The Challenge to Legacy Building Management Systems

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"*A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty*."
Winston Churchill

Overview

When you scrutinize the data points in a building the vast majority, maybe 70-90%, is related to the Building Management System (BMS). BMS systems are the mainstay of everyday building management, primarily for engineers and technicians as they drill down and analyze the specifics of a particular piece of equipment. Over the years the major manufacturers have made some modest improvements to their BMS. However, it's fair to say advancements in BMS have lagged considerably in comparison to other technologies such as software, cell phones, computers and video: no building managers have ever stood in line at the doors of BMS manufacturers to get the latest release of a BMS.

Given that major BMS manufacturers are automation companies not technology companies, the lag in BMS systems may be understandable. For the major manufacturers, BMS sales are also a small part of their overall revenue and possibly even a modest portion of any sale of their building automation systems (BAS). What may be insignificant for manufacturers however, is the central tool for building owners to manage their building's optimal performance.

The marketplace and client needs for BMS systems are changing significantly as buildings and building management are becoming more complex. The pressures are coming from the need for greater visibility and transparency in energy consumption, the introduction of new technologies, and the evolving skill sets and knowledge required of facility personnel. For

example, many other parties in an organization, aside from the facility engineers and technicians, now want access to the energy data which in part is generated in the BMS. Building managers are looking for more sophisticated applications to help in analyzing and managing systems and demand platforms that can handle broader integration of other building systems. BMS manufacturers are also facing the retooling of their platforms to communicate and interact with the smart grid.

The response to these emerging marketplace needs has so far come from medium sized and start-up companies with enterprise Integrated Building Management Systems (IBMS) and not from the traditional BMS manufacturers. That's to be expected. The smaller companies don't have the bureaucracies that bigger companies do, resulting in smaller companies being agile enough to act quickly without the bureaucratic "processes" hindering innovation and the time to bring a product to market. One of the primary enablers of newer IBMS systems have been the ability to access the BMS or controller data points via open protocols and standardized IT databases such SQL or databases that can be accessed via OPC applications. Once the IBMS vendors can access the BMS data and use the data in their own applications most of the user tools or applications of the BMS systems are not needed and could essentially be idled.

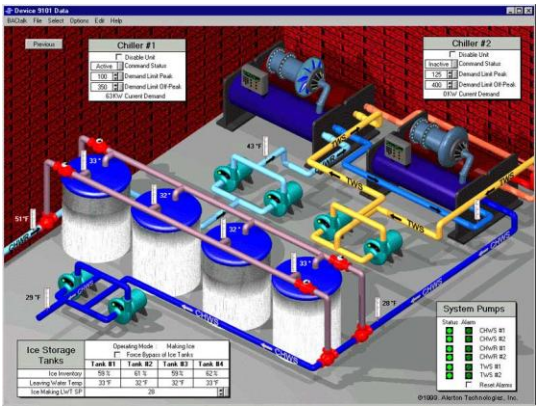
BMS manufacturers could ignore the trends and changing marketplace and essentially cede the future to the IBMS vendors or "step up their game" and offer the innovations building owners are looking for. If one was to make out the near-term "To Do" list for the major BMS manufacturers the list would look something like this:

1. **Deal With BMS And Controller Security** – Years ago BAS systems were a series of interconnected serial networks. As those networks evolved they started to provide web access and direct connection to IT networks via controllers and the BMS that essentially exposed the BMS and BAS controllers to the security threats of IT networks and the Internet. Overall, the security vulnerabilities of BMS systems have not been adequately

addressed. You may ask “What’s the threat?” or “What mischief or damage can hacking into a BMS or BAS controllers result in?” Imagine someone remotely setting off the fire alarm, opening doors, turning off the HVAC controls, accessing a video surveillance camera or turning off all the lights in a building. All of these are possible life safety or major business disruption issues. The BMS and related controllers need improved security consistent with the best practices of IT management.

2. **Provide Sophisticated Analytic Tools Such As Fault Detection** – Most BMS systems provide data on building equipment and it’s up to an engineer to analyze and interpret the data. Regardless of how talented or knowledgeable the engineer may be it’s better if a software application can support the engineer or technician in the analysis. That is why one of the emerging software applications especially for large HVAC systems is fault detection and diagnostics (FDD) and predictive analytics. These tools generally support the optimization of the HVAC system and can result in significant energy and cost savings. Very few BMS systems have such sophisticated tools while most of the IBMS systems do.

3. **Improve And Broaden The Integration Capabilities Of The BMS Systems** – Buildings are more than just HVAC, fire and security systems. BMS systems must provide integration capabilities for many other systems. Some of these offerings will be for other building systems such as lighting, window shading systems, power management, etc. Others will be business systems such as accounting or human resources. For example, in order to provide energy information the user may need to know energy consumption but will also want energy expenditures or budgets, information likely to be on business system side. Other information that is relevant to building management may be outside the organization, such as weather data. Overall, the building manager needs data from several sources in order to create information and this requires integration, <u>not</u> silos of data. Improved or advanced BMS systems will need to have “middleware” software tools and be able to standardized data from a variety of sources and systems into an open database structure.



Integration of systems not only involves obtaining different but related data to create information, it also means deriving more functionality from the process of systems working together. That means a sequence of operations between two or more systems, where an event or condition of one system can trigger or initiate actions by other systems. BMS systems generally do integration

between fire alarm, HVAC systems and access control but the opportunity for other similar coordination exists; some integration such as aligning building occupancy with energy related systems can have significant payback opportunities.

4. **Build A Wide-Ranging Suite Of Energy Applications** – This may be the greatest undertaking for the BMS manufacturers. It's much more than just presenting energy consumption and cost data and deriving trends in usage. It involves complete interoperability with the grid, renewable energy sources, storage and opportunities we envision with a smart grids and smart buildings. The starting point for the BMS manufacturers may be two applications that building owners can use immediately:

    - *Automated Demand Response* – Users will need a software application that can activate predefined electrical load reducing signals to the HVAC, lighting and power management systems and do so based on different levels of load reduction. The hardest part of this is not necessarily communicating with the power grid or programming a curtailment strategy but developing the scenarios for different responses, measuring and verifying results, and tracking financial effects.

    - *Load Profiling and Energy Procurement* – Building owners with large portfolios and large energy expenditures will want to aggregate their usage prior to going to the energy marketplace. Tools that can profile individual and enterprise-wide energy loads are needed; once the load profiles are generated the procurement tools that can optimize supply pricing based on the load are required. The procurement tools are similar to trading tools for commodity markets that are examining real time market data, analyzing different types of transactions and contracts and optimizing the procurement based on the overall load profile, pricing and risk.

The BMS marketplace has changed and the new entrants, IBMS vendors, are challenging the old. It may be that they coexist for a short period; the BMS handling the DDC systems and the IBMS offering enterprise capabilities and advanced applications. Over time however, either the IBMS vendors will replace the need for a BMS, or the BMS manufacturers will move from BMS to IBMS platforms.

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