

# **Unifying Automation Systems with a Web-enabled Software Platform:**

## **The Need for an Automation Framework**

**A White Paper**

# **Unifying Automation Systems with a Web-enabled Software Platform**

The proliferation of smart devices has changed all facets of our world. It has resulted in an explosion of intelligent systems in the buildings where we live and work. From systems for control of HVAC equipment, access control and security, to electrical metering devices, process control systems, on-site generators and lighting control, today's facilities contain a wide range of embedded systems.

While these devices provide great utility in their specific area of application, they pose a great challenge in today's increasingly knowledge-based economy. The problem stems from the fact that in most cases, these diverse devices do not communicate with each other, do not communicate with enterprise systems, and do not communicate with the Internet.

## **Why The Problem Exists**

The reality is that these systems employ a dizzying array of communications protocols, data formats, and software platforms. From legacy systems developed before the advent of standard protocols, to new products based on the multitude of competing protocols, many of which are considered "industry standards", today's building owner can expect to have numerous devices that are not designed to work together. The result is a facility that is highly fragmented, not interoperable, and more complex and expensive than necessary to manage. Quite simply, these systems have not been conceived with the Internet, interoperability, and integration with the enterprise in mind.

While it is true that more recent systems follow some of the emerging standards, this has only exacerbated the problem due to the fact that the standards themselves have not been designed to interoperate. In reality, the recent push towards standard protocols has created more "languages" that need to be integrated instead of fewer. And because devices themselves continue to get smaller, less expensive and more focused on a single application, we cannot expect to see the devices themselves solving the problem by speaking many languages simultaneously.

History has demonstrated that interoperability will not be accomplished through the use of any single "standard". There are simply too many that have achieved viable followings. The ability to move to new standards is also problematic for the owner. Economics do not support wholesale replacement of existing, functioning systems. It is simply not practical to replace all existing devices with ones that speak a new standard, no matter how compelling the potential benefits.

What we are left with is the need to integrate the myriad of smart devices without affecting the devices themselves. We need a solution that embraces both the multitude of new standards and the wealth of legacy systems on an equal basis.

### **An Analogy from the PC Revolution**

The desktop computer revolution created a standardizing force that allowed software developers and manufacturers to focus on a single platform and set of technologies. It provided a standard methodology for interfacing to printers, networks, storage systems, etc. This standard platform had the affect of shielding application developers from the details of how those devices worked, thereby allowing them to focus on their applications. The result was dramatic acceleration of application development in the software market.

This fundamental step has not occurred in the world of embedded systems and “smart devices”. There is no standard platform for application developers to build on. Every software application has to be written to deal with the unique characteristics of each system that it will be used with. This creates a tremendous financial burden on developers and has limited the range of independent software applications that can be used with embedded systems.

### **An Automation Framework is the Solution**

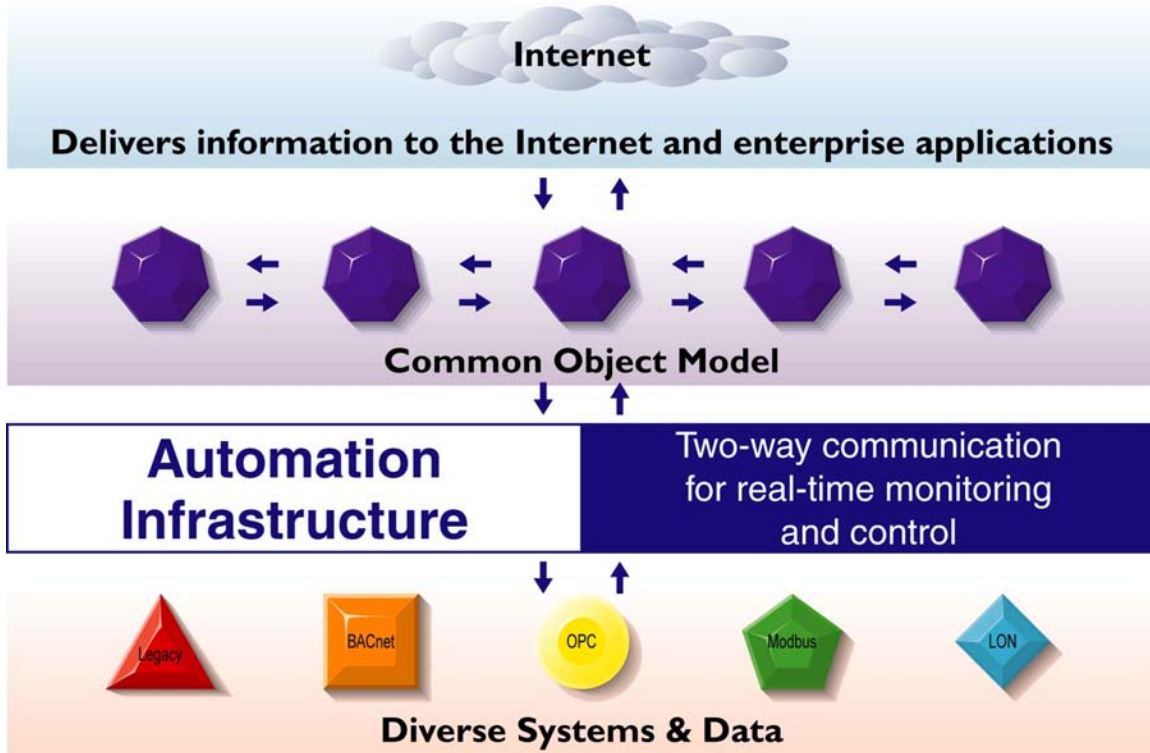
The problem we have described is present throughout the world of embedded systems. What is needed is a solution that brings together all embedded devices, old, new, standard or otherwise, into a single environment that acts to shield the user (and software developer) from the distinctions between different systems. This is the role of an automation framework.

The framework, or infrastructure, is a layer of software that resides above the individual systems and their specific protocols. Its’ role is to provide a uniform method of accessing data from, and issuing commands to, the various smart devices. The framework must be protocol agnostic and vendor neutral supporting all devices equally.

### **How It Works**

The framework enables seamless integration of the diverse systems by introducing a new factor into the equation. That new factor is the concept of a “common object model”. Simply put the framework takes the data elements from all of the various devices – inputs, outputs, setpoints, schedules, control parameters, etc., and “morphs” these items into virtual objects. This creates a virtual model of the actual systems – a model that supports all of the functions and features of the end devices. The result of this conversion is a uniform, normalized, database of objects for the user or

application developer to work with. This database becomes the platform through which other applications interact with the various systems.



**Figure 1: Representation of an automation framework.**

The framework takes in heterogeneous data from different systems and creates standardized software objects that represent them. These virtual objects are fully interoperable. On top of this object database the infrastructure provides a set of general services such as a real-time control engine, scheduling, alarming and Internet connectivity.

### **A Framework Provides a Foundation for Value Added Applications**

The common object model, which has access to all of the data and actions supported by the diverse systems, can now serve as a foundation for other software applications that provide value to the operation of the facility. Examples include: real time energy data collection and analysis, execution of global control strategies such as schedules and alarming, aggregation and control of energy consumption across multiple facilities with different systems, etc.

The common objects also make it easy to build browser-based displays, reports, alarms and even supervisory control logic that works across the multiple systems. The

result is true interoperability without the need for users to get mired in the details of competing protocols and without the need to disturb the installed systems. All of this is made possible by the framework, which forms the foundation for higher-level functionality.

It is important to note this approach also allows system expansion through the addition of existing device type(s) while at the same time enabling expansion with devices based on new and emerging protocols. It provides the owner with the ability to truly choose “best of breed” smart devices and systems.

## **Summary – Why It Matters**

Much has already been written about the need for interoperability. The control industry has debated the virtues of various standard protocols for a number of years. Through these efforts new protocols have emerged, many of which can rightly be considered as standards. Even so, no comprehensive solution to interoperability has emerged – until today.

Today, our increasingly information driven economy demands seamless operation across diverse systems. Whether it be the need to respond to the challenges unleashed by energy deregulation – demand management, curtailment programs, and real time pricing, or the need to share real-time information between access control and HVAC and lighting systems, facility management applications need to be able to interact with each other, easily, reliably and cost effectively. And, these applications demand a solution that works not only with new systems based on emerging standards, but also with the huge installed base of legacy systems.

Similarly, the continued proliferation of new standards has created a challenge for manufacturers trying to serve their customers – they simply cannot support all of the standards. They typically choose to support one major standard or the other, but not both. This limits market access for the manufacturer and choice for the customer.

For each of these challenges, an automation framework provides the solution – a platform that allows companies to easily unify and Internet-enable applications to monitor and control smart devices regardless of protocol, operating system or age.