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CABA's 2011 Intelligent Buildings Roadmap

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As a non-profit trade association, CABA is in a unique position to provide collaborative research on behalf of its association members. In some cases, these member companies would not be able to afford such research individually. Nor could they share costs with other companies in an *ad hoc* consortium without considerable legal expenses needed to avoid anti-trust issues.

CABA has been conducting research on behalf of the building automation system industry. Since 2002, CABA has published its *Technology Roadmap for Intelligent Buildings, a Best-Practices Guide for Evaluating Intelligent Building Technologies, the 2007 CABA Intelligent Buildings Roadmap and the Intelligent and Integrated Buildings Technologies: Market Size in North America 2010* report.

In 2010, CABA launched a research project to revisit intelligent buildings. A focus of this investigation was the impact of smart grid developments on building operations, performance, and energy conservation. This project also included water conservation.

This paper summarizes the Intelligent Buildings Roadmap 2011 that was completed in December 2010.

The Steering Committee

CABA assembled a Steering Committee from among CABA members whose businesses include building automaton systems and related products. Each Steering Committee member contributed a participation fee. In exchange, they helped shape the research agenda.

The Steering Committee members and their primary business areas are listed in Table 1. The Steering Committee and CABA chose Frost & Sullivan to conduct the research and to write the Roadmap. I was asked by CABA to be the program manager.

Steering Committee Members

Company	Business Area
Belimo Air Controls	Actuators for heating & cooling systems
Consolidated Edison Company of New York	Electric & gas utility
Distech Controls, Inc.	Building automaton & energy management
Echelon Corporation	Automation for buildings, homes, & industry
Honeywell International, Inc.	Building automaton & energy management
Ingersoll Rand / Trane / Schlage	Building automaton & energy management
Johnson Controls Ltd.	Building automaton & energy management
Lawrence Berkeley National Laboratory	Energy management research
Natural Resources Canada	Development & use of natural resources
Pacific Northwest National Laboratory/ DOE	Energy management research
Philips	Lighting systems
Schneider Electric	Building automation systems
Siemens Industry, Inc.	Building automation systems
Sloan Monitored Systems	Water fixtures & control systems
Wattstopper / Legrand / Ortronics	Lighting control systems

Frost & Sullivan analyzes new market opportunities for corporate growth with research in technology, markets, economics, corporate best practices, training, customers, competitive intelligence, and corporate strategy. The company was founded in 1961 and now has more than 1,800 industry consultants, market research analysts, technology analysts, and economists operating from more than 40 global offices.

The Steering Committee participated in many teleconferences in 2010 to plan the project and to review interim results. A meeting was held last November at Frost & Sullivan in San Antonio, Texas to discuss the contents of the final report. Each Steering Committee member had the opportunity to submit written comments for improving the report. All comments were thoroughly reviewed and addressed in a formal "resolution of comments" procedure to produce the final report.

The project mission

The objectives of the Intelligent Buildings Roadmap are to enhance industry knowledge and perspectives on the following topics:

- The impact of energy efficiency, renewable technology, information technology (IT) convergence, and the integration of buildings with electric utility smart grids on building operations and automation systems.
- The trend towards an Integrated Design Process for BAS integration and efficiency. The availability of a trained and skilled workforce and the role of master system integrators.
- Existing and emerging smart technologies and solutions, market preferences, and commercialization plan for improved energy performance of buildings.
- The role of regulatory mandates to accelerate the development of intelligent building products and technologies for energy management.
- The potential impact of water conservation on building operating costs.
- The current and future direction of the intelligent buildings market in North America, and the opportunities it represents for participants in the value chain.

The reason for the focus of this Roadmap on energy management and efficiency comes from government programs, potential regulatory mandates, and industry trends in building design and operations. Among these factors are:

- The push for an electric smart grid to enhance reliability and security by integrating IT with the electric grid.
- The U.S. publication of the NIST Framework and Roadmap for Smart Grid Interoperability Standards in January 2010.
- Electric utility investigation of demand response technologies for buildings.
- Water conservation goals for buildings.
- National goals in some countries for reducing greenhouse gas emissions, including carbon dioxide reduction initiatives.
- Programs planned for energy labeling, mandatory compliance with energy guidelines, and certifications for building performance.

Research methodology

Frost & Sullivan developed the Intelligent Buildings Roadmap 2011 based on research conducted for this project (called primary research) integrated with existing research data (called secondary research). Sources of secondary research include government agencies and labs, think tanks, industry associations, Internet sources, plus research publications and databases developed by Frost & Sullivan.

Five Steering Committee members offered information about buildings to complement the research and to demonstrate practical energy management, water conservation, and building automaton features. The demonstration projects and features are summarized in Table 2.

Demonstration Projects

Company	Project Description
Consolidated Edison Company of New York	Upgrade office building for Energy Star and LEED certifications
Johnson Controls Inc.	Renovate corporate headquarters with major energy savings and greenhouse gas reduction.
Natural Resources Canada	Automated demand response for energy management in an office building
Sloan Monitored Systems	Flush control system for water conservation in a public school

Wattstopper / Legrand / Ortronics	Lighting control system for expanded cancer research center

BAS trends

Building automation systems (BAS) enable buildings to respond effectively to energy management programs for conservation and greenhouse gas reductions. Building automation has been evolving gradually since the late nineteenth century when the thermostat was introduced. Technologies for sensors, actuators, controllers, users interfaces, and communications networks have been upgraded incrementally.

Some major technology transitions were pneumatic to electronic signaling, analog to digital control, and integrated applications. The state of the art in BAS architecture is illustrated in Figure 1. Most buildings do not use the latest technologies since continuous reliable operation is paramount and trumps the introduction of new features and operational efficiency.

The Intelligent Buildings Roadmap 2011 report investigates the eventual impact of new technologies on the BAS industry including:

- Convergence between existing building control infrastructures and IT.
- The role of Internet Protocols on BAS communications.
- BAS management: local versus remote versus cloud-based ("software as a service").

The Roadmap audience

As explained, the Steering Committee members who funded the Roadmap represent electric utilities, government agencies, and building equipment supplies. Those who will benefit from this report also include:

- IT companies.
- Building architects and specifiers.
- Energy service companies.
- Equipment installers and facility managers.
- Regulatory authorities and legislatures.
- Energy management service providers beyond utilities, such as telecommunications companies and new companies.

The Intelligent Buildings Roadmap 2011 will be offered for sale through the CABA Web site starting in June 2011. Until then, the report is embargoed for the exclusive use of those CABA members that paid a research fee for this project.

Dr. Kenneth Wacks has been a pioneer in establishing the home systems industry. He advises manufacturers and utilities worldwide on business opportunities, network alternatives, and product development in home and building systems. In 2008, the United States Department of Energy appointed him to the GridWise Architecture Council. For further information, please contact Dr. Wacks at 781.662.6211; kenn@alum.mit.edu; www.kenwacks.com.

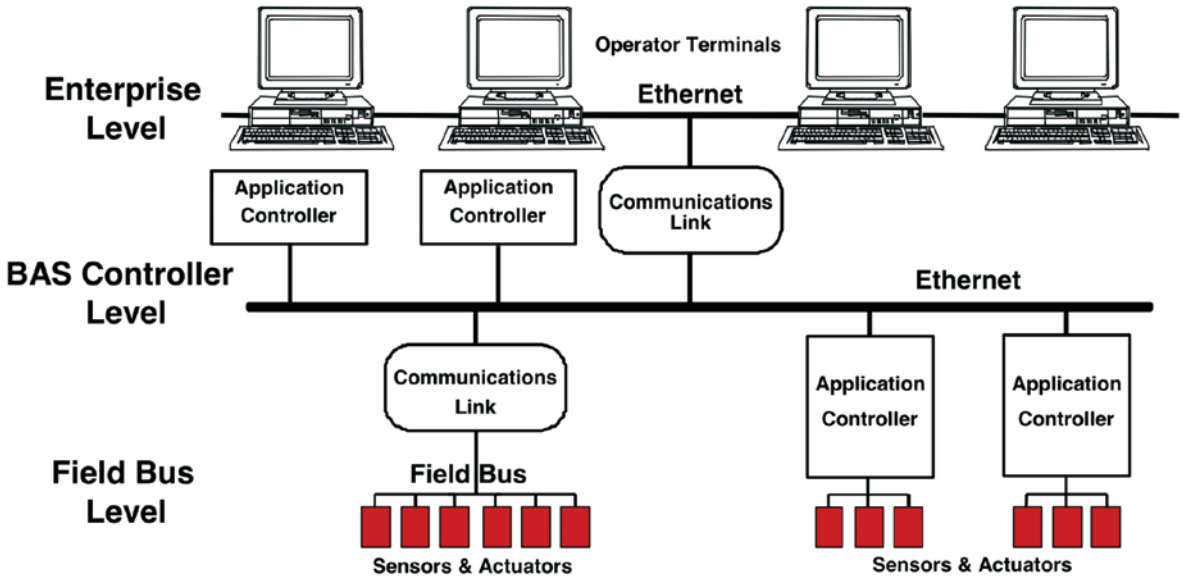

Figure 1 – Building Automation System Architecture