NIST Smart Grid and CPS Newsletter

June 2016

Smart Grid Community Loses One of its Leaders, Erich Gunther (1958-2016)

The smart grid community was deeply saddened last week by the untimely death of one of its pioneers, Erich Gunther.

"Erich was an exceptional talent, collaborator, and dear friend to me and many others at NIST," said Dr. David Wollman, Deputy Director of NIST's Smart Grid and Cyber-Physical Systems Program Office. "Many of us, both on the NIST Smart Grid team and in the Community Resilience Program, had the great privilege of working closely with Erich in recent years. He brought a rare combination of intelligence and passion—of head and heart—to his work, his hobbies, and, most of all, to the many communities he touched. We offer our deepest condolences to his family, his friends, and his co-workers at Enernex."

Among the many tributes appearing online last week, these two may be of special interest to the readers of this newsletter:

- Sharon Allan, President of the Smart Grid Interoperability Panel (SGIP), initiated an Erich Gunther memorial website at forevermissed.com, and many members of the smart grid community have been contributing their tributes, pictures, and stories. NIST launched the SGIP as a public-private partnership in 2009, and Erich Gunther (and Enernex) played crucial roles in its formation, growth, and evolution.
- "Smart Grid Today" established a public link to a special issue remembering Erich Gunther. The issue contains links to every story that was ever published with Erich Gunther's name in it. (There are more than 50 stories, dating back to 2009.) "The stories are open to the public and offered in honor and celebration of his life as a true leader, visionary and mentor to the smart grid industry and the broader electricity industry."

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Facility Smart Grid Information Model: Standard and User's Manual Published

With this month's publication of ASHRAE/NEMA Standard 201P, Facility Smart Grid Information Model (FSGIM), the ability of buildings and the smart grid to share information took a big step forward. The new standard provides a common basis for electrical energy consumers to describe, manage, and communicate about electrical energy consumptions and forecasts.

According to Steve Bushby, manager of the NIST Embedded Intelligence in Buildings Program and chair of Standard Project Committee (SPC) 201P that developed the standard, "the potential benefits of this standard—for both energy providers and facility owners—are very significant. In a

smart grid world, facilities of all kinds will become partners in managing the electricity grid, sometimes providing local generation and moderating loads to balance variations in renewable energy supply or meet other grid constraints. The FSGIM provides a common path forward for residential, commercial, and industrial control technologies to implement the features needed to participate in the smart grid."

Almost all electricity is consumed in a building of some kind. This standard attempts to capture the breadth and diversity of these consumers by using the term "facility" to refer to a single family house, a commercial or institutional building, a manufacturing or industrial building, or multiple buildings such as a college campus.

Among the many energy management applications enabled by this standard are potential game-changers, such as on-site generation, demand response, electrical storage, and peak demand management. The FSGIM standard may also play an important role in the emerging technologies and systems known as "transactive energy." This standard builds on and integrates with other smart grid standards, including Green Button energy usage standards, BACnet, Smart Energy Profile (SEP) 2.0, IEC's Common Information Model (CIM), and IEC 61850.

The newly published standard is accompanied by a User's Manual that provides information about how to interpret the features of the model. The manual also defines a set of anticipated use cases for facility interaction with a smart grid and provides guidance on how to apply the standard to those use cases.

The standard development process, which often requires many years, was accelerated for the FSGIM by the establishment of the Smart Grid Interoperability Panel's (SGIP) PAP-17 in 2010 (co-chairs Steve Bushby, NIST, and Dr. Martin Burns, NIST). PAP-17 played an important role by developing use cases that served as the basis for deciding what needed to be included in the model. Two standards development organizations—The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and the National Electrical Manufacturers Association (NEMA)—joined forces to move the FSGIM through the development process.

According to Bushby, "Many experts and organizations helped drive the standard development process forward. SPC 201P has had contributions from over 50 individual technical experts representing utilities, consumer interests, and manufacturers of products for residential, commercial, and industrial buildings. It's been a labor of love for many of us."

A ballot has been initiated to approve Standard 201 as an International Organization for Standardization (ISO) standard, via ISO/Technical Committee 205 Building Environmental Design. If approved, the ballot, which is expected to take several months to complete, would move the standard to publication as an ISO standard.

Both the ASHRAE/NEMA Standard 201P, Facility Smart Grid Information Model, and the accompanying User's Manual are available online at the ASHRAE Bookstore.

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Nearly 100 Action Clusters Showcase Their Projects at the Global City Teams Challenge Expo, June 13-14, 2016

The Global City Teams Challenge (GCTC) Expo—convened by NIST and US Ignite earlier this month in Austin, Texas—attracted 2000 attendees to see the latest developments in the rapidly expanding smart city sector. With more than 110 cities from 11 countries giving on-stage presentations and hosting display booths, the Austin Convention Center was, for those two days, the center of the smart city universe.

Each presentation and/or booth featured the ongoing work of a GCTC "action cluster"—a team comprising leaders and experts from municipal, technology, and academic organizations. (Copies of the presentations are available online.) Many of the action clusters included at least two cities, an aspect of the challenge designed to move the smart city community toward scalability and replicability. Some action clusters are also looking to integrate smart city technologies across

several sectors (e.g., energy, transportation, environment, emergency response, lighting, etc.). Brief summaries of each of the action clusters are available online.

According to Dr. Sokwoo Rhee, who leads the GCTC effort for NIST, the collaborative action-cluster approach is accelerating the pace of technology development and deployment. In an interview with StateScoop.com, a media site focusing on news and events in state and local government technology, Rhee said, "I'm seeing that the breaking down of silos is really working, and we think that will only continue."

Attendees at the Expo also listened to a mayoral panel, as well as keynote talks from federal and state government leaders, including former Maryland governor Martin O'Malley, who has signed on as national advisor to MetroLab Network, a group of 34 city-university partnerships focused on bringing data, analytics, and innovation to city government. The MetroLab Network, just like NIST's GCTC 2016 program, was launched as part of the White House's Smart Cities Initiative in September 2015.

Another highlight of the Expo was the announcement of the four action clusters that were selected to receive 2016 GCTC Leadership Awards:

- Connected Intelligent Transport (Portland, Oregon) - Grand Prize Winner of $20,000
- SCALE: Safe Community Awareness and Alerting Network (Montgomery County, Maryland)
- IoT-Based IDP Tracking and Monitoring System (Taraba, Nigeria)
- Hyperlocal Testbeds for Citizen Science (Boston, Massachusetts)

The GCTC Expo served as the mid-point of the GCTC 2016 initiative. In the coming months, the action clusters will continue to refine and deploy their projects, and measure progress toward goals and key performance indicators. The Challenge will culminate next year with a major Expo event, currently being planned for June 2017 in Washington, D.C.

For additional information about the GCTC program, please visit http://www.nist.gov/cps/sagc.cfm and www.globalcityteams.org.

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IoT-Enabled Smart City Framework Takes Shape During GCTC Expo Week

As the hundreds of attendees and action cluster members were packing up at the end of the GCTC Expo, a smaller group of over two dozen experts convened for an intense two-day workshop of the IoT-Enabled Smart City Framework (IES-City Framework) international technical working group (June 15-16, 2016). The meeting brought together the three working groups who are engaged in identifying pivotal points of interoperability (PPI) that are common to the dozens of smart city frameworks and platforms being developed by organizations around the world.

IES-City Framework, an outgrowth of the GCTC, is designed to distill common features from the many participating clusters. This technical analytical activity assesses the broad scope of GCTC-participating technologies and stakeholders by discovering the alignment, gaps, and overlaps of solutions. As a result, interoperable and composable smart city applications are anticipated to emerge.

According to Dr. Martin Burns, who is leading the program for NIST, the three working groups have been making excellent progress since the effort was launched in March 2016. At the workshop this month in Austin, they shared preliminary results and developed an integrated outline for the final report, which is expected to be published this autumn.

The IES-City Framework project, launched just three months ago with kickoff events in North America (Gaithersburg, Maryland) and Europe (Rome, Italy), will:

- describe the landscape of smart city applications and requirements for readiness of cities and municipalities to absorb them;

- compare and distill current architectural efforts;
- identify pivotal points of interoperability (PPI) across the many existing and deployed architectures; and
- produce a consensus framework document of common architectural features.

This framework document will help cities deploy interoperable and scalable smart city solutions that will meet the needs of their communities. It will help cities plan roadmaps to acquire these solutions for their citizens. It will help SDOs converge their efforts on smart cities and IoT. Finally, it will help vendors of products and solutions meld their offerings to allow for composable smart city deployments in the future.

Participation in the working groups and framework activity is open to anyone. For additional details, see https://pages.nist.gov/smartcitiesarchitecture/.

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Upcoming Meeting: NIST/IEEE Workshop on Timing Challenges in the Smart Grid, October 26, 2016

Registration is now open for the NIST/IEEE Workshop on Timing Challenges in the Smart Grid (Gaithersburg, Maryland, October 26, 2016). The goals of the workshop are to clearly identify and analyze:

- the practical challenges that are currently being experienced in wide-area time synchronization in current measurement and control deployments; and
- timing-related barriers that prevent the power industry from realizing future measurement and control technologies.

Dr. Doug Arnold, the IEEE 1588 Precision Time Protocol co-chair, will be chairing the event. Utilities planning to provide their perspectives on application precision timing requirements, experiences, and challenges include Bonneville Power Administration, Dominion Virginia Power, Pacific Gas and Electric, and Southern California Edison. Workshop organizers plan to initiate discussion on potential solutions and evaluate the need for standard and metrology enhancements. A NIST report summarizing the challenges of wide-area clock synchronization and potential solutions will be drafted.

The workshop steering committee has issued a call for abstracts on the following topics:

- stakeholder perspective on wide-area time synchronization needs and challenges;
- future applications requiring wide-area time synchronization and timing requirements for distributed measurement and control;
- research/practice in GPS receiver calibration and testing;
- research/practice in assembling techniques to enable fault tolerant wide-area time synchronization; and
- research/practice in deploying and testing IEEE1588 (using Power Profile or wide-area deployment).

Please submit an abstract to tsg_steering@nist.gov by July 17, 2016.

For additional details about the workshop and its organizers, please visit the workshop webpage.

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Commerce Department's National Technical Information Service (NTIS) Unveils New Joint Venture Opportunities in Data Sharing/Services

The Commerce Department's National Technical Information Service (NTIS) has published a Federal Register notice (FRN) announcing a new joint venture partnership (JVP) opportunity focused on improving access, analysis, and use of federal data. According to the FRN, NTIS is seeking proposals from potential joint venture partners "to improve access, data interoperability, search, or use of federal data and data services to drive innovation and business outcome."

Among the federal priorities likely to be supported by the new NTIS-enabled joint ventures are cyber-physical systems, smart cities, the Internet of Things. big data, open data, and open access.

Since its founding in the early 1960s, NTIS (not to be confused with NIST, also an agency of the Commerce Department) has met its mission of widely disseminating federal science and engineering information and data largely through its database of more than three million publications in 350 subject areas. As technology has evolved, NTIS has increasingly focused on providing its federal customers with online data and services, and the new JVP data program will accelerate that trend.

"We are excited about this new direction for NTIS," said Secretary of Commerce Penny Pritzker. "Finding innovative ways to utilize the federal government's expansive data resources will provide great opportunities for public-private sector collaboration."

"Data is a major currency of the 21st century," added Avi Bender, the newly appointed director of NTIS. "NTIS has unique legislative authority to match federal agencies that collect, use, and disseminate valuable data sets with highly qualified private sector partners. We want to make it easier for federal agencies to efficiently use and share their data in agile and innovative ways."

An in-person informational session and webcast to augment information in the FRN and answer questions from the public is scheduled for Thursday, July 7, at 9 a.m., Eastern Time. For location details and to register go to the NTIS homepage.

The deadline for submitting proposals is August 1, 2016.

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SGIP Update

Registration is now open for SGIP's 2016 Annual Conference, which will be held November 7-10, 2016, at the Capital Hilton in Washington, D.C. Billed as the 2016 Grid Modernization Summit, the theme is "Accelerating Transformation." The speaker program will include utility, vendor, and industry senior executives, FERC, government, regulators, national labs, and consultants. NIST staff members continue to participate actively in SGIP technical sessions and will be contributing to the conference.

SGIP and NEMA (National Electrical Manufacturers Association) hosted a June 23 webinar titled "New IPRM Standard Provides Framework for Smart Grid Testing and Certification" (archived here online). During the webinar, members of the Smart Grid Testing and Certification Committee (SGTCC)—including NIST's Cuong Nguyen, who led the committee's effort—discussed the motivation for the development of this framework, provided a high-level overview of the standard, and described the standardization process.

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