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Intelligent Buildings: The Past and the Future

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Presentation Summary

1. Overview of CABA
2. Intelligent Buildings Description
3. Market Sizing, Characteristics and Trends
4. Green and Zero Net Energy Buildings
5. Smart Grid and Buildings
6. Life Cycle Costing and Intelligent Buildings
7. Intelligent Buildings and Big Data
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About CABA

The Continental Automated Buildings Association (CABA) is an international not-for-profit industry association dedicated to the advancement of connected home and building technologies. The organization is supported by an international membership of over 325 organizations involved in the design, manufacturing, installation and retailing of products relating to home automation and building automation.

www.CABA.org
CABA Board of Directors

CABA Vision Statement
“CABA accelerates growth in the connected home and intelligent buildings sectors.”
A Smart Building is an intelligent space that will transform efficiency, comfort, and safety for people and assets.

Source: Intel Corporation, CABA Board Member
The Architecture of Latest Building Automation System (BAS)

Source: CABA Intelligent Buildings Market Sizing for North America Report
Intelligent Building Solutions Market Life Cycle Analysis

In other words....
Enterprise Convergence Platform for Building Systems and IT Systems

Variety of Information Technology systems, applications, servers, databases, content management, services and software

- VoIP
- IPTV
- SQL
- SaaS
- Apps

Internet Protocol, HTML/XML, oBix

Centralized Control and management

IT Systems
Web-enabled scalable remote control

Building Systems

Enterprise Portal

BacNet, Lonworks, Modbus, Legacy protocols

Sensors
HVAC
Security
Lighting
Meters

Variety of building systems and controls from a variety of manufacturers with limited standardization

Source: CABA’s North American Intelligent Buildings Roadmap 2011
Cloud Technology

SmartCloud™ Service Delivery for electronics

- Analytics
- Remote Access
- Device & Service Management
- Dynamic Monitoring

Source: IBM
BMS Penetration by Number of Buildings – by Commercial Building Size Category

Source: CABA’s Smart Grid Impact on Intelligent Buildings
Characteristics and Trends

**Verticals**

- Higher education
- Healthcare, mainly hospitals
- Governmental buildings
- Transport (airports)
- Offices
- Sports Stadiums
- Life science/pharmaceutical industry
- High tech/precision manufacturing

**Trends**

- Remote access to data (needs to be IP) - Could be Cloud based
- Cheaper sensors, processors and available application software
- Possibility of generation data from M2M/IoE
- PoE platform – Low voltage lighting systems and sensors
- Uptake of wireless protocols
- Increasing use of software packages

**Who is driving convergence?**

- IT companies
- Consultant / design engineers
- Facility managers
- EPC (Gov, Edu, Health)
- IT SIs
- End-users (property investors)

Source: Market Sizing for North America – Intelligent Buildings
CABA Zero Net Energy: Building Intelligent Controls Driving Success

Funders

More information can be found at:
Smart Buildings for a Smart Grid Video by Cisco
Why will intelligent technologies cost less than traditional technologies?

Building's Life Cycle Cost Over 40 Years:
- Retrofit: 25%
- Operation: 50%
- Financing: 14%
- Construction: 11%

Source: ASHRAE

http://www.caba.org/brightgreen

Source: CABA's Convergence of Green and Intelligent Buildings Report
CABA Intelligent Buildings and Big Data

Funders

[Logos of various companies]

CABA
Defining Big Data in Intelligent Buildings

- Big data in intelligent buildings is defined as:
  - The next generation in business and operational intelligence derived from the analysis of data integrated across multiple streams or sources for the purposes of overall system understanding, performance, and optimization.

- The term big data encompasses both the solution architecture and associated analytics.

Source: CABA Intelligent Buildings and Big Data 2015
Most decision makers do not know how to define big data or understand the potential benefits

On a scale of 1 to 5, where 1 is not knowledgeable at all and 5 is extremely knowledgeable, how do you rate your knowledge about the concept of big data and the application of big data to buildings? (n=400)

Source: CABA Intelligent Buildings and Big Data 2015
Survey Findings

Security and privacy are the biggest issues

On a scale of 1 to 5, where 1 is not knowledgeable at all and 5 is extremely knowledgeable, how do you rate your knowledge about the concept of big data and the application of big data to buildings? (n=400)

- Security of network: 3.76
- Privacy of data: 3.61
- Ability to analyze data: 3.57
- Reliability of data storage: 3.54
- Ability to combine data from multiple sources: 3.50
- Complexity of data: 3.46
- Training of building management workforce: 3.41
- Amount of data: 3.36
- Acceptance of the leadership of my organization: 3.34
- Acceptance of building management workforce: 3.29
- Frequency of data: 3.21
- Acceptance of IT department: 3.16

Source: CABA Intelligent Buildings and Big Data 2015
Major Findings

- There is a lot of low-hanging fruit in building and operational improvements – many customers can still benefit from periodic reporting and analytics on existing building systems, and, as a result, many customers are not ready to adopt fully integrated big data solutions.

- Those interested in big data require transparency in the ROI of building and operational improvements.

- Big data in intelligent buildings represents a pinnacle in energy and operational management.

Source: CABA Intelligent Buildings and Big Data 2015
Major Findings

- Chasm between the technology and end-user readiness for big data in intelligent buildings.
- The majority of decision makers in the intelligent buildings market do not know how to define big data or understand the potential benefits of these new solutions.
- Data security is a major concern for customers, and technology providers have an opportunity to demonstrate how standards and procedures can protect businesses investing in big data solutions.

Source: CABA Intelligent Buildings and Big Data 2015
1) New CABA Landmark Research “Intelligent Buildings and Cybersecurity”

http://www.caba.org/intelligentbuildingcybersecurity/

2) New CABA Landmark Research “Cybersecurity and the Connected Home”

http://www.caba.org/homecybersecurity
Global IoT Market is Poised for Explosive Growth

2013 = $1.9 trillion by 2020
$7.1 trillion

"By the end of the decade, everyone on Earth will be connected."
- Eric Schmidt
Google Executive Chairman

How many “things,” including your body, can you communicate with through a device? And will a smartwatch become more like a wearable woven into your garments, contact lenses or implanted into your body?

Whatever the eventual device, it is manufacturers that play a lead role in translating technologies into new products for tomorrow.

Source: Jabil, www.jabil.com
Internet of Things

Devices that are connected to the internet, integrating greater computer capabilities, and using data analytics to extract meaningful information.

Source: Intel Corporation, CABA Board Member
“Internet of Things” Principles

1. **Edge to Cloud:**
   Delivery of services across the enterprise, across the globe. Compute and comms close to the edge, but securely cloud connected.

2. **Mobility:**
   Ability to visualize interact anywhere on the planet.
   Cell phone, Tablet, PC.

3. **Analytics:**
   Based on sensed world, provides analysis and insight.
   Anticipation of needs.

4. **Security and Manageability:**
   Connects securely to ‘things’ in the built world, in a trustworthy fashion.
   Data, Security, Management. Quality of Service.

5. **Collective Relevance:**
   Meaningful to a community.
   More than one person benefits.

Example: Buildings anticipate and respond to occupants presence and preferences.

Source: Intel Corporation, CABA Board Member
SMART CITIES
What’s a Smart City?
A city-wide network of sensors provides real-time valuable information on the flow of citizens, noise and other forms of environmental pollution, as well as traffic and weather conditions.

**Smart Parking**
- Connected to WiFi network
- Online parking spot searching & payment via smartphone apps

**Smart Bus Stops**
- Display real-time bus times, tourist info & digital ads
- Charging sockets for devices
- Free WiFi hotspot

**Smart Street Lights**
Beyond energy efficient lighting, streetlights have sensors that
- Monitor air quality
- Provide WiFi hotspot

**Even Garbage Bins are Connected**
- WiFi connected bins monitor trash levels
- Optimize routes for garbage collection

Source: Jabil, www.jabil.com
Trends and Drivers

- Uptake of Building Energy Management Systems (BEMS)
- Uptake of energy usage data analytics and ‘Big Data’
- Concerns about energy efficiency
- Legislative requirements (e.g. Indoor Air Quality Standard)
- Uptake of ‘Internet of Things’
- Cybersecurity
- Connectivity and interoperability between BACS and other systems
- Impact of Automated Demand Response (ADR)
CABA Improving Organizational Productivity And Building Automation Systems

Funders

More information can be found at:
http://www.caba.org/CABA/Research/NRC-Research-Project.aspx