

EPSCoR

iUTAH



# Cyberinfrastructure

**Innovative Urban  
Transitions and Aridregion  
Hydro-sustainability**

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# Cyberinfrastructure Overview

- Synthesis of diverse data collection and modeling requires a facility with storage, networking, computational, and human resources
- Existing resources are inadequate and spread across Utah institutions
- The *iUTAH Modeling and Data Federation* is a distributed facility that will increase capacity for data collection, organization, management, sharing, synthesis to higher level products, and integration with models

# Cyberinfrastructure Team

- Component Faculty/Researchers
  - Jeff Horsburgh (USU), Eric Hawley (USU), Matt Lorimer (USU), Amber Jones, (USU), Stephanie Reeder (USU), Steve Corbato (UU)
- Component Student Assistants
  - None yet – but several planned
- Component Partners (data users, data providers, model stakeholders)
  - Higher education institutions, Utah Education Network
  - State Agencies – Utah Water Rights, Water Resources, Water Quality, Automated Geographic Reference Center
  - Federal Agencies – USGS, USBR, NRCS
  - Existing NSF CI projects – CI-WATER, CUAHSI HIS, DataONE

# Cyberinfrastructure Goals

- Goal 1: Increase capacity for data collection, organization, management, sharing, synthesis to higher level products
- Goal 2: Increase capacity for integration of data and models

# Cyberinfrastructure Objectives

- Goal 1: Increase capacity for data collection, organization, management, sharing, synthesis to higher level products
  - Objective 1.1: Develop infrastructure to support data collection and management activities of iUTAH facilities and researchers
  - Objective 1.2: Identify and prioritize external datasets needed by iUTAH researchers
  - Objective 1.3: Enable iUTAH researchers to share and access data using standard formats, protocols, and services

# Cyberinfrastructure Objectives

- Goal 2: Increase capacity for integration of data and models
  - Objective 2.1: Support iUTAH participants in discovering and accessing iUTAH and relevant external data
  - Objective 2.2: Identify and prioritize modeling needs and models to be used by iUTAH researchers

# Cyberinfrastructure Activities

- Goal 1: Increase capacity for data collection, organization, management, sharing, synthesis to higher level products
  - Objective 1.1: Develop infrastructure to support data collection and management activities of iUTAH researchers
    - Activity 1.1.1: Design and deploy a virtual server architecture to host the iUTAH MDF
    - Activity 1.1.2: Assist research facilities with telemetry system design
    - Activity 1.1.3: Develop databases, web services, and software cyberinfrastructure for managing datasets from iUTAH facilities
  - Objective 1.2: Identify and prioritize external datasets needed by iUTAH researchers
    - Activity 1.2.1: Develop and conduct a survey to identify planned and existing data needed by iUTAH researchers
    - Activity 1.2.2: Begin development of relationships with existing agencies, data providers, and existing CI projects

# Cyberinfrastructure Activities

- Goal 1: Increase capacity for data collection, organization, management, sharing, synthesis to higher level products
- Objective 1.3: Enable iUTAH researchers to share and access data using standard formats, protocols, and services
  - Activity 1.3.1: Select/develop standard data and metadata formats for iUTAH
  - Activity 1.3.2: Select/develop standard data access services/mechanisms for iUTAH

# Cyberinfrastructure Activities

- Goal 2: Increase capacity for integration of data and models
  - Objective 2.1: Support iUTAH participants in discovering and accessing iUTAH and relevant external data
    - Activity 2.2.1: Activity 2.2.2: Develop a searchable metadata catalog for iUTAH data resources to support data discovery and retrieval
  - Objective 2.2: Identify and prioritize modeling needs and models to be used by iUTAH researchers
    - Activity 2.3.1: Develop and conduct a survey to identify planned and existing data needed by iUTAH researchers
    - Activity 2.3.2: Coordinate to leverage CI-WATER EPSCoR Track 2 modeling services and results

# Cyberinfrastructure Activities Out Years

- Continued development of priority data services
- Federating data discovery across external data resources and catalogs (Utah AGRC, CUAHSI HIS, DataONE)
- CI Support for Decision Theaters – data and visualization services
- Support for formal data publication and archival via CUAHSI HIS and/or DataONE
- Leverage CI-WATER Track 2 results to provide better linkages to models and computational resources
- Leverage the work of the NSF-funded HydroShare project and work closely with the Education and Outreach team to create enhanced functionality for data/resource sharing and collaboration within an online collaboration environment

# Cyberinfrastructure Outputs

- Goal 1: Increase capacity for data collection, organization, management, sharing, synthesis to higher level products
  - Successful hire or partnerships for part-time system administrator, programmer analyst, data manager
  - Hardware platform for hosting iUTAH data and CI purchased and installed + linkages with CI-WATER STORE data storage resources
  - Operational databases, web services, and software for managing data from iUTAH facilities
  - CI research and development opportunities for undergraduate/graduate programmers

# Cyberinfrastructure Outputs

- Goal 2: Increase capacity for integration of data and models
  - Searchable metadata catalog for discovering iUTAH and other relevant datasets
  - New relationships with partners, including state and federal agencies as data providers, data consumers, and model stakeholders
  - Informatics training for graduate students

# Possible Challenges

- Cyberinfrastructure literacy of project participants
- Managing expectations of project participants
- Data related
  - Heterogeneity - multiple sources, websites, systems, data formats, schemas, semantics
  - Building a consistent metadata catalog to support discovery and access
  - Prioritizing where to allocate limited resources
- Model related
  - Bridging the gap between scientists and computational resources
  - Formal model integration and coupling
- Long term sustainability of the CI – hardware and software

# Anticipated Outcomes or Impacts

- Operational Cyberinfrastructure
  - Short term: Enable research teams to manage and share data from iUTAH facilities
  - Medium term: Enable data users (students, researchers, partners) to discover and access iUTAH and other relevant data
  - Longer term: Online research collaboration capabilities, support for model integration, model and data integration