IoT Oriented Collaborative systems

For the AEC sector

Background

- The Internet of Things (IoT) has a potential transformational effect on the AEC industry its customers, technology providers, technologies, and sales and marketing models.
- The IoT connects remote assets and provides a data stream between the asset and centralized management systems. Those assets can then be integrated into new and existing organisational processes to provide information on status, location, functionality, and so on. Real-time information enables more accurate understanding of status, and it enhances utilization and productivity through optimized usage and more accurate decision support. Business and data analytics give insights into the business requirements data feed from the IoT environment and will help predict the fluctuations of IoT-enriched data and information.

Problem Definition

- The day-to-day operation of a building represents over 70% of the total cost of that building over its lifespan. It's a big number, so it makes sense for everything to be done to lower operational costs. Especially if those same actions could help improve the experience of occupants.
- It sounds too good to be true, but that's exactly how the Internet of Things (IoT) is impacting building operations. IoT is truly disruptive technology, and it is impacting all aspects of the building ecosystem, including building management.

Problem Definition

- Smart building control solutions, the core application for enterprise IoT, need robust design, high availability, redundancy and architecture designed to scale in order to satisfy the high performance requirements.
- Connecting thousands of nodes at these facilities using a consumer grade wireless technology is pushing the envelope in terms of scale. Moreover, many facilities have proprietary building management system (BMS) and each system relies on a different communication protocol (BACnet, Modbus or LonWorks) to exchange information.
- Integrating disparate systems, getting them to communicate using a standard protocol and providing interoperability across devices is the biggest roadblock preventing the IoT from reaching its true potential for the enterprise market.

Objectives

- First, to address how to plan, build and manage an IoT infrastructure one must take a comprehensive approach to lifecycle management and a unified management layer.
- Second, understand data management requirements so that one can conduct analytics in an effective and less distributed manner.
- Thirdly, determine and discuss a possible solution on what is the best lifecycle approach for managing IoT in the building industry.

Proposed Solutions

- Smart building information management with IoT
  - Suitable field level network architecture to allow scalable system to be developed as user requirements change. This will include looking at wireless sensor and edge computing hardware. This idea here is to process as much of the data as possible into meaningful information at field level to free up bandwidth on network backbone.
  - Suitable data management system, this will consist of gathering and archiving critical and regulatory building operational data that is required.
  - Integrating this information in real time into reporting systems. Holistically integrating the solution into a given BIM model – identifying the requirements for this throughout.

Identified problems

- Security — The increasing digitisation and automation of the multitudes of devices deployed across different areas of modern urban environments are set to create new security challenges to industry.
- Enterprise — Significant security challenges will remain as the big data created as a result of the deployment of myriad devices will drastically increase security complexity. This, in turn, will have an impact on availability requirements, which are also expected to increase, putting real-time business processes and, potentially, personal safety at risk.
- Privacy — As is already the case with smart metering equipment and increasingly digitised automobiles, there will be a vast amount of data providing information on users' personal use of devices that, if not secured, can give rise to breaches of privacy. This is particularly challenging as the information generated by IoT is a key to bringing better services and the management of such devices.
- Data — The impact of the IoT on storage is two-pronged in types of data to be stored: personal data (consumer-driven) and big data (enterprise-driven). As more sensors, and other sources such as apps etc are connected, significant data will be generated.
- Storage Management — The impact of the IoT on storage infrastructure is another factor contributing to the increasing demand for more storage capacity, and one that will have to be addressed as this data becomes more prevalent. The focus today must be on storage capacity, as well as whether or not the business can harvest and use IoT data in a cost-effective manner.
- Server Technologies — The impact of IoT on the server market will be largely focused on increased investment in key vertical industries and organizations related to those industries where IoT can be profitable or add significant value.
- Data Centre Network — Existing data centre WAN links are sized for the moderate-bandwidth requirements generated by human interactions with applications. IoT promises to dramatically change these patterns by transferring massive amounts of small message sensor data to the data centre for processing, dramatically increasing inbound data centre bandwidth requirements.

Outline

1. BMS CONNECTIVITY AND IOT DEVICE MONITORING AND CONTROL
   1.1. The Traditional Building Management System
   1.2. The IoT: definition
   1.3. Drivers for BMS IoT Integration
   1.4. BMS, the IoT, Big Data, and Analytics
   1.5. Building Sensor Integration
2. BRINGING BMS INTO THE IOT
   2.1 Software as a Service Building Management
   2.2 Device Management and Application Enabled Platforms
   2.3 Standards and Frameworks
3. MODELLING IOT BASED BMS
   3.1. Deployment of solution
   3.2 Validation of solution
   3.3. Continuous improvement through data driven model
4. CONCLUSION
   4.1 Best approach for different requirements
   4.2 Recommendations on functional & non functional hardware and software specifications
   4.3 Future research

Thank you

Questions?