CONTROL ENGINEERING

Beyond HMI – Evolved solutions bring significant new rewards

HMI and more

For a select few HMI providers, the very concept of an HMI has grown and evolved to where it is now fully infused at all levels of a manufacturing organization. It now can extend beyond its traditional role and empower individuals from the plant floor to executive suite, delivering information in context and supporting enhanced decision making.

It's broken out of the control room, moving with a technician to all parts of the plant, or carried by a manager on a mobile device for real-time access anywhere. Information can now be visualized in ways and places that would have been unimaginable just a few years ago. The story is getting bigger and more complex every day. Forget the boundaries of traditional HMI and information context, the possibilities are virtually limitless.

Today's evolved and expanded HMI facilitates communication in multiple directions, empowering people to engage with historians, web services, enterprise systems, engineering stations, maintenance departments, and operators in the control room. Whether it's getting production numbers to management, or financial data to plant personnel, information gets where it's needed to support decisions that enhance operations, safety, and profitability.

Wonderware InTouch and ArchestrA represent the evolved HMI and facilitate this connectivity and information flow. Platform scalability ensures that as demands change, the system can keep up and adapt to new needs. This eGuide will provide a greater level of detail on this discussion, including more on how the technologies operate and interact, including some very complex applications that became much simpler because of truly scalable infrastructure.

Brought to you by **Wonderware**.

Unchained – HMI breaks out of the control room

Mobile industrial worker

Technologies have enabled industrial workers to get mobile, and there's no going back.

Peter Granger
02/28/2012

Greater worker mobility is one of the biggest trends in organizations. Whether it's called BYOD (bring your own device), "multiple devices," or just plain "Internet of things," workers of all sorts—control engineering, instrumentation technicians, plant managers, maintenance personnel, troubleshooters, design engineers, and all manner of factory workers—are becoming mobile workers. They are all using wireless devices to do their jobs. There are lots of reasons. From motor manufacturers to food factories, from paint plants to drink distributors, from oil rigs to service companies, more companies are cutting the fixed wire leash that has been holding back their workers from doing more with less.

Many reasons contribute to the greater use of mobility on plant floors and manufacturing operations, but the reality is that industry has no choice. We're undergoing one of the biggest shifts in workforce availability in recent history. Baby boomers are retiring and the newer generations just can't fill the void. Looking at the oil industry, for example, Booz Allen Hamilton found a year or so ago that there are only 1,700 people studying petroleum engineering in 17 U.S. universities, compared to more than 11,000 in 34 universities in 1993. This dramatic reduction in worker resources means more automation in factories wherever possible, greater access to expertise globally, and more responsive organizations employing truly mobile workforces.

> "More companies are cutting the fixed wire leash that has been holding back their workers from doing more with less."

Extending reach

Workers must be enabled with the latest technologies and devices so that they can interact with automation controls and machines, from afar if necessary. That means the underling network infrastructure has to be up to the challenge. Until recently, wireless networks haven't been as robust as many manufacturing operations would like. Thankfully that's changing rapidly with "industrial-strength" networking that has the kind of capabilities manufacturing operations need. That infrastructure has to withstand a host of factory-style interference, mitigate conflicts, and self-heal to be able to maintain continuity of operations.

As a result, workers can carry mobile devices that more reliably interact with machinery from a sensing and from a reaction perspective. There are still the big red buttons of course, but HMIs (human-machine interfaces) are not always hardwired to the machine anymore. Systems now can enable a worker to monitor and interact with multiple machines and take reactive measures if necessary. For example, wireless radio frequency identification (RFID) based e-Kanban systems operate in motor manufacturers for line side parts replenishments, and mobile computer devices are fixed to forklift trucks that interface with warehouse and ERP systems, as well as wip (work in process) parts and materials tracking systems on the plant floor. Now we're starting to see machine controls added to the list of mobile device capabilities.

Mobile wireless workers find benefits in companies such as Thermo King, which manufactures transport temperature systems for trailers, truck bodies, and other applications. The company configures production lines with wireless, battery-operated call buttons for parts replenishment. The same wireless infrastructure that staff uses for data communications with laptops and handheld mobile computers is used to receive parts requests to replenish work area parts bins. Since the solution requires no hard wires, it is easy to deploy and, more importantly, enables flexible support of changes to different production line layouts. Production lines can be reconfigured easily, just by remounting the wireless

Kanban-like call button. No rewiring is required since the call button is battery operated. Oil companies similarly use wireless systems, sensors, actuators, and other automation technologies for the same reason—flexibility, and a huge saving in manual labor laying power and Ethernet or other protocol lines over a large plant surface.

Once a plant implements a wireless infrastructure that is rugged enough to handle moving vehicles, such as forklift trucks and carriers that might have electromagnetic, metal obstruction, and network interference, then WIP and supply chain applications can be deployed. This enables mobile workers to carry devices, sometimes firmly fixed to the vehicle, to communicate with the enterprise resource planning (ERP) and manufacturing execution system (MES) software. That's what companies like John Deere and Continental Tires of the Americas are doing. They enable mobility on the production floor, making sure that the right parts and materials are used at the right time and that supply chain issues can be reworked in real time. In both cases workers actually "see" the plant-floor configuration on their devices, and can use it as a real-time map.

See what's going on

Ability to better "see" what is going on is another advantage of wirelessly enabled workers. If you look at intercompany interactions, for example, between Boeing and GE Aviation regarding the 787 Dreamliner engines, engineers can talk to each other with video and voice devices. Looking like a traditional single lens reflex (SLR) camera, the device GE Aviation uses is a wireless-enabled IP telephony and video communications device that even allows for telestration techniques (on-screen mark-ups by both the mobile workers and remote engineers) and the input of other devices (like borescopes) to "see" what's going on inside an engine or part and get real-time data. These mobile workers can move around the plant and send real-time video to developers in conference rooms using telepresence techniques, for example.

From an automation and controls perspective, wireless is increasingly becoming the norm. Manufacturing industries (discrete, process, and hybrid) are beginning to rely on real-time information gained from wireless networks of sensors installed at key points throughout the factory or field site. This data could be the measurement of air pressure, electrical current, weight load, corrosion, fuel levels, temperature, pipe flow, and the like. These data points are essential to the effective and efficient operations of a safe plant. Many of the most robust wireless sensor systems themselves use self-organizing mesh technology that is tried and tested, and the basis for the WirelessHART and ISA100 standards.

As we move through 2012, wireless technologies will continue to enable worker productivity. We'll see more handheld devices in tablet form, some ruggedized, others not. There will be multiple devices attached to multiple networks, producing more data. Those involved will want to have more control, more access, and more security, and with it will come more complexity if not implemented in the right way. The biggest issue facing the control engineering and the IT sides of the organization will be the resulting deluge of data—not so much the data-at-rest (stored data for historians and data warehouses, for example), but data-in-motion.

How organizations implement data mobility will demonstrate the value of wired and wireless networks in dealing with real-time information and the effect on controls. Different threads of information can be drawn together in an intelligent network to provide knowledge. Coming full circle, that knowledge will help organizations deal with the lack of skilled workers.

- Peter Granger is senior manager, Cisco Systems. Edited by Mark T. Hoske, content manager, CFE Media, Control Engineering. This is part of the March 2012 cover story for the Control Engineering North American print and digital edition.

www.cisco.com
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Integrated – Old + new = success

Bermuda Electric Light Company Limited

Hamilton, Bermuda

Since 1908, the Bermuda Electric Light Company Limited (BELCO) has been powering the lives of the residents and visitors to the picturesque island chain of Bermuda. Its beautiful and remote location — nearly 700 miles southeast of Martha's Vineyard on the east coast of the United States — is an asset, but also means that self-sufficiency is a way of life.

> "The major advantage we've experienced is that it's very easy to develop and integrate the Wonderware software with the wide variety of equipment we have here. Plus their support is global and very timely."
>
> **John Blizman,**
> Vice President,
> Plant Management

For over 100 years, BELCO has successfully met its mission: To provide a secure, reliable and sustainable electric power system for the people of Bermuda. And today, with the help of Wonderware software, BELCO is planning for a bright future.

The Importance of Planning

Dependable power when you flip a switch is something most people take for granted — until it's not there. Across much of the world, electricity is an expected amenity. But in island locations like Bermuda, the design and maintenance of power systems can require more effort.

That's why the utility has historically planned in 20-year increments. In 2005, BELCO completed the development of the East Power Station, the culmination of several projects that expanded capacity to meet growing demands as well as increased the efficiency of the company's operations.

And as soon as this milestone was reached, the next 20-year project was launched. The current integrated resources plan is focused on improving distributed generation, expanding the central plant and adding renewable energy and sustainable development for homes and businesses across the 181 islands of Bermuda.

Achieving Consistency and Self-Sufficiency

When BELCO chose Wonderware software products, starting with the InTouch® Human Machine Interface (HMI) in 1995, both planning for the future and ensuring that the utility could operate consistently were deciding factors. How have they done it? The answer is the powerful ArchestrA System Platform. This scalable technology has enabled BELCO to integrate and unify various operations management systems, including recently added and legacy devices.

John Blizman, BELCO's Vice President, Plant Management, agrees, "They're consistent across any type of equipment we have… whether it be old generators, new generators or other ancillary equipment. The operator interfaces are the same."

Easy-to-use Wonderware InTouch is central to meeting BELCO's goals. The standards-driven,

objects-based system has supported smooth and independent upgrades, and has enabled operators to customize applications.

Another way that InTouch helps is by providing an easy-to-read, graphic representation of BELCO's central plant as well as the 34 substations which are located throughout the islands. Real-time alarms show engineers exactly where their attention is required and the system provides essential trending reports, both real-time and historical.

When Support is Needed

Even so, BELCO knows that Invensys will be there when called upon. Support and training partner Wonderware North, with locations on the east coast of the United States, has provided assistance. But for the most part, the utility has deployed and maintained their systems independently, which is important considering its 35,668 metered connections and location in the Atlantic.

Blizman explains, "The major advantage we've experienced is that it's very easy to develop and integrate the Wonderware software with the wide variety of equipment we have here. Plus their support is global and very timely."

Recognition for Environment Excellence

As part of the current 20-year plan, BELCO leaders set their sights on ISO 14001:2004 certification.

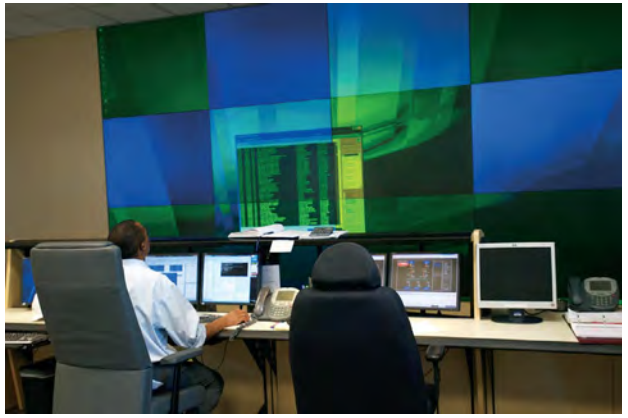
Audits and extensive reporting are required as part of the process, and the Wonderware Historian and the Wonderware IntelaTrac® mobile application were up to the challenge. Operational data was collected, aggregated and organized with ease. The products' advanced reporting capabilities helped BELCO show auditors their plan and new environmental management policies as well as demonstrate real-time results with speed and transparency.

According to Denton Williams, VP of Energy Supply at Belco, "The IntelaTrac product really helped us with implementing ISO 14001 because the results were so transparent we could readily produce reports for auditors, for external parties, we could show the regulators anything that was needed that was associated with options and It was just very wide open and very easy for people to use and there was no great increase in the amount of work we had to do, it was all part of what we do."

In July 2010, the company was officially registered for its state-of-the-art production, transmission and distribution of electricity in Bermuda — the first organization in the territory to achieve this prestigious milestone!

Looking Ahead to 2025 and Beyond

Expectations are that Bermuda will continue to require expanded electricity generation, and the current integrated resources plan has accounted for this need through 2025. In addition to Wonderware products, BELCO has deployed other Invensys Operations Management platforms and products from Triconex® and Avantis®. Because of this unique ability to integrate solutions to meet evolving demands, Invensys hopes to continue their unique partnership with BELCO well beyond the current planning period.



For more information:

Click here to watch how BELCO provides a secure, reliable and sustainable electric power system for the people of Bermuda.

Empowered–Workflow moves beyond automation to collaboration

Removing inefficiencies out of the supply chain with workflow

Introduction

Automation has been around for years, but its scope, complexity and sophistication have widened considerably. Automation's primary focus has been to take a manual process, such as building a car, and then add equipment and other processes to facilitate higher output, standard execution, consistent quality, and normalized flow of materials.

This white paper explores the changes that have come about, driving automation systems to become more of an enterprise-player, and explores the way workflow contributes both the effectiveness of the automation layer and the efficiencies of the entire supply chain.

Automation: The Way They Were

Programmable Logic Controllers (PLCs) provide a good example of the traditional objectives

of automation. PLCs replace relays, which are devices that open or close electrical circuits. They make it easier to configure and deploy stacks of relays quickly, using a common software programming language that mimics an electrical diagram.

For many years, refining the automation layer meant adding processing power to PLCs, adding computers and specialized software for visualizing the plant operations, and increasing the sophistication of plant floor devices by adding intelligence overlay products such as barcode readers, vision systems, and radio frequency identification (RFID) technology. These products were all meant to add context to the manufacturing process itself—adding information about the efficiency of the packaging line and answering questions such as "How many labels were put on correctly?", "What was the primary reason for rejects?" and "How can we minimize errors by adding additional automation or reconfiguring the processes?"

> "Workflow software adds context to events; includes the participation of key stakeholders in those events; and closes out events in a standard, methodical, and repeatable manner."

In the mid-1990s, a new trend occurred: connecting plant systems to enterprise business applications. The 1990s was a time of huge growth. Plants were straining to meet demand, and outsourcing was just starting to take hold. Operations were no longer just in a single, unified site, and manufacturers were demanding better management of their entire process—from the time the materials were released until the time they were eventually consumed. Just-in-time (JIT) and other inventory management practices emerged to help streamline material utilization and remove holding costs of unnecessary inventories on the floor.

The real operations goal of a leaner, more responsive enterprise, was not only tracking material consumption and operations efficiency on the plant floor, but transferring that key information to the business systems—so that functions such as replenishment, procurement, order processing, sales and marketing, all of which depended upon knowing what products were in process and which orders were ready to be shipped, could be fed with current, real-time information. Up to that point, most Enterprise Resource Planning (ERP) systems (or their predecessors, Materials Requirement Planning (MRP) systems) were batch-based systems, which reconciled operations details on a daily, weekly, or even monthly basis.

But manufacturing worked on a real-time basis and couldn't wait for these latent reconciliations. Since the real-time data was already present—in the processors and in visualization software—tying the two entities together made sense. The resultant challenges were around enterprise integration, which they solved with the help of a number of products and companies, all of which had the same basic goal: bring important process-based information,

such as end of runs, materials consumed, product quality, or delivery information, to the ERP system in a timely manner so that it could in turn update promise-to-ship information, reorder materials, refine quality and inspection procedures, and optimize scheduling and shift loading.

A Step Change in the Way of Doing Business: MES

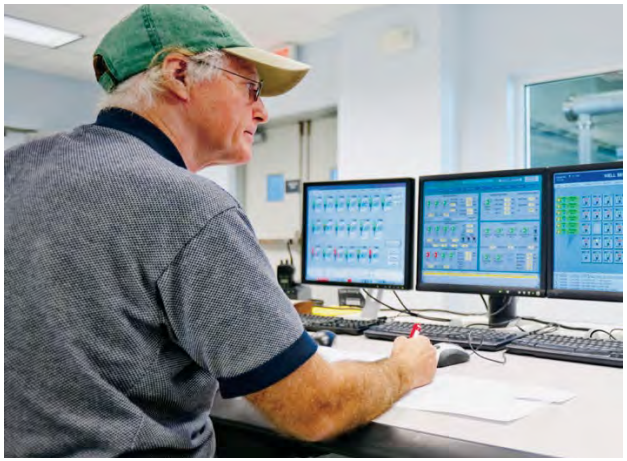
In the mid-to-late 1990s, information technology providers such as HP, IBM, Microsoft and Sun supplied enterprise integration software and hardware solutions; while automation companies, such as GE, Rockwell, and Siemens tied their PLC-based control architectures into the new world of enterprise software supplied primarily by SAP, J.D. Edwards, and later, PeopleSoft and Oracle. It took a consortium of all of these parties to effectively create the underlayment for that data transfer to occur. The Manufacturing Execution Solutions Association (MESA) International was established at this time, specifically to address the enterprise integration aspects of automation to business systems, leveraging a new class of software, Manufacturing Execution Systems (MES.)

But there were still gaps in this architecture. First, the people-based systems weren't effectively incorporated. Automation dealt with continuous processes such as material conveyance, packaging, or, on the front end of the process, weighing, blending, and batching. The processes in between, such as transfer of lots to different lines, equipment maintenance, order prioritization or escalation, were all unmanned processes, which had to overlay the automation. Even with the growth of MES, though, the entire supply chain wasn't being addressed. Late in the 1990s, the outsourcing craze hit hard. Companies such as those doing box-build processes, like telecommunications equipment and personal computers, began outsourcing, relying on other firms build their products, sometimes based on the design of the manufacturer, sometimes based on the design of the outsourcer. Visibility of this supply chain became critical!

Operations such as material procurement, shipping and order fulfillment were now under control of someone else but the original equipment manufacturer (OEM) was still responsible for customer satisfaction, brand management, and product performance. MES brought much-needed operations visibility to the supply chain. This helped in part by identifying process bottlenecks, but if there was a problem, they provided no clean way of notifying, remediating, and creating a system of record for the disturbance.

Changing Role of Workflow Automation

MES did automate some workflow at this time but it was mostly intra-operational, not normally



part of the product release from one step to the next. It did not transcend to the rest of the supply chain—to the ERP, purchasing, quality, systems, for example—with any kind of precision or systematic execution. Messages and data were sent as part of the Standard Operating Procedure or to comply with specific company or industry regulations, but it was neither logic-bound nor procedure-bound to any extent.

Fast-forward now to the early/mid 2000s. MES by this time had been well accepted and well executed within a majority of manufacturing concerns that are high volume, regulated, or automated. The methodology for enterprise-to-manufacturing data transfer and information sharing becomes semi-standardized, with Microsoft and a number of automation and IT vendors providing off-the-shelf interfaces, extending the supply chain's visibility and knowledge of the real-time operations. But gaps between the operational constituents still existed. Maintenance, operations, quality, receiving, and shipping were still independent entities and often did not see, or share, the same information. If events required participation of multiple

parties, they were handled outside of the applications, not as a natural extension of them. This is where workflow automation really comes into play.

Facilitating Collaboration between People, Materials and Assets

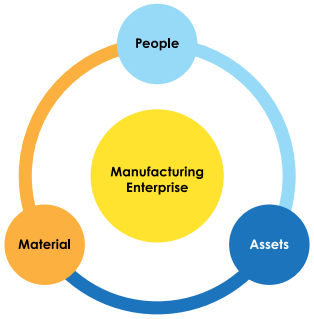


Figure 1.

Workflow software adds context to events; includes the participation of key stakeholders in those events; and closes out events in a standard, methodical, and repeatable manner. Workflow is the key to providing supply chain collaboration between operations and the enterprise, because it overlays those systems to fill gaps, Figure 1.

A Supply Chain Example

As an example, assume an incoming inspection procedure regularly occurs on Mondays with the receipt of materials from Vendor A and this executes a standard sampling plan. But one day, the inspector notices that the lot fails inspection on the scratch criteria. He takes a double sample, and again those blanks fail. Normal procedure is to:

- *Quarantine the lot (so that it cannot be used in production)*
- *Notify the shift supervisor (because Monday's lot was to be used on Tuesday)*
- *Notify Purchasing (for vendor management/ score carding), and*
- *Notify Operations and Sales (for order com pletions & promise dates slip)*

It could take several hours to notify their internal supply chain, update subsequent systems, and make alternative plans, such as to produce different products, procure substitute materials, or contact backup vendors. But these are all paper-based, not automated systems. Thus the MES, ERP, and other enterprise apps would depend on filler operations to ensure notifications and compliance to new procedures were fulfilled.

Using automated workflow software, these notifications, alternatives and the decisions taken all become system-of-record—enforced and visualized instantly. Workflow automation allows companies to institutionalize standard operations by overlaying rules-based, business logic oriented processes and procedures. All integral players in the supply chain have a consistent view

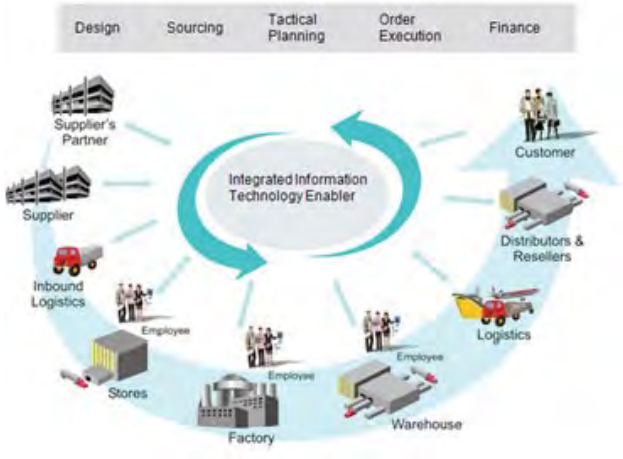


Figure 2.

of their role, their responsibilities and required action, figure 2. Workflow automation offers escalation procedures, so that critical responses are secured. It can update enterprise business systems with the resultant output of the workflow procedure (alternate supplier, new ship date, etc.) and can capture one-off responses to any event.

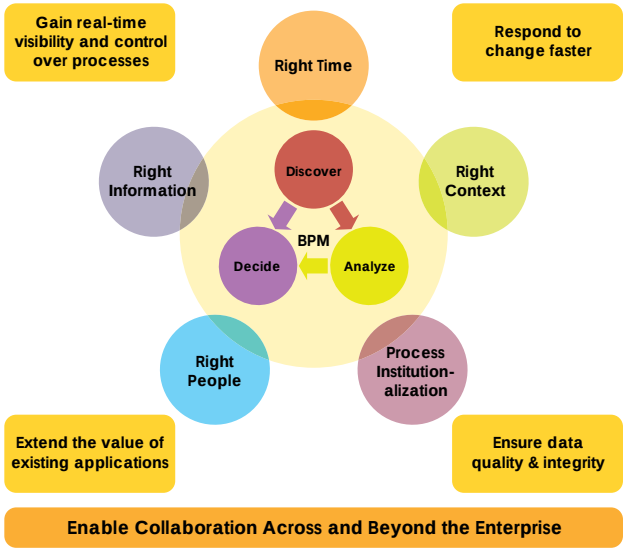


Figure 3.

Workflow can be added to an existing supply chain infrastructure. There is no need for a high degree of manufacturing automation in place. Workflow automation can, in fact, precede these systems and provide a structure for future IT development. It can be customized it to a specific industry, capturing best practices, corporate specialty procedures, making it an integral knowledge management tool to proliferate intellectual property, figure 3. Workflow automation supports, extends and improves the supply chain for full visibility, responsiveness, and closed loop process control.

For more information please visit iom.invensys.com/InTouch

Size matters – Start right, grow as needed

Raising the bar on scalability

Introduction

The term "scalability" has been so overused in regard to industrial software systems that most users, integrators and decision makers are completely desensitized to its use. Those same individuals, however, care deeply about true scalability. Scalability is not merely starting small and growing big. There are many dimensions to consider and most are critical to true investment protection for the end user. This white paper will explore these dimensions of scalability and hopefully set a new expectation for scalability for industrial software system purchasing decisions in the future by "raising the bar" on scalability.

> "Wouldn't it be nice to start with a small implementation and grow to the size needed, when needed, with modest incremental effort and without increased risk?"

The Challenge

Automation and information systems represent a major investment for all industrial businesses, large or small. Long-term protection of that investment is a significant consideration when selecting a partner and a system. Though technology lifecycles may precipitate change, it is extremely important to be able to evolve solutions over time, expand them into previously unforeseen areas, and integrate them with other systems which may or may not already be in place. In many cases, it is also important to consider the ramifications of potential merger or acquisition activity and how systems may be affected by that eventuality. All the while, businesses must stay focused on protecting intellectual property, minimizing disruption to operations and doing so cost effectively. These requirements match system characteristics along dimensions of scalability, from small to large, one to many, current to future, simple to complex, single piece of equipment to entire enterprise. Meeting those requirements demands a level of architectural design of automation and information systems that is purposefully constructed to support scalability in all dimensions. Those kinds of demands cannot be met by "bolting on" interfaces, repeating expensive design work or rip-and-replace tactics. The result would be inadequate and unbearably costly. To meet that challenge, Invensys through its Wonderware® business embarked on the development of ArchestrA® technology, a software architecture designed to be inherently scalable in all meaningful dimensions. Wonderware software solutions leverage the powerful capabilities of ArchestrA technology, ensuring remarkable ease-of-use and scalability.

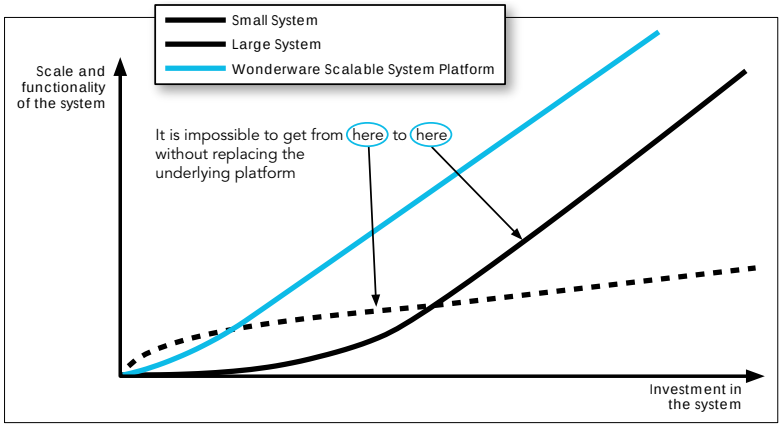


Figure 1 - The Challenge of Functional Scalability

Functional Scalability

Traditional small projects involve low initial cost, low risk and short implementation time, all important characteristics. However, many small projects are difficult to functionally extend and very difficult to scale. In contrast, traditional large projects are more functionally complete and enjoy full-scale implementation, but they have much higher initial costs, require much longer implementation time, and carry much higher risk. Wouldn't it be nice to start with a small implementation and grow to the size needed, when needed, with modest incremental effort and without increased risk? Traditionally, the underlying software platform has been an enormous constraint; small systems simply have not been designed to grow into large systems without completely replacing the underlying architecture (see Figure 1). Wonderware breaks this tradition with a truly scalable software platform called ArchestrA, which effectively removes these constraints and enables a smooth evolution of the software solution from small to as large as the business requires, without replacing the underlying technology. At the heart of ArchestrA is a plant model, which supports the gradual evolution of an applica-

tion by permitting additional attributes and functionality to be added to the solution and deployed throughout the operation from any given development station.

Solution Scalability

Growing a system from small to large requires another dimension of scalability in addition to functionality. True scalability demands that a solution can be easily extended from a single, simple application — perhaps a single machine — to a comprehensive networked solution serving the needs of an entire multi-plant industrial enterprise. What if it is necessary to have multiple supervisory applications that are different but have similar components, and must be kept separate but benefit from each other's design? What if the applications must be able to operate, change and grow independently? This is a real-world scenario for which the ArchestrA architecture and the ArchestrA System Platform were designed. Wonderware has combined the most powerful capabilities of objectoriented plant modeling, InTouch®, the world's favorite graphical HMI (Human Machine Interface) and unparalleled device integration capabilities. This combination provides maximum re-use of engineering effort where appropriate, with flexibility where required; common application logic with device-independence; consistent application visualization with security and application-specific detail; all of which can be deployed and managed from a centralized, standards-based environment.

Vertical Scalability

A supervisory system is just one part of an industrial operation, albeit a significant one. In the same way that each department in an organization needs to integrate and collaborate smoothly, supervisory systems need to integrate and enable collaboration with other systems in an industrial enterprise. Effective industrial software solutions must be capable of efficient, scalable integration with enterprise-level systems such as ERP, Supply Chain Automation, Enterprise Asset Management and other corporate systems for planning and reconciliation. Invensys' strong commitment to standards — and continued active involvement in defining industry standards — means that integration and scalability are built into all Wonderware solutions. Standards such as XML, OPC® and SQL are complemented with Web Services and

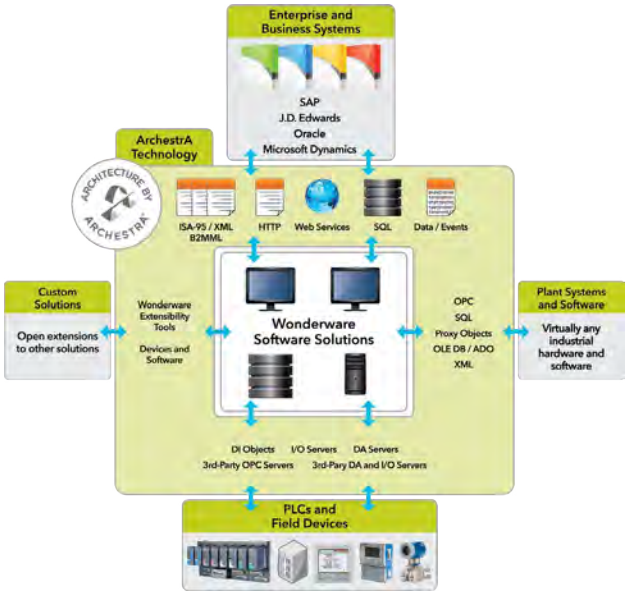


Figure 2 – Overview of a Scalable Connectivity and Software Integration Architecture

ISA-95/XML B2MML support (see Figure 2.) Vertical scalability also means scaling to the plethora of field device connectivity requirements that exist today. While supervisory systems may provide interfaces to physical devices such as RTUs and PLCs, these interfaces are typically simplistic and foster integration solutions which are closely tied to the physical hardware. To achieve true scalability for device connectivity, a software architecture that provides a level of abstraction from the specific devices is required. The ArchestrA architecture offers outstanding integration with a vast array of devices while providing true abstraction from the details. What does this mean in practice? Well, it means for example, that a device independent application could be developed for a project using one specific family of PLCs, making use of all of the connectivity capabilities provided by that device. The challenge comes when it is necessary to automate a similar area at a facility — one that was built at a different time and uses a completely different family of PLCs and automation equipment. With Wonderware's DA Server (Data Access Server) and DI Object (Device Integration Object) capabilities, the software application can be easily re-purposed for a different family of hardware devices without changing the application. Multiply that efficiency over many pieces of equipment and many different hardware systems, and the result is a truly scalable software solution. Of course, implementing the application is just part of the effort. For effective scalability, it is necessary to be able to configure, monitor and run diagnostics on multiple I/O interfaces from a convenient central location. Wonderware's device connectivity architecture provides comprehensive remote management capabilities, built-in diagnostics and flexibility to deploy in a variety of architectural topologies to suit the needs of the industrial enterprise — the hallmarks of a truly scalable infrastructure.

ArchestrA technology enhances scalability through the separation of application code from device communications management, so both can be easily managed and updated:

a. Takes a flat communications model and adds structure and better manageability

b. Makes individual communication paths avail able globally for any application to use

c. Enables communications and device nam ing to be different for the same application, facilitating re-use on any machine

Horizontal Scalability

Supervisory systems do not operate in isolation. They need to integrate smoothly and reliably with a wide range of peer-level systems including MES, DCS, Historians, LIMS, Workflow, Field Mobility Solutions and Quality Management systems. Historically, the solution to these kinds of integration tasks has frequently consisted of crude interfacing attempts using proprietary interfaces, middleware and limited data-level integration. These approaches, while barely satisfactory for standalone solutions, are the antithesis of scalability, requiring custom engineering approaches and significant expenditure for system integration work. A truly scalable solution for horizontal integration of this kind requires a purpose-built integration architecture. Wonderware InTouch and ArchestrA System Platform supervisory solutions are designed with scalability and integration capabilities built-in (see Figure 2, page 3). Embracing standards such as OPC, SQL, OLE DB/ADO and XML with an object-oriented architecture has enabled Wonderware to deliver the most easily scalable industrial software solution set available.

"Baked-in" Scalability

Traditionally, scalability cannot be added into operational systems after the fact. True scalability comes from purposeful design. Legacy systems can be integrated into a scalable infrastructure, but the real benefits come from starting with the right software platform. The ArchestrA System Platform was developed from the ground up to provide ease-of-use from day one, and scalability for the lifetime of the operation. This "baked-in" scalability comes from a powerful, prag-

Figure 3 – Model View and Deployment View

matic, object-based engineering environment that enables valuable engineering and best practices to be re-used and securely deployed across multiple facilities — without physically visiting each facility. This scalability also comes in the form of centralized management which permits oversight, configuration, diagnostic analysis and security management of entire automation systems deployed across numerous computers that are geographically distributed across a multi-site industrial enterprise. Training, skills and familiarity with automation systems in one area of operation are immediately transferable to different areas. This kind of scalability delivers tremendous economies of scale as automation solutions are rolled out to new areas of the operation. A unique, logical abstraction through a model view versus a deployment view (see Figure 3) provides unsurpassed capabilities to retain and re-use engineering efforts put into a system, while increasing application functionality, one step at a time.

Summary

Ease-of-use and scalability are two of the most important characteristics of a supervisory software solution. Combined with outstanding functionality and connectivity, it is these characteristics which provide real investment protection for the future. Wonderware software's scalable design and easy-to-use tools uniquely embody these characteristics — specifically, the powerful ArchestrA System Platform and InTouch visualization tools. With the broadest range of integration options, powerful MES, workflow and mobile solutions, Wonderware has set a new benchmark for combining ease-of-use with unparalleled scalability.

For more information, please visit iom.invensys.com/InTouch

Speed matters – Scalability – NOW!

China Ministry of Railways

Beijing, China

Since ancient times, China has been recognized as a cultural and industrial leader, contributing to the world a rich panoply of art, literature and scientific achievements. China boasts a recorded history of thousands of years of technology innovations, so it's no surprise that the population of more than 1.3 billion people is on the move once again. The economic powerhouse has embarked on an ambitious course to provide highspeed rail service throughout the entire country.

Large-scale projects are nothing new to China. Built between the fifth century B.C. and the 16th century A.D., the Great Wall covers more than 8,800 kilometers (5,500 miles) and is the longest man-made structure in the world. The new highspeed rail lines, developed by the China Ministry of Railways, have to be completed in a much shorter time frame. The first 120-kilometer (100-mile) leg of the high-speed line was inaugurated during the 2008 Beijing Olympic Games, with service between Beijing and Tianjin. The 30-minute high-speed trip saves travelers 40 minutes each way, with trains zooming along at speeds of up to 350 kilometers per hour (220 miles per hour).

> "The ArchestrA System Platform and Wonderware InTouch solution allowed the integration of 60 different third-party vendors into the station's Passenger Information System"
>
> **Shao Xiaofeng,**
> Vice President,
> Easyway Company Limited

To complete the initial high-speed rail project in time for the Olympic Games, the Ministry of Railways selected solutions from Invensys Operations Management. Invensys distinguished itself by offering the unique advantage of off-the-shelf, object-oriented software, which contrasted with previous passenger service systems in China that had been based on proprietary solutions that were expensive, hard to configure and difficult to maintain.

Facilitated by the implementation of 21st century technology, the world's longest high-speed rail network operates on ArchestrA System Platform, which is part of the InFusion Enterprise Control System from Invensys. When the China railway system is fully completed in 2020, it will carry both passengers and goods and will be able to reach distances of 4,000 kilometers (2,500 miles) in less than a day.

The complex rail network involves the collaboration of more than 60 different third-party vendors for each station's facilities management system. To manage station technology infrastructure, the China Ministry of Railways engaged the services of Easyway Company Limited, an Invensys Ecosystem Partner that specializes in railway solutions. Every vendor can communicate seamlessly with each other because of the ArchestrA System Platform, which allows Easyway to

quickly and easily respond to railway ministry requirements. System Platform provides a single, scalable platform for all SCADA, supervisory HMI and MES required by railway operators to manage overall facility operations. System Platform also provides a simple upgrade path to easily add new software and hardware to the system.

"We had three or four choices before selecting Invensys," said Shao Xiaofeng, vice president at Easyway. "We eventually selected ArchestrA System Platform due to two main reasons: first, we believed it had the capability to rapidly meet the requirements of our client, and we thought it could meet the time requirement after evaluation; second, we thought the stability of this system was unique. Experience proves that our choice was correct. From the initial operation in 2008 until today, no problem due to the System Platform has caused any system failure."

Large Project Scope, Short Time Frame

The China Ministry of Railways is responsible for passenger services, regulation of the country's rail industry, development of the rail network and the overall rail infrastructure. In a country that encompasses more than 9.6 million square kilometers (3.7 million square miles), this is no small task. China needed a passenger station

management system that could be implemented quickly and expanded efficiently as well as one that would easily integrate with China's existing rail technology infrastructure. The railway ministry also wanted a user-friendly interface that would make operating and managing the railway network as economical as possible.

Grand Central Issue:
Managing Station Facilities

The first stage of the project – the high-speed Beijing-to-Tianjin line – included five stations. A primary goal was to ensure that the facilities management system (FMS) would make these stations hospitable and safe for travelers. Called the Passenger Information System, the FMS provides an integrated and centrally managed platform to support communications equipment, including the public address system, video displays and automated ticket sales, plus closedcircuit television monitors and other components used by supervisors to manage operations and safety systems.

"The most important features of the Invensys system are usability and expandability," said Xiaofeng. "We can easily plug in the new features and expand them to new stations in a very short time."

Whistle Stop for Scalability

The Chinese government railway agency knew that selecting a partner that could provide technology to benefit the project over the long haul was critical. With solutions from Invensys, the railway ministry could scale the enterprise, beginning with the Olympic line and extending it in stages to the entire nationwide high-speed rail network as needed.

Today, more than 220 railway stations across 15 high-speed rail lines are controlled by Invensys. Once complete, more than 800 new stations will be running on Invensys technology solutions throughout the 12,000-kilometer (7,500-mile) rail network.

Scalability is among the highest priorities of the Passenger Information System. Railway facility technology solutions typically start with modest goals as proof of concepts are validated. Then they expand rapidly using lessons learned and the tools created during initial project phases. The Invensys software-based system is open, enabling engineers to develop applications and then easily reproduce them internally, without the assistance of outside experts. Standardized objects promote repeatability and customization and save time, so that new stations can be deployed to meet strict budgets and deadlines. In fact, stations have been configured in as little as one day. And when changes are needed, they can be made at select stations, or even rolled out across the entire system, thanks to the Invensys application templates.

The Power of Technology Operating in Harmony

Before the China Ministry of Railways developed the plan that began with the Beijing-to-Tianjin line, its Passenger Information System was

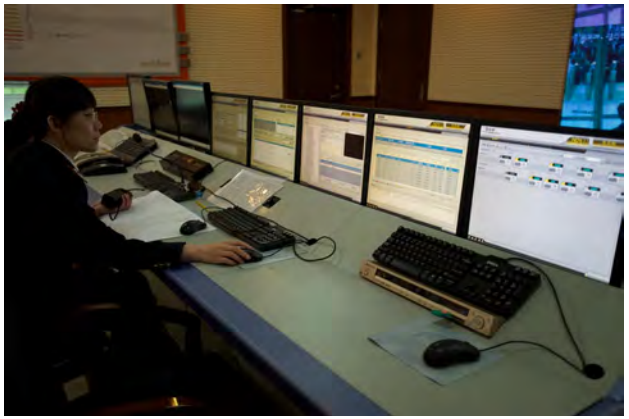
not integrated. Components were purchased from different manufacturers and did not operate well together. Stations and terminals were not linked efficiently, creating inefficiencies in deployment, operations and maintenance. Today, the system benefits from a unified management strategy, standardized technical architecture requirements and centralized operations. For example, because the Passenger Information System is built on the ArchestrA

System Platform, data connectivity is maximized, allowing railway facility operations to be unified and controlled from the central system. Plus, through the Wonderware Toolkit, third-party solutions used in conjunction with the FMS also communicate with the central application. This creates a fully integrated approach that enables all status and control instructions to be shared automatically with every rail station in the entire network. Currently, the ArchestrA System Platform installation for the Passenger Information System manages approximately 200,000 I/O points. By the time the project is completed in 2020, the Invensys solution will manage more than 3 million I/O points.

"During the Olympic Games, we were pressed for time so we developed the integrated system for the stations within nine months, which benefited from the use of ArchestrA System Platform," said Xiaofeng. "Then the Ministry of Railways required us, within a very short time, to use this system to reproduce the functions of big stations at the smaller stations. The government wanted to reduce labor costs and decrease personnel. After doing relatively little development and commissioning work, our Invensys-based system easily extended to the smaller stations."

The ArchestrA System Platform has given Easyway the ability to create all the modules needed to deploy the Passenger Information System. More important, collective knowledge relating to routines, communications, control, security, redundancy and historization have been encapsulated in System Platform. This information can now be deployed in subsequent projects and creates standardization and uniformity for solution deployment at all railway stations throughout China. The implementation of engineering applications has been enhanced by this process, enabling operators to rely on common user interfaces and procedures regardless of which railway station or control room they may be assigned.

Operators monitor and control station assets and communications equipment though this core system, enabling them to manage the comprehensive capabilities of the FMS. Managers can assign and move personnel according to demand, a functionality which has resulted in reduced operations costs. And since some of



the station equipment operates automatically, the Passenger Information System is saving energy as well.

Planning has also improved. The Wonderware Historian provides real-time station asset data for trending and analysis as well as more efficient and complete reporting. The Wonderware solution interfaces with third-party databases and Microsoft Office programs such as Excel and Word, allowing information to be shared readily.

"With the implementation of the ArchestrA System Platform, China's Ministry of Railways is laying a solid technology foundation for the future growth of the unified station management system," said Steve Garbrecht, vice president of product, services and solutions marketing, Invensys Operations Management.

The End of the Line Offers Greater System Visibility

The new Passenger Information System controls all station displays, the public address system, schedules, customer assistance, baggage stor-

age and more. That makes the human machine interface (HMI) provided by Wonderware InTouch crucial. Operators depend on it for overall visualization – whether they are working at a remote station or a central monitoring location. Railway operators use the HMI to view the status of each device, plus they receive and manage alarm information and easily apply corrections when needed.

Another important aspect of operating a large rail system is maintenance. The Invensys solution enables the railway ministry not only to respond promptly to needs for repairs, but also to develop a systematic program to maintain the railway system for optimum performance and upgrades.

The Right Track to Success

The China Ministry of Railway's journey to provide extensive rail transportation services is on the fast track to success. In less than 10 years, it is estimated that the Invensys solution developed by Easyway will help the railway agency connect 1.3 billion people in comfort and at great speed. So far, new passenger stations have joined the network on schedule. Considering China's storied history, not bad for the construction of the longest high-speed rail line in the world.

For more information:

Click here to watch the High Speed Rail's Passenger Information System in action

Out-of-the-box – Getting real with virtualization

Leveraging virtualization for higher business continuity within industrial facilities

Executive Summary

Virtualization offers the promise of lower IT costs and higher levels of business continuity for industrial companies. This paper provides a basic introduction to virtualization and how it can specifically benefit industrial companies. High availability and disaster recovery scenarios are presented along with expected system performance targets for system downtime after an event or system failure.

Introduction

Today, many of the world's top companies are using software virtualization technology to deliver significant cost savings, improved efficiency, greater agility, enhanced system availability and improved disaster recovery capabilities. The typical industrial facility, including manufacturing plants, utilities and processing companies, has many important software applications that can be virtualized. Software like Human Machine Interface (HMI) applications, process data historians and manufacturing execution systems (MES) along with other analytical and reporting applications can all be virtualized. In this paper we will discuss what software virtualization is, its history, what benefits can be expected, and some typical ways to implement software virtualization.

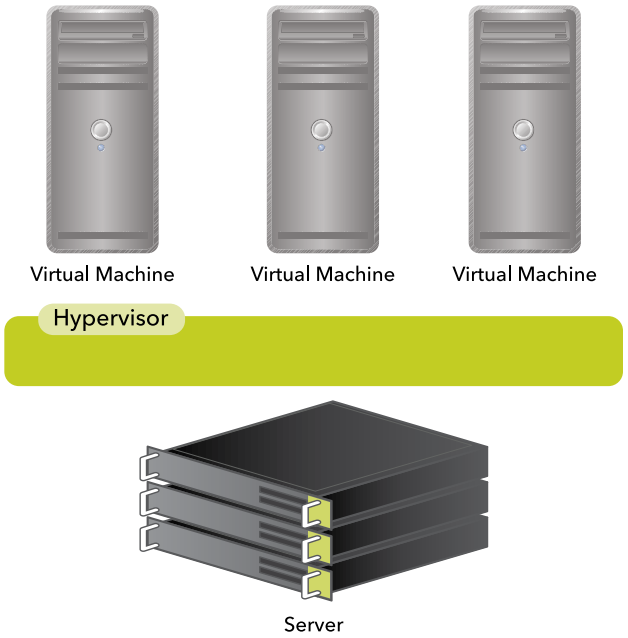
What is Virtualization?

In simple terms, virtualization is the creation and employment of a "virtual" (software emulated) version of an "actual" version of something. Broadly speaking, virtualization can apply to physical devices, operating systems, network resources, device drivers or any actual thing for which a virtual equivalent can be substituted. Virtualization is a form of software abstraction, which allows users to manipulate the virtual versions of things in ways which would be impossible for their physical counterparts. It is this fundamental ability to manipulate the virtual versions of things that provides the power and flexibility to derive so many benefits from the use of virtualization technology.

Hardware Virtualization

Hardware virtualization employs software technology, like that offered by Microsoft® and VMware®, to transform or "virtualize" a computer to create a virtual computer that can run its own operating system and applications just like a "physical" computer. With virtualization, several applications and their required operating systems can run safely at the same time on a single physical computer with each having access to the resources it needs when it needs them. Today, this is all possible with commercial off-the-shelf computer hardware and operating systems.

At the heart of the virtualization process is a software component called the "hypervisor", a term first coined during the early IBM mainframe days. There are two general categories of hypervisor. Type 1 hypervisors run directly on the physical host hardware and manage "guest" or virtual machines so their operating systems can run concurrently on the physical host hardware. This is achieved by intercepting or "trapping" instructions from the guest operating systems and resolving them so that the "guests" function properly in their virtualized environment. VMware ESXi and Microsoft Hyper-V are examples of type 1 hypervisors. Conversely, type 2 hypervisors run on top of the host operating system and are not as commonly used with PC-based systems.



Desktop Virtualization

Besides the virtualization of industrial applications, another area of virtualization that is gaining momentum is the virtual desktop interface (VDI). Commonly used desktop applications and their required system resources are contained within a VDI and accessed from a network server. As none of the software runs on the user's local machine, less costly computer equipment can be used. IT support responsibilities are reduced and the burden of data backup can be removed from the user. Besides the many IT related benefits, VDI users have the added benefit of being able to access their virtualized desktop from a variety of other devices including their smart phone, tablet or home computer.

Virtualization Platforms

Many companies are now using virtualization at the enterprise level to create entire virtualized computing infrastructures that allow IT departments to automatically deploy computing resources when and where they need them, with a minimum of manual IT intervention. Cloud-based implementations promise even more flexibility and economy by outsourcing computing resources to vendors such as Microsoft with their Azure platform as well as others. Virtualization platforms are already providing businesses of all kinds with tremendous IT cost savings and improved infrastructure utilization.

History of Virtualization

The high cost of mainframe computers in the 1960's led IBM engineers to develop ways to improve the efficiency of their equipment. By logically partitioning their machines they were able to offer multi-tasking. For the first time multiple applications could run at the same time – significantly improving utilization.

As low cost PC-based client-server architectures became the computing standard in the 1980's and 1990's the focus shifted to exploiting this new architecture by delivering more computing resources and applications to more users. Virtualization was not a technology considered by most IT departments. However, by the late 1990's the sheer number of servers and desktop machines reached the point where virtualization technology became viable as a cost reduction strategy.

In 1999, VMware released their first virtualization products and by 2005 processors became available that directly supported virtualization. Today, a majority of large corporations are using virtualization to reduce their IT costs.

Virtualization – The Phases of Adoption

Industrial companies often adopt virtualization technology in two phases; we will call them Virtualization 1.0 and Virtualization 2.0.

Virtualization 1.0:

In this first phase the emphasis is on IT and how virtualization can be used to lower IT costs, improve IT staff efficiency and improve hardware utilization. IT works on creating virtual machines of key applications and consolidating them on corporate servers. This first phase of virtualization allows companies to reduce their hardware costs, improve their server utilization and improve their ability to operate and maintain a wide range of software applications. IT service improves because IT takes on the responsibility for managing applications which have been reluctantly managed by the groups directly using the applications, like Operations or Maintenance. Human Machine Interface applications, process data historians and web report servers are examples.

Virtualization 2.0:

During the second phase of virtualization, companies often deploy multiple instances of the same application to ensure business continuity or to improve application performance via load balancing. For business continuity, multiple

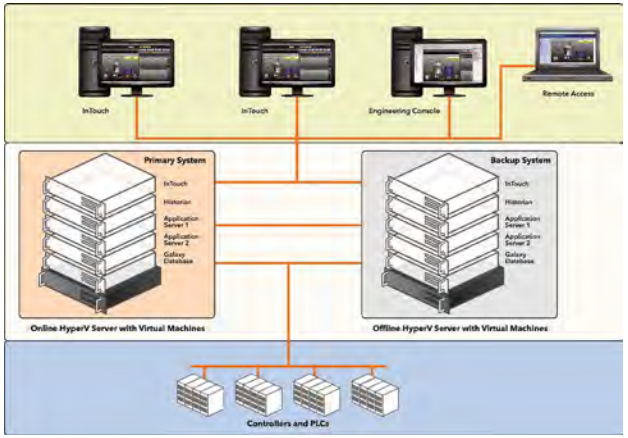


Figure A: Supervisory HMI System using Virtualization for High Availability

instances of an application, and the data servers furnishing it with data, are run simultaneously so that if the primary application or data server fails, the secondary application instance and data servers automatically take over and downtime is minimized.

If simultaneous application instances are run on servers located in different physical locations, disaster recovery is much easier.

Some applications can be run in load balancing mode when the processing load is shared across two or more virtual machines; improving the overall performance of the application without having to invest in a second physical server.

Benefits to IT, Operations and Engineering

Virtualization of industrial applications can benefit many groups within a business. Let's explore the benefits gained from virtualization based on business function, namely IT, Operations and Engineering.

IT Benefits:

There are three main areas of benefit from virtualization for the IT organization:

COST REDUCTION

- Consolidation of Physical Servers — virtualization allows much greater utilization of server hardware so fewer servers are required
- Energy Reduction — fewer servers mean less energy is consumed in data centers
- Lifecycle Extension — virtualized applications have a longer lifecycle because they are insulated from hardware or software technol ogy shifts, generating more ROI for the business

MANAGEMENT

- Hardware Upgrades — fewer hardware upgrades are required over time, reducing capital expenditure requirements and IT workload
- Central Management — the use of virtual machines facilitates centralized management of applications since fewer applications reside on local servers
- Fast Deployments — self contained virtual machines can be easily deployed without having to install the required operating system, pre-requisite software or the application itself on a dedicated server
- Corporate Standard Libraries — virtualized applications allow the creation of standardized application configurations that deliver maximum value to the business

SUPPORT

- Virtual Desktops — the use of virtual desktops allows much more efficient management of desktop machines
- Fast Deployment — since application software doesn't reside on each desktop machine, new applications can be rolled out to a large number of users much faster
- More Effective Backup Procedure — all data stays on corporate or cloud servers allowing more sophisticated backup operations to effectively eliminate data loss

OPERATIONS BENEFITS:

- Business Continuity — multiple instances of the same virtual machine can run in an automatic failover mode to help ensure business continuity. If the failover instance is located in a separate physical location disaster recovery is also enhanced
- Operational Cost — reduction in physical server footprint leading to a higher return on capital and a reduction in the Mean Time

To Recover (MTTR)

- Support — thin client PCs on the plant floor running virtual desktops reduce the support burden and can be maintained by IT not Operations

ENGINEERING BENEFITS:

- Development Costs — virtualization lowers engineering infrastructure costs since fewer physical servers are required with fewer modifications needing to be made over time to keep applications running properly.
- Development Speed — virtualized instances of object-based applications, like ArchestrA System Platform, can be developed and deployed faster than conventional applications
- Collaboration — since multiple instances of a virtual machine can run at the same time developers can work in a more collaborative and efficient manner

Availability	Description	Expected Failover	Details
Level 0	No redundancy	None	No redundancy built into the system architecture.
Level 1	Cold Stand-by	Availability: 99% Expected Downtime: 4 days/yr	Primary and secondary systems, manual failover to secondary system, data periodically synchronized.
Level 2	High Availability (HA)	Availability: 99.9% Expected Downtime: 8 hrs/yr	Virtualization used for primary and secondary systems. Disaster recovery (DR) via virtual machine systems located in geographically separate locations.
Level 3	Hot Redundancy	Availability: 99.99% Expected Downtime: ~52 mins/yr	Full synchronization of primary and secondary systems.
Level 4	Fault Tolerant	Availability: 99.999% Expected Downtime: <5 mins./yr	Fault tolerant hardware, lock step failover to redundant application instance.

Levels of Availability

When we speak about a "high availability" solution we typically mean a solution with redundant software and/or hardware components that "failover" to an unaffected system to enable a pre-defined level of availability over a specific time frame.

Implementation Scenarios

High Availability Implementations

It is possible to achieve Level 2 or even Level 3 availability for applications like HMI and Supervisory Control using two, preferably identical, hardware servers (bought at the same time) each loaded with an identical virtual machine. Identical hardware and virtualized applications help ensure that if a failover occurs there are no deviations in system performance resulting from differences in hardware or software.

To achieve Level 4 availability usually requires an investment in fault tolerant hardware, including servers, disk systems, power supplies and network cards. At this availability level downtime is reduced to very low levels; less than 5 minutes per year, for example.

The performance of any high availability (HA) solution is dependent on the quality and implementation of the HA architecture.

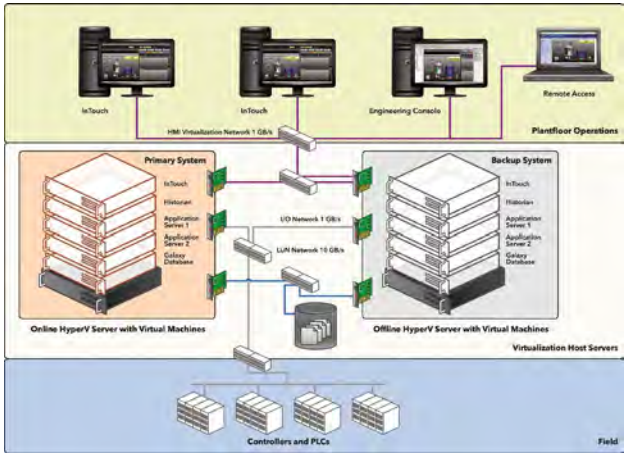


Figure B: High Availability Architecture using virtual machines for automated failover.

Disaster Recovery Implementations

With the risk of natural disasters and a growing threat from terrorism, many industrial companies are exploring ways to recover faster from possible catastrophic disasters. Virtualization provides a realistic and practical way to recover critical applications and their associated data more quickly and economically. Like High Availability, if identical physical servers and identical virtual machines are run together in failover mode, but located in different geographic locations, a Level 2 or Level 3 availability can be achieved.

High Availability Combined with Disaster Recovery

The goal of a High Availability and Disaster Recovery (HADR) solution is to provide a mechanism to automatically shift data processing and retrieval for a critical industrial application to a standby system; for "normal" failure scenarios to a standby system in the same facility or, in the event of "catastrophic" events, to a standby system located in a different geographic location.

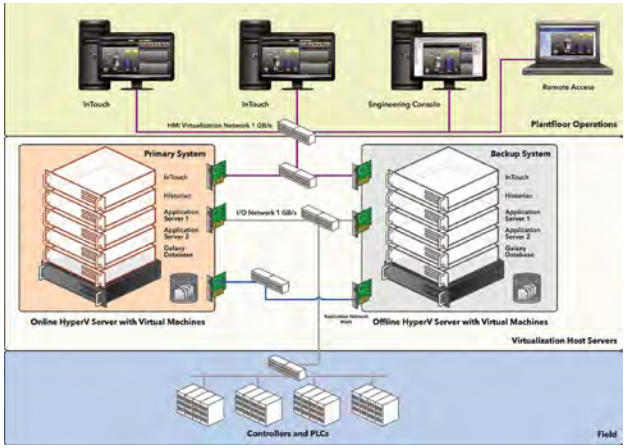


Figure C: Disaster Recovery Architecture using virtualization located in geographically separated locations.

By combining High Availability and Disaster Recovery architectures, industrial applications can be made highly available and able to quickly recover from a disaster.

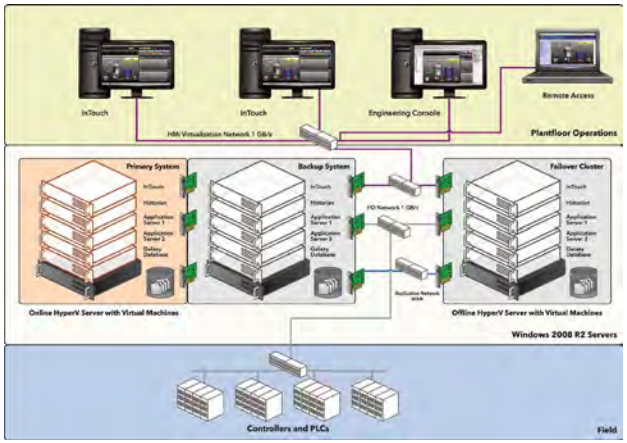


Figure D: High Availability and Disaster Recovery Architecture using virtualization techniques.

Virtualization of ArchestrA System Platform and Wonderware InTouch Applications

ArchestrA System Platform and Wonderware® InTouch® 2012 are certified on both VMware ESXi 5 and Microsoft Hyper-V. From the previous discussion, two virtualization scenarios provide significant value for HMI and Supervisory applications: High Availability and Disaster Recovery. These virtualization scenarios focus on keeping productive processes up and running and protecting the valuable data generated from HMI and Supervisory systems.

System performance during an event is largely dependent on the system architecture used. To help you understand best practices for high availability and disaster recovery for HMI and Supervisory applications using Wonderware InTouch and ArchestrA System Platform, please consult the "ArchestrA System Platform Virtual Implementation Guide" found on the Wonderware Developer Network website.

Summary

Today's virtualization software solutions from Microsoft, VMware and other vendors provide a cost effective way to improve the availability and disaster recovery capabilities of critical, industrial applications such as HMI and Supervisory systems. Standard, off the shelf computer hardware and software can be used to lower costs and reduce the level of expertise needed to implement these types of solutions. Any manufacturer, processor or utility needs to evaluate these new approaches so that they too can mitigate risks and ensure continuity at their facilities.

Quality counts – From process to payback

Pepsi Bottling Ventures decreases downtime and achieves swift payback

Nampa, Idaho – In the consumer marketplace, constantly changing tastes drive innovation. This principle plays out – literally – in the beverage business, where offering a multitude of soft drink choices is a mainstay of growth and success.

Pepsi Bottling Ventures (PBV) manufactures and distributes more than 100 different flavors and brands. In 2009, Beverage Industry magazine named PBV its Bottler of the Year. The company has become the third largest manufacturer and distributor of Pepsi-Cola products in North America, operating 27 bottling and distribution facilities in six states.

In Idaho, PBV runs a state-of-the-art manufacturing and sales distribution plant in Nampa as well as three other distribution centers throughout the state. And even as a new member of the PBV family, joining in early 2009, this division has contributed to the company's award-winning operations with impressive performance and results.

Integrating the Present with the Future

The Nampa facility was built in 2005 and was equipped with a combination of new and legacy machinery. Blending these assets proved possible, but issues of waste and downtime were apparent.

Additionally, a home-grown data collection system that had been in place for the legacy assets did not take full advantage of the capabilities of the new equipment. Operators tracked downtime and recorded it manually during their shifts. Relying on these clipboard notes sometimes led to inconsistent decision making and an inability to track trends accurately over time.

But PBV didn't accept this situation for long. They knew that better solutions were available. Their vision included a performance management and downtime tracking system that would connect all of the equipment, and that would also help them quantify return on investment and justify future plant upgrades.

Wonderware Certified Systems Integrator Apex Manufacturing Solutions worked with Wonderware PacWest to assist PBV in evaluating the possibilities. It became clear that Wonderware software was the preferred solution when Apex Senior Project Manager Erik Phillips recommended it, and Chris Bacon, PBV Production Manager, confirmed prior positive experiences with the Wonderware solution.

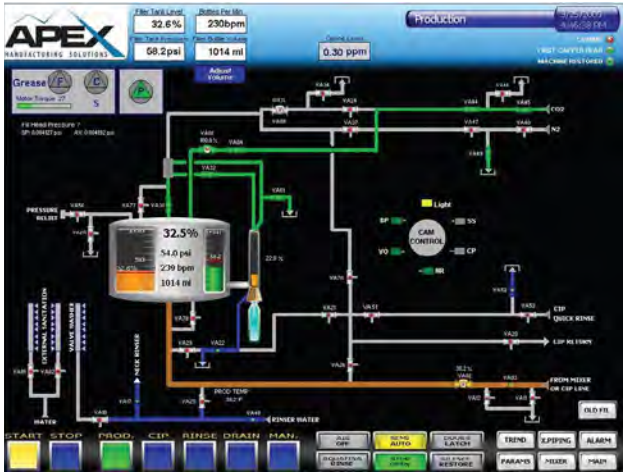
The solution – featuring the Wonderware System Platform, Wonderware Performance software, Wonderware InTouch, Wonderware Active-Factory and Historian software – was installed in September 2008, and commissioned and validated just one month later.

> "With more detailed data available from the PLCs in real-time, we are able to cost justify upgrade projects specifically for certain machine centers. We're able to prove the need for more capital investment."
>
> **Chris Bacon,**
> Project Manager

Concentrating on Changeovers

With such a wide variety of products, making smooth switches between formulations is central to the plant's productivity. Before the Wonderware software solution was installed, engineers estimated that changeovers took 60 minutes. With the new system in place, the data showed actual time to switch between flavors averaged 90 minutes.

Realizing that this degree of downtime was putting a damper on profitability, PBV used the Wonderware software to identify the chief constraints and their root causes. Armed with this data, they determined that the most critical bottleneck was in the filler process. Correcting this issue improved changeovers by up to 45 minutes and resulted in additional savings in raw materials and packaging. Efficiency on the filler line increased by 10%.



Teamwork for Continuous Improvement

Just as importantly, the Wonderware Historian provides reports and trending tools that enable cross-functional teams to analyze plant operations consistently. Maintenance, operations and engineering staff members can depend on accurate, reliable data, which takes guesswork and assumptions out of the process.

PBV personnel share an overall view of operations with Wonderware InTouch software. A graphical visualization of the plant makes operational tasks intuitive and facilitates clear communications. It also makes the system easy for new operators to learn.

Like most manufacturing businesses, PBV maintains a lean headcount. So Wonderware software's objectbased programming enables more work to be done by fewer engineers, speeding the development process and making it as efficient as possible. When a new asset or line is added, existing processes can be quickly and easily replicated thanks to Wonderware software's standardization.

Calculating Payback

Understanding return on investment is important for PBV on a day-to-day basis, but even more valuable when it comes to planning for investments that will ensure the operation's continued success. Especially now, capital expenditures are scrutinized closely and those that cannot be justified for true ROI are in danger.

After seeing the improvements in the filler line performance, PBV used Wonderware software data to conduct an ROI analysis:

	Projected	Actual
Investment	$85,000	$76,219
Annualized Payback	$67,334	$78,548*
Payback Time	1.25 years	.97 years

* Includes additional savings in raw materials and packaging resulting from more efficient changeovers.

PBV will use this experience to sustain their Continuous Improvement process as well as to identify future opportunities to invest in capital improvements that can be justified based on ROI.

The Best Solution

Just like consumers selecting a soft drink, PBV had a number of choices to consider for its new manufacturing performance system. Appealing qualities such as superior data collection and analysis capabilities, easy-to-understand HMI visualization and efficient programming helped the bottler choose Wonderware software. And like a refreshing Pepsi, adding Wonderware software to the PBV Nampa operation provided immediate positive results. But it will also contribute to longlasting performance improvements and verifiable returns on investment.

For more information:

Click here to watch the continuous improvement at Pepsi Bottling Ventures

Beyond HMI – There's a reason it's called Wonderware

Wonderware InTouch – So much more than just HMI

For 25 years Wonderware® InTouch® has been the world's number one human machine interface (HMI), offering market leading innovation, brilliant graphics, legendary ease of use, unsurpassed connectivity, the industry's best support and the broadest partner ecosystem.

Today's InTouch has evolved through the years to become much more than the traditional HMI available in the market. InTouch continues to lead the industry while greatly expanding the concept of what an HMI can do, increasing the value of an HMI to a company by increasing the number of touch points throughout a customer's operation from the plant floor up to the executives enabling many levels of personnel to make timely performance and profit enhancing decisions.

InTouch Fits Any Situation in Your Facility

Wonderware InTouch can be deployed to meet your specific requirements, from the traditional control room implementation with one or more monitors, to panel displays at an equipment location or manufacturing cell, to even a mobile operator moving through the facility using an Apple iPad.

InTouch also supports the latest Microsoft Remote Desktop Services technology to help you simplify your deployment and lower your system costs.

InTouch applications can be deployed remotely — no need to travel to install a new or updated InTouch application. Centralized application management via the ArchestrA Integrated Development Environment (IDE), now included with InTouch, makes it easy to keep InTouch applications up-to-date and running trouble-free.

Virtualization is a hot topic today, and can save you a significant amount in convenience and hardware costs. No one in the industry offers more virtualization options than Wonderware, including the latest Microsoft virtualization technology, Hyper-V and VMware. InTouch leverages Hyper-V and VMware so you can set up redundant HMI applications locally or at a remote site for more cost effective high availability and disaster recovery options.

Wonderware Delivers So Much More

Wonderware products are a comprehensive set of industrial software solutions that assist you on your path to greater business success. All Wonderware software solutions are tightly integrated to help improve your business today, and expand your operations in the future; so you can start small and grow your business at your own pace with peace of mind that Wonderware solutions will grow with you.

Wonderware InTouch enables users to quickly & easily create and centrally manage standardized, reusable, industrial applications; maximizing return on engineering, shortening project times, reducing risk and significantly reducing total cost of ownership.

Wonderware InTouch doesn't sit at the edge of our customers' business – It lives at the very core of the operation. For 25 years now, businesses in all industries have trusted Wonderware InTouch to help them run those businesses better, faster, safer and cheaper. There are very good reasons why InTouch is still number one and a very good reason why it's called Wonderware!

Find out "Why" at iom.invensys.com/intouch or contact your nearest Wonderware representative at iom.invensys.com/ContactUsWW