BIG DATA REGIONAL INNOVATION HUBS & SPOKES

Update on Program Activities

Fen Zhao
March 7, 2017
KEY TAKEAWAYS

01 THE PROGRAM
Brings together domain scientists, computer scientists, and end users to use data to solve challenges

02 THE STAKEHOLDERS
Encourages collaborations with industry, state & local governments, non profits, and others that are not typical NSF participants

03 PARTICIPATION
Opportunity for NASA and your communities to get involved!
vision of the BDHubs program
activities of funded Hubs
spokes awarded
opportunities for participation

30 mins
**WHAT IS THE HISTORY BEHIND BDHUBS?**

The National Big Data R&D Initiative & Data to Knowledge to Action (Data2Action)

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<th>Date</th>
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| **MAR 2012** | **Launch**  
NITRD Agencies (lead by NSF) kick off the National Big Data R&D Initiative with new federal programs totaling $200M |
| **NOV 2013** | **Data2Action**  
90 organizations announce 29 new Big Data partnerships supported by $100M in non-federal funds |
| **MAY 2013** | **Big Data Partnerships Workshop**  
Industry, academia, and government representatives gathered to learn about current Big Data partnership and brainstorm new ideas |
| **JUN 2014** | **Partnerships Bear Fruit**  
Partnerships update NITRD on midterm outcomes from announced projects |
| **MAR 2015** | **BDHubs**  
NSF initiates BDHubs effort to sustain and scale up collaborative Big Data innovation activities |
THE HISTORY BEHIND BDSPOKES

BD Spokes is the second phase of a long term NSF agenda for Big Data Partnerships

- **MAR 2015**: BD Hubs Launched
  - BD Hubs solicitation to fund four regional Hubs is released

- **APR 2015**: Big Data Regional Charrettes Held
  - Industry, academia, and government representatives gathered in four charrettes around the country

- **SEPT 2015**: Hubs Awards Made
  - Awards made to coordinating institutions

- **NOV 2015**: BD Spokes
  - BD Spokes solicitation released before 5th DC national charrette (bdhubs.info)

- **SEPT 2016**: BD Spokes Awarded
  - 10 (+1) Spokes and 10 planning grants awarded
WHAT IS THE BDHUBS NETWORK?

“Hub and Spoke” – A Nation-Wide Network for Data Innovation

1. **Hubs**
   - Local stakeholders guide activities locally and nationally

2. **Spokes**
   - Hub selects some local priority areas (i.e. transportation, manufacturing)

3. **Nodes**
   - Partnerships formed to drive specific end goals in priority areas

**Geographic Regions**

**Priority Areas**
Within the broader portfolio, BD Hubs and BD Spokes focuses on building partnerships around Big Data.
Alaska & Hawaii are part of the West region
US Territories can participate in any region

BD Hubs
founding organizations for BDHubs in 2015
points indicate affiliations of individuals named as steering council members and/or task leads or senior personnel.

MIDWEST
106 Personnel
79 Organizations
12 states

UNiversity
HPC Center
Non-profit
Industry

NORTHEAST
193 Personnel
99 Institutions
9 States

WEST
86 Personnel
47 Organizations
13 States

SOUTH
116 Personnel
95 Organizations
15 States + DC
HUB ACTIVITIES

Hubs ideate and coordinate Spokes, but also host a variety of activities for the community

- Microsoft awards Hubs $3M in cloud computing credits
- Massive regional All-Hands with hundred of attendees
- Early career researcher programs with CCC
- 3 years sociotechnical study of Hubs
The strategy behind BD SPOKES

BD Spokes are not your typical R&D project nor are they mini Hubs
MISSION DRIVEN SPOKES

BD Spokes proposals must articulate a clear focus within a specific Big Data topic or application area, while highlighting their Big Data Innovation theme.

All BD Spokes must have clearly defined mission statements with goals and corresponding metrics of success.
SPOKES MAJOR THEMES

Three different ways of slicing the Big Data Innovation problem
AREAS OF EMPHASIS

Some NSF priority areas include

- NEUROSCIENCE
- REPLICABILITY & REPRODUCABILITY IN DATA SCIENCE
- SMART & CONNECTED COMMUNITIES
- DATA PRIVACY
- DATA INTENSIVE RESEARCH IN THE SOCIAL, BEHAVIORAL, & ECONOMIC SCIENCES
- EDUCATION
Percent funding per region

- West: 18%
- Midwest: 28%
- South: 26%
- Northeast: 28%

Percent funding per topic area

- Cybersecurity: 2%
- Material Science: 8%
- Neuroscience: 8%
- Education: 9%
- Environment: 17%
- Sharing and Reproducibility: 18%
- Health: 18%
- Smart Cities: 20%

Total Spokes ~$12M in first round
Alaska & Hawaii are part of the West region
US Territories can participate in any region

**BD Spokes: Phase 1**
Includes lead and non-lead institutions for Spokes and Planning Grants

- Planning Grant Lead
- Planning Grant Non-lead
- Spoke Lead
- Spoke Non-Lead or Subaward
**IBM WATSON + ENCYCLOPEDIA OF LIFE**

“Using Big Data for Environmental Sustainability: Big Data + AI Technology = Accessible, Usable, Useful Knowledge!”

Encyclopedia of Life (EOL) is the world's largest database of biological species and other biodiversity information. EOL also works closely with scores of other biodiversity datasets such as BISON, GBIF, and OBIS.

This project seeks to make EOL and related biodiversity data sources accessible, usable, and useful, by integrating extant artificial intelligence tools for information extraction, modeling and simulation, and question answering.

1. **Cognopsi**: semantically annotate documents in EOL through controlled vocabularies for specific domains within ecological and environmental science

2. **MILA-S**: constructs conceptual models of ecological phenomena and automatically spawns simulation models; use with EOL TraitBank, to generate and test explanatory hypotheses as well as make predictions about ecosystems

3. **Watson+**: adds semantic processing to Watson to act as a virtual research assistant; will train Watson+ for answering questions about biological species using EOL.

Georgia Tech & Smithsonian Institution 
Lead Proposal: 1636848
SMART GRID DATA SHARING

“Smart Grids Big Data”

Will create an organization that brings together a cross disciplinary capability from academia, industry, and government. The goal of the project is to ideate from Smart Grid Data new knowledge and solutions offering major improvements in smart grid operation (e.g., power generation and distribution; renewable energy) and smart grid user necessities (critical infrastructures, smart cities, transportation, etc.)

Over 67 organizations submitted letters of collaboration.

Will be building an open data and software exchange. Initial data committed:

• data provided by over 50 utility companies and 30 utility industry solution vendors

• National Lightning Detection Network Data from Vaisala

• Lawrence Livermore National Lab (LLNL) data coming from local sensor network including several PMU’s and weather monitoring devices

• International partners: Brazilian power system project MedFasee; demand side management studies University of Manchester, renewable generation data collection activities - University of Cyprus

• And many, many more

Texas A&M et al.
Lead Proposal:1636772
DIGITAL AGRICULTURE

“Unmanned Aircraft Systems (UAS), Plant Sciences and Education”

Will organize academic, industrial, and governmental sectors around the development of policies and best practices for data science and Big Data applications in agriculture

Main focus on automating the Big Data lifecycle:

• automation of transport, storage, dissemination, and analysis of UAS imagery and ground characterizations

• automation of Big Data pipelines and the integration, interoperability and re-use of databases across plant and cropping systems – from farm management and remote sensing to high throughput plant phenomics and crop genomics

Activities focus on workshop series, hackathons, challenges, for example:

• Will develop a set of webinars on ontology, analytics, data management, data sharing, data standards and conventions, and data instrumentation to be used as a blueprint for a graduate level seminar on data science in agriculture

• Runs a competition for “mini proposals” in data annotation and interoperability for ag-genomics
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FOR FURTHER QUESTIONS CONTACT

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