



SmartAmerica Challenge

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Cyber-Physical Systems



- ▶ Integrated, hybrid networks of cyber and engineered physical elements
- ▶ Co-designed and co-engineered to create adaptive and predictive systems
- ▶ Respond in real time to enhance performance

Examples:

- Internet of Things (IoT)
- Smart Grid
- Network-enabled Healthcare Solutions
- Smart Robots/UAVs
- Autonomous Vehicles & Traffic Management Networks
- Advanced Manufacturing Plants
- Emergency Response Networks



The Vision of SmartAmerica

Demonstrate the benefits of interconnected Cyber-Physical Systems including improved safety, sustainability, efficiency, healthcare, and travel.



The Issue

Despite significant progress for years in Cyber-Physical Systems research and development, there is still a gap between R&D and nation-wide, across-the-board adoption of Cyber-Physical Systems in our daily life.

Many CPS deployments are sector-specific and fragmented, and do not show their true potential of ***tangible and measurable impacts***



The Approach

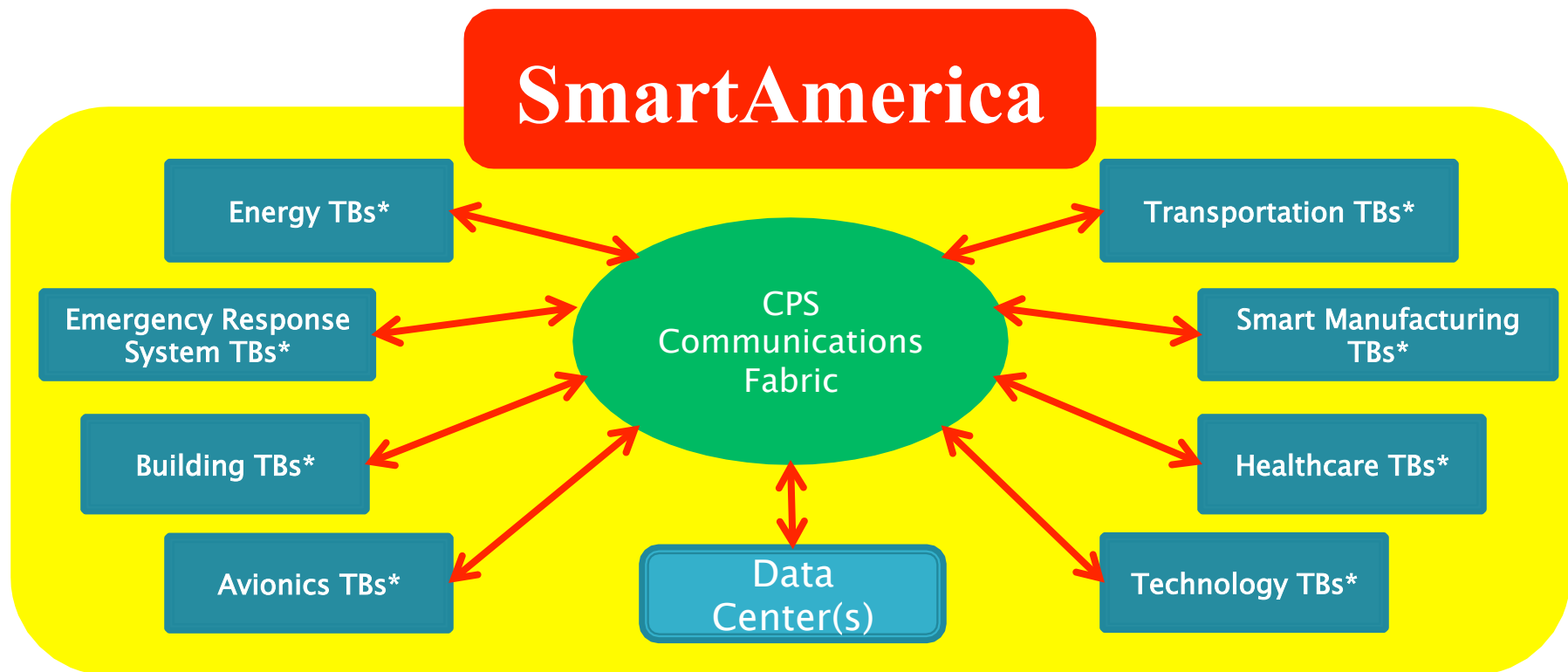
Build an integrated Cyber-Physical Systems that allows interconnection of test beds and interoperation through shared data and associated data analytics for easy integration and accelerated adoption of CPS applications.

The “Arpanet” for CPS Innovation



Smart America Overview

“Open, secure, high-confidence and collaborative CPS network “



* TBs : Testbeds can be research driven and/or commercially-driven



Process

Given a set of real CPS test beds

Define a “scenario” that connects and operates ***cross sector*** test beds
and
Build it to show the benefits of interconnected CPS.



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.
 - Saving lives - through improved health systems, deployment of city and community resiliency technology and better utilization of health data
 - 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



Examples

- ▶ More than 20 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



Stakeholders

- More than 100 organizations are currently participating in the Challenge
 - Multi Industry
 - Auto, Health, Energy, Buildings, ...
 - Multi Agency
 - NIST, NSF, DoT, DoD, DHS, DoE, ...
 - Key functions:
 - Healthcare – e.g. Smart Hospitals
 - Transportation – e.g. V2V and V2I, Autonomous Vehicles
 - Utilities – e.g. Smart Grid
 - Manufacturing – e.g. Robotics, Smart manufacturing
 - First responders – e.g. Emergency Response



Summary

- SmartAmerica Challenge will:
 - Create new investment opportunities by demonstrating new CPS application scenarios and business models
 - Catalyze innovation by encouraging cross-sector collaborations and public-private partnerships
 - Identify gaps
 - Present model cases of the collaboration among CPS stakeholders from different sectors and show their benefits and impact.



The Kick-off Workshop

- December 12, 2013 at the White House
- More than 60 organizations from industry, academia, and government participated.
- Participants brought in “Lego blocks” (CPS test beds, networking technologies, data analytics, etc.) and discussed ideas of collaborative application scenarios.
- Presented examples of framework and application scenarios
- 12 distinct projects created in the fields of Healthcare, Emergency response, Transportation, Security, Energy, Public safety and resilience



The Tech Jam

- ▶ February 11, 2014 at NIST
- ▶ Speeches from NIST leadership and OSTP
- ▶ More than 150 attendees participated
- ▶ 18 team projects presented with status update
- ▶ Breakouts for team work and new team formations
- ▶ 2~3 new projects formed
- ▶ Next step: Crystalize the scenarios and prepare for the amazing set of demonstrations in May/June to show the power of CPS to invigorate jobs and economy



Timeline

- Kick-Off Workshop at the White House (Dec 12, 2013)
- Tech Jam at NIST (Feb 11, 2014)
- Smart America Summit (June 2014)
 - Demonstrate the achievements and announce the results
 - Planning multi-day events

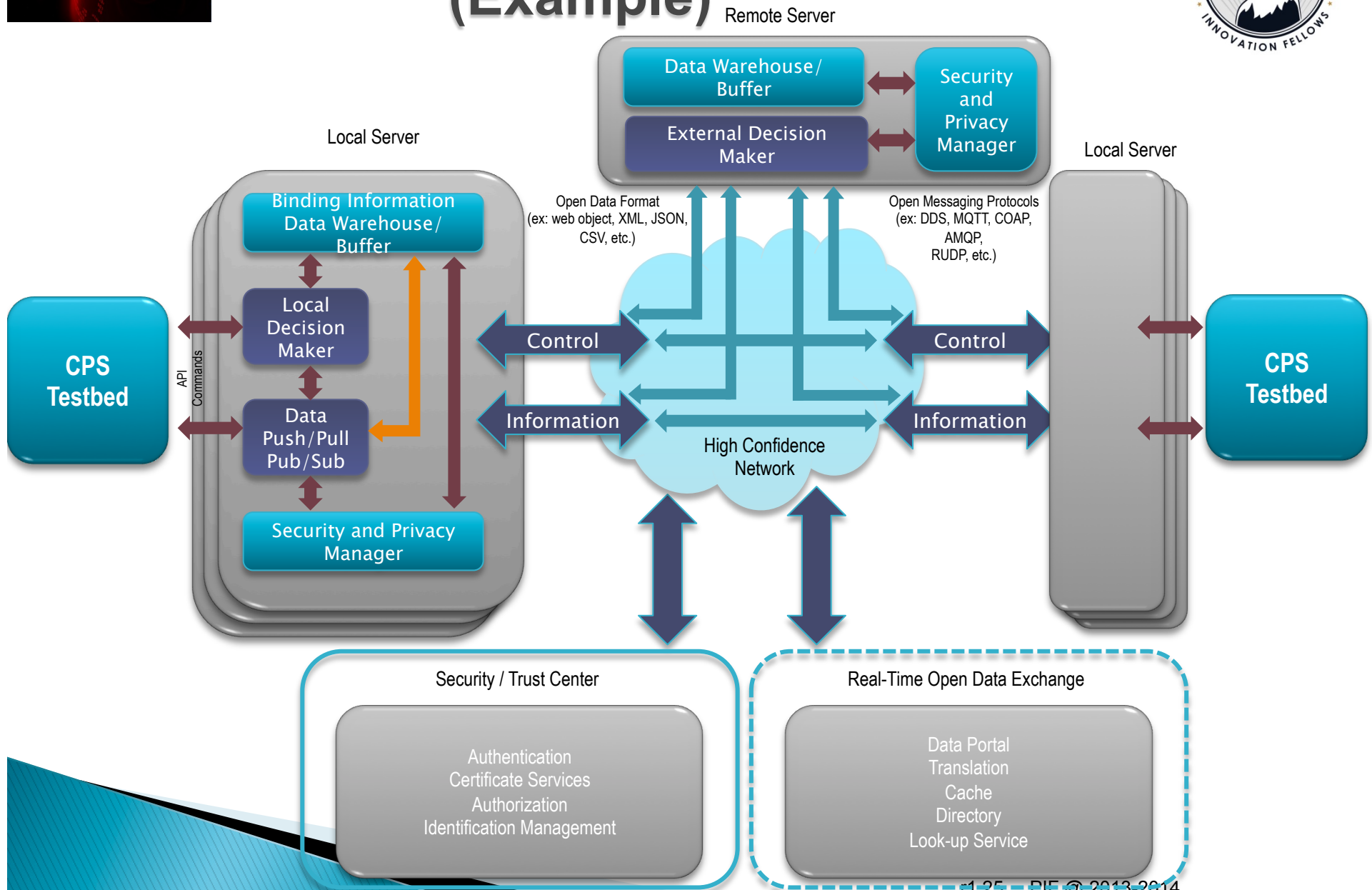


Technical Framework

- High Confidence Network (“CPSnet”)
 - High speed, low latency, high determinism, resiliency
- Security
 - Private and secure communication
- Communications Stack
 - Open standard protocols (IP Suite)
- Data Architecture
 - Open, easy-to-use application protocol and semantic structure



SmartAmerica Architecture (Example)





Contact Info

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SmartAmerica Challenge official website

- ▶ <http://www.nist.gov/el/smartamerica.cfm>