The Greening of Buildings with Computerized Web Enabled Automation

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AutomatedBuildings.com is based on Vancouver Island on the West Coast of Canada**,** and is a global online magazine and resource inspired by and focused on radical evolution in large building automation.

Summary

Opportunities arrive daily to intelligently use building automation as more than just a connector of "brute force" comfort generation systems. To realize this renaissance the building automation industry must become part of the globally expanding green building movement and show how improved occupant / architectural interaction can enhance environment friendly buildings. Using evolving automation, we can bring passive designs alive with the necessary missing ingredient "intelligent interaction". The low energy impact of the original raw materials required to create the building automation systems, coupled with their potential power creates the greenest of all building materials. Automation's capability to provide significant change with only grams of substance, and the inherent ability to be easily reconfigured to grow and adapt with the building makes it the essential backbone of leading green building design. Web-enabled Building Automation takes us to a higher level of interactive communication with the architectural fabric.

Introduction

The acceptance of many new communication and computerized concepts has radically changed the function of our large buildings. Office hotelling has allowed the sharing of expensive office buildings with an increased number of telecommunicating occupants. To effectively manage this phenomena coordination of everything is required, i.e. personal environment, phones, workstations, data links, security access etc. Occupants also must have the ability to interact with their environment virtually. The greenest of buildings extends beyond shared office space; it includes sharing the total transportation and support infrastructures while making our residential interface more efficient.

Broadband is the common term for high volume networks.

Telephony is the convergence of voice, video, fax, and data.

The weaving of the medias of **Broadband, Telephony, and Building Automation** has created a powerful new virtual architectural fabric. I call this fabric **"Enviromation".**

Enviromation provides the greatest strength of all building materials, integrating a new powerful connection to the building occupants. Additional strengths in the communication quality of this new fabric can insure that building energy is purchased at the lowest cost from the environmentally correct sources. Once the energy arrives at the building, expert operators utilizing dynamic feedback from real time data can insure that this energy is used to create the greatest comfort for the least environmental impact. To insure that the original system design intent is achieved this same communication fabric can provide real time feedback and interaction to the original designers. The ongoing interaction with the building by both occupants and designers will lead to improved sustainability. Increased overall real and perceived value of the property will occur, not just during project construction but forever, providing a conduit for interaction for the life of the building through its online web presence.

Our approach to optimization, feedback interaction, and learning from our designs will be forever changed. Online documentation of building designs, concepts and intent will greatly aid operators and occupants in understanding and feeding back variances and concerns.

Designing Greener Buildings

Tom Hartman, internationally recognized expert in the field of advanced high-performance building operation strategies, described how integrated building automation raised the bar to a new level of green building design in his article **Designing Greener Buildings [1.]** ".....the target audience for greener design should start with the building development and property management community."

This article provided us with a list of necessities for greener buildings and showed us how Web-based Automated Building Systems enabled the potential of the next level of design. A few direct quotes from Tom's article are important to set the scene.

Make the approach Top-Down rather than Bottom-Up: *Whether your goal is a single green building or initiating a complete green building program, don't put your focus on selling architects and engineers on the merits of green building design. Rather work on the principals; the building owner(s) or government agency that manages the real estate.*

"Think green in all your work: *For my presentation I showed the group how applying integrated network control concepts can reduce HVAC energy use by 30% to 50% below the energy requirements for the same equipment with the types of conventional controls that are currently employed. I also discussed the unfortunate fact that at times technology is seen as an enemy of green building designs. This view may be fostered by the narrow focus engineers too often apply that results in "brute force" comfort system designs"*
The paragraph ends with *"Broadening our thinking to a "green" perspective helps us do a better job in all the areas of our responsibility."*

Amen Tom! Opportunities are evolving daily to use building automation intelligently and not simply as a connector of the myriad of "brute force" comfort systems. Our industry

has grown and evolved to include integrated anywhere communications as part of our automation system allowing occupant and designer interaction. We need to take our industry message to principals, and owners or agencies that manage these green buildings. To achieve this renaissance the building automation industry must become a major part of future green teams and show how improving building intelligence with well integrated automation can enhance the new style low tech buildings. We can bring the passive designs alive with the necessary ingredient "intelligent interaction". A trend will occur in the industry to control and intelligently interact with passive designs providing much needed online feedback. Rapid evolution will occur with these new hybrid green buildings. The low energy impact of the original raw materials, coupled with the potential power of automation, creates the greenest of all building materials. Automation's ability to provide mammoth changes to buildings with only grams of substance, and the ability to be easily reconfigured to grow and adapt with the building makes it the essential backbone of leading green building design.

One example of what can be achieved is from Denmark and is based on an Austrian "intelligent" sun protection project, which shows how we can do a better job interfacing with the total building fenestration and envelope. The interaction of buildings with occupants has been very limited because the automation systems of the past had no knowledge of when occupants were in various areas, who the occupants were, and what they were doing. Integrating web technology with security, lighting, ventilation and other environmental control functions has a powerful greening effect on buildings.

Building intelligence can close blinds, lower awnings, turn solar panel arrays, increase ventilation air, predict outdoor air temperature, flushing urinals, lock doors, identify identities and turning on and off the lights. These are conventional concepts but with a little imagination we can help the green team achieve what has never been done before.

We need to reset the hinges of our conventional thoughts and think in freer terms. Much of our wisdom is based on many years of applying hardware limitations to our complex occupant interface applications. Our prior interfaces are a collection of compromises to achieve an acceptable occupant, environment, and system interface. We now have new tools and can do a better job. We need to revisit our reasons for reason and work as a new team of Occupant, Owner and Vendor. The industry is now freer in structure, with tools that are softer and more pliable. Together we can do a better job of Occupancy Integration while reducing the environmental footprint.

We need occupants and their coordinators to re-ask the question, "What is the best interface for my client?" We need to think new thoughts as to how to use the new interface tools to provide a better green interface.

Highly functional interfaces are presently available that seamlessly connect existing DDC systems to most vendors' latest and greatest graphical web-based operating systems. The ease of, and the relative low cost to completely change the personality including the touch and feel of the existing DDC systems, while greatly increasing the overall functionality is tempting building owners. These benefits make upgrading existing systems very compelling.

The Importance of Web-Based Interfaces

I have selected a few pull quotes from my **Web Based Facilities Operations Guide** **[2.]**

that demonstrate the importance of web-based solutions in the greening of buildings with automation. The theme of the Guide is **"**Doing more with less by using Web-based anywhere information to amplify your existing building operational resources."

Quotes from Guide

Using the building's website to demonstrate a good online energy accounting program as operated by an accountable operator allows identification of conservation successes and failures and is the backbone of the complete energy conservation program.

The new generation of browser software can launch other applications and files, which leads to the simple custom generation of easy to use, highly functional, integrated project information from all sources.

By demonstrating concepts, such as the effect of closing blinds, with a multimedia presentation, you can educate your client to help themselves by doing everything possible before registering a complaint.

Occupants also must have the ability to interact virtually. The greenest of buildings extends beyond sharing office space; it includes sharing the total transportation and support infrastructures while making home units more efficient.

The power of web ways to create complex interactions in a simple point and click interface familiar to most is extremely powerful and should not to be ignored.

Industry Rapidly Adapts to New Ways

Extracted from **Controlling Convergence**
"Identifying the Complex Components of Convergence" [3.]

Never in my 30 years in the large building automation industry have I felt such excitement as I did at the January 2003 AHR Expo in Chicago. It was not just about new products and new capabilities it was about new directions and new relationships with building owners.

At the AHR Expo show in Chicago there was unified acceptance of web-based solutions in addition to a strong acceptance and connection to the evolving digital office standards, by all automation hardware and software vendors. Building owners and the real estate industry in general are well versed in the use of web-based solutions to provide critical information anywhere to help market their products. They are on the leading edge with 360-degree viewer controllable presentations of their properties being the norm.

The industry's thermostats are literally coming off the wall and into a web browser near you. The large building automation industry's visibility is greatly increased which has changed the building owners perceptions. Dynamic data has become easier to generate than comparable static data.

The article goes on to talk about radical industry changes and the effect of Information Technology convergence on our building industry.

Convergence is Driven by Economics

I have extracted the following views from this excellent article.

Economy Drives Convergence [4.]
The first advantage of convergence is installed cost**.**

The convergence of building automation systems (BAS) and enterprise networks is a matter of economy and capability for building owners and facilities managers. Using an enterprise wide area network (WAN) to carry building automation system (BAS) data makes good business sense on many levels, protecting today's bottom line and accommodating tomorrow's growth. In the forefront of the technological revolution enabling this convergence is BACnet/IP, also known as "Annex J" BACnet.

The first advantage of convergence is installed cost. It's less expensive for the BAS to use multi-function cabling and technology already installed for other enterprise networking applications: email, sales data, collaboration tools, and others. What's more, enterprise networks are correctly seen as mission critical. As a result, these networks usually are high-performance, capable of carrying a vast amount of application data at high speed with good security and reliability.

IP is the core of the enterprise network and the automation system
The language of enterprise networks is undoubtedly the internet protocol (IP). The routers, gateways, switches, and servers that run enterprise networks all "speak" IP. That's why the key question about a BAS for the facilities minded really is, "Does your BAS speak IP?" To fully take advantage of the enterprise network and all it offers, the key BAS components at the management and integration levels must speak IP. That's why BACnet/IP (also known as Annex J BACnet/IP) is such groundbreaking technology, and why the products that use it are at the forefront of the convergence revolution.

Jeff's article provides a great insight into evolving converging economics.

Our Industries Communities are Converging

I am constantly reminded of the people convergence that needs to occur to make the necessary technology transition. Our real industry value in the future will be the ability to customize our dynamic data and interactions to better integrate into our client's enterprise. These concepts will radically change our business community. Virtual online relationships will be a large part of the new community and will be assembled as required for particular projects and services. The success of our companies will be directly related to our ability to assemble teams of the correct online identities.

As new relationships with building owners evolve, our ability to provide cost effective optimization and support services online will win us market share. Access to our assembly of online individuals will be our added value. Our collection of expertise that we are able to reach out and utilize will become a tangible asset. Our strengths will evolve into managing the complex building services requirements for the owners' enterprises.

Keep in mind that the radical changes that will be occurring in our community will also be occurring in all of the business communities that we interact with and this will create a

moving target. The reassembly of our function, capabilities and reach is the catalyst for change. Selling to a market that your very presence changes is complex.

Conclusion

The Greening of Buildings with Computerized Web Enabled Automation will not only change our industry, it will have significant impact on how building owners approach management and optimization. The guidance of successful convergence will become a valuable art. The practitioners that can work with this new fabric and create the dynamic interface while making the myriad of complex technologies used to create this reality all but invisible will be the winners. To the companies and their artisans who move us ahead with successful demonstrations will go increased market share. New relationships and partnering will abound. Smaller and smaller companies will provide greater impact on the industry through online interactions that become available with web-based presentation. The concept of partnering to provide our clients' complex requested software functionality will become common. These partnerships will lead to significant cross-pollination with complete new technologies and concepts all which will feed the convergence fire. New mediums for our industry such as cell phone, PDA, Video, Digital Signage Systems, etc will be seamlessly integrated.

The reality is the convergence of facilities management and Information Technology (IT) is well underway. It is a convergence that heralds the inevitable move of environmental monitoring and control onto the building information infrastructure. Though it is often the technological issues that are stressed, it is a convergence of both technology and the working community relationships.

The understanding of the above concepts will allow the green building practitioners to discover the true power of **“Computerized Web Enabled Automation”** as a new building fabric.

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