Ave Maria University an Independent Case Study

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Case Study Snapshot

The concept of 'Convergence' in the building industry has evolved considerably, moving beyond traditional and often isolated co-functionalities that made two or more building systems work together from a maintenance and management standpoint. In today's convergent buildings, it is not sufficient to merely integrate the air-conditioning with lighting, or physical security with access control. Going beyond randomly chosen systems, advanced technological capabilities are now enabling components such as HVAC, lighting, security cameras, fire alarms, electrical, building-access control systems as well as voice and data communication to be integrated and controlled intelligently and seamlessly from a single network.

This is the type of emerging best practice in convergence that characterizes the Ave Maria University Project in Florida. This case study profiles the objectives and key highlights of the design approach and accomplishments documented by this project. Spanning more than 900 acres in the township of Ave Maria, Florida, this project shows how careful planning and consideration in combining building-systems and information technology (IT) functionalities can be managed centrally over an Internet Protocol (IP) network, allowing owners to optimize capital expenditure for guaranteed long term savings.

Project Overview

Situated on a 908-acre campus in Ave Maria, Florida, the Ave Maria University campus has 500,000 square feet of facilities, serving nearly 500 students and 200 faculty and staff. The campus development has been conceived with state-of-the-art design elements and integration of technological systems to result in operational efficiencies and cost savings. To the owners, converging various technologies made sense from both a construction and ongoing operations standpoint and this proved to be a key deciding factor in choosing single party technology contracting to design, install and oversee the management of multiple systems throughout the campus. From IT to facility operations, the infrastructure encompasses nearly 23 systems that were proposed to be converged and made interoperable on a single IP network.

Guaranteed Savings

By resorting to single party technology contracting, integrating systems management into a single network and avoiding unnecessary and redundant cabling characteristic to conventional campus design, the Ave Maria University has optimized both capital budgets and time to achieve an outcome that is truly smart, scalable and financially beneficial over time.

By entrusting responsibility of facility systems management and information technology functions to a single department – the Office for Systems and Engineering – Ave Maria University has been able to staff their operations more efficiently. The integrated infrastructure has enabled the project team to exercise management capabilities that would not have been possible under a conventional design framework.

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Savings Summary

- Saved over $1 million in building costs by eliminating the redundant wiring and cabling of multiple isolated building systems

- Reduced staffing costs by enabling IT to assume tasks of building maintenance staff with an estimated US$350,000 savings annually in human resource costs

- Enabled significant efficiencies in utility usage with an estimated US$600,000 in annual savings

Project Objectives

The key objectives that were guiding the project initiative included the following:

- Achieve cost reductions by avoiding the installation of separate and proprietary mechanical, electrical and communications systems.

- Minimize human resource dependency by reducing physical monitoring and maintenance of separate systems across the 908-acre campus.

- Monitor utility usage and expenses, avoid power spikes and excess supply issues while seeking financial reconciliation for discrepancies with utilities.

- Manage nearly 23 facility and IT systems on campus from a single network operations center

The key challenges that the project team at Ave Maria University faced, like most similar scale developments included:

- **Capital Cost Outlay:** Managing budgets for mechanical and electrical installations for each separate system, both for facility operations and IT, and carefully allocating costs for each system's network of wires and cabling as well as proprietary protocols for control and communications.

- **Anticipation of Incremental Manpower Costs:** Human resource allocation across departments such as IT, Life Safety and Operations to monitor and manage tasks for each isolated system on campus meant an incremental cost exposure for hiring technically qualified manpower.

- **Management Challenges:** With separate external communications connections for each system under a conventional setup, the operations team would be required to manually monitor the operations of each system. This challenged the ability to detect problems in real time and avoid damages and secondary impacts.

Solution Platform

In view of the above challenges, the project team at Ave Maria University realized that the best way to achieve the end objectives was to centralize operations and management of all systems over a single network. The solution was to seek out consultants, contractors and vendors who would embrace the university's vision. Towards this objective the project team decided to work with Smart Buildings – a professional engineering and consulting services company, engaged in the area of designing integrated building technology systems for cost effectiveness and functionality.

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Smart Buildings designed a solution that encompassed lighting control, power management, HVAC control, data networks, voice networks, audio-visual systems, video distribution, video surveillance, access control and facilities management.To put the design concept into action, Smart Buildings worked closely to assemble industry experts who would be delegated with specific functionalities, based on the expertise they bring to the table.

Partnering For Efficient Delivery

The partnership model for service delivery was based on the 'Technology Contracting' approach as opposed to traditional contracting with multiple subcontractors installing separate proprietary systems. This approach involved entrusting the responsibility for planning, designing, installing, integrating, commissioning and servicing technology sytems throughout the project footprint to a single provider. *"Picking one contractor to do this project saved an enormous amount of not only money, but something more costly, being time. That's because we were able to reach out to one partner, consolidate all of the project management, mobilization and overhead costs into one platform,"* states Mehaffey.

Johnson Controls Inc, who was appointed technology contractor for the project, supervised the design and installation of an IP infrastructure and the technology that resides on the network.

Technology Contractor – Johnson Controls Inc.

- Provided Building Automation and Access Control Security System

- Designed and installed IP infrastructure and technology that resides on the network.

- Adopted LonMark open data protocol that allowed equipment from various vendors to be installed and integrated on the same infrastructure, avoiding unnecessary networks and cabling.

- Systems installed included - Johnson Controls Metasys® building management system and P2000 security management system, Cisco data equipment, Notifier fire panels, GE lighting, IClass smart cards, HID proximity readers, HVAC components, a Maximo maintenance management system, an AVI audio/visual distribution system, and servers among other equipment and applications.

Information Network Partner – Cisco Systems Inc.

- Deployed a campus-wide intelligent information network based on Cisco solutions linked together across a rapidly scalable and reliable optical network

- Installed interfaces and sensors into all building systems to connect with a Cisco end-to-end network

- Equipment: CISCO system switches, fiber-optic wireless and IP telephony equipment

- Built a 24-hour network operations center on campus that controls and monitors all university communications and building operations from one location

CISCO

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Equipment Providers

- Data Center: 5-rack-mount servers in the main center and another 10 in the back-up center – housed in APC InfraStruXure enclosures that handle battery back-up, cooling and security.

- Software: Microsoft Windows, SQL Server and Active Directory

- Electrical System: by Eaton Corporation

Intelligence at Work

All systems on the campus were installed in such a manner that they could be managed from the network operations center. The Metasys system helped operators manage and mechanize the campus's HVAC setup, chiller plant, indoor air quality, air flow, lighting and lavatories, in addition to carrying out power management and asset tracking. Other systems monitored from the center include Internet, email, fire panels, digital video monitoring, and security and access control via the Johnson Controls P2000 system. Systems being web enabled, operators can monitor and control them from their smart phones.

"*The Metasys system allows operators to react to temperature fluctuations and make HVAC equipment adjustments with a click of a mouse. Integrated occupancy sensors activate lighting in rooms and lecture halls and airflow adjustments as needed. Integration benefits fire and life safety as well. If the fire alarm system detects a fire, Metasys signals the HVAC system to stop delivering fresh air to the area and pressurizes the path of egress, clearing it of smoke. The access control system will unlock doors along the route, and train surveillance cameras on the fire to give responders a live feed.*" Johnson Controls Inc .[1]

The Cisco® end-to-end intelligent information network was deployed from the optical network connecting the campus and town buildings to the switches and wireless access points in each building, up to the IP phones on desks and in study rooms. This network was installed keeping future scalability in mind to extend to the township of Ave Maria, catering to high speed data and voice transfer and Internet access requirements of retail business owners in the area.

"*With the advanced Cisco intelligent information network, the town's businesses can also have unprecedented opportunities to implement advanced capabilities available on the Cisco Human Network, from visual communications such as TelePresence, to Unified Communications for enhanced collaboration, to mobility for anywhere, anytime.*" Cisco Systems Inc[2].

In lieu of wiring and cabling for each proprietary system, a single IP network running over Ethernet cabling was installed and all systems, devices, and sensors interface to this Ethernet network. This helped reduce capital costs while increasing system collaboration tremendously. "*I feel the university is as future-ready as it could possibly be because of what we've accomplished with Johnson Controls help,*" says Bryan Mehaffey, Vice President of Technology and Systems Engineering at Ave Maria University.

[1]Case Study, Ave Maria University: Source – Johnson Controls Inc.
[2]Customer Case Study – Ave Maria University; Cisco Public Information: Source – Cisco Systems Inc.

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Reaping A Smart Harvest

Four years after the commencement of this project, the occupants at the Ave Maria University campus are enjoying the benefits of a seamlessly connected environment. The state-of-the-art, nine-building campus has a fiber-optic network that links each building, with WiFi access throughout the campus. Maintenance is fully mechanized with temperature control and pressure readings all taken care of by staff members through simple mouse clicks and keyboard adjustments. All devices from HVAC, fire, security to lighting are remotely managed and monitored.

There is a 900-square-foot network operations center with wall-mount LCD TVs, for the staff member to monitor the campus' IP surveillance cameras and view real-time data from building systems. "*When on campus, they can view security cameras and system management software from their BlackBerrys and smart phones. For physical and logical access, students and university staff members swipe wireless smart cards by proximity readers at doorways to gain access to buildings and computer labs. An identity management database lets the IT team manage users' privileges and monitor access. The card also doubles as a debit card, letting students buy books and food or make copies at copy machines on campus. The library system uses them as well, to check out materials.*" The Angelus[3].

Landmark In Building Systems Integration

The Ave Maria University project is a clear landmark in the area of intelligent building management, demonstrating that beyond integration, smart building technologies can ensure elaborate monitoring that can sense the pulse of the building. By allowing systems to effectively communicate with one another, operational expenses can be driven downwards through enhanced efficiencies and functionalities. The savings generated establishes the financial attractiveness and long-term sustainability of the project. As Jim Sinopoli, Principal of Smart Buildings points out, "The project establishes a new paradigm for the design and integration of building and communications systems and provides us the opportunity to achieve unprecedented new capabilities while drastically reducing costs." This project reflects the evolution of the building systems to an IP network, the financial advantages for building owners to integrate their systems, and the important role of the building systems in controlling energy usage and costs. "*This project reflects the evolution of the building systems to an IP network, the financial advantages for building owners to integrate their systems, and the important role of the building systems in controlling energy usage and costs*", adds Sinopoli.

Instilling Faith In Smart Buildings

Fruitful results and the promise of on-going benefits documented by Ave Maria University project, marks an important step in the integrated building industry. With examples like this, the proponents of smart and integrated buildings can adopt this concept for definite returns. This project proves that smart technology integration used to manage our buildings will not only meet current needs and expectations but will also deliver future scalability and cost advantages. With the right project plan and service provider involved, such projects can go well beyond merely performing routine tasks; they could very well be the catalyst for addressing climate change.

[3]The Angelus, The Voice of Progress for Ave Maria University and Town, May-June 2008