federal Agencies are Different

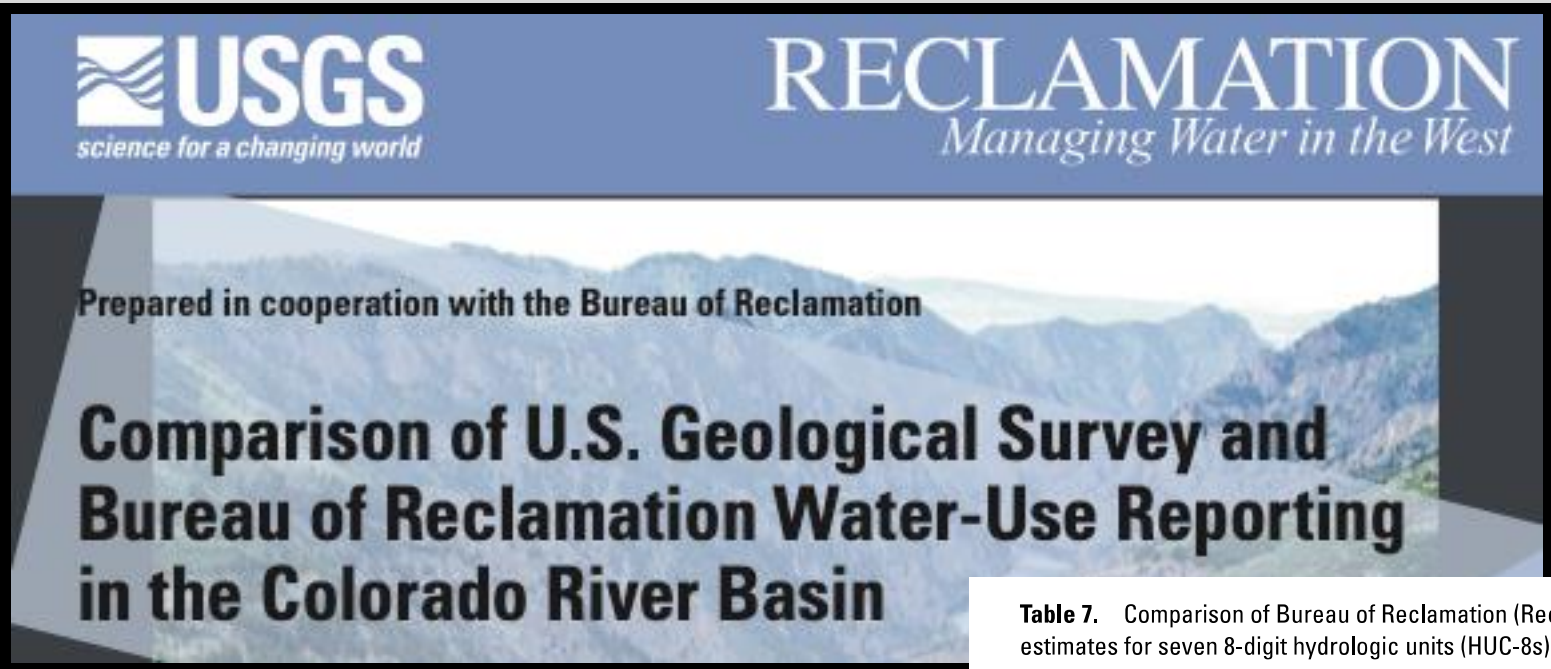


Table 7. Comparison of Bureau of Reclamation (Reclamation) and U.S. Geological Survey (USGS) 2010 agricultural water-use estimates for seven 8-digit hydrologic units (HUC-8s) on Colorado's Western Slope.

[Data provided by David Eckhardt, Bureau of Reclamation, written commun., May, 2017; and Tamara Ivahnenko, U.S. Geological Survey, written commun., May 2017. m, meter; acre-ft, acre-foot; NIR, net irrigation requirement; mod B-C, modified Blaney-Criddle; ft, foot; IWR, irrigation water requirement]

HUC-8	Mean elevation (m)	Reported water use volumes		Irrigated acreage		Irrigation requirement (depth)	
		Reclamation consumptive use (acre-ft)	USGS consumptive use (acre-ft)	Reclamation irrigated acres	USGS irrigated acres	Reclamation NIR from mod B-C (ft)	USGS IWR from mod B-C (ft)
14010001	2,401	76,049	49,096	66,757	53,731	0.951	0.914
14010002	2,480	20,761	7,169	16,904	7,637	1.020	0.939

IoW Efforts: Glossary

Colorado DWR:
Consumptive use: the amount of water that is lost to the stream system, for example, through crop consumption or evaporation, when applying water to beneficial uses.

WA: “Consumptive water use causes diminishment of the source at the point of appropriation,” and that, “Diminishment is defined as to make smaller or less in quantity, quality, rate of flow, or availability.”

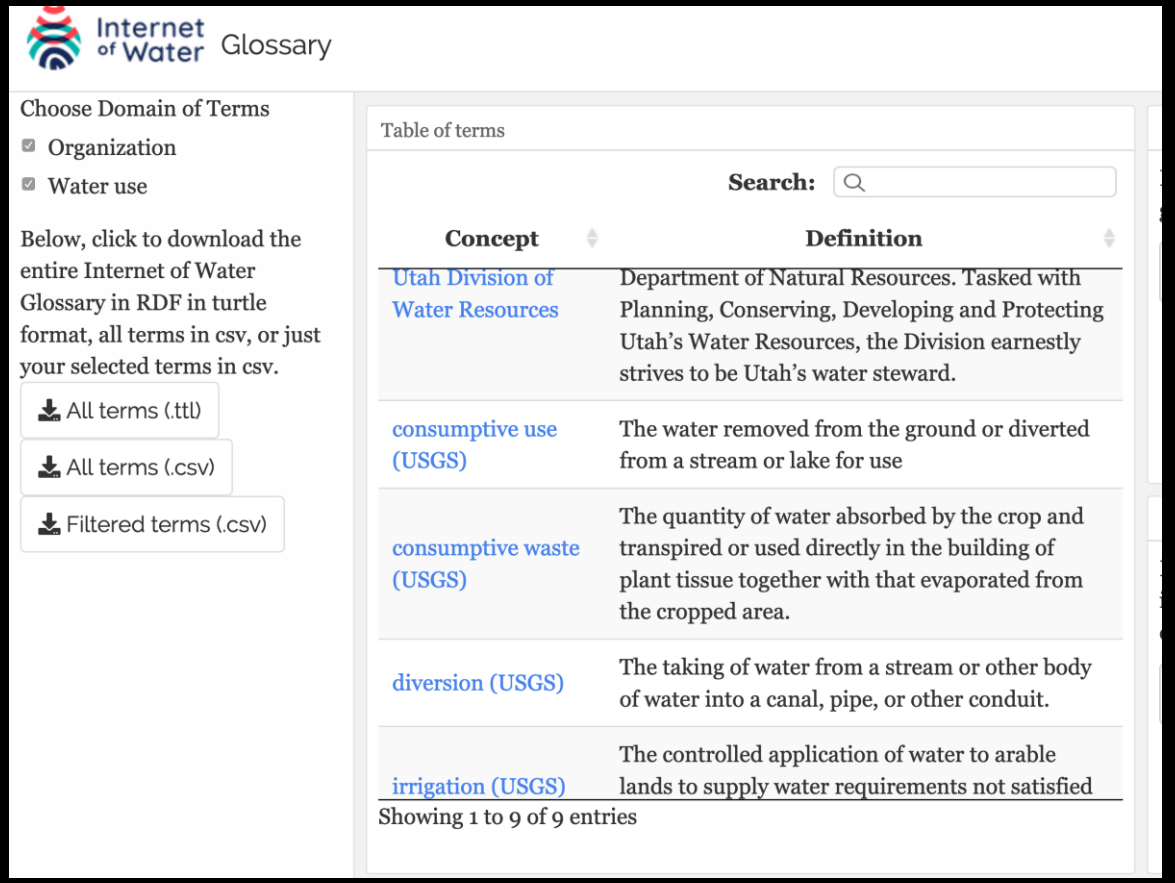
IoW Efforts: Glossary

Cataloging controlled vocabularies and legal or regulatory glossaries from:

- Federal and state agencies
- Water data science and software groups (eg CUAHSI)
- Relevant IT & data publishing (e.g. WaDE, OkN, ODM
- Water rights administration
- Water use reporting
- Water budgeting and availability assessments
- Water quality regulation
- Water data standards
- Linked and open data technologies

IoW Efforts: Glossary

- Organize and build semantic links:
  - Homonyms
  - Synonyms
  - Overlapping or nested concepts
- Compare terms and definitions across agencies
- Links directly to originating vocabulary where available
- Download selected concepts in csv or rdf formats.



IoW Efforts: Water Budgeting Ontology

Establish cross-walks for water budgeting model components (including use estimates) across states

- Starting with
  - USGS National Water Census
  - CA DWR Water Budget Handbook
  - CO CDSS
  - NM Dynamic Statewide Water Budget

IoW Efforts: Water Budgeting Ontology

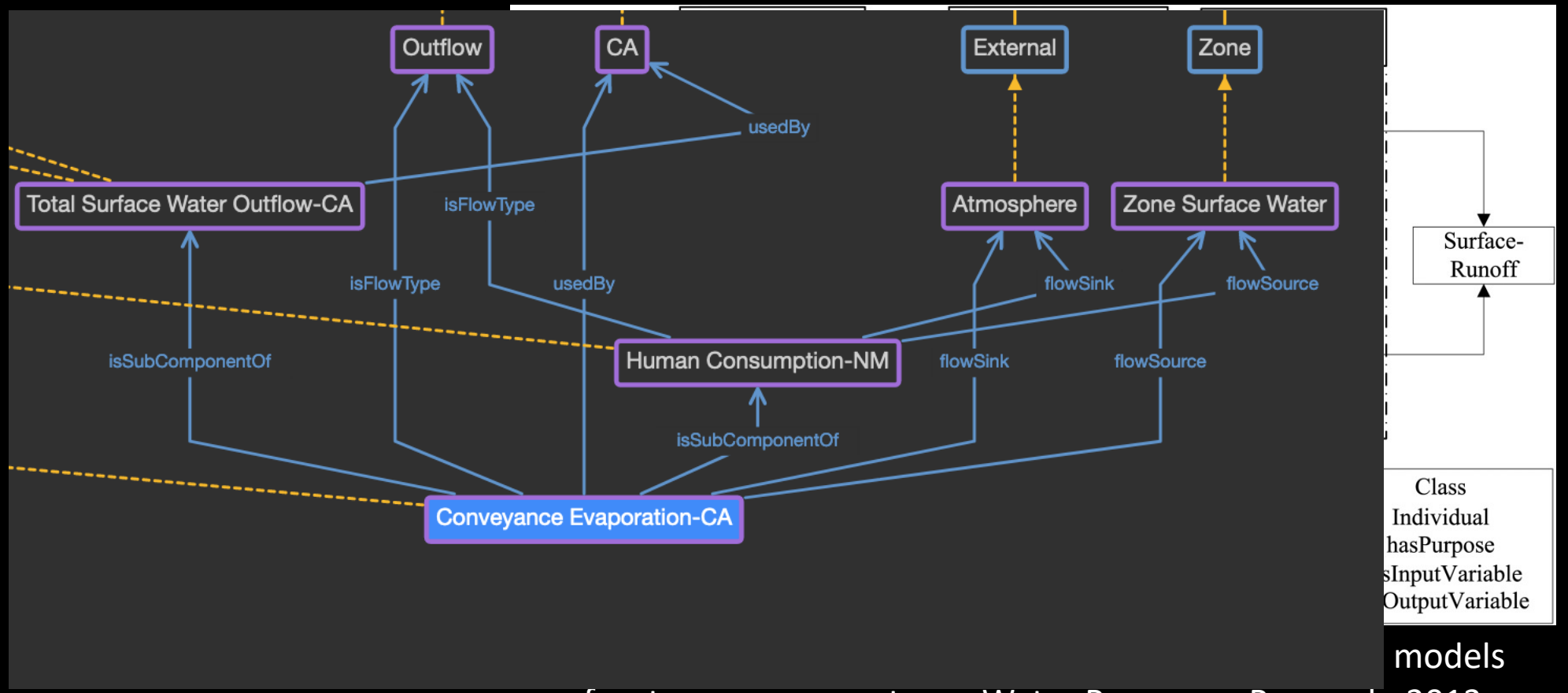
Answer questions like:

What combinations of water use categories that my State A reports corresponds to categories X and Y that State B reports?

If I have data sources X, Y, and Z, for a HUC-12 unit that crosses state boundaries, what estimation methods are possible and what estimation methods are each state likely to use?

I am required to use estimation method X, and have data sources A and B. What other data sources do I need?

IoW Efforts: Water Budgeting Ontology



models of water resource systems. Water Resources Research. 2013 Aug;49(8):5077-91.

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