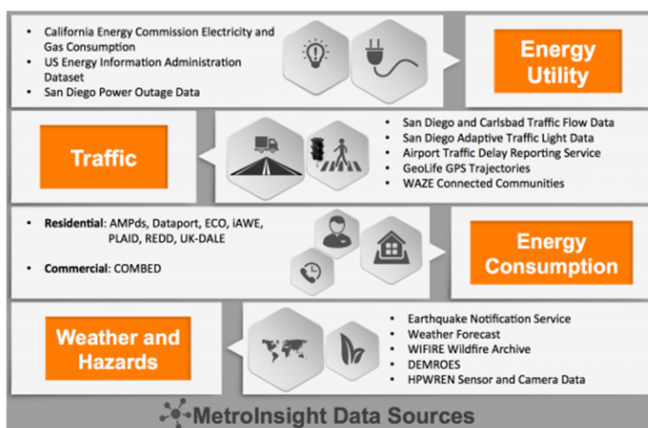


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Big Data Hub Gets a Spoke: NSF Funds Regional Approach to Big Data Challenges in the West



Four primary sources of data to be channeled into MetroInsight, including some of the priority datasets provided by public or private partners (e.g., San Diego power outage data from SDG&E).

Researchers at the University of California San Diego, UCLA, and Arizona State University are partnering on a regional effort in the western United States to enhance “knowledge discovery and real-time interventions from sensory data flows in urban spaces.” The MetroInsight project is one of 10 regional projects funded today by the National Science Foundation (NSF) to establish Big Data Spokes extending out from the four [Big Data Regional Innovation Hubs \(BD Hubs\)](#) established in 2015 in the northeastern, southern, midwestern, and western parts of the U.S.

In addition to \$10 million awarded to the 10 BD Spokes projects, NSF will make available another \$1 million across all of them for planning efforts and Early-Concept Grants for Exploratory Research (EAGER) awards to support efforts targeted at the nation’s big data innovation ecosystem.

“The West faces particular and compelling challenges such as wildfires and earthquakes,” said UC San Diego Computer Science and Engineering Professor Rajesh Gupta, principal investigator for the MetroInsight project. “In those and other critical areas, large-scale longitudinal data from environmental and other sensors can have life-or-death consequences. The NSF is counting on the Western Hub to pull together major data stakeholders across this region to produce targeted interventions and get on the same page for sharing critical data from environmental and other sources.”

Each BD Hub fosters multisector collaborations among academia, industry, and government, while also bringing together a wide range of big data stakeholders to solve regional challenges. Each Big Data Spoke (BD Spoke) announced September 28 will work on a challenge that requires big data innovations.

“The BD Spokes advance the goals and regional priorities of each BD Hub, fusing the strengths of a range of institutions and investigators and applying them to problems that affect the communities and populations within their regions,” said Jim Kurose, assistant director of NSF for Computer and Information Science and Engineering. “We are pleased to be making this substantial investment today to accelerate the nation’s big data R&D innovation ecosystem.”

The total \$11 million in funding to BD Spokes represents 10 percent of the amount NSF will invest in fiscal 2017 in Big Data research.

Rather than directing research, the West’s MetroInsight and other BD Spokes will convene stakeholders, engage end-users and solution providers, and form multidisciplinary teams to tackle challenges no single field alone can solve. MetroInsight has a specific, goal-driven mission: to build an end-to-end system for knowledge discovery using highly-dimensional sensor time-series and real-time data streams to support the metropolitan infrastructure through data-driven analytics, effective workforce development and policy support.

In short, MetroInsight aims to go beyond the deluge of all types of urban data from sensor by developing new models and methods to transform all of that information into population-level data suitable for “dynamic processing, real-time monitoring and visualization.” “We will also implement a workforce development plan by training the next generation of data scientists to analyze complex and subtle spatiotemporal dynamics of interdependent urban networks that are always changing,” explained co-PI Ilkay Altintas, Chief Data Science Officer at the San Diego Supercomputer Center (SDSC) at UC San Diego.

MetroInsight foresees developing online courses on sensor data analytics, and Altintas will be teaching the capstone class in the Computer Science and Engineering Department’s new Data Science M.S. program in the winter and spring quarters. “We envision at least two sets of capstone projects to be mentored by MetroInsight researchers,” added Altintas. “Training teams will have access to metropolitan sensor data and the predictive models to better understand the city infrastructure and sensitivity to hazards, population changes, and development.”

According to PI Gupta, “MetroInsight provides an ideal platform for capstone projects not just in the recently launched MAS program in Data Sciences and Engineering, but also in the upcoming Data Sciences undergraduate major that UCSD is getting ready to launch.”

MetroInsight will focus initially on urban data collected from metropolitan infrastructure, including sensor data for traffic, energy use, water quality, and air pollution. “The handling of such information using predictive modeling is a natural first step to gain insight and generate more value out of investments for data collection,” said co-PI Mani Srivastava, professor of electrical engineering at UCLA. “It opens the way to evidence-based decision making when managing our cities and improving social welfare.” Srivastava will also lead work on Managing Information Privacy and Policy Constraints, one of 10 ‘work packages’ to be developed by PIs and senior personnel. Researchers will also develop a Federated Data Collection and Management System (led by SDSC’s Altintas).

Altintas is also PI on the NSF-funded WIFIRE cyberinfrastructure project to improve emergency detection and response to wildfires in the San Diego region. WIFIRE’s archive of wildfire imagery and environmental information gathered through the HPWREN network of weather stations and mountain-top cameras in fire-prone areas of southern California is one of the major data sources on which MetroInsight will rely for monitoring weather and hazards in outlying metro areas.

Building a ‘system of systems’ to monitor the interconnected urban networks, MetroInsight pulls in scientists and policy-makers from area agencies that are sources of metro data from California and Arizona, while also having a stake in the four target sectors – energy, water, transportation, as well as weather and hazards – that will drive the project’s research. The universities involved in MetroInsight will collaborate closely with the cities of San Diego, Los Angeles and Carlsbad, San Diego’s city-university partnership (part of the nationwide MetroLab Network), the San Diego and Los Angeles Fire Departments, as well as L.A. Water and Power, among other agencies.

“We will undertake demonstrative case studies of traffic flow, electric-vehicle deployment, emergency response to earthquakes and wildfires, and even economic policy development,” noted UC San Diego’s Gupta. Other faculty participating in MetroInsight will include UC San Diego computer science and engineering professor Julian McAuley, UCLA mechanical and aerospace engineering professor Rajit Gadh, and Arizona State University research scientist Shade Shuttles.

In addition to metro public and emergency-response agencies, MetroInsight will also collaborate with industry partners including Qualcomm, Dell, and OSIsoft.

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