SmartAmerica Challenge

Sokwoo Rhee & Geoff Mulligan
Presidential Innovation Fellows

The Vision of SmartAmerica

Unleash the true value of various testbeds by demonstrating the benefits of interconnected Cyber-Physical Systems including improved safety, sustainability, efficiency, healthcare, and travel

The “Arpanet” for CPS Innovation
The Challenge

- Based on convergence and cross-sectorial pre-competitive collaboration using open standards, participants will demonstrate **measureable impacts** of CPS on the following topics.
  - **Fueling job creation** - development, installation, maintenance of these new Cyber-physical system components, expansion of knowledge workers
  - **Creating new business opportunities** - design and development of CPS and the management and use of data
  - **Improving the economy** - drive growth in manufacturing, expansion of the digital economy
  - **Saving lives** - through improved health systems, deployment of city and community resiliency technology and better utilization of health data

Current Participants

- More than 100 organizations are currently participating in the Challenge
  - **Industry**
    - IBM, GE, Intel, Qualcomm, AT&T, Schneider Electric, Boeing, TI...
  - **Research/Educational Institutions**
    - MIT, Harvard, UC Berkeley, Vanderbilt, U Penn, UCLA, Internet2, US Ignite, Massachusetts General Hospital, MITRE Corporation...
  - **Government**
    - NIST, DoT, DoD, DHS, HHS, Montgomery County...
Teams

- 24 team projects are currently running. Examples include:
  - Closed Loop HealthCare
  - Transactive Energy
  - Public Safety for Smart Communities
  - Smart Emergency Response Systems
  - Smart Distributed Manufacturing
  - Autonomous Vehicles working with hospital system
  - Smart Vehicle Communication
  - Event Management for Smart Cities
  - Smart Manufacturing
  - Smart Building Rooftops

AT&T and IBM SmartAmerica Initiative

Transactive Energy Management

Transactive Energy Management (TEM) provides integration and management of Distributed Energy Resources (DER). TEM uses economic signals that incorporate the valuation of both business and operational objectives along the paths of electricity delivery to create a control signal that reflects the dynamically changing system requirements at a fine-grained nodal level.

The Offering
- Holistic Transactive Energy Management solution including:
  - IBM Internet-scale Control Systems (iCS)
  - IBM Transactive Agents
  - IBM Analytics
  - AT&T M2M services and communications
  - AT&T smart grid devices and end points
  - AT&T Thin Platforms

Solution Benefits
- Make optimal use of distributed energy resources (DER) to meet both business and operational objectives
- Improve the reliability and efficiency of the electric system
- Reduce requirement for spinning reserve to balance renewable intermittency
- Enable horizontal interoperability between highly heterogeneous devices and organizational entities along the electricity supply chain
- Management of the extremely heterogeneous energy assets in the system, and also create aggregations of assets such as microgrids
- Enable new business models and access to value streams throughout the supply chain (including for customers)

Target Audience
- Public or private sector organizations which are part of the electric supply chain—such as bulk generation producers, system operators, transmission operators, distribution utilities, services providers (such as aggregators)

Additional Impacts
- Energy Savings
- Empowered consumers
- Job creation associated with the innovation and production of TEM technologies
Closed Loop Healthcare:
Home to Hospital to Home

Home sensors monitor patient’s vital signs and activity level before and after hospital visit.

Patient data stored in the cloud.

Family member accesses patient data from the cloud, sees reason to check in or seek medical treatment.

Hospital accesses data from the cloud & adverse events are prevented using smarter technology in an integrated clinical environment (ICE).

Smart Emergency Response Saves Lives

Mission Command

Team Lead: Justyna Zander, MathWorks Research, 3 Apple Hill Dr., Natick, MA 01760, USA. Contact: dr.justyna.zander@ieee.org.
14% of U.S. traffic fatalities were incurred by pedestrians in 2011

Honda & Qualcomm collaborated to extend existing V2V development to the new area of vehicle-to-pedestrian (V2P) safety

**Vehicle-to-Pedestrian CPS Safety Concept**

**Next Steps**

- **Smart America Summit (June, 2014)**
  - Showcase projects and teams, demonstrate achievements, make announcements.
  - 3 days: June 10-12 (White House, Expo, NIST)
- **Global Cities Challenge**
  - Planned Launch Fall 2014
  - Move from demonstrations to deployment
  - City teams working with technology innovators to reduce the time and cost of smart cities deployments
Need for Consensus CPS Definition and Reference Architecture

- Provide a common lexicon and taxonomy that can apply across CPS
- Show a common architectural vision to help facilitate interoperability between components and systems
- Enable creation of reusable CPS components and tools to measure and evaluate their performance
- Promote communication across diverse stakeholder community
NIST CPS Public Working Group
Deliverables

- Definitions & Taxonomies
- Requirements & Use Cases
- Security & Privacy
- Reference Architecture
- Technology Roadmap

NIST CPS Public Working Group
Subgroups

<table>
<thead>
<tr>
<th>Co-Chairs</th>
<th>Definition, Reference Architecture</th>
<th>Use Cases</th>
<th>Cyber Security</th>
<th>Timing (Coordinated Effort with Boulder Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIST</td>
<td>Abdella Battou</td>
<td>Eric Simmon</td>
<td>Vicky Pillitteri</td>
<td>Marc Weiss</td>
</tr>
<tr>
<td>Academia</td>
<td>Janos Sztipanovits</td>
<td>John Baras</td>
<td>Bill Saunders</td>
<td>Hugh Melvin</td>
</tr>
<tr>
<td>Industry</td>
<td>Steven Mellor (IIC)</td>
<td>Steven Mellor (IIC)</td>
<td>CSRA</td>
<td>Sundeep Chandhoke</td>
</tr>
</tbody>
</table>
NIST CPS Public Working Group
Anticipated Timeline

• Inaugural Virtual Meeting:
  – June 2014
• First Draft Documents from Subgroups:
  – Fall 2014
• Second Draft, Integrated Subgroup Inputs
  – Winter 2015
• Publication of Results
  – Spring 2015