GLOBAL CITY TEAMS CHALLENGE

SMART BUILDING BLUEPRINT

OUTLINE

Draft document subject to change. Please visit our website for most updated document.

https://pages.nist.gov/GCTC/super-clusters/

Smart Buildings are robust, connected, experience rich IoT platforms and an integral part of the Smart City ecosystem. They accelerate the deployment of smart city infrastructure; enable the development and deployment of broader municipal smart applications; are a launch pad for scalable economic development; entice corporations, job seekers and entrepreneurs to bring their business to the municipality; and increase health, wellness and happiness for workers and citizens.

This Smart Building Blueprint will explore in depth some of the key aspects that comprise such a built environment such as communications, how smart buildings support and challenge public safety and security, the impact on health and productivity of occupants, the interplay between smart buildings and next generation transportation, and trends in energy management for utilities and micro-gridded buildings.

Included in this outline are the topics that will be covered in the Smart Building Blueprint.

I. INTRODUCTION

1. The Smart City – Smart Building Roadmap
    a. Context setting/ Who should use this Blueprint?
    b. Statistics
    c. SB Definition
    d. What are Smart Building services
    e. Building a Better User Experience

II. CONNECTIVITY

Lead: Ronna Davis

1. Summary
    a. Why Network Connectivity
2. Types of Building Connectivity
    a. Wired Connectivity from Service Provider
    b. Cellular Carrier Wireless Service
    c. CBRS Private Cellular Networks
    d. Building WiFI Service
    e. Short Range Wireless Technologies
    f. Building Fiber Connectivity
    g. Building High Performance Device/ Endpoint Connectivity
3. Architectures and Cost Models
    a. Physical Network Architectures
    b. Cost Models for Building Wireless Service
4. Critical Planning Milestones
    a. Communication and Collaboration
    b. Checklists
5. Use Cases & Sample Works

III. ORGANIZATIONAL PRODUCTIVITY & SMART BUILDINGS

Lead: Jiri Skopek

1. Smart Building technologies that will Improve Organizational Productivity
    a. Definitions & KPIs of *Organizational Productivity* and *Workplace Productivity*
    b. How Workplace Productivity contributes to Organizational Productivity
    c. TABLE A: A Comparison of the effect of various workplace strategies on worker productivity
    d. Problem Statement: '*In recent decades, organizational productivity in advanced economies has stalled.'*
    e. Smart Building technologies improve organizational productivity with respect to the type of investments by Building Owners.
2. Stakeholders
    a. In office buildings, there are several private and public sector stakeholders for whom Smart Building technologies will affect the level of productivity within their respective organizations
3. How Smart Building technologies contribute to Organizational Productivity Goals
    a. Smart Buildings are part of the M2M revolution
    b. Smart Buildings optimize performance and enhance competitiveness
    c. Smart Buildings can reduce peak demand and be 'grid partners with utilities
    d. Interconnected Smart Buildings can increase the resiliency of the grid
    e. Smart Building incremental capital expenditures can offer a rapid return on investment (ROI)
    f. Smart Building technology offers short and long-term scalable opportunities
    g. TABLE B, How Smart Buildings can help to achieve the Organizational Productivity goals for each stakeholder organization and the smart capabilities these may require.
    The goals listed in Table B can be broadly grouped in two areas:
    h. TABLE C: Operational Efficiency & ROI for the building owner property managers and examples of companies that offer solutions.
    i. TABLE D: Organizational productivity for the corporate tenants, and a positive human experience of the occupants in the workplace managers and examples of companies that offer solutions.
4. Matching Solutions to Needs (implementation)
    a. Engage a neutral automation consultant
    b. Things to consider when designing a Smart Building
    c. Designing a Smart Building System should be a collaborative effort
    d. The role of the Tenant's IT team
5. Organizational Productivity of Cities - Smart Buildings for Smart Cities
    a. The role of Smart Buildings in a Smart City

IV. SMART CITIES / SAFER BUILDINGS

Lead: Jeff Booth

1. Summary
    a. Safe Buildings
        i. Safety as
    b. Overview of Safe Buildings to SBs and SCs
        i. Social & Public Benefits
        ii. Commercial Benefits
2. Social & Public Benefits
    a. Digital inclusion
    b. Services for citizens
    Note: primarily focused upon government services: schools, libraries, community centers, inherently governmental services
3. Commercial Benefits
    a. Dual Use
        i. Safety devices to facilitate building operations and maintenance
    b. Economic development
4. The Value Proposition of Safe Buildings
    a. Human Factor
        i. Smart Building…Smarter People
    b. Insurance
        i. Example: Emergency Management Plans for safety ratings
    c. Safety Act
        i. New Technology risk mitigation (liability exposure)
5. Implementation & Funding Models
    a. General Fund Model (Government focus)
        i. Example: Wi-Fi as Public Infrastructure
    b. Public/Private Partnerships (Government & Private Focus)
        i. Example: Wi-Fi access in exchange for services/goods
    c. Government regulation and commercial compliance
        i. Building Codes
            1. Cost pass-through to tenant
6. Smart City / Safe Building: Next Steps
7. Use Cases
8. Tools & Checklist

V. TRANSPORTATION

Lead: Yuri Gawdiak

1. Overview of relationship between Smart Buildings and Transportation Super Clusters
    a. Smart Buildings as key nodes - drivers and sinks for transportation operations
    b. Emerging opportunities and challenges on the relationship
        i. Internal building transportation: mobility operations/management - robotic/autonomous systems
        ii. On Demand Mobility (ODM) support/interfaces
    c. Smart Buildings & Transportation integration with the other Superclusters
2. Operational coordination aspects and requirements
    a. Multimodal demand tracking
    b. Multimodal resource coordination & control
    c. Metropolitan/Regional coordination and resource support
3. Support services
    a. Shared sensors (Wx, Emissions, etc.)
    b. Autonomous Deliveries
    c. Distributed security
    d. Emergency services leveraging mobility systems
4. Physical requirements evolution
    a. Docking/Storage for advanced transportation systems
    b. Dynamic/Adaptable building structures for transportation
        i. Physical adaptation of transportation systems (docks, bays, landing areas - ledges, pads, etc.)
        ii. Power interfaces for transportation support
    c. Power (bi directional) Management for transportation support
        i. Remote Grid Power
        ii. Local Energy Generation
        iii. Transportation Vehicle/Systems Charging/Storage (mobile batteries)
    d. Other operational supplies - cleaning, firefighting, etc. related to transportation systems
5. Policy/Legal aspects for Smart Building Transportation integration

VI. INTERFACING WITH CITY SERVICES AND UTILITIES

Leads: John Coluccio and Heather Ipsen

1. Summary
2. Utilities
    a. Grids
    b. Weather related
    c. Business models
3. Services
    a. Waste Collection
4. Building as a battery
    a. Storage requirements
5. Smart Street Lighting Technology
    a. National Grid/ City of Schenectady REV Demonstration Project