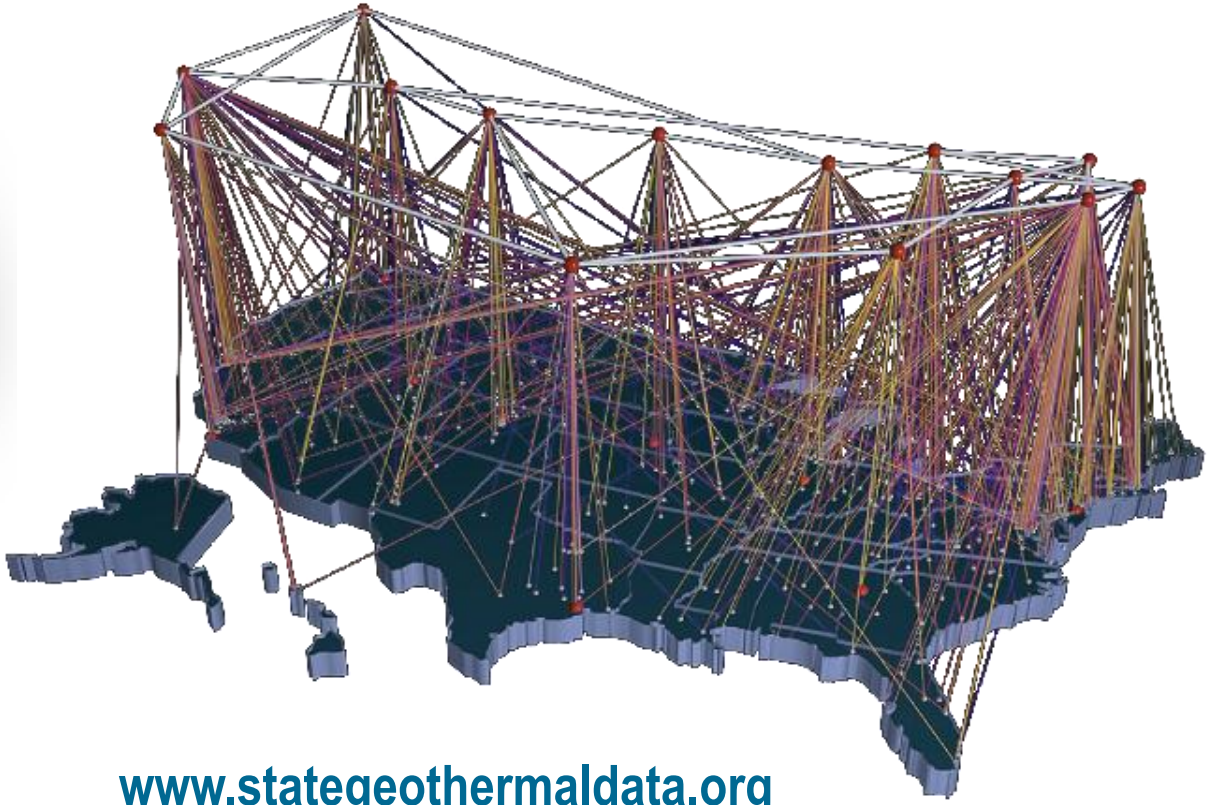


Image: NSFNET

www.stategeothermaldata.org

State Geothermal Data Contribution to the NGDS

June 7, 2011

PI: M Lee Allison, Ph.D.
CoPI: Stephen M Richard, Ph.D.
Arizona Geological Survey
Data System Projects

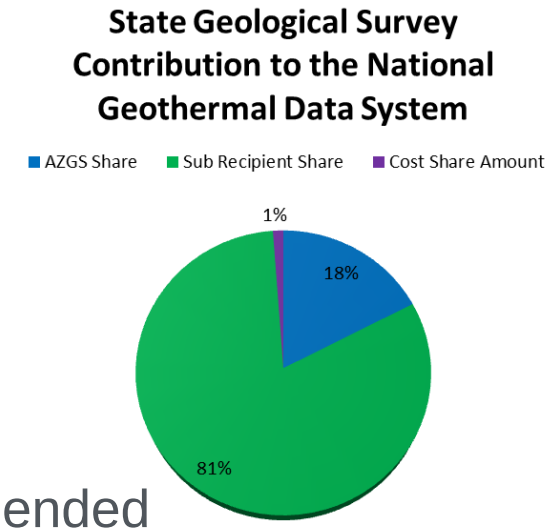
Overview

Timeline:

- Project Award Date: January 8, 2010
  - Sub recipient kick-off meeting and contracts: May 2010 (3 Year Contracts to May 2013)
- Anticipated End Date: May, 2013 to accommodate sub-recipients
- Percent Complete, Deliverables & Work Load: 17% as of 03/31/11
  - Projected 20% - 23% by 05/31/11

Budget:

- Total Project Funding: $22,117,121
  - DOE Share: $21,858,224
    - AZGS: $3,857,775
    - Sub Recipients: $18,000,449
  - Awardee Cost Share: $258,897
- Total Spent as of 03/31/11: $2,249,594 or 10% expended
  - Spend Plan Projections May 31, 2011: $2,889,594 or 13%
- Cost Share Reported as of 03/31/11: $19,468 or 8%



Relevance/Impact of Research

Relevance/Current Challenges:

- Industry and policy-makers lack publically available, consistent and reliable geothermal data
- High cost and risk of exploration drilling hampers industry growth
- High cost of staff time devoted to finding, retrieving, and verifying information

Impact:

- This project will facilitate and streamline discovery, evaluation, and access to geoscientific information used to locate, evaluate, and develop geothermal resources
  - EERE GTP Specific:
    - Expand reference and resource data for Research and Development activities, including data in low-temperature locations
    - Lead to Innovative Exploration Technologies through increased data availability on geothermal energy capacity while collecting new data in previously unexplored or under-explored locations
- Move recent technology development for data interoperability and distributed information from design/prototype into production
- Implement framework for new paradigm in data stewardship and delivery that supports broader open government data initiatives

Scientific/Technical Approach

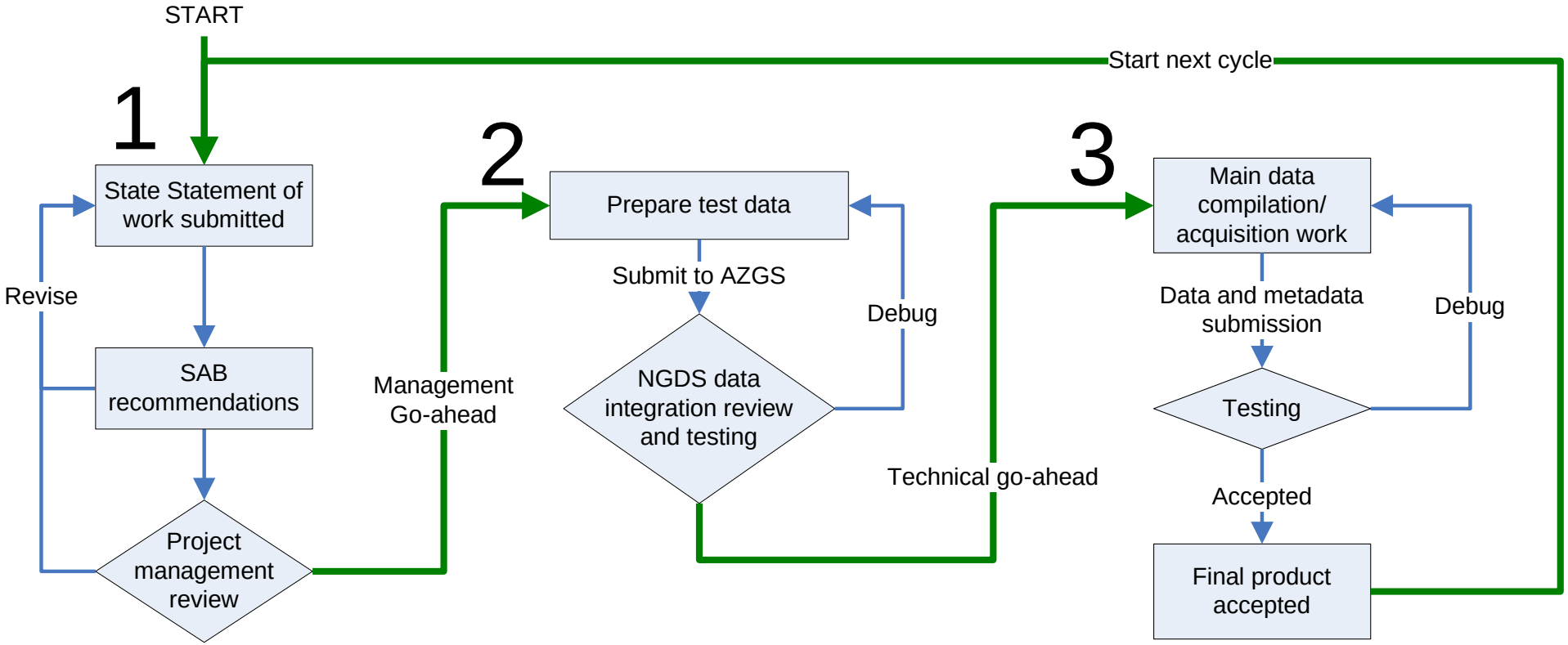
Adapt the USGS-AASG Geoscience Information Network (GIN) for use by National Geothermal Data System (NGDS)

- Modular, Distributed, Web-based, Interoperable
- Open source or common off-the-shelf software
- Focus on adapting existing capabilities
- Implement **Catalog** of geothermally relevant resources (http://catalog.usgin.org/geoportal)
  - USGIN Metadata profile, utilize ISO standards for encoding (http://lab.usgin.org/USGIN-ISO-metadata-v1-1)
  - Open Geospatial Consortium (OGC) Catalog Service for the Web (CSW)
- Develop and document **protocols** for data access
  - OGC Web Map Service and Web Feature Service
  - Develop simple feature templates for standard data types (http://www.stategeothermaldata.org/data-delivery/content-models/)

Deploy NGDS across all 50 states

Work with geo surveys & partners to assemble and serve state datasets online

Scientific/Technical Approach: Technical Data Development Cycle



- Debug iterations are made between the NGDS system and each data producer until the prototype is demonstrated to work and provides the necessary content.
- The prototype dataset is made accessible online in the system, but flagged as development data set
- The final submission provides the complete dataset evolved from the prototype and made accessible online as a node in the network.

- Subcontracts for data acquisition from 50 states
- Announcement, review and decisions on supplemental funding for new data from 15 states; contracts in negotiation
- Project web site designed, implemented, and maintained (www.stategeothermaldata.org)
- Implementation of catalog (http://catalog.usgin.org/geoportal)
  - Metadata for 4,658 digital resources (as of 4/26/2011)
- Development of procedure and web tools for tracking data submission review and processing
- Compilation identified and documented 30 draft content models
  - 8 content models developed, reviewed and version 1 posted http://www.stategeothermaldata.org/data-delivery/content-models/
- First 13 WFS and WMS services online
  - See http://services.azgs.az.gov/ArcGIS/rest/services/aasggeothermal or catalog (http://catalog.usgin.org/geoportal, search WMS)

Project Management/Coordination

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

- Three Year Contracts to Sub recipients awarded 5/24/2010
  - Sub recipient reporting, quarterly and annually, on budget and deliverables
  - Annual Meetings – 05/2010 in Washington, DC and 06/2011 at AASG meeting in Dubuque, IA
- Management/Coordination through Advisory Committees
  - Management, Science, Technical – each has DOE participation
- Application of Resources
  - Additional funding sources, e.g. NSF funds used for US Geoscience Information Network (USGIN)
  - Spending checks and balances, e.g. data deliverable review per invoice and annual review
- Program Integration
  - Key data component of the NGDS through coordination of all 50 states as data provider nodes
- Coordination with Industry & Stakeholders
  - Aggressive Education Outreach and Training (EOT) including 26 talks, 10 briefings, 5 publications, 7 webinars/webcasts, 3 exhibits, 1 workshop, and multiple news media interviews
  - Growing consultation and engagement with industry
- Variance in Planned Schedule and Deliverables
  - Challenges to the schedule include subcontracting delays, state agency uncertainties, and staff hiring (including qualifications and state hiring freezes)
  - Current Solutions:
    - Adjust YR 1 & 2 deliverables and SOW dates to signed contract dates (often Fall of 2010), shorten YR 3
    - Adjust current staffing dedicating more hours to the State Geothermal Project, hiring through contract labor
  - Intended Solution: Request no-cost grant extension

Primary Objectives

Facilitating sharing of geothermal-relevant data

Making data resources readily available online

- Multi-tiered architecture
  - Simplest data sharing is via file access in web-accessible directories (web sites, repositories)
  - Web Map Services provide data portrayals suitable for map-based web-mashups
  - Web Feature Services use standard, documented data schema to enable data integration by clients
- Standardized metadata is key component for discovering available resources
  - Describe individually accessible documents or file-based data products
  - Describe data services with sufficient information to enable software clients to connect transparently
- AZGS is producing templates for interoperable data delivery
  - 30 topic areas; 8 completed: Active Fault, Basic Metadata, Borehole Temperature Observation, Geologic Map Data, Hot Springs Feature, Well Header, and Well Log data
  - Scanned documents organized in online document repositories
- Data made accessible online through web-accessible data providers. Hubs (AZ, NV, IL, KY) available for backup or providing service.
- AASG Nodes and Hubs linked with the DOE Geothermal Data Repository and desktop applications as part of the NGDS

Collaboration

- Project Collaborators
  - 45 Sub recipients covering all 50 states
    - *Geological Surveys (State Agency or University Based)*
      - AL, AK, AR, AZ (CA), CO, FL, IA, ID, IL, IN, KS, KY, LA, MA (CT), ME, MN, MO, MS, MT, NC, ND, NH, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, TN, TX, UT, VA (DE, GA, MD), VT, WA, WI, WV, WY
    - *Universities*
      - HI, MI, ND (for NE), SD (Sinte Gleska University)
  - USGS Community on Data Integration
    - *Revised GIN agreement to incorporate NGDS*
  - Western Regional Partnership (15 federal agencies and Governors covering 5 states)
    - *Working Agreement; linking with 10,000 GIS layers for land use management*
  - State of Arizona
    - *GIN/NGDS approved as data integration framework for state agencies*
  - Industry
    - *Energistics, Microsoft Research*
  - Early discussions: CUAHSI, iPlant Collaborative, DataONE, ESIP Federation, Groundwater Protection Council/IOGCC, AGI Online Education
- Cumulative number of jobs created to date: 80.88

Future Direction: State Geothermal Data

Key Activities – 2011-2012

- All regional hubs operational
- All states providing data live to the network
- All submitted data described by metadata in catalog system
- Training programs developed & implemented: webinars, videos, guidebooks, online tutorials, short courses
- Web site serving as project coordination nexus and public face of project
- SAB review of Year-1 work for all subs; evaluate and approve Year-2 work plans
- Carry out bulk of new data acquisition, including drilling a minimum of 21 gradient and research holes in 6 states (ID, NV, OR, UT, WA, WI)
- Prototype deployment of the system roll out during summer 2011
  - Identify and address issues and constraints with operational deployment and use of system: scaling, validation, response times, up-time, user feedback, unforeseen issues

Key Activities – Project Duration

- Complete digitizing data, cataloging, and metadata records
- All data to be made accessible online, hosted by providers or in cloud via the hubs
- Network operations to provide distributed backup, facilitate data transfer
- Facilitating third-party data or service providers to be full system participants
- Sustainable business model plan

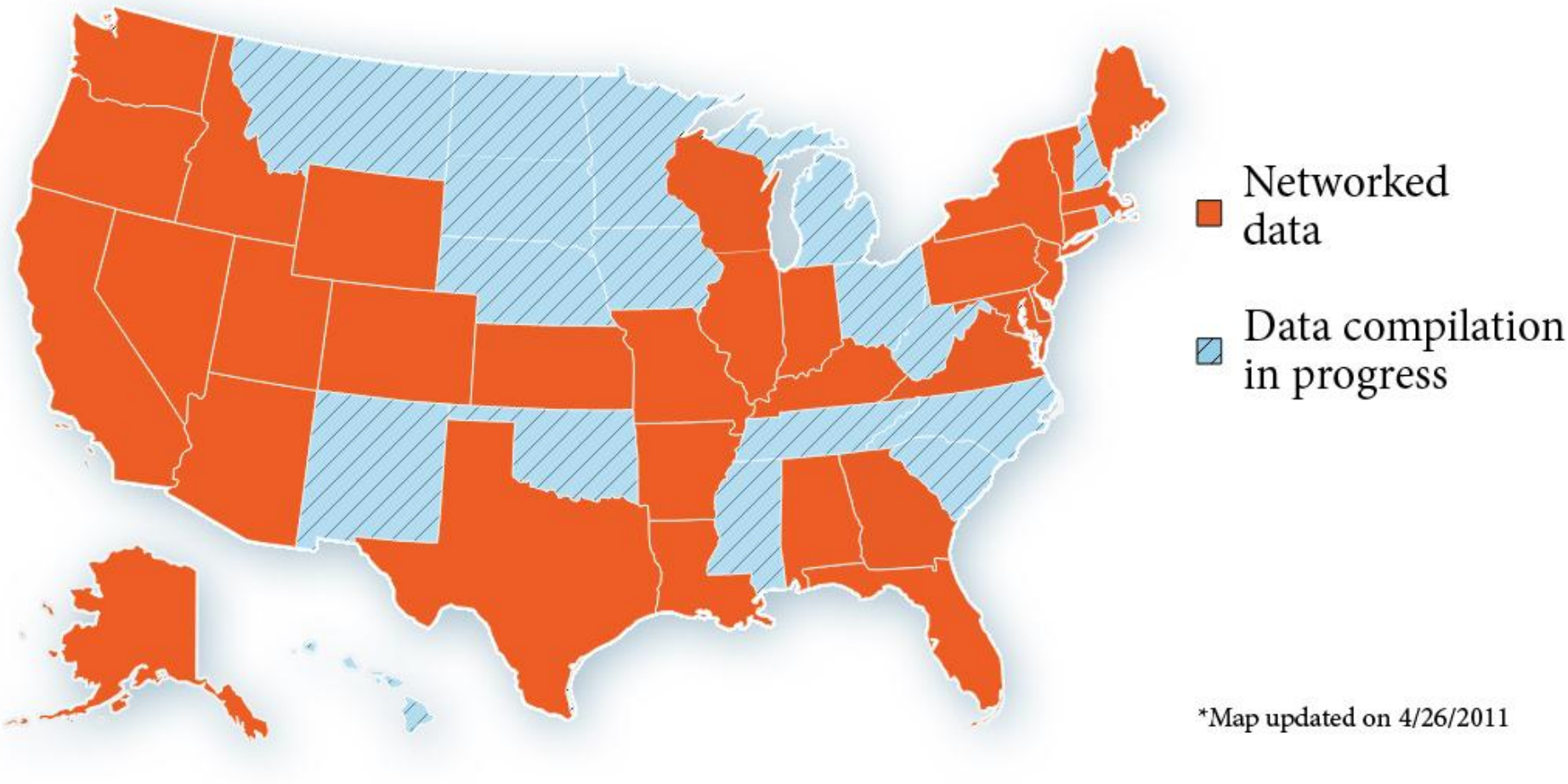
Summary: State Geothermal Data

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

- Deployment of national distributed network in progress
- Data being compiled from all 50 states
- Main system components in place –
  - *Find*: Catalogs – profiles, protocols, document repository
  - *Get*: Services – protocols, interchange formats, servers
  - *Use*: Clients – adopting existing software for desktop applications
- Leveraging additional data and apps from state & federal agencies, academia, and industry
- System adoption exceeds expectations and our ability to meet demands from third parties

	FY2010	FY2011
Target/Milestone	Assemble project team and subs	National distributed network prototype functional, in production mode
Results	All 50 states represented	Contracts in place to cover 50 states; data compilation in full production; server hubs in progress; network services adopted and in test mode

Supplemental: State Geothermal Data providers



Supplemental: Supplemental funding for new data acquisition

Drilling Project s	Funding Received
Idaho*	$457,662.80
Nevada*	$504,201.80
Oregon*	$526,803.80
Utah*	$516,294.80
Washington	$648,878.80
Non Drilling Projects	**Funding Received**
Arizona	$179,976.00
Colorado	$174,763.00
Indiana	$69,975.00
Maine	$49,912.00
Massachusetts	$74,839.00
New Jersey	$49,989.00
New Mexico	$200,000.00
Oklahoma	$20,000.00
Vermont	$78,870.00
West Virginia	$42,858.00

Total Awarded: $3,595,024.00

* Members of the Great Basin Drilling Consortium, awarded $1,000,000.00 for drilling services split equally between members

Supplemental: Coordination of projects in the NGDS program