Internet2 CINO Internet of Things (IoT) Working Group Collaborative Innovation Community Meeting

9 November 2015

Chairs
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Meeting Objectives

- TechEx Update
    - IoT Innovation Working Group Meeting Update
    - TechEx Collaborative Innovation Community Big Idea Hackathon Meeting & Lunch Results
- IoT Working Plan Update
- IoT Sandbox Next Steps
- E2ET&S for IoT Workshop Update
- Smart Cities/Campus Focus Group
- Next Steps

Innovation Working Group Meeting at TechEx on October 5, 2015

Agenda

- Welcome and Introductions

    - Review of the Collaborative Innovation Community

- Status of Current Plans & Next Steps
- IBM Bluemix/Indiana University IoT Sandbox Demo
- Other Innovations
- Closing

- *Entire presentation can be found on the Wiki, IoT Homepage*

    - *http://bit.ly/1KFAwir*

Collaborative Innovation Community Big Idea Hackathon Meeting & Lunch at TechEx on October 6, 2015

- Agenda
    - Welcome and Introductions
        - Review of the Collaborative Innovation Community
        - Big Idea Hackathon Overview and Process
    - Big Idea Hackathon Brainstorming
    - Presentation of Big Idea Hackathon Ideas
    - Closing

- Results:
    - IoT Taxonomy recommendation
    - Humanists/Digital Humanities Focus
- *Output can be found on the Wiki = http://bit.ly/1Owk5c4*

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IoT Working Group Plan (Page 1 of 2)

Initiative/Use Case	Description	Plan
Smarter Cities / Campuses: **Smart Grid with E2E IoT Trust & Security Architecture** **Building & Wireless Waterways Testbed** **Electric Vehicles**	Use of the Internet2 network to enable research on smart grid communication and collaboration, to extend to smarter cities Collaboration between the Port of Pittsburgh Commission, University of Pittsburgh, and Internet2 to bring cyberinfrastructure as a service to researchers	• Draft whitepaper (available on our Wiki: http://bit.ly/1iJ0N5V) on opportunity to leverage the Internet2 network for Smart Grid R&D with End to End Trust & Security • Collaborating with NIST, member universities and utilities on how to best leverage the Internet2 network as a Smart Grid testbed • Consider demo using SDN for IoT authentication, configuration, and security
End to End Trust & Security Open Architecture for IoT	Create a point of view and recommended next steps to develop a comprehensive End to End Trust & Security Open Architecture for the Internet of Things	• Workshop 1Q16 in cooperation with IEEE, NSF, and George Washington University

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IoT Working Group Plan (Page 2 of 2)

Initiative/Use Case	Description	Plan
IoT Sandbox and IoT Stack	Determine the components of IT infrastructure for IoT enablement and create a sandbox environment for university researchers to test and pilot	• Develop IoT Sandbox technical model and business model for IoT collaborative development, with IBM and extend to others • Demo and Pilot Deployment (4Q15)
Power Over Ethernet	Provide overview and practical examples of Power Over Ethernet and how it relates to IoT, including PoE devices, capabilities, campus facilities that can be part of PoE, and funding sources	• Develop whitepaper (4Q15)
Internet of Medical Things	How to best leverage – securely – IoT for medical devices	• Develop plan for Healthcare / Life Sciences including Internet of Medical Things (2H15)
IoT Taxonomy	Determine a common definition for IoT	• Develop white paper that includes taxonomy and matrix of domain applications

Building & Testing IoT Solutions BOF at TechEx on October 6, 2015

- Welcome and Introductions
- Technologies available to support university research in IoT
  - Researcher Support through Microsoft, OSIsoft and Neal Analytics
  - Early IoT experiences with IBM BlueMix and IoT Foundations
- Some campus perspectives on developing and deploying IoT Solutions
- Q&A and Open Discussion

IoT Sandbox Next Steps

- Additional university participation expressed during TechEx
  - Yale
- Engaging with other industry players to expand IoT Sandbox
  - Microsoft (Presented at TechEx *http://bit.ly/1MqvwSL*)
  - Amazon
  - Cisco
  - Maybe also some potential new members
    - Google
    - Apple regarding ResearchKit or HealthKit
    - OSIsoft (Presented at TechEx *http://bit.ly/1MqvwSL*)
    - Others
- Potential to create an Innovation portal for access to IoT Sandbox

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E2ET&S for IoT Workshop Overview

- *Full DRAFT proposal available on the IoT Wiki (http://bit.ly/1KDleHu)*
- **Goal**: For researchers, IT architects and security professionals from industry, government and academia to discuss and agree the scope of an end to end trust and security open architecture for IoT, resulting in a report out and point of view with recommended next steps.
- **Target audience is 100 to 150 attendees representing**:
  - Universities including researchers, IT, IoT, CISO
  - Agencies including NSF, NIST, DHS, DOE, OSTP
  - IoT related Standards Organizations including IEEE and IIC
  - U.S. Regional Research & Education Networks (e.g., NYSERNET)
  - Industry Players such as IBM, Cisco, ARM, Intel, STMicro, Medtronic (not just members)
  - Internet2 staff and Collaborative Innovation Community (E2ET&S, IoT, DBDA WG's)
- **Pre-work**: There will be a call for presentations to deliver during the workshop.

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E2ET&S for IoT Workshop Logistics

- Planning a 2 day event in conjunction with IEEE, NSF, and George Washington University

  - Day 1 - Deep technical workshop on E2ET&S for IoT open architecture needs, viewpoints, use cases. Co-sponsored by IEEE, Internet2, NSF, GWU, perhaps more

  - Day 2 - IEEE ETAP ([Experts in Technology and Policy](#)) – IEEE Invitation Only

- Dates: February 4 & 5, 2016

- Location: George Washington University, Marvin Center, Washington, DC

- Potential for follow on workshops

  - UW-Madison potentially May 2016 timeframe

  - Marshall University

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Smart Cities as a focus group to establish shared value and learnings across use cases

SMART CITY CONCEPTS
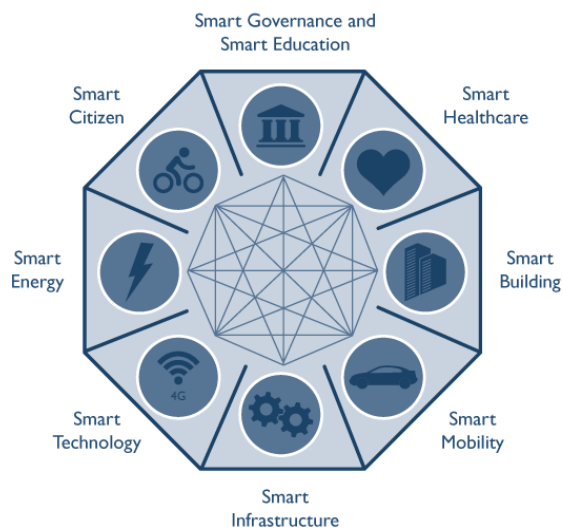
Source: Frost & Sullivan

The White House announced a "Smart Cities" initiative in September 2015 to help communities tackle key challenges

- $160M in new investment identified
  - $35 million new grants and $10 million investments by NSF and NIST for Smart Cities research infrastructure
  - $115 million by DHS, DOT, DOE, DOC, EPA for safety, energy, climate preparedness, transportation, health
  - Multi-city collaborations for 20+ cities including 20+ Internet2 university members and 4 industry members

- Key strategies include
  - Creating test beds for "Internet of Things" applications and developing new multi-sector, intercity collaborative models
  - Leveraging existing Federal activity
  - Pursuing international collaboration

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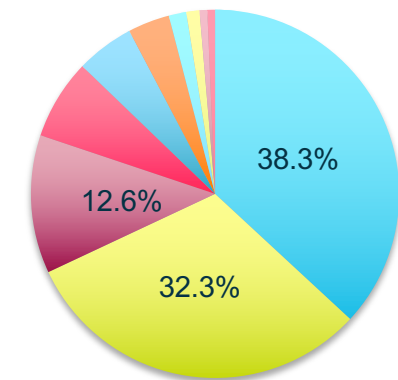# Smart Campuses are a form of Cities, and enable Smart Communities

Smart Campuses are in themselves Smart Cities

- Smart Campus initiatives can enable American College & University Presidents' Climate Commitment (ACUPCC) to deliver results
  - Reduce GHG emissions, educate, create solutions, lead by example
  - 22% (151) of 679 ACUPCC signees are Internet2 members
- Smart Campuses can be testbeds for Smart Cities and Communities
  - Measure, monitor, model, manage to reduce energy/water usage
  - Increase in situ renewable energy leverage

Research universities are enabling smarter cities and communities, for urban and non-urban environments

- Smart cities, communities, waterways, public safety, transportation
- Case Western, NYU, Pittsburgh, Rice/Houston, UCSD, University of Chicago, UWMadison, 20+ Internet2 member universities as announced by the White House "Smart Cities" initiative

Average Net Emissions of Doctorate Granting Universities

- Purchased Electricity — 38.3%
- Stationary Combustion — 32.3%
- Commuting — 12.6%
- Air Travel
- Custom Sources
- Purchased Steam
- Solid waste
- Mobile Combustion
- Fugitive emissions
- Purchased Cooling

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Establishing Smart Grid Testbeds

Project Plan
- *December 2015* – Outreach to Internet2 members and potential sponsors; additional some communication with the PSERC meeting in early December
- *January and February 2016* – Broaden partner list and create a Smart Grid research focus group to help with testbed requirements. Identify potential funding sources from federal agencies or possibly industry sponsors, notably electric utilities and the Electric Power Research Institute (EPRI).
- *March through June 2016* – Organize proposal teams and develop initial research proposals including Internet2 network and associated services as the basis of Smart Grid testbeds.

Full project plan will be available on the **IOT/Smart Grid Wiki,
http://bit.ly/1iJ0N5V**

Next Steps

- Develop invitations and call for presentations for E2ET&S for IoT Workshop invitees – by Nov 30
    - Internet2 Collaborative Innovation Community – IoT, E2ET&S, DBDA WG's
    - IEEE P2413 and IEEE IoT initiative
    - Agencies – NSF, NIST, OSTP, DHS
- Upcoming participation in the Cisco IoT World Forum, Dubai, December 8
    - Internet2 hosting panel on IoT Collaborative Innovation (http://www.iotwf.com/)

        Participants include: Raj Veeramani (UWMadison), Victor Reijs (HEAnet); Gaya Srinivasan (IBM), Oleg Logvinov (IEEE)
- Smart Campus focus group participation – to begin 1Q16
    - Pitt, Princeton, UWMadison expressed interest
    - Invite participants in US Government Smart Cities initiatives
- IoT Sandbox participation – let us know if you want to participate
- Smart Grid testbed – let us know if you want to participate

Innovation Working Group Operations Timeline: 2015 – Startup year

1Q
- Member survey on open collaborative innovation ideas

2Q
- Announce working groups based on member survey
- Attract co-chairs and members
- Working Groups Startup
- Monthly meetings
- Gather use cases

3Q
- Cross-working group discussions
- Develop plans: tactical & strategic

Tactical outcomes
- E2ET&S SDP Webinar
- IoT Sandbox

4Q
- TechEx in-person meetings to discuss recommendations
- Gather new input

Strategic Planning
- Smart grid testbed
- E2ET&S for IoT
- Healthcare/Life Sciences

Innovation Working Group Operations Timeline: 2016 – We evolve and grow

1H
- *E2ET&S for IoT workshop(s)*
- *Smart Grid testbed planning*
- *Smart Campus focus group*
- *Expand IoT Sandbox*
- Develop Healthcare/Life Sciences (HCLS) strategy with DBDA
- Develop DBDA Digital Humanities/Humanists strategy
- Increase researcher engagement
- Continue education & awareness for new innovation opportunities

2H
- *Assess/extend Sandbox approach*
- *Smart Grid & HCLS testbeds*
- *Smart Campus enablement*
- *Continued IoT and DBDA strategy development*
- E2ET&S collaboration across extended community
- HCLS strategy execution
- DBDA Digital Humanities strategy continuation
- Constant market insight gathering
- Innovation input from community

Ongoing Community Input

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Questions & Answers…
Thank You
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