The Management of Building System Data (…or the absence of)

Jim Sinopoli, PE, RCDD, LEED AP

"A *wealth of information creates a poverty of attention*." Herbert Simon, Economist, 1971

Overview

There's a lot of whoop-la in the industry today about dashboards, especially energy-related dashboards. While dashboards are ultimately the user interface into building and energy data, very little attention has been given to the quality and management of the data behind the dashboards. Dashboards are somewhat like the cover of a book where the data is the book and the fundamental underpinning of the information provided to the user who's looking at the cover. The best designed most intuitive dashboards are trash if the dashboards utilize inaccurate or incomplete data.

Building system data must be viewed as an asset: it has value, is necessary for properly operating and maintaining the building and it must be managed and treated as such. The question is how do we get accurate, validated and well organized data from our building systems that can be managed on an ongoing basis? What follows are some of the issues we face in managing building systems data:

Lack of Planning

Most building operations do not have a data management plan. What passes for the "data management plan" consists of a database associated with their Building Management System (BMS). With that approach the information is limited to just those systems monitored or managed by BMS. In addition, the setup of the database, the naming conventions formats and structure is left to the BMS contractor with little input or none from the building owner. Furthermore, getting the data out of

the BMS database oftentimes involves additional software or application programming interfaces (API) from the manufacturer, sometimes even multiple copies of the same software or APIs based on points limitations.

Comprehensive planning means you take a broader look at all the data and information required or desired in order to manage the building's performance. Put it all in writing and the operations policy - no more makeshift, improvised, make-it-up-as-you-go approaches. An investment of time at the start to properly develop a data plan will save time later.

Start the plan on a wide-ranging scope. Identify the data and information that different people or groups involved with the building's performance need to perform their work. Of course much of the data will be monitoring points on building systems but some data may be needed that's in business systems or other systems outside of facility management or even outside the organization.

Identify where the data exists or how it will be generated and collected, how it will be accessed and estimate the scale or volume of data. Decide on a data format. Deal with the administrative aspects of the plan such as user access, dissemination of the data, how data will be integrated, how it will be archived, retention policies, how often the plan is reviewed, etc. Plan the organization of the data to assure the data is accurate and easily accessible.

Lack of Standardized Naming Conventions

Standardize what you call things. A multi-building campus with buildings built at different times with different contractors is likely to have multiple names and tags for similar pieces of equipment. You don't want to end up with ten different names for air handlers or pumps. Multiple naming conventions in an existing building or portfolio of existing buildings is the largest and most time consuming issue involved with implementing an integrated building management system.

Building system data is no longer only for facility management and operating the building but also has value for larger business processes such as **asset management, capital planning, regulatory compliance, energy management and a host of other business applications**. This basic reality cries out for a comprehensive information and data management plan for a building or a portfolio of buildings.

Realize that data does not belong to just one department; if you take that approach you end up with silos of data and miss out on opportunities to create meaningful metrics and key performance indicators. Consider coordinating the use of the naming convention or a portion of the naming convention across systems (i.e. BMS, asset management, purchasing, work orders, etc.) so that other departments and applications can understand and share the data.

The format of a naming convention for data and equipment is less important than strict adherence to and enforcement of one standard naming convention.

Lack of Data Mining

Facility managers are missing opportunities if they don't have the analytic tools to mine, predict and correlate building data. How many building owners are "harvesting" and analyzing data for the purpose of gaining insight into their building's performance? Very few. However, when you look at other organizations and businesses they "mine" data from their users and customers and analyze the data in order to predict and guide their business and business processes. Data mining has been around for a while and is used extensively in web sites, retail purchases, financing, smartphones, to name a few. Look at a retailer like Wal-Mart which knows how many rolls of paper towels are sold daily at each store location, data that is part of a process to optimize their just-in-time supply chain process. Yet, how many large building owners can even tell you how many people entered their building on a daily basis or which building space is the least energy efficient? Which is the most used space? Which is the most and least secure?

Data mining related to energy usage would seem to be a wide open field. Energy consumption metrics related to space usage, operations processes and business aspects can provide new insights. As Frank Rotman, a former head of analytics at Capital One has said, "If I examine a new data set, the chances are I can find something in that data that has predictive value". Predictive value means the organization can be proactive rather than reactive.

No Validation of Data

There's no point in collecting inaccurate data. To get the most accurate information you'll need to 'tune-up' the building systems and

check the calibration of sensors and meters. The building systems themselves should be regularly re-commissioned or better yet continuously commissioned using a real time building system analytic tool. Traditional commissioning uses the design documents and design intent for the foundation of commissioning. Over time however, building spaces or uses may change; the effect is that while you can confirm or validate the design parameters, for example 54° air being delivered by an air handler, the space may have changed and have a different cooling load, and may not need 54° air from the air handler. There the systems may need to be adjusted in order to reflect current conditions.

 Sensors and meters should be regularly calibrated, both the device itself as well as the communication between the device and its controller. Inaccurate sensors may provide a false sense of complacency and more importantly waste energy and money. For example, assume you have a temperature sensor that is 2°off, showing a discharge air temperature of 55° when its actually 53°; this two degrees may trigger extra cooling and additional power consumption by the chiller and air handler or reheating of overcooled discharge air which obviously wastes energy.

Haphazard Document Management

How much time do we spend trying to find as-built drawings or some similar dated documents? While the building systems' data points can be part of a typical database, a significant portion of relevant FM information is likely to be in other formats; primarily paper, including hard-copy drawings, submittals, O&M manuals, photographs, contracts, faxes, forms, etc., but also electronic files in Word, PDF, Excel and Autodesk, all of which need to be managed. A document management system should be implemented to scan the paper documents into an electronic format and store all of the electronic files.

The system typically has an index with a format that may be similar to that of the building database, which either stores the document or directs users to another system where the

document resides. Systems typically have a "search" capability allowing users to retrieve documents based upon different criteria. These systems compliment the data management plan previously referred to and in order to truly fit they need intuitive indexing and firm adherence to the administrative processes of indexing and document conversion.

With the flood of data and information that's potentially generated in a building it's not unusual or unexpected to feel overwhelmed. With the right administrative processes the technology that is generating the deluge of data can be put to work to deal with all that data and find the valuable information we need to effectively manage our buildings.

For more information, write us at info@smart-buildings.com .