



# 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

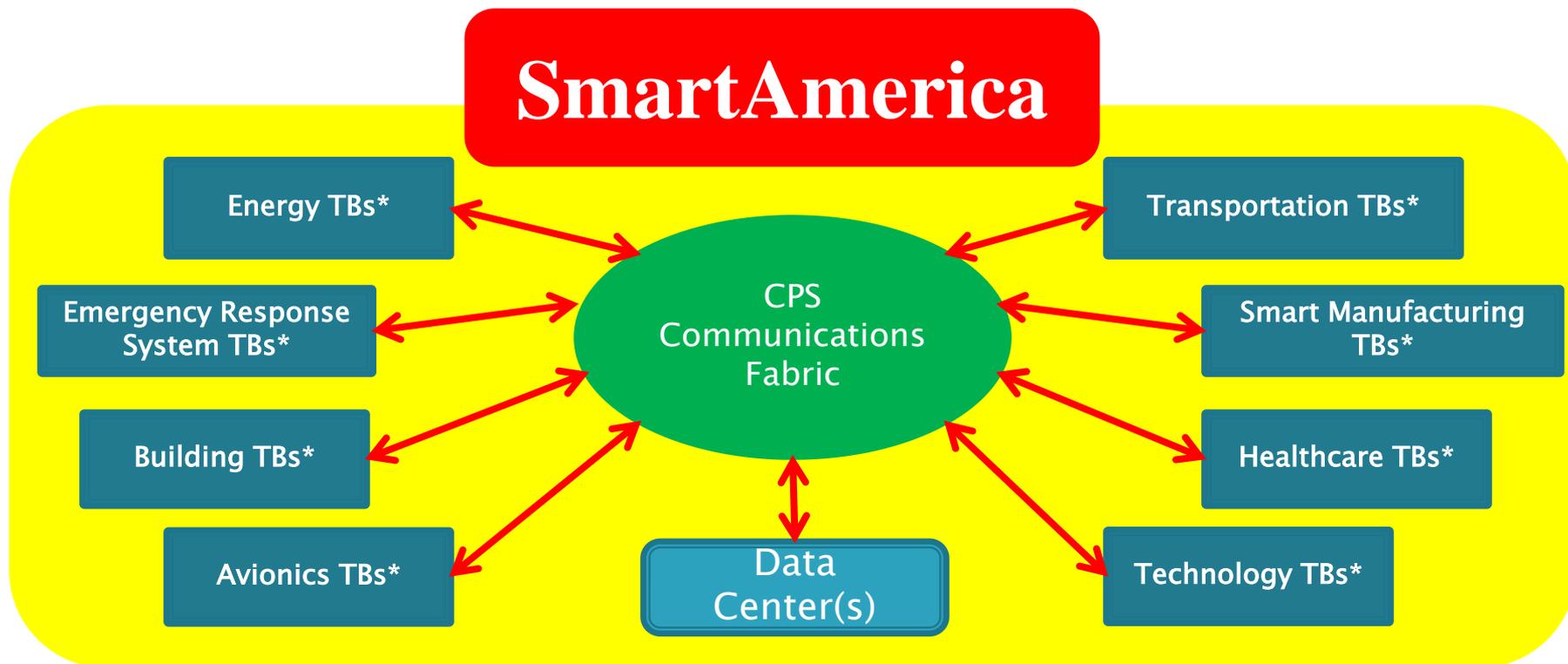
Build an integrated Cyber-Physical Systems that allows interconnection of test beds and interoperation through shared data and associated data analytics for easy integration and accelerated adoption of CPS applications.

*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



# Current Participants

- ▶ **Industry**
  - IBM, Intel, Qualcomm, AT&T, Schneider Electric, GE, Philips, UTRC, Boeing...
- ▶ **Research/Educational Institutions**
  - MIT, Harvard, UC Berkeley, Vanderbilt, U Penn, UCLA, Internet2, US Ignite, Massachusetts General Hospital...
- ▶ **Government**
  - NIST, NSF, DoT, DoD, DHS, Montgomery County...



# 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

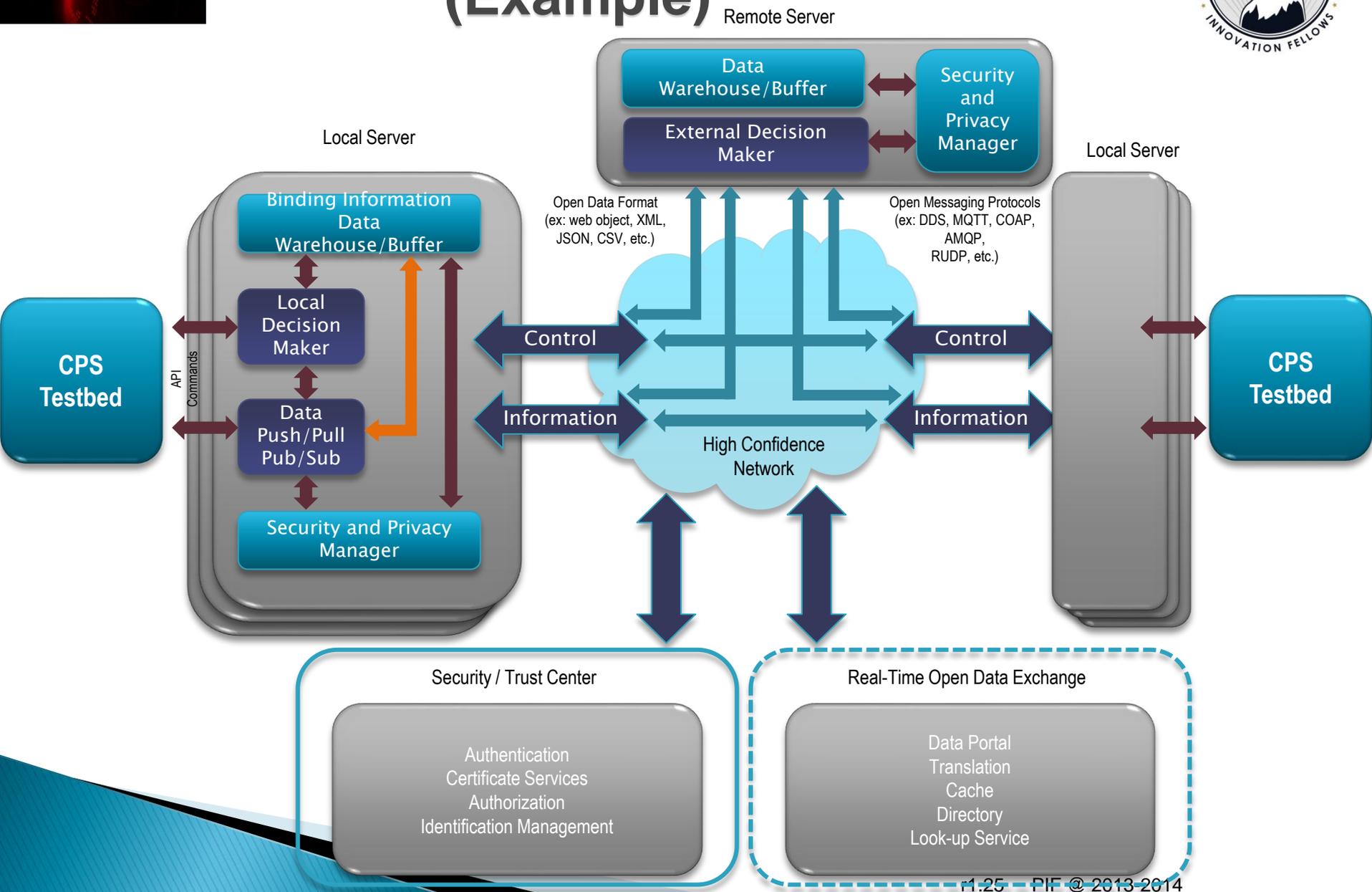


# Technical Framework

- 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

## White House Presidential Innovation Fellows

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## SmartAmerica Challenge official website

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