



*"I want to improve the system, not fight it"*

## **Business Integration with MQSeries and MQSeries Integrator**

### **Executive overview**

Over 85% of business managers are being held back by their IT systems. That's the startling conclusion of an independent survey that found managers today believe that better integration of management information systems across the enterprise would bring real competitive advantage.

Innovative managers have a vision of where they would like their business to be, but their IT systems often struggle to match that vision. This paper describes this business environment, and shows how a strategic IBM approach called Business Integration with MQSeries can provide the qualities that today's computing systems should have, in order to do justice to the creative abilities of business managers.

IBM's Business Integration with MQSeries initiative is introduced as a solution for developing the enterprise and its existing information systems in order to exploit new technologies like the Web. Later sections describe two steps necessary to coordinate information flow around the enterprise, in order to implement business processes. The two steps are:

- a fundamental IS integration approach called Message Queuing, using IBM's MQSeries extension of Message Queuing with tools to provide a full information distribution capability for business processes, using IBM's strategic solution -- MQSeries Integrator.

### **The Business Environment**

There's one tool that is absolutely indispensable in business. It monitors events, reacts to situations and provides an instant overall picture of the company. It's available everywhere and, although it doesn't actually come cheap, the more you use it the more benefits you get.

This amazing tool is the human brain. The mind is a wonderful thing - and it needs to be, given the challenges businesses face today and the dramatic shift in the way that companies work. The brain is capable of making all kinds of connections, coming up with creative solutions, and being flexible in the face of change. And the people who can hold all the connections in their head, *and* be creative and flexible, become the best business managers.

All managers today are involved in a never-ending search for increased efficiency, reduced cycle time, lower costs and (possibly most importantly) better service for the customers. And all this must be achieved within the context of change: growth through acquisition, increasing complexity in business processes like supply chain management, and new e-business opportunities provided by the Internet. These are just some of the challenges that managers face:

- ❖ **Supplying dynamic business needs.** Devolving business decision making means that business units can stay light on their feet, but it means that the enterprise's information systems have to evolve rapidly to keep up with change.
- ❖ **Leveraging the extended enterprise.** Wider choice of suppliers, tighter supply chains and customer access across the Web all mean that lines of communication and the ability to connect become highly significant in a loosely coupled organization
- ❖ **Doing more with less,** so that the larger organization can function as effectively and efficiently as a smaller one. Managers require a combination of skills and methods that can tax the most advanced enterprise. It's a problem that all businesses face as they grow: coordinating the different units to maintain or increase productivity with fewer resources.

A common thread that runs through all of these challenges is the making of connections. Whether it's strengthening existing lines or establishing new ones, the ability to share and exploit information across the enterprise is key to success in business today (see sidebar).

### **The automated enterprise**

Trying to get better communications working between different parts of the business is nothing new. A century ago department stores were using pneumatic tubes to move money between the tills and the accounts department, and technology has been trying to improve on that ever since.

Ever since commercial computers became available, information technology has been a powerful tool in the fight for productivity and effective management. IT offers every part of the organization the chance to be more efficient, to communicate faster and provide better service. Industry has seen IT spread from the central computing complex (the glasshouse) into every department and onto every desk so that business units could implement their own ideas more quickly. Decentralization has given each part of the business its own computing facilities to help it do more, with less resources.

The result is a network of mini-businesses within the enterprise, all of whom contribute individually to the overall efficiency of the organization. Manufacturing, Procurement, Order Entry, Billing, etc. all went their own way. Systems diverged, data bases came in multiples, applications were a free-for-all. While each part may be running lean, convergence was never a major issue. In many ways, the cause of enterprise computing was set back by local systems doing their own thing because, although the systems can handle data and real time, an essential dimension is missing: an understanding of the whole enterprise and the rules by which it operates -- *enterprise intelligence*.

There is another important aspect to this. While customers may deal with just one part of the business, they perceive the company as a whole. The customer of a manufacturing company

may have an inquiry about availability, but may also be interested in prices, alternative parts and delivery dates. While each different part of the organization may be able to answer questions like this efficiently, the customer's immediate problem is to get a part that meets his criteria by the date it's required - can the company at the end of the phone do it? The ability to mobilize the separate parts of the enterprise to appear as one is a powerful differentiator when it comes to winning a customer's business.

Managers can visualize what's wanted. They hold a mental map of the relationships of the business units, the processes and business rules, and the business events that are driving the enterprise. They understand intuitively how these relationships can be modified to achieve better results. We call this special quality that managers bring to their job *enterprise intelligence*.

It's frustrating, therefore, when the technologies behind enterprise communications (the information systems) struggle to keep up -- though it's not particularly surprising. Most mission-critical applications have been developed and enhanced over many years, and the newer ones may reside only in systems local to one business unit. Until recently, connecting disparate systems like this has been a complex technical task. The result has been a massive mismatch between managers' vision and the ability of information systems to deliver -- an independent survey of the ways that IT departments are responding to business challenges, conducted by Spikes Cavell and Co., shows a staggering 86% of managers believe that better integration of management information systems across the enterprise would bring real competitive advantage.

Recent developments have increased the urgency for a solution. New ways of doing business -- pioneered by people like Amazon.com selling books over the Web, Federal Express allowing customers to track their deliveries over the Internet, and Montreal Bank of Canada accepting mortgage applications from Web browsers-- have shown that creative use of the Internet and the Web, integrated with existing business processes, can pay huge competitive dividends.

Managers are looking for something that works - and thinks - the way they do: quickly. They think of the company as a whole, not as a set of parts. They operate in terms of real business processes and events, not anonymous bits of data. And they bring a degree of intelligence and discrimination to the job, so that the best of what they do now is kept to complement the best of new ideas. In other words, they're *applying* enterprise intelligence.

Is it unreasonable to expect enterprise intelligence in computer systems? No, it's not.

Business Integration provides exactly that -- in supporting intelligent integration of business processes across the whole business, it also includes the capability for centralizing knowledge of the rules by which the business is run. Business Integration is not an exotic new technology, nor is it some quick-fix nostrum that will be briefly fashionable. It is a way of working within an enterprise and its business processes that will allow it to grow and expand in the only feasible way: by building on its existing applications. After all, the only alternatives are rewriting the systems or the installation of a solution like an enterprise resource planning (ERP) package, and both of these approaches are expensive, demand scarce skills, and disrupt the business.

Business Integration is a journey, rather than a destination, and it's a journey that many companies have already embarked on to secure themselves competitive advantage. It doesn't depend on one new product, it simply builds on all the existing applications through an extension to the communications infrastructure called messaging, plus a whole new layer of capability through the addition of a tool kit.

## **Messaging fundamentals and MQSeries**

Getting different technologies -- like the Web, Java or Components -- to work together across the enterprise can be a nightmare. *Ad hoc* solutions to link two systems are complex to program, and prove inflexible if the systems need to change with the business. Often the solution adopted is human intervention -- people are used to bridge the gap via phone, fax or e-mail. Inevitably, mistakes occur when high volumes of data are re-keyed, pieces of paper are lost or e-mail mysteriously goes astray with no audit trail.

This is no way to run a modern enterprise, and certainly is not going to provide a business with the sudden access of energy that takes a business ahead of the competition. Diverse, or *heterogeneous*, systems are a fact of life, and businesses have too much financial and intellectual capital locked up in their existing systems to be able to start over with a clean sheet of paper. The problem is not the diversity of systems themselves which, individually, do exactly what is required of them - the challenge is to find some common means of communication in a computing Tower of Babel.

The only practical solution is message queuing. Message queuing provides reliable transfer of information between computer applications, regardless of the type of computer or network. It acts in a way analogous to an administrative assistant (AA) managing the in-trays and out-trays on office desks: work arrives (by internal and external mail, e-mail and telephone messages) and is sent out, while executives steadily work through each piece in turn. An AA can place high priority items on top of the piles, so that they are dealt with first and, if necessary, can check on the safe delivery of important items.

Now imagine computer applications being able to work cooperatively in the same way as these executives, but with the speed of modern electronic communications, confidence-inspiring assured delivery, and an enterprise-unifying ability to connect to any computer technology found in business today.

The benefits of a general messaging approach are:

- ❖ It is generally straightforward to connect an application to another, with only simple programming needed to establish full two-way communication. This means that skills are acquired easily and productivity can be high.
- ❖ It is not necessary for both applications to be working at the same time. This means that the two applications can operate independently of each other, each handling requests from the other when they are ready to do so. This is called *asynchronous* operation, and helps keep personnel working, while conventional (or synchronous) systems have to wait for a response when the another application is heavily loaded or the network is unavailable
- ❖ Messages sent are assured of delivery, once and once only. Where data has a high intrinsic value, like financial transactions, this is of immense importance.

In addition, IBM's messaging solution, MQSeries, has extra advantages:

- ❖ MQSeries runs on more than 25 different platforms, so that virtually any platforms found in the commercial and industrial worlds can be connected
- ❖ MQSeries is the *de facto* messaging standard, with more than half of the messaging market, and more than 4000 customer sites.
- ❖ MQSeries is developed by IBM, who can draw on more experience of enterprise-strength transactional computing than anyone else in the business.
- ❖ MQSeries enjoys global service support, and broad support from many technology and service partners.

### **Delta Airlines**

A good example of the creative use of shared data between applications is provided by Delta Airlines. Delta's Information Technology group, a wholly-owned subsidiary called TransQuest, has been instrumental in turning around the fortunes of Delta, from serious financial problems in the early 90's to sustained profitability today.

Delta, in common with other airlines, has a large number of different systems that administer customer information, revenue, flight and crew operations, and business support systems. Often, different systems contained information which, collectively, could provide an extra level of value to customers and the airline. For instance, customer data can be combined with reservations and flight leg information to notify designated family members with notification of imminent arrival or change in itinerary; business associates with direct access to seat phone number; or hotels and car rental agencies with the customers' current status.

Delta have used IBM's MQSeries to link together their different systems so that they can combine different data flows in this way. The integration of different applications has enabled them to provide a much higher level of customer service so they can compete aggressively in a crowded market.

### **Business Integration and MQSeries Integrator**

Message queuing is a very capable technology, and one-to-one links can be created with simple programming in each application. With message queuing it's simple to cross-link applications, but a point can be reached when an extra layer of capability makes it possible to bring the benefits of *enterprise intelligence* to the whole network.

Imagine a number of different computer systems and applications spread through the enterprise. Message queuing makes it possible to interconnect each of them with all the others, but a map of all the possible connections will very quickly become bafflingly complicated. Now imagine that, instead of direct connections between systems, a new connection point is established in the middle of the map (we'll call it a hub, for convenience) and each system has a single connection to the hub. The maze of connections dramatically simplifies to a star diagram

-- and the hub at the center of the star becomes the focus for enterprise intelligence, the extra layer of Business Integration capability. All messages pass through the hub, which is architected to handle any volume of traffic, no matter how heavy or complex. IBM's solution in this area is called MQSeries Integrator, designed to build on the messaging infrastructure provided by MQSeries.

## **Business integration capabilities**

The value of Business Integration is that it more easily shares, and can act on, knowledge. In other words, it provides the core of enterprise intelligence. The knowledge it maintains is of two types: knowledge of the business, including information and rules by which the business is run; and knowledge of the applications in the enterprise systems.

This knowledge allows the hub to take action, based on the type of messages that come in. Knowledge of the applications enables *transformation* of message formats; knowledge of business rules and information requirements enables *intelligent routing* of information to where it's needed; and knowledge of packaged application documents, held in *application templates*, enables a quick start to integrating these applications with the rest of the enterprise.

Collectively, capabilities like these in the hub are usually known by the term *message broker*. MQSeries Integrator has all the capabilities to be a full message broker.

## **Transformation**

Transformation is important because of the way that applications work. Most enterprises have applications that have developed over the years, on different systems, using different programming languages and different methods of communication. Standard message queuing technology can bridge differences like these, but each message queue has to be explicitly told about the characteristics of each message destination.

Business Integration changes all that. The knowledge of each application is stored just once in the hub and, while intelligent routing (see below) decides where each message is to go, it is translated into the appropriate format. For instance, personal names are held in many forms in different applications. Surname first or last, with or without middle initials, upper or lower case: these are just some of the permutations. Supplied with the information definition of each application, the transformation engine can supply data in the right format to any receiving application, without the sending application needing to be modified in any way.

A couple of other examples of data needing transformation will show what an important function a transformation engine performs.

Different applications require data in different formats. For instance, an order entry application may have a Part ID in the body of the message, while stock applications may have it as the message header. A transformation engine has knowledge of these different formats, and can repack data fields to the appropriate format.

Similar considerations apply to the exchange of money. For instance, some European countries use a comma, instead of a period, for a decimal point. A transformation engine can handle all of these differences without the laborious hand-coding of application logic.

## **Intelligent routing**

Intelligent routing encapsulates business knowledge of how information should be distributed between message-sending and receiving applications throughout the enterprise. This knowledge is stored in the hub as a set of rules, that are applied to each message that passes through the hub. Messages are sent on, or distributed, according to criteria applied to the values of fields within the message. For instance, a money transfer might always be sent to one application but, if the value of the transfer is more than say \$10,000, then another application that records high-value transactions should be sent a copy.

The advantage of this capability is that a far more flexible approach can be taken to the distribution of information. It's here that we can really see the application of enterprise intelligence in the information systems -- a business manager with a concept for an enhancement to an automated process has only to articulate it in terms of a few business rules, and the rules can simply be stored in the hub, rather than having to laboriously modify the appropriate applications. For the first time, the computing heart of the business can keep up with the dynamism of its business managers.

To reflect the reality of business processes, the rules can be complex, generating multiple messages, but even simple rules can make it easy to gain competitive advantage. For example, an organization like a national auto club might provide a premier service to specific members for orders above a threshold value. Most orders would be routed through the usual channels but, if the membership number and order value meet certain criteria, the order can be processed separately for special treatment. It's easy to see how rapid implementation of innovative services like these can create strong differentiators in a crowded market.

A variant of intelligent routing is known as Publish and Subscribe, or simply pub/sub. When a business event takes place, like receipt of an order, typically an application will publish a message corresponding to the event. The message is received in the hub, and the pub/sub function reviews its lists of subscribers and delivers the message to each one whose criteria are met. Applications must register their interest with the pub/sub function before they can subscribe to messages -- typically a subscription is registered by an administrator via an admin interface to the hub, or dynamically by the application itself, through a programming interface.

IBM's MQSeries Integrator will initially offer rules-based intelligent routing.

### **Application Templates**

Many enterprises make use of packaged applications, like PeopleSoft, and SAP's R/3. Packages like these make use of hundreds of different *forms*, which contain information relating to specific transactions that are handled by the applications. Application templates encapsulate knowledge of all the data that is carried in the forms, to make it easy for other (non-packaged) applications to gain access to the information that is in the forms. Used in conjunction with transformation and intelligent routing where necessary, application templates ensure that information flow can encompass every type of application in the enterprise, both packaged and custom-made.

Additional templates are also available for protocols like Electronic Data Interchange (EDI) and SWIFT (the financial network). Even more templates will be available in the future to ensure simple integration with popular packages and protocols.

## **MQSeries Integrator - IBM's Business Integration solution**

The toolkit capabilities described above have a specific place in the middle of IBM's Business Integration with MQSeries initiative. MQSeries Integrator incorporates the key tool kit capabilities of transformation, intelligent routing and application templates.

MQSeries is already the *de facto* industry standard for messaging, and now MQSeries Integrator adds an important new layer of functionality. MQSeries' messaging is fundamental to the IT infrastructure of the enterprise; with the enterprise intelligence that it can incorporate, MQSeries Integrator extends messaging capabilities into the business arena.

MQSeries Integrator should be seen as the first step in a strategic evolution of IBM's messaging toolkit into a solution that can automate the linkage of every step of the business process. Later releases will contain additional functional capability, and systems management and monitoring capability.

An early version, *MQIntegrator*, is generally available from New Era of Networks and is marketed jointly by IBM. This offering will be enhanced to support international customers, and will be manufactured and supplied under IBM terms and conditions, and offered world wide. IBM will continue to add business integration capabilities to MQSeries Integrator and provide an infrastructure for IBM partners to offer additional functionality.

Another key element of IBM's strategy is the development of relationships with Business Integration partners. Well-known companies will supply complementary technologies and applications that will rapidly extend the base of the MQSeries family of products. Other partners will supply services that will make it easy to adopt a messaging solution based on the MQSeries family.

### **Benefits of MQSeries Integrator**

Effective application integration is vital to an organization's ability to respond to changing market demands, seize new market opportunities, improve customer service and achieve business growth potential.

It all boils down to opportunity. New business opportunities inevitably require the same flexibility in business processes as in managers' thinking. The tool kit extends the vital application integration capabilities of message queuing to reach across full business processes so that they can be adapted flexibly to exploit any new business opportunities.

The benefits of MQSeries Integrator can be realized both within and beyond the enterprise:

- ❖ By making it easy to integrate application and data enterprise-wide and providing faster access to information, it can shorten time to market, improve customer service and reduce overall costs.
- ❖ By opening up the information in IT systems to suppliers and customers, it can help leverage the value chain to improve quality and accelerate responsiveness to change.
- ❖ By providing relief from the burden of modifying applications every time they are integrated - that is, connected in new ways. Transformation and routing of data is

performed outside the application, without the need for scarce programming and communications skills, so application testing and assurance costs are reduced.

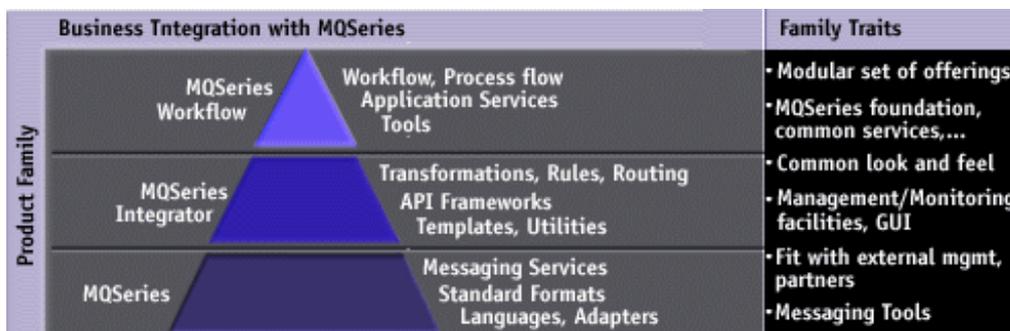
## Summary

MQSeries, IBM's industry-leading, messaging-oriented middleware, enables diverse applications to communicate securely and reliably, with enterprise-level performance, over a wide range of platforms. MQSeries leads the market with over 4000 customer sites and has broad partner support. MQSeries is available today, worldwide.

MQSeries Integrator makes it possible for routine process work to be delegated to the enterprise intelligence at the center of the information systems network. Based on MQSeries messaging and queuing capabilities, the MQSeries Integrator is a real-time, intelligent rules-based message routing and dynamic message content transformation and formatting system. Along with this functionality, preconfigured templates for major packed applications and e-business extensions will also be provided. These capabilities are also available today.

The other component in IBM's Business Integration using MQSeries initiative is MQSeries Workflow, the top tier in the diagram. MQSeries Workflow gives enterprises more control of their business activities involving applications and staff by capturing and using knowledge of business processes so the flow of work can be quickly implemented, enhanced, and updated.

## For more information.....



...visit the Business Integration website at [www.software.ibm.com/ts/mqseries/busint](http://www.software.ibm.com/ts/mqseries/busint)