

# Intelligent Buildings

## The future of facilities and information management

The migration of traditionally disparate systems such as building management, access control and CCTV to IP-based platforms has led to the realisation that their integration, along with other ICT systems, can offer a raft of services once reserved only for science-fiction movies. Visions of people walking into shops and being greeted by the building's contextual display systems are not as far-fetched as one might expect, with many of the required component parts already in use.

Previously used for basic building management and monitoring, the intelligent building has become a fusion of fully-integrated services that deliver key business benefits to the owner. As the building silently manages energy consumption and reduces facilities staffing requirements through automation and centralised monitoring, it also provides occupants with bespoke experiences as they roam their working domain.

*The future of the Intelligent Building is an exciting one.*

The delivery of timely information to users based on their roles, responsibilities and physical location is the foundation of the Real-Time Enterprise, the Intelligent building is becoming one of its primary enablers.

Realising this vision however, is potentially limited by its ability to demonstrate business benefits. Today, when little is done 'for the hell of it', the Intelligent Building must prove that it adds value to an organisation by providing opportunities to reduce operating expenses and improve occupant experiences.

### Reducing Costs

The Intelligent Building can help to reduce running costs by ensuring that energy budgets are stringently adhered to and that anomalies in expected consumption are highlighted to those responsible for further investigation. Where a cost effective energy budget has been agreed with local energy suppliers, the intelligent building ensures that it is not exceeded.

The automation of plant, ventilation systems and air conditioning greatly reduces the manual overheads associated with building management processes. Additionally, reduction in staffing levels can be realised and centralised management put in place to further optimise budgets.

### Enhancing the occupant Experience

The space in which we work has a proven effect on productivity. The Intelligent Building creates a safe, secure and comfortable environment with essential ICT services delivered to the user irrespective of their location on the estate. While contextual engines, logic controllers that process information and deliver it only to those who may find it useful based on location and user profile, provide information updates to users in real-time. Voice, video and data services are available seamlessly across the entire estate, and environments are automatically managed to provide optimum levels of light, heat and oxygen (i.e. Carbon Dioxide concentrations above 1000 parts per million can hinder a person's ability to concentrate, cause drowsiness, headaches and nausea).

Recent engagements with partners have seen Telindus heavily involved in designing next generation Intelligent Buildings, specifically in secondary schools and prisons. These are both environments where the mix of Facilities Management and ICT services demand building intelligence to support a highly varied user population. Further Telindus research shows that the concepts, going under names such as 'Connected Real-Estate', are already being widely deployed in the Enterprise.

As the future of the Intelligent Building takes shape, let us take a quick look at some of the elements that come together to make it possible:

### Converged multi-service infrastructure:

the backbone of the Intelligent Building is the multi-service infrastructure that uses a seamless mix of wired and wireless technologies to ensure the secure availability of required data anywhere on the estate. Information from sensors placed on items such as plant machinery, boilers, smart cards, CCTV cameras, air conditioning systems, ventilation mechanisms and other physically oriented services is passed to centralised network-attached logic controllers across the converged multi-service infrastructure.

Consolidating services onto the same infrastructure that already provide the more traditional business communications services has been shown to reduce the cost of design and build by 15 to 20% (over) when compared with disparate traditional systems. This is due mainly to a single point of focus for management, maintenance, resiliency and redundancy costs. The cost of adds, moves and changes is also greatly reduced as a required service can be extended to wherever infrastructure access is available.

**Wireless Mobility:** the deployment of voice-grade wireless allows flexible working across the entire estate and the ability to gather information anywhere. In addition, the layering of services is possible, including Fixed Mobile Convergence (FMC) which can help reduce the cost of internal mobile calling by up to 20%.

Asset tracking through WiFi and RFID tagging allows devices, people or assets to be tracked as they move around to within a few metres of accuracy. Two good examples of this are Hospitals and Prisons. Some hospitals have already begun to see the benefits of tagging by being able to find a required crash trolley or piece of medical equipment quickly via WiFi tracking technologies. This is helping to save lives. Meanwhile, prisons are using wide-area RFID systems to track inmates and apply logic to their behaviours, providing alerts when individuals with a known history of violent disagreement are 'spotted' in the same physical spaces.

**Digital Surveillance:** adaptable surveillance delivered over the same single system integrates with access control and asset tracking systems to provide a physical views and a recording of the detected event or issue. Video from any camera can be viewed at multiple locations, on or off site, and mobile users also have fully featured access to the video streams via PDA client devices. Digital Surveillance enables central remote monitoring to reduce operational building costs during un-occupied hours, since the same system is used for the delivery of video locally during the day and remotely over night.

Intelligent video analytic services such as Automatic Number Plate Recognition (ANPR), loitering detection, object removal and video motion detection further enhance the capabilities of the overall system. Plus, they optimise the effectiveness of each security operator, keeping costs down as more and more cameras are deployed.

**Smart Access control:** access control is fully integrated into a number of systems including ICT user authentication services, allowing the user to access other systems with nothing more than their smart card. Over and above securing entry to selected areas, the access control system allows access to shared message board terminals installed throughout the building. Access control, bespoke intranet kiosk access, cashless catering, electronic registration, library services and locker systems can all serviced by a single card.

When accessing car parks, a smart card in the car windscreen allows the access control system to recognise the entering vehicle and raises the gate. Where higher levels of security are required, two factor authentication of the vehicle can be conducted through the use of ANPR and the smart card. Multi-factor, logic based authentication can be a combination of any integrated service deployed in the Intelligent Building.

**Energy management:** Building systems, including heating, ventilation and air conditioning (HVAC) use feedback and control mechanisms over the network infrastructure to facilitate the delivery of a highly efficient and comfortable workspace. Data is collated by the building management system to make intelligent decisions as to how is best to meet a defined energy consumption profile.

With preferential rates offered to customers who can accurately identify what their energy requirement is for any given time of day, the ability of the building to automatically adapt to the agreed profile becomes very important (there are often financial penalties, many for the remainder of the quarter). If for example the current heating levels threaten the overall energy budget for that hour of the day, automated decisions on the reduction of temperature across the entire estate (a reduction of 1 centigrade per room, unnoticeable to the occupant) can be taken. Human intervention only occurs here the building cannot see a way of adapting energy requirements without more drastic measures.

The building management systems not only allow automated reactive measures, but employs predictive logic to estimate where energy loading may flex for the positive as well as the negative. The system can connect to a local weather station for example from where more accurate external temperatures are taken

along with a forecast for the coming week. This forecast can be compared to predicted occupancy (room booking systems and outlook calendars) and Facilities Management staff alerted to any possible difficulties in adhering to the defined power budget.

#### **Adding Value**

Telindus' research shows that integrating technology into buildings during the initial design will actually reduce the cost of construction as the cost of multiple traditional systems is removed. The demonstrable management of energy consumption for any given time of day also provides the building owner with leverage over the energy supply companies who provide financial incentives to those who can accurately work with them to define power requirements.

Research has also shown building developers achieve higher rentals for integrated buildings as the network required for the tenant is now included within the base construction, therefore saving costs and creating the opportunity for up-selling services within the lease. The tenant can also see via dashboard functionality how efficient their building is and provide accurate historical data for carbon footprint incentives. Staff working in the building are provided with a comfortable, secure and safe building that intelligently ensures it is optimised for work activities, allowing productivity to increase.

#### **Expectations now and in the future**

The Intelligent building must meet the two requirements identified earlier: the reduction of cost and an enhanced user experience. A good example of this is the government's Building Schools for the Future (BSF) programme, which offers an ideal opportunity to provide increased value and better utilisation of learning space through the deployment of Intelligent Building

technologies. The requirement for the reduction of energy costs and development of exciting new learning experience strategies has driven the need for deployment of many of the elements discussed. The integration of information from all identified systems will ensure the delivery of an environment fit for learning that keeps operating expenses predictable and manageable.

The future of the Intelligent Building is an exciting one, limited only by innovation from various markets in the adoption of IP as the preferred transmission protocol. With converged networking already established in traditional business communications, the delivery of enhanced data services such as contextual messaging and electronic message boards already supports the aspirations of the Real-Time Enterprise. It is the utilisation and management of data from the new additions to the convergence fraternity such as access control, digital surveillance and building management where building owners and managers will begin to realise the full potential of their Intelligent Building. As we move into the next 3-5 years of development, Telindus expect the number of available value added Intelligent Building services to grow...and quickly!

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