The Day IT Operates the Building

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For years Information Technology has relentlessly penetrated virtually all of the control and management systems in a building. The list of systems is long and growing and it's harder to identify a building system without some aspect of IT. Yet despite the industry's strides in building controls, automation and deployment of IT we're not close to the potential of fully implementing advanced automation in our buildings.

We look at aircraft autopilots that have automated flight for almost a century, driverless cars, and a society drenched with electronic devices and apps. We have an Earth where almost everyone has a cell phone and we look for a future of billions of electronic devices networked by the internet that will be managed, monitored, integrated, implanted and worn. More automation than anything currently deployed could take building operations to a new level for the benefit of occupants and building owners.

Advanced automation will not be some accommodation with building information technology. It will be a full embrace of the basic tenants of IT: (a) granular data, (b) data management, (c) the development of the logic, policies and "rules" of how we want the building to operate, (d) additional sensors, (e) the analysis of data, and (f) standard tools of the IT market.

To move to a higher level, the automation systems need to be smarter, innovative, and sophisticated, where for example the systems can automatically configure and integrate new equipment or devices without the need for a technician to manually configure the equipment; where the system can optimize itself, self-heal; and not only identify faults or failures, but can compensate and re-configure the system to minimize any impact of the system.

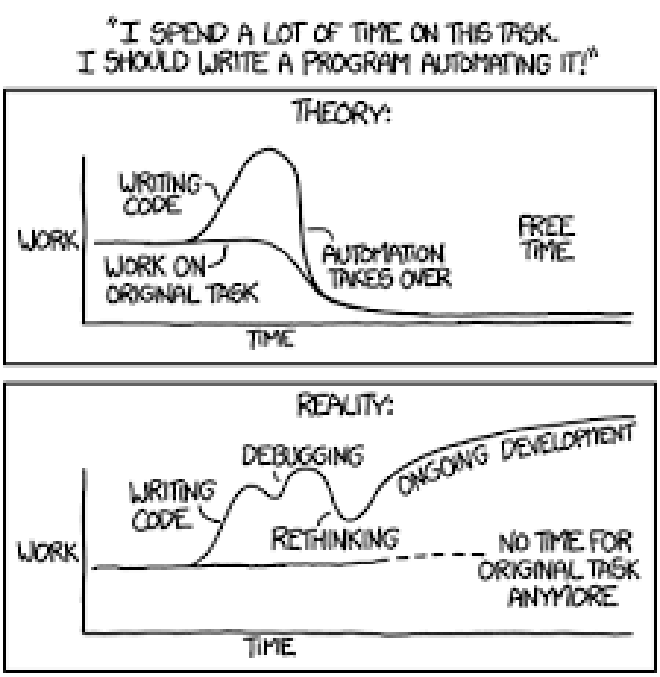
Automation is not 100% - people are required. An airplane may have an autopilot, but there are still stages of a flight where pilots are needed, such as taxi and takeoff. The same is true of facility management, where advanced analytics applications can identity system faults, but personnel are needed to diagnosis and provide system remedies. The larger challenge for facility management is qualified people, the constantly

changing skills sets requiring deeper information technology resources, as well as a dearth of younger mechanical, electrical, and automation specialists interested in operating buildings.

The Building Blocks

Granular Data –Building-wide or system-wide data will not be sufficient for a highly automated building. The metrics are too broad and vague. To really manage a building we need to get down to the details. The spaces within most buildings are too different regarding their orientation, use, occupancy, needs, etc. Granular data provides more precision in properly managing specific spaces within a building, potentially resulting in squeezing out the smallest amount of excess energy consumption and improving occupant satisfaction. Going "granular" will mean increased sensors, tailored controls for individual spaces and a bit more investment that will result in a significant ROI.

Detailed Policies and Logic – For a building to be fully automated it will require the "logic" or the "policies" of the automation to be fully developed. These are pre-determined rules using an array of data sources and data. The building senses real time conditions and then automatically responds or adjusts based on energy costs, occupancy, thermal loads, etc.



The development of this logic will not necessarily be easy; as buildings become increasingly complicated the decisions regarding their performance become more complex as there are many more variables in the decision making process. Defining the logic or policies will take extensive planning which is sometimes a pitfall in some facility management. An example being a scarcity of detailed written alarm management plans which reflects the lack of planning and forethought. These policies will need to touch on every significant building situation or scenario affecting energy, operational costs, life safety and tenant comfort. The planning should involve diverse groups within the building's ownership and management. This is really an extensive exercise to develop the brains of the automation systems and in the process, deciding exactly how the building should adapt to changes and how it should perform.

Much of the data used as the basis for “policies” will be near real-time data from the building systems however critical data and system-to-system communications are needed with the facility management programs, business systems, the utility grid and other external systems, such as weather or energy markets. A highly automated building will require numerous policies, control logic and sequences of operations which take into account a great number of variables. A major development in preparing policies and logic will be the evolution of facility management from a rather reactive to an assertive proactive orientation and operation.

Data Analytics – For astute building owners or facility managers, analytics is now “main stream”; they’re aware of the results other building owners have had with analytics, such as saving money on energy consumption and supporting the effectiveness and efficiency of facility personnel. The marketplace now has commercial analytic software packages, analytic contractors providing services via the cloud and a host of analytic options for building owners. Analytics is popular, with the best analytic rules coming from the facility personnel who know the building. In general facility management has not traditionally used these techniques. They’ve focused on analyzing energy consumption data and have analytic tools to optimize HVAC but there’s a lot more data out there to be generated and analyzed.

A critical component in building automation is data because it’s the data that will be the foundation for the development and revisions to the logic or policies of the automation. Data mining or business intelligence comes down to analyzing the building data, finding trends in how the building is performing or being used, inferring relationships between variables and creating rules, Then that information is processed to predicted how the building will perform under different scenarios. This progression is likely to bring new perspectives to the building operation and new ideas for how to operate the building, and may uncover benefits of integrating systems.

Vast Amounts of Sensors - Highly automated buildings will need many additional sensors and metering; some for energy systems (plug load, lighting, HVAC), others for air quality, building occupancy, external lighting conditions, water consumption, security, etc. Although one would think IoT would be primary aimed for home automation and wearable technology, a majority in surveys on the Internet of Things think the IoT will be about buildings.

Understanding the Larger Context of Information and Communications Technology ICT –We can’t be constructing highly automated buildings in isolation. All around us is a society and world where people are connected in a pervasive and

hyperactive manner to other people and objects. Everyone occupying, managing and owning buildings is part of this community.

This level of building automation is not illusory. You can see the first steps of heightened automation and innovation in smaller and medium size companies creating new BMS platforms, automation systems, and new analytic tools and incorporating IT tenants and platforms. You can also see it in technology companies increased interest in buildings, energy, life safety and analytics. Enhanced automation is a device to eventually get to the nirvana of minimal energy consumption and improved performance of buildings.