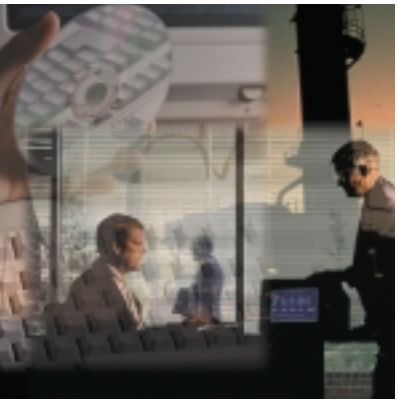
Industrial IT...



...The Next Way of Thinking

Author

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Few people involved in the business world could fail to marvel at the pace of computing and information technology during the past two decades. The paradox of ever-doubling capability and ever-halving price leaves us constantly bordering between *impressed* with the latest idea and *impatient* for the next.

Amidst this excitement, business leaders face another paradigm shift of sometimes-frightening scope: local commerce has become global. Once-personal customer relationships are giving way to unseen electronic transactions. Time-to-market, product lifecycles, and project payback are coming to be measured in weeks or months instead of years.

A recent survey by *Industry Week* magazine revealed Operational Excellence as the number one challenge facing CEOs as they steer their companies into a new millennium. The information needs produced by this thinking are rapidly narrowing the space between systems that serve the plant floor, the control room and the boardroom. The advent of e-Business is stretching the need for *real-time* information and automation all the way from mass marketing to manufacturing to delivery of highly customized products.

Learning by example

The creation of ABB in 1987 marked one of the first royal marriages geared to blending industrial might with 'information age' finesse. Confronting the para-

digm shift, ABB moved early to tune its internal efficiencies while investing in R&D geared to improving both capabilities and delivery for its products.

While riding the wave of technology, ABB recognized that computing horsepower would have to be harnessed and integrated in real time across many islands of business activity in order to best serve both the company and its customers. Like others, we faced some difficult choices amidst the evolution from industrial brawn to intellectual brain:

Will we meet new financial targets simply by selling off assets and laying off people, or can we improve the payback of assets in place? Must we reserve interactive decision support for top executive meetings, or can this powerful tool be woven deep into the fabric of the organization? Do we have the conviction to standardize a myriad of global business processes, or will we continue to pay the price of incompatible systems, duplicated effort, and delayed time-to-implementation?

I believe ABB made some good choices on all three counts.

The goal of Industrial IT is to integrate automation systems in real time from the pursuit of orders via traditional or e-Commerce methods right through to production and delivery of finished products.

Matching assets to strategies

The promise of *integrated* tools for plant automation emerged early as an asset optimizing strategy. As the systems integrators rushed to coin new acronyms (CAD, CAM, CAE, CIM, MAP, MES, ERP) for the linking of disparate products, ABB invested strategically in automation technologies to round out a compatible offering that now spans instrumentation, control systems, motors and drives, robotics, propulsion and power systems. Complementing these were new automation and information systems *talents* – many recruited from customer industries including utilities, oil & gas, metals & minerals, pulp & paper, chemicals, consumer goods, automotive, and more.

The intersection of these tools and talents produced the first glimmering of Industrial IT, wherein bits of information *shared* in real time across the business produced a whole that was far greater than its parts.

Interactive decision support

As the ABB Group approached 175,000 employees, some $30 billion in revenues, and operations in more than 100 countries, the 'islands' of information and decision support became more evident. Bright ideas in one part of the organization were too often slowed to the point of obsolescence, duplicated elsewhere, or simply lost in the shuffle.

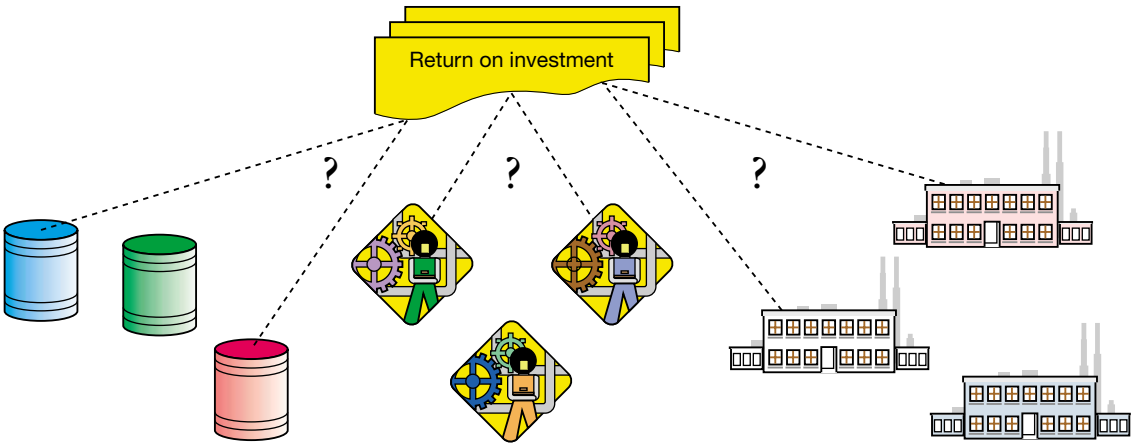
ABB reacted to this lesson by acknowledging that real-time business information must be *shared* to succeed. Executives in the boardroom, operators on the plant floor, and every soul in between must see how their decisions and actions fit into the bigger picture. Today, ABB has nearly 100,000 employees worldwide linked in real time through a secure decision support system that blends inter-office communications, corporate reference, policies and standards, and current events for all to share.

This investment in *global* decision support and information management has paid big dividends: ABB management has gained a real-time tool with which to both take the pulse of the organization and deliver key messages. Employees are better informed on how their personal efforts interface with others. The internal 'marketing' of information creates a friendly spirit of competition that helps to yield better communications tools – reusable far beyond the authoring individual or business unit.

Most important, the real-time integration of information systems has placed ABB in a position to participate in a dynamic era of e-Business partnership with our customers, channel partners, suppliers and stakeholders.

Optimizing the internal processes

Perhaps the most difficult step along ABB's path to change was the recognition that a global leader must implement reusable global processes. A *common way of working* must be woven across the organization, spanning a value chain that encompasses product and software design, sales pursuit, manufac-



Effective asset optimization requires a comparative, real-time look at the current status – and thus the incremental value – of each asset, whether material, equipment or plant.

turing, materials management, communications and customer service.

ABB Automation approached the task by forming an internal organization charged specifically with improving and standardizing internal business practices. We call the function TOPs – for Total Optimization of Processes. This team was given the management charter of steering the company's diverse businesses and employees towards one culture in the ways we interact with each other and our customers.

In its simplest form, the TOPs process can be seen at work in such tools as the 'common story board' developed to define the terminology of a new business initiative. From the start, New Project XYZ has *one* set of buzzwords, *one* official definition of goals and objectives, and even *one* set of communications tools (slides, graphics, etc) for use in discussions across the company.

Moving up the value chain, the TOPs concept has brought new efficiency, speed, and economy of scale to processes as diverse as procurement, engineering, software design, manufacturing logistics, and distribution channels among hundreds of individually measured profit centers worldwide. Doing the job 'my way' has become doing it *one* way.

Most important for our customers, ABB's focus on global processes has helped the company implement more globally shared solutions. Innovative solutions developed in one country or industry are structured to fit onto ABB's shelf of *reusable* global solutions. Standardized practices help local units deploy these solutions for customers anywhere in the world, quickly and cost efficiently.

Why Industrial IT?

Through the experiences outlined here, ABB has not only refined its internal processes and products, we've done some hard thinking about what we wanted to offer our automation customers. (Not surprisingly, we found many customers reassessing what they really wanted to buy).

Our conclusion was that ABB's most valuable automation 'product' isn't sold in a box. Enter the era of *knowledge-based* solutions.

ABB motors, drives, robots, instruments, controls and power systems operate more plants and processes than those of any similar supplier. While we're proud of this record, our most exciting success has come when we and our customer reached beyond the process or the plant to integrate systems that influence a multi-faceted business *enterprise* spanning marketing, design, manufacturing, quality, finance, distribution and similar processes.

The interaction of these processes – and the systems that guide them – through the exchange of

dynamic, real-time information is what we've chosen to call *Industrial IT*.

Those who recall the days of lumbering mainframes, mystical programming languages and frenzied computer scientists may react with some caution to our choice of the term Industrial *IT*. To reassure, ABB's goal is to complete the removal of IT Solutions from the 'black box' of mystique in the finance department – shifting them to the realm of real-time, interactive decision support, asset optimization, and common global processes across the organization.

Information shared in real time across the business produces a whole far greater than its parts.

Daring to dream

In its simplest form, Industrial IT could be characterized by an open control system that automatically configures and re-ranges hundreds of plant instruments to the real-time needs of a new production run. But it could be much more.

Imagine, for example, that each physical plant device was accompanied by a dynamic, *living* software entity – carrying with it not only configuration data but control software, purchase and cost information, maintenance records, mechanical drawings and communication interfaces. Next, imagine that the same approach could be applied to products – endowing each batch, barrel or box with a dynamic set of real-time characteristics.

Now, consider the impact if these distributed plant devices could inherit functionality from the environment in which they were placed: new devices would be configured not by a host control strategy, but as a direct result of the business setting in which they were deployed: process transmitters and valves would inherit the range information required for the current 'recipe'. Motors and drives would adjust their control set-points as a function of current line speeds. Robots and manufacturing cells could be moved from one task to another – retrieving new control software as they 'recognize' the new process and its requirements.

Just as these devices could automatically inherit characteristics from their surroundings, they could also report information and influence operations in other parts of the enterprise. Real-time information from a bottlenecked or failing device might automatically trigger compensating adjustments in downstream operations. Interactive quality measurements

Industrial IT integrates diverse automation and information technologies in real time to provide better business decision support, standardization of global processes and a greater return on assets.

from raw materials through finished goods would provide comprehensive materials traceability and documentation. Most important, the integration of systems for sales pursuit, enterprise resource planning, and supply chain management would stretch the vision of 'e-Productivity' all the way from procurement of the most basic raw materials to delivery of the most advanced finished products.

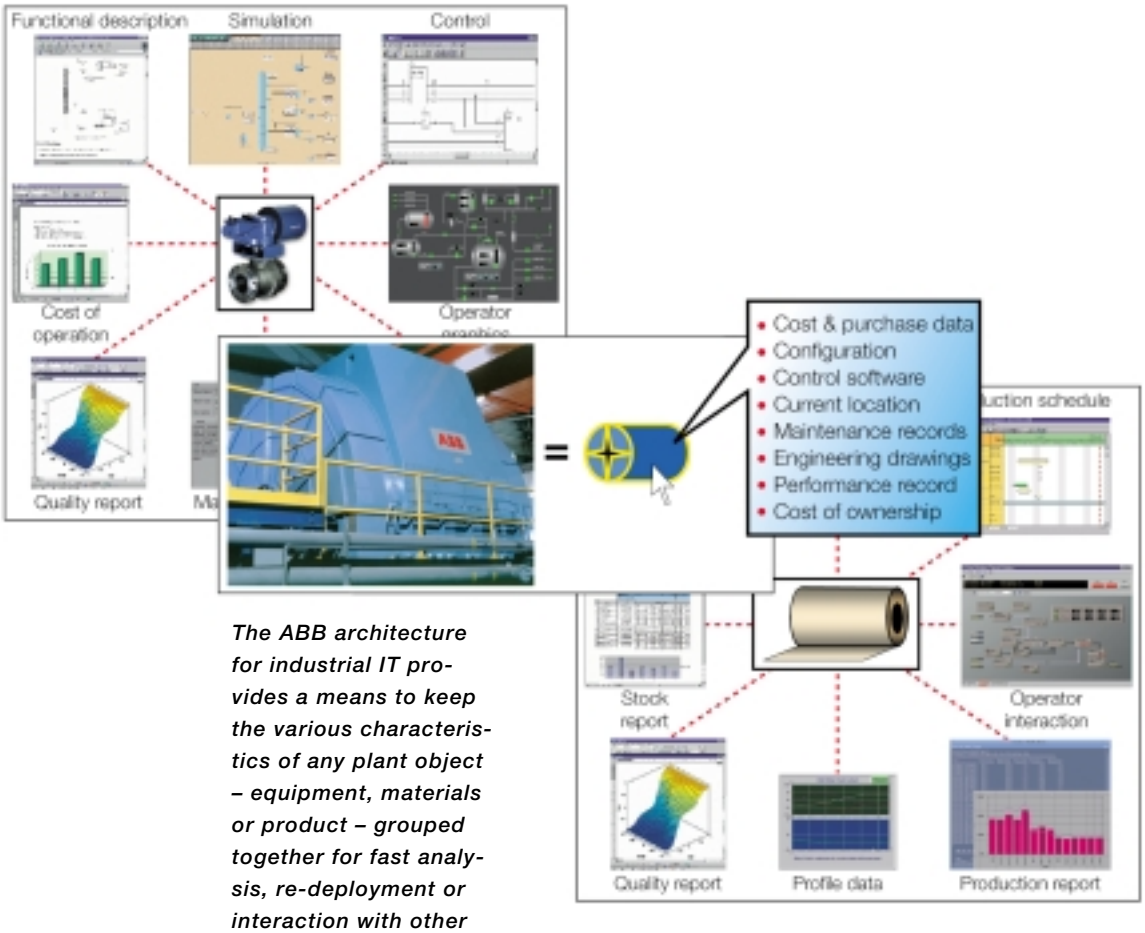
Consider the impact if distributed plant devices could inherit functionality from the environment in which they were placed.

Outside, looking in?

Tools such as the foregoing stretch the value of *plant* information systems from basic control and optimization to a broader arena of automated logistics. Even the best-laid plans can fail, however, when the production 'start' button is pushed by a manager without access to the real-time *condition* of his enterprise.

Today's paradigm of 'Internet time' is rapidly filtering down to the operations level. Managers who are unaware of the incremental cost of production – and its incremental *value* at any given moment – will be at the mercy of the fiercely competitive, wide-open markets to come.

Ideally, asset optimization includes a comparative, real-time look at differences in performance between *multiple* assets of similar capacity – be they transmitters, turbines, turbochargers, robots, conveyors, compressors, motors or complete production trains. This analysis can provide an early warning of impending failure, while allowing healthy assets to operate closer to design limits. Most important, a real-time look at asset *availability* leads to greater *productivity* by giving the strongest assets priority in real-time scheduling decisions.



The ABB architecture for industrial IT provides a means to keep the various characteristics of any plant object – equipment, materials or product – grouped together for fast analysis, re-deployment or interaction with other assets.

Plant-centric architecture

This dynamic interaction of 'enlightened' plant devices reveals the essence – and the dramatic benefits – of Industrial IT solutions. But how are they achieved?

After years of debate over competing standards for communications protocols, automation providers are starting to understand that the real potential lies not in the 'highway', but in the objects that it connects. A true plant-centric automation architecture must recognize each plant object (valve, pump, motor, fan) and its inherent characteristics (range, capacity, speed, output) as one. With this functional marriage accomplished, dynamic access to the object's asset management characteristics, (productivity, capacity, cost of ownership, ROI, etc) follows logically.

Just the same, each definable unit of manufactured product (batch, barrel, bag, lot, roll) might become an Industrial IT object, accompanied by inherent characteristics including product specification, quality data, raw material content, customer name, delivery date, etc. These product characteristics would become the 'drivers' that issue the call to action of corresponding plant objects.

The Plant-Centric approach considers each enterprise object as a modular building block from which to create total production scenarios.

ABB's approach to the plant-centric information architecture considers the myriad of enterprise objects (plant devices, materials, products) as the building blocks that make up a total production scenario – or even a specific business-to-business transaction. Although the various objects and their associated software may reside on multiple networks or computers, each object carries with it an integral collection of characteristics, or *aspects*. A 'system' is created by dynamically linking a series of distributed objects as software clients.

Beyond the obvious benefits of faster device installation and interaction, the object-oriented architecture opens up powerful scenarios for both asset and business management: A click on the object icon offers up context-sensitive information from current configuration and diagnostic status to maintenance history and scheduling commitments. Linked dynamically to other plant management systems, the device contributes its local assessment to *global* decision support tools such as production reports by unit or section, process disturbance analyses, or quality comparisons among end products based on the specific assets used.

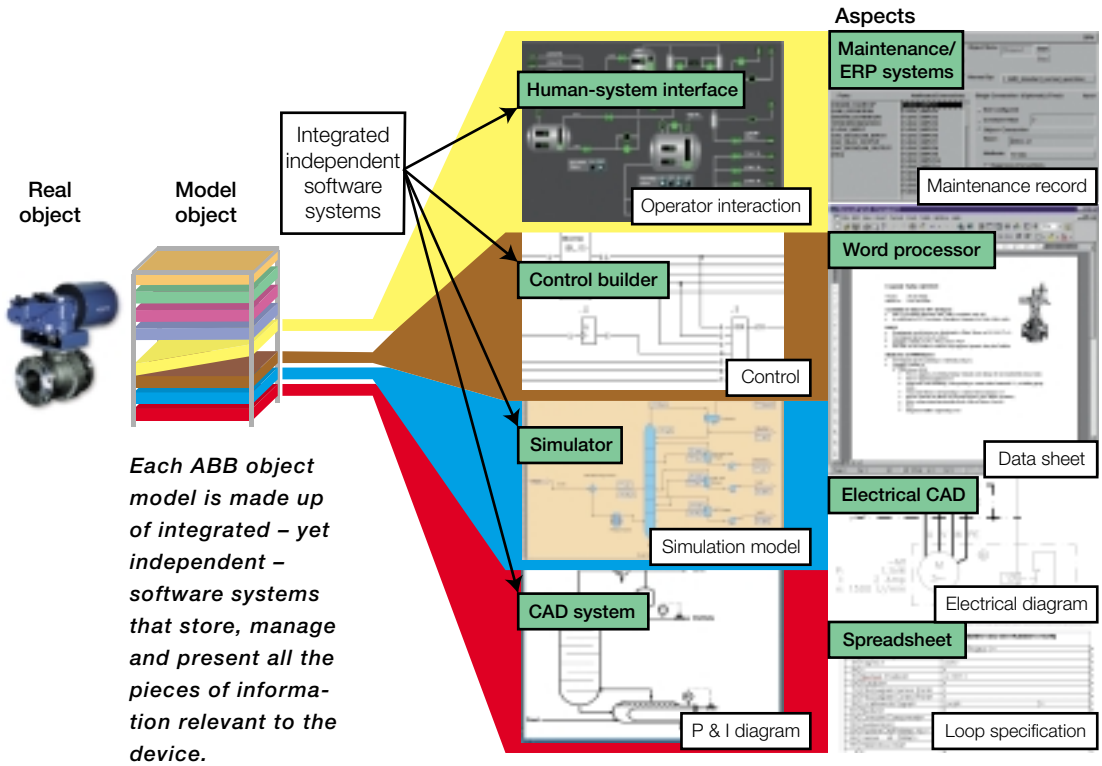
Most important, the ABB 'plug and produce' architecture sets the stage for real-time interaction across the enterprise value chain – from e-Business order input to just-in-time procurement and production to end product distribution. Drawing from a vast library of dynamic enterprise objects, the Industrial IT architect will deploy real-time, *repeatable* automation scenarios to fit a wide variety of business objectives. Just as one would browse the files in a PC directory, the user will browse among and configure multiple structures of enterprise assets – assigning each to the most productive and profitable task at hand.

Putting it all together

In discussing ABB's commitment to Industrial IT solutions, it must be emphasized that the total vision involves far more than dynamic linking of plant and product objects. The ABB architecture – and the shift to more *open* products, systems, and communications – is freeing technical personnel to focus more time on application-oriented solutions that offer vast incremental value. ABB Automation employs some 19,000 software and application engineers – nearly forty percent of our total workforce – in support of squeezing extra value from industry specific, vertically integrated applications.

As the ABB 'productivity objects' are deployed across the enterprise, the job remains to link them with internal and third-party systems for decision support, asset optimization and common processes. The era of business downsizing has left many organizations unprepared for this task. Thus, the Industrial IT concept must include a broad range of professional services for technology migration and integration, networking, object packaging – plus process and plant optimization and asset availability. Nearly twenty percent of ABB Automation revenues now come in this area. Our team of application and service professionals worldwide boasts a proven track record of value-added project execution.

Finally, the Industrial IT portfolio must include financial tools to help speed project implementation,



Each ABB object model is made up of integrated – yet independent – software systems that store, manage and present all the pieces of information relevant to the device.

risk and reward measurement, and payback evaluation. As a global leader in financial services, ABB brings a diverse set of capabilities including leasing and structured financing, insurance, financial consulting, and risk management. This internal capability directly extends the range of ABB Automation solutions into an arena of client/supplier partnership that, in itself, can offer significant dividends.

ABB Automation has formed strategic alliances with major customers from every industry. In their simplest form, these agreements incorporate special pricing considerations and preferred-supplier commitments. More sophisticated partnerships encompass dedicated project teams and executive sponsors; joint development; shared risk and reward project execution; and on-site lifecycle support. Through these partnerships, ABB customers have saved hundreds of millions of dollars in reduced procurement costs, faster project implementation, improved asset availability, standardized software and spares, and – most important – the integrated benefits of real-time enterprise solutions.

Pushing the technology envelope

While most of the tools and the talents for Industrial IT solutions exist today, the never-ending pace of technology will only enhance their scope and benefits.

At a recent industrial exhibition, ABB's automation display incorporated a 'think tank' of progressive product ideas as a guide to discussion on *the next way of thinking* about Industrial IT. Our demonstrations here incorporated emerging technologies such as GPS-based plant information systems, wireless communications among plant devices, object-based document management and remote plant operation via the WAP mobile phone interface.

Amidst a 1500 square meters display of robust and proven automation technologies, the think tank quickly became a show stopper. Intended primarily to stimulate thought on the future of enterprise automation, many visitors chose to view the think tank demonstrations as a privileged look into ABB's development programs. So be it.

Clearly, the benefits of integrated, real-time automation and information solutions are limited only by the imagination. Working in partnership with our customers, ABB Automation is committed to transforming the dramatic benefits of Industrial IT from vision to *reality*. ■