



BD Hubs: Midwest: “SEEDCorn: Sustainable Enabling Environment for Data Collaboration”

Midwest Big Data Hub

Accelerating the Big Data Innovation Ecosystem

One of four Big Data Regional Innovation Hubs (BD Hubs) funded by the
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Transportation Spoke Overview

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Univ. of Michigan
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Transportation Spoke – Big Data Challenges

- Data and information standardization, integration and aggregation of multiple data sets, including those in vehicle, those at stationary sensors, and those from secondary sources of importance, such as weather.
- Information privacy (for individual location, etc)
- Best practices regarding data sharing and use of open-source Big Data analytic applications

Transportation Spoke – Proposed Activities

Convene ... a set of

- Hybrid workshops (on-site and virtual),
and
- Other community building activities

... to **establish** a defined set of **sustainable public-private partnerships** focused on addressing opportunities and challenges related to Big Data in Transportation

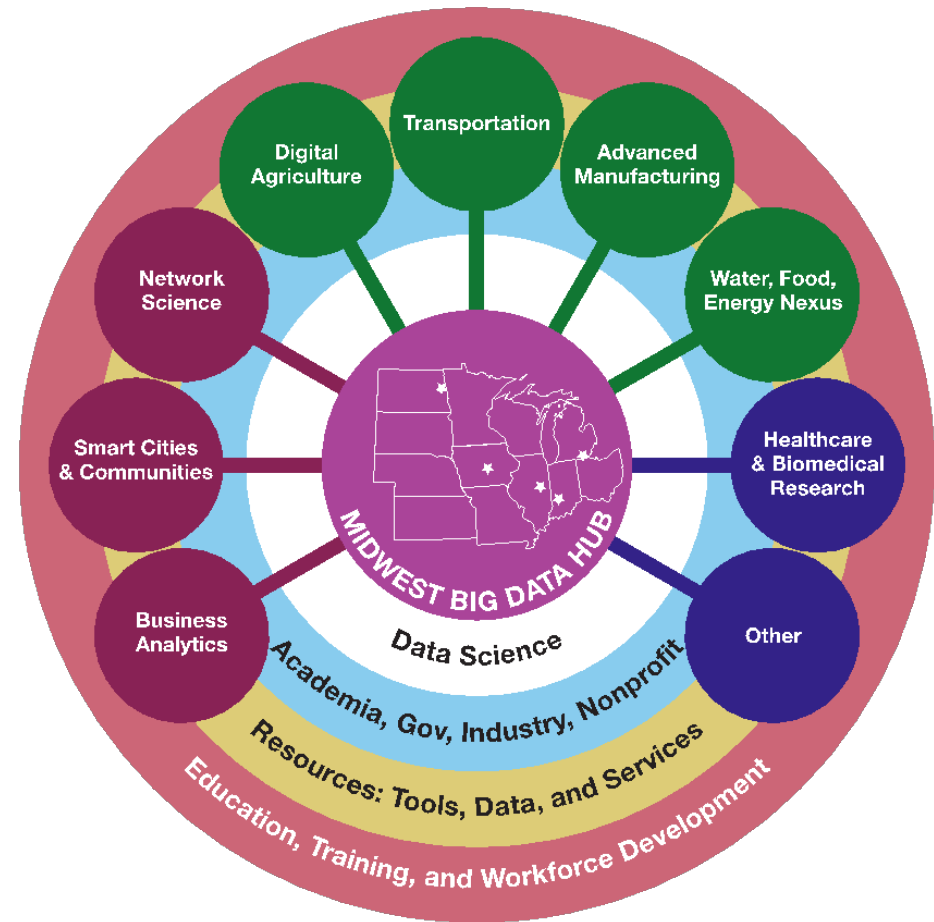
Transportation Spoke – Leveraging MBDH

Leveraging Rings

- Data Science
- Education, Training and Workforce Development
- Tools, Data and Services

Spoke Collaboration

- Urban Informatics
- Network Science
- Business Analytics



HBR Spoke – Proposals Submitted

NSF Solicitation 16-510

- **Three planning grants were submitted**
 - Infrastructure
 - Automotive
 - UAV
- **Others were considered:**
 - Rail
 - ...

Big Data Innovations for Bridge Health

 **Robin Gandhi, Brian Ricks, Deepak Khazanchi**
University of Nebraska at Omaha

 **Chungwook Sim, Daniel Linzell**
University of Nebraska-Lincoln

The Problem

- U.S. bridges received a C+ grade in 2013
 - \$76 billion required to improve deficient bridges
 - 30% of bridges have surpassed 50-year design life
 - 25% of bridges functionally obsolete or structurally deficient
 - Many of these bridges have a manual (visual) inspection cycle every two years!

Multi-institution and multi-sector coalition



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 **OPEN COLLABORATION**
DATA FACTORIES

 **College of Education**
University of Missouri



Prototype

- Pilot an open source platform for partners to curate, validate and publish regional data
 - NSF Data Infrastructure Building Blocks (DIBBs) platform (<http://datacenterhub.org>)
- Pilot standardized manifests for dataset IP and license agreements tracking integrated with data access control primitives
 - NSF Science Across Virtual Institutes (SAVI) project, Open Collaborative Data Factories (OCDF)

Transportation Infrastructure Assessment through Big Data from Self-Updating Remote Sensing Systems

North Dakota State University (NDSU):

Ying Huang, Bruce Rafert, Raj Bridgelall, Pan Lu.

Colorado State University (CSU):

Rebecca Atadero.

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The Problem

- Transportation system is huge and the cost to maintain is high which requires large scale performance measures;
- Process to inspect and assess the transportation system for resource relocation through manual inspection is difficult to automate and hard to communicate between agencies and to the public;
- The data obtained for the assessment is massive – Big Data, and only available to limited users.

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Remote Sensing: Others Involved

- Dr. Simone Ludwig
- Dr. Chrysafis Vogiatzis
- Multiple departments in NDSU

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The Plan

Establishing big data sets to leverage emergent intelligent transportation systems (ITS) to include remote sensing techniques using low-cost and small Unmanned Aircraft Systems (sUAS) for hyperspectral, bundling established high definition video, Lidar, and acoustic data acquisition. The information obtained such as road conditions and traffic recording to be used to access the transportation health conditions.

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Data Ecosystem for Transportation Safety

University of Michigan:

H. V. Jagadish, Carol Flannagan

Iowa State University:

Omar Smadi

University of Illinois, Chicago:

John Dillenburg

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The Problem

- Each year 32,000 are killed and 2 million injured in motor vehicle accidents in the US.
- Policy questions need data to address better.
- New technologies can help with safety:
 - Active Safety Systems
 - Connected and Automated Vehicles

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Transportation Safety: Organizations Involved

- U Mich, Iowa State, U. Illinois-Chicago
- University of Illinois, Urbana-Champaign: Nora El-Gohary
- Ohio State University: Benjamin Coifman
- Auto Industry Consultant: Samy Uthurusamy
- Chalmers University, Sweden
- Texas Transportation Institute (Texas A&M)

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Goals

- Develop the design for a data ecosystem that:
 - brings together multiple automotive safety data sets,
 - develop integration paths between them, and
 - provide multiple access and analytics modalities, including novel visualization capabilities and open source analysis building blocks.
- Engage with a broad community of users, including industry, governmental organizations, and students at various levels.

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Transportation Spoke – Get Involved

- Refine “Big Data” Challenges
- Organize Workshops
- Identify additional Partners
- Identify additional Resources



Transportation Spoke – Key Contacts

- **H. V. Jagadish**, U. Michigan jag@umich.edu
- **Leaders of the Spoke Proposals**
- **Robin Gandhi**, U. Nebraska, Omaha, rgandhi@unomaha.edu
- **Ying Huang**, N. Dakota State U. ying.huang@ndsu.edu
- **Conrad Ruppert**, U. Illinois, UC ruppertc@illinois.edu
- Others please step forward!