

# IoTAB Smart and Critical Infrastructure Sub-WG Notes

## Smart and Critical Infrastructure End Customers / Use Cases [All]

- CISA Sector Needs and Use Cases
- City and Municipality Needs and Use Cases
- Opportunities and barriers (e.g., Tech vs. Contractors)
- Building systems, Energy sector (i.e., Electric Utility Infrastructure), water and wastewater utilities, etc as defined by CISA critical sectors
- Electrification, Digitalization, Mobilization, Environment, Workforce
- **ACTION:** Identification of use cases through Federal agencies that are leads on critical infrastructure sectors, vendors supporting government owned infrastructure, industries owning infrastructure

## Typical Industrial Environments [Steve, Tom, Pete, others TBD]

- Opportunities
  - Improve Factory Automation and Operating Efficiency
  - Boost Productivity, Streamline Production, Manage Downtime
  - Leverage sensors and AI to increase protection and prevent failures
  - Establish real time monitoring and insights to improve profitability
  - **Address the labor shortage**
  - Similarity between general infrastructure improvement and specific industrial improvement
  - Similar capabilities needed by non-manufacturing critical infrastructure sectors and those needed in manufacturing/general industrial environments
- Barriers to Adoption
  - Consumer IoT is very different than Industrial IoT (need to outline contrast) (note that GAO report failed to make this detection)
  - Personal data vs. Machine data and difference in use cases
  - Legacy systems (IPC, PLC, SCADA, I/O, Sensors) and vulnerabilities
  - Security, interoperability across wide variety of Industrial devices
  - **Workforce skillsets for digital**
  - Other TBD (Please add)
- Holistic Issues – Convergence of IT-OT systems and relation to the supply chain

## Typical City Environments [Benson, Nicole, Steve, others TBD]

**STEVE-** we are talking about smart cities in the Smart Traffic and Transit Technologies Subgroup)

Examples: Columbus, OH- winner of the US DOT Smart City Challenge: <https://smart.columbus.gov/about> )

New York City (<https://edc.nyc/industry/smart-cities/>)

Singapore? (<https://www.smartnation.gov.sg/> )

- Opportunities
  - **Increase internal efficiency and productivity; free up staff and resources to work on other projects**
  - **Support key initiatives around ESG, equity, accessibility/inclusion**
  - **Improve city/community preparedness, responsiveness and resiliency against a variety of events – public safety, health, disaster, etc.; improve speed of response to events**

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- Increase and improve quality of services to community (extend availability of services to more people, responsiveness to calls, etc.)
- Increase proactiveness and responsiveness to community needs (new services, faster response, etc.)
- Increase efficiency of city for the residents; reduce operating costs
- Barriers
  - Lack of knowledge and education for the public/residents of city
  - Legacy infrastructure / Outdated and disparate IT infrastructure
  - Departmental/agency silos – don't have a reason to work together
  - Limited budgets and funding sources
  - Privacy fears – especially concerns around cameras and how the camera and imaging data will be used (e.g., license plate readers); questions about equitable treatment from the data; application of face recognition and tracking technology
  - Limited/lack of digital infrastructure/connectivity in some parts of the city (digital divide) –
    - Availability
    - Affordability (IoT for the masses not just the “elite”)
    - Accessibility / access to services
    - Rural v. city infrastructure – lack of broadband / fiber in rural areas
  - Lack of a central innovation vision/piecemeal approach to smart cities (due to silos)
  - Long procurement cycles (“you could go out of business selling to government”); typically two year budget cycle
  - Resistance to change (culture, work overload, “owned” by multiple departments, policies, unions, etc.)
  - Limited appetite → “no one gets elected for building a smart city”; get elected for being responsive
  - Return on investment vs. return on community vs. return on X (X = equity, etc.)
  - Interoperability (across multiple jurisdictions, as well as internal) – e.g. traffic signal systems,
  - Long cycle to get things done – community engagement, regulations, right of ways, etc.
- Holistic Issues
  - Limited budget availability for innovation
  - Smaller cities have no/limited innovation (and sometimes IT) capabilities
  - Workforce/staff lacks the new digital skills (analytics/data science, programming, etc.)
  - Procurement processes/policies/practices designed for more established products/services
  - No “smart city” owner within a city (CIO <> smart city owner)
  - Community facing considerations – accessibility/inclusion, privacy, equity
  - Designed for long lifecycles – 30 years+, maintenance considerations, reliable and predictable
  - “Inertia” – slow to act (unless emergencies), more focused on stability and provide consistent and reliable services over long periods of time
  - Different jurisdictions in a city have ownership of assets, right of ways, responsibilities (regional agencies like air quality, transportation, sanitation, utilities, highway, railways, etc.)
  - Pension timebomb – crowding out limited budget availability; can affect city services

### Barriers and Opportunities for Suppliers for the above Environments

- Industrial IoT Supplier Business Challenges
- Silos across BUs of systems and software
  - Need incentives for environments to be integrated
- Digitalization and Digital Transformation Opportunities
- Becoming a smart-connected IIoT Supplier

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- Barriers to adoption, deployment and growth
- Dependence on vulnerable Hardware (no chip security)
- Barriers, Cost and ROI of migrating brownfield environments

### Potential Speakers (or contributors of reference material)

- Darryl Haegley
- Joe Weiss
- Execs from Schneider, Rockwell, etc.
- Michael Dunaway, PhD
- David Wollman, PhD
- Ian Magazine
- Karen Lightman
- Samuel Navarro
- Michael Berkholtz
- Kent Hibben
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### References (also add URLs)

- [McKinsey & Co Leveraging Industrial IoT and advanced technologies for digital transformation](#)
- [NIST Special Publication 1900-206 Smart Cities and Communities: A Key Performance Indicators Framework](#)
- Market research reports on IIoT, investments, etc.
- The Next Pandemic Could be Digital, Rick Switzer

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## Pete Tseronis Feedback (Context Establishment)

### [Resources](#)

#### The Global Community Technology Challenge (GCTC) Strategic Plan 2023-2025 (DRAFT)

This draft GCTC Strategic Plan is based on the concept that a “Smart City” is a community ecosystem in which advanced technologies are adopted in order to increase the efficiency, availability, and accessibility of city services with the goals of improving city operations, enhancing public safety and community resilience, equitably distributing economic and social benefits, and improving overall quality of life for residents. The principal goal of this program is to support the ability of any community, municipality, or region in achieving its vision for public-focused innovation through the application of advanced technologies.

- [Part I](#)
  - A strategic plan for the NIST Smart City Infrastructure (SCI) program that manages the GCTC as a component of the Smart Connected Systems Division (SCSD) of the NIST Communications Technology Laboratory (CTL)
  - principal objectives
    - Continue developing the GCTC as a national and international public-private partnership with federal agency sponsorship dedicated to the development, testing, and integration of advanced technologies for cities and communities
    - Establish a research-based, scientific foundation for the Smart City Infrastructure program and the GCTC—in collaboration with other NIST research programs and operating units—with emphasis on measurement and assessment of outcomes of technology integration within smart cities
    - Broaden the definition and R&D agenda of “Smart Cities” to include rural areas and smaller municipalities, and to address current challenges of smart connected systems in order to achieve a more equitable distribution of outcomes and benefits to communities and residents.
- [Part II](#)
  - provides a corresponding 3-year plan for the GCTC organization developed through a consensus planning process involving a team of community and technology leaders of the GCTC program
  - offers a community-focused perspective on the national Public-Private Partnership spanning smart cities and supports the federal (NIST) program described in Part I of this document
  - the strategy outlined in Part II is based on a series of Strategic Planning Workshops held in 2022 among the leadership of the GCTC Technology Sectors who, collectively, represent over 220 U.S. and international community-based Action Clusters, organized into the following twelve technology sectors:
    - Transportation systems, vehicles, and autonomy
    - Data governance and city data platforms and dashboards
    - Wireless communications and broadband applications
    - Cybersecurity and privacy for public and private sectors
    - Public safety and security, and mission critical communications
    - Community resilience, adaptability, and sustainability
    - Public utilities for energy, water, and waste management
    - Agriculture and rural productivity and quality of life
    - Smart building technologies and IoT applications
    - Education and workforce development
    - Smart Regions and collaboration strategies
    - Community well-being: Diversity, Equity, Integrity, and Trust (DEI&T)

### Outreach and Communications Platforms

- [ACT-IAC Smart Infrastructure Working Group](#)

The IoT Smart Infrastructure Working Group was created to provide an authoritative resource for government agencies looking to understand and incorporate IoT and Smart Technologies into their organization. This working

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group has two (2) functions: 1) provide a venue where members can hear about the latest in IoT/Smart Tech and 2) develop resources for adoption and use of this technology in government

- **NIST IoT Devices and Infrastructure Group**

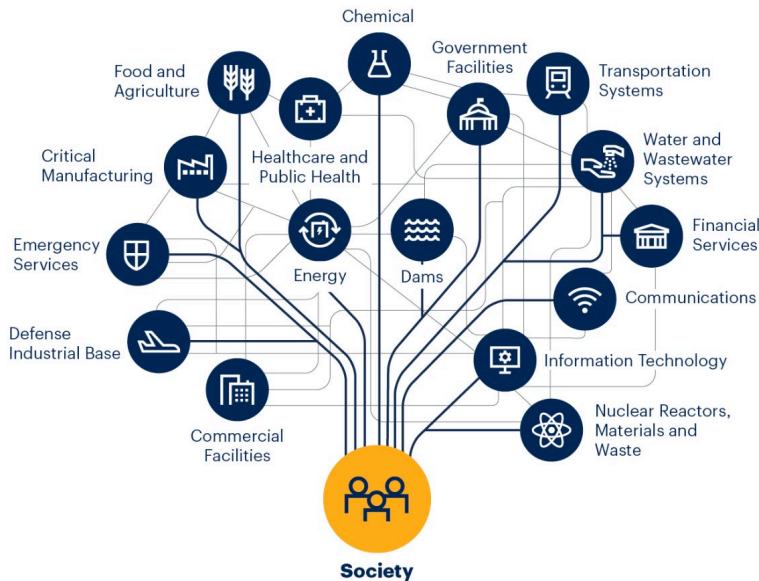
Cities and communities across the globe are seeking to deploy advanced technologies such as Cyber-Physical Systems (CPS) and Internet of Things (IoT) to improve the quality of life for their residents. Such a system involves cyber-networking devices and other supporting systems working with physical infrastructure. When applied to transportation, health care, utilities and other sectors, these CPS and IoT could expand and improve services, promote economic growth, and enhance quality of life.

- **Dots and Bridges Thought Leadership Consortium**

Intimate, interactive, and visionary forums, e.g., webcasts, networking events, roundtables, celebrating Government, Commercial, and Academic luminaries intended to raise awareness, share insights, and cultivate relationships

### U.S. Department of Homeland Security: Cybersecurity Infrastructure Security Agency

- The 16 critical infrastructure (CI) sectors are those whose assets, systems, and networks, whether physical or virtual, are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof.



- The fifty-five (55) National Critical Functions (NCFs) are functions of government and the private sector so vital to the United States that their disruption, corruption, or dysfunction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof. The set of NCFs are organized into four areas—connect, distribute, manage, and supply—which identify the:
  - Connections by technologies that enable critical communications and capabilities to send and receive data (e.g., internet connectivity),
  - Distribution methods that allow the movement of goods, people, and utilities inside and outside the United States (e.g., electricity distribution or cargo transportation),
  - Management processes that ensure our national security and public health and safety (e.g., management of hazardous material or national emergencies), and
  - Supplies of materials, goods and services that secure our economy (e.g., clean water, housing, and research and development).

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CONNECT 	DISTRIBUTE 	MANAGE 	SUPPLY 
<ul style="list-style-type: none"> <li>▪ Operate Core Network</li> <li>▪ Provide Cable Access Network Services</li> <li>▪ Provide Internet Based Content, Information, and Communication Services</li> <li>▪ Provide Internet Routing, Access and Connection Services</li> <li>▪ Provide Positioning, Navigation, and Timing Services</li> <li>▪ Provide Radio Broadcast Access Network Services</li> <li>▪ Provide Satellite Access Network Services</li> <li>▪ Provide Wireless Access Network Services</li> <li>▪ Provide Wireline Access Network Services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Distribute Electricity</li> <li>▪ Maintain Supply Chains</li> <li>▪ Transmit Electricity</li> <li>▪ Transport Cargo and Passengers by Air</li> <li>▪ Transport Cargo and Passengers by Rail</li> <li>▪ Transport Cargo and Passengers by Road</li> <li>▪ Transport Cargo and Passengers by Vessel</li> <li>▪ Transport Materials by Pipeline</li> <li>▪ Transport Passengers by Mass Transit</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conduct Elections</li> <li>▪ Develop and Maintain Public Works and Services</li> <li>▪ Educate and Train</li> <li>▪ Enforce Law</li> <li>▪ Maintain Access to Medical Records</li> <li>▪ Manage Hazardous Materials</li> <li>▪ Manage Wastewater</li> <li>▪ Operate Government</li> <li>▪ Perform Cyber Incident Management Capabilities</li> <li>▪ Prepare For and Manage Emergencies</li> <li>▪ Preserve Constitutional Rights</li> <li>▪ Protect Sensitive Information</li> <li>▪ Provide and Maintain Infrastructure</li> <li>▪ Provide Capital Markets and Investment Activities</li> <li>▪ Provide Consumer and Commercial Banking Services</li> <li>▪ Provide Funding and Liquidity Services</li> <li>▪ Provide Identity Management and Associated Trust Support Services</li> <li>▪ Provide Insurance Services</li> <li>▪ Provide Medical Care</li> <li>▪ Provide Payment, Clearing, and Settlement Services</li> <li>▪ Provide Public Safety</li> <li>▪ Provide Wholesale Funding</li> <li>▪ Store Fuel and Maintain Reserves</li> <li>▪ Support Community Health</li> </ul>	<ul style="list-style-type: none"> <li>▪ Exploration and Extraction Of Fuels</li> <li>▪ Fuel Refining and Processing Fuels</li> <li>▪ Generate Electricity</li> <li>▪ Manufacture Equipment</li> <li>▪ Produce and Provide Agricultural Products and Services</li> <li>▪ Produce and Provide Human and Animal Food Products and Services</li> <li>▪ Produce Chemicals</li> <li>▪ Provide Metals and Materials</li> <li>▪ Provide Housing</li> <li>▪ Provide Information Technology Products and Services</li> <li>▪ Provide Materiel and Operational Support to Defense</li> <li>▪ Research and Development</li> <li>▪ Supply Water</li> </ul>