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Meeting the Enterprise Challenge: The State of
Integration in Today's Business World

— IBM Corporation

▶ Hurwitz Report

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Introduction

Hurwitz Group's recent research on the state of integration in enterprises of all sizes illuminated a number of key trends that reflect how enterprises view integration and what the primary reasons are for implementing integration infrastructure. First, the Hurwitz Group e-business Process Integration Study of 2001 uncovered that the percentage of IT budgets dedicated to integration software is rising for 2002. The data shows that across all sizes and types of industries, there will be more dollars spent on integration software in 2002 than in 2001. In general, there will be as much as a 2% increase over 2001 of the overall IT budget that is allocated for integration software spending in 2002. Depending on the size of the enterprise, some budgets devoted to integration spending could be nearly 30% of the overall IT budget. Several key reasons surfaced that help to shed light on why these budgets are increasing. Respondents are convinced that now more than ever integration technology is highly critical to their business success. Many, in fact, list integration as a "mission-critical" endeavor for their businesses. These companies recognize that successful integration is directly related to business success.

Two main business drivers behind the need to integrate are reducing costs by making business processes more efficient and maintaining competitive advantage through delivering high quality information services to customers and partners. For these companies, business success means building self-service customer portals for improved customer support. Portals give a unified view into multiple information systems, requiring integration to unify the multiple systems. Portals also become a point of self-service, which optimizes business processes and frees human resources to work on more challenging tasks. Success also means sharing more critical transaction information with suppliers in near real-time so that the supply chain becomes smoother and more efficient. It means ensuring that as information pours in from the supply chain it is promptly delivered back into the fulfillment systems without delaying hand offs and costly errors. It means the ability to drive a transaction straight through multiple systems in an automated fashion to build a more optimized business process. Internet and wireless touchpoints continue to challenge corporate IT to deliver multiple types of information residing in disparate systems out to eager consumers. First generation web commerce sites need to be more fully integrated with internal business processes, and new application development must build on current IT assets, not displace them. These kinds of business drivers are raising the business criticality of integration software, because it is designed precisely to help solve these kinds of business challenges.

But the market is still far from being fully enabled with integration technology. In aggregate, fewer than 35% of companies have fully installed enterprise application integration products.

Furthermore, less than 10% of the companies have fully integrated their most critical business processes. Integration is a challenging endeavor. It typically encompasses several organizational departments and spans multiple IT systems. There is a lot of work yet to be done, and because that work is difficult and spans such a broad spectrum of the enterprise and technology, it is essential to have an integration solution that can meet the various needs of the enterprise. A number of technologies and techniques are needed for enterprise integration, and purchasing a solution that fits the broad spectrum is highly advisable. This report outlines the key trends discovered from buyers of integration technology during the 2001 research. It provides a look at what current enterprises are doing with respect to executing on their integration strategies. Next, it outlines some of the key types of integration that these adopters are implementing. Finally, it highlights IBM's software infrastructure suite, WebSphere, which provides a breadth of technology for the successful development, deployment, and integration of applications.

Integration Adopter Themes

Hurwitz Group identified the following common themes among the current implementers of integration technology. Leaders were successfully executing on their strategies by meeting the challenge of integration in these ways:

Organizational issues. Overwhelmingly successful integration projects and strategies must incorporate an interdisciplinary team that crosses three key functional boundaries in the enterprise. The teams consist of representatives from IT, business, and operations. The IT representatives evaluate the integration technology, work with the chosen solution to build projects, and develop the integration applications. Business representatives deliver the knowledge of how a specific business process is executed, outlining the business rules associated with transactions, and the expected inputs and outputs of those transactions. Operations captures, models, and maintains the business processes and acts as the buffer between business and IT so that processes can truly be reflected in the IT infrastructure, and the IT infrastructure stays in line with changing business processes. These groups act as catalysts for the whole enterprise integration strategy. High level representation from each of the three groups is essential for evaluating products, prioritizing projects, and coordinating efforts from all involved. These groups are not adding to costs, but rather maximizing the use of business and IT budgets by coordinating efforts, not creating redundancy. Hurwitz Group's current research shows that supply chain processes still require a lot of integration work to unite the external and internal components of multistep processes and a large portion of these integration swat teams are focused on better integration in the extended supply chain. Ultimately, these endeavors are geared toward not just integrating the data, but also toward

having rich management of business processes that drive the extended supply chain. The efforts are multistepped and best handled in phases.

Technology issues. These integration groups relied on the IT representatives to ensure that the chosen solutions would meet several technical criteria. First, the groups evaluated the adaptability and flexibility of the solution. Leaders desired a solution that would be usable as a strategic integration platform. The solution must be applicable to a broad range of integration projects, not just providing limited use. Resoundingly, the groups all expressed that the solution must fit into the existing application architecture. No one was interested in a solution that would require drastic changes to current IT assets. Next, the teams were challenged by the limitations of the technology capabilities of their partners. Because supply chain processes were such high priority projects, the teams were often challenged by the vast technical differences among the various participants in their supply chain. Consequently, they needed a solution that could meet partners on a variety of levels, from supporting browsers to wireless to EDI to XML document exchanges. The complexity of B2B relationships was consistently noted as a strong technical challenge. Finally, the teams all expressed the necessity of having a platform that is highly extensible and easy-to-use. This gave the developers the means to customize the solution to fit their particular needs without relying on costly consulting.

Buying requirements. As businesses made their buying decisions, vendor viability played a significant role in deciding on a specific solution. Because integration is so critical and because the chosen solution would act as a strategic platform, buyers wanted to be sure that the vendor would be around to support them and improve the product over time. To help make this decision, buyers asked for customer references within the specific vertical industry in which they did business. Because vertical industry processes have specialized business rules and unique ways of conducting business, buyers wanted to be sure that the chosen solution would work within their respective vertical industry. These customer references were critical toward demonstrating past customer satisfaction with the solution. Finally, the buyers wanted to be sure that the vendor would continue to support the solution and devote resources to improving the product for the future. This is directly related to viability and R&D resources of the provider.

Adopter scenario. Because supply chain processes came up as high on the list of most critical processes to integrate in 2002, the following manufacturing example is presented to highlight a common problem that integration can help to solve.

Vendor managed inventory (VMI) was noted as a critical e-business process. Integrating VMI encompasses several important steps: 1) understanding how automatic inventory replenishment works, 2) using VMI as a sales and marketing tool to bring strategic partners on board, 3) using it to drive supply chain efficiencies and as a fulfillment enabler.

The manufacturer has two major objectives in mind with the VMI program, namely an increase in sales and customer retention. For the customer, VMI increases inventory turns, which in turn reduces costs. For the manufacturer, VMI frees up purchasing managers and inventory control analysts, who no longer have to monitor inventory. On the demand planning side, the manufacturer now has smoother manufacturing schedules as continuous replenishment eliminates the sudden spikes in demand. Increased predictability in demand allows for better scheduling throughout the supply chain and satisfied customers.

Specific performance measures can be put in place to measure the impact of VMI. The manufacturer can know the amount of savings and how these will be realized. Questions driving the performance measures include:

▶ Will it improve the demand planning cycle to affect manufacturing consistency and reduce costs?

▶ Will it allow the purchase of goods at a lower or lesser cost?

▶ Will it allow the manufacturer to interact with customers more efficiently? If so, how does that translate into dollar amounts?

VMI fosters collaboration and provides great benefits. Because the VMI process is very detailed and requires both internal and external parties to be involved in the design and implementation and in deciding on the rules of engagement, close customer partnerships emerge. The true value from such an initiative comes from trading partner collaboration. The integration backbone that underlies the VMI initiative facilitates direct B2B and system-to-system interaction and eliminates the need to rekey orders on either end. The entire process drives efficiency as backend systems are automatically populated on both sides.

These trends in the buying community and this specific example highlight the ways that leading enterprises are tackling the on-going integration challenge.

Business Integration Solution Spectrum

Enterprises are executing on integration strategies through a number of important tactical methods. All forms of business integration require application integration as the foundation of an integration solution. The primary styles of application integration are actually spans within the spectrum from information integration to process integration.

Application integration is the exposure and use of "services" between applications. The business driver here is to connect applications together with business logic so that businesses can benefit from automated updates and straight through processing of transactions.

Ultimately, businesses are building a collaborative information infrastructure with integration so that information and application logic can be delivered anywhere it's needed to complete a business process. To support the application integration needs of customers, regardless of the style, many ISVs support callable interfaces to their applications for specific business functions. These interfaces can range from proprietary language-specific calls to XML document-based interfaces to the increasing use of new industry standards to provide Web Services interfaces. In the spectrum of information and process integration, techniques including prebuilt application connectors can be used to leverage these callable interfaces to speed business integration. Through these interfaces, application integration solutions can extract data and business logic and apply transformation and routing rules to them so that disparate assets can effectively share resources.

In information integration the focus is on the application endpoints of an integrated system. The bulk of the business logic and process is captured in applications at those endpoints, and there is little logic distributed throughout the system. In this case, message-based integration technologies are most appropriate for getting the information from one application to another. The main driver for messaging is to provide a means for applications to exchange information in a reliable manner. This is driven by the business requirement that information cross several lines of business and collaborative data populate multiple applications. The basic concept is a message bus that provides an abstracted communication layer for guaranteed delivery. Applications are connected into the bus to exchange event messages asynchronously. A publish and subscribe model is used to build message queues. This model creates a loosely coupled environment in which applications publish messages on a specific "topic" and only receive messages to which they subscribe. Reliable messaging, data transformation, and high speed publish and subscribe functionality are key attributes needed for this style of business integration solution.

Process integration encompasses a number of key functional areas designed to provide a way to view, coordinate, and manage functional assets as part of an over-arching business process. The driver for process integration is to build a closer software representation of the way the business actually runs, which promotes smoother collaboration among people and businesses. Process integration enables better coordination of IT assets with human resources and gives business users an easier way to fluidly interact with multiple applications in a way that allows them to focus on their part of a process, not the whole thing. In process integration, the focus is on the business object and the flow of these objects across not just applications, but also the people in a business process in order to achieve a business objective. The ability to define generic business objectives, map relationships between people and processes, and connect applications into this flow are key attributes of a solution. The

elements involved in process integration are:

▶ **Process modeling.** The means to graphically represent processes as they are executed by the business. This includes modeling the flow of work across applications and among applications and people, and representing it as it extends across business boundaries.

▶ **Process automation.** This refers to automating the exchange of data between applications with the top-down, process approach guiding the integration. There is typically no human intervention in an automated solution. Data from applications is transformed from source to target and then intelligently routed to its destination. This automation enables fast transactions and quick processing. In business scenarios when transactions can be driven through the supporting applications without the need for employee decisions, this kind of solution is very powerful. It yields highly efficient processes and frees workers to focus on exception handling or personalized interactions. Process automation is often the result of application integration whereby a specific transaction is automated through data exchanges triggered by specific events.

▶ **Workflow.** This refers to the flow of business among people and incorporates providing a portal workspace for workers to complete items that move a transaction to its next stage. It incorporates an intelligent engine that pushes work items to employees in an orchestrated fashion.

▶ **Process management.** This is the ability to view running business processes, monitor their health, and analyze their performance in terms of time, results, and resources. Historical analysis is also included, which gives analysts the means to measure the performance and efficiency of processes.

Ultimately, in a process integration solution, these elements need to be unified and work in harmony. For example, analysis of a process can lead to process changes that can be driven from the model and will ultimately be reflected in the way underlying applications and people interact.

The following techniques often represent a hybrid of information and process integration. The first generation of B2B integration was more data-centric and the future generations will be more process-centric, with Web Services being highly process driven. This is due, in some respects, to the use of XML to normalize data representation. The greater challenge with B2B and Web Services is ensuring that the data is used in a timely, process-savvy way.

B2B integration. This refers to using the Internet and XML to exchange documents and data among varying participants in a B2B network. EDI was a first generation solution for B2B, but

the newer alternatives offer a much lower TCO, more flexibility, and can be rolled out to more partners. The business driver here is to build a more real-time, collaborative network with partners to create high efficiency information exchanges. Partners can join in to the network using only a browser in many cases. With XML at the heart of B2B solutions, data and processes can be shared much more easily.

Web Services. Service oriented integration is beginning to develop on the horizon of the integration frontier. As e-business initiatives mature and new business models are understood, enterprises are beginning to expose the IT infrastructure as finite points of business value. In other words, enterprises are building Web Services that encapsulate a business function, are defined by a set of business processes, and are executed by a specific combination of applications and people. The driver here is to optimize the use of computing resources and provide a dynamic infrastructure that enables businesses to react quickly and change as market conditions dictate. The introduction of Web Services follows closely on the heels of B2B e-business and is being touted as the next generation of highly distributed computing that utilizes the Internet as the touchpoint for all interactions.

Web Services need a means to be located, understood, aggregated, integrated, and delivered in a timely and efficient manner. Web Services rely on a number of key trends, including the increasing use of XML as a data description language and subsequent standards that utilize XML. In addition, Simple Object Access Protocol (SOAP) is currently garnering the most momentum as a messaging layer for exchanging objects over the Internet. The Universal Description, Discovery, and Integration project is also gaining momentum as a the means to locate, describe, and integrate Web Services that are published in UDDI.

These methods of integration represent the primary ways that today's enterprises are building solutions.

The IBM Solution Suite

IBM brings a broad spectrum of technology to bear on market requirements. With its WebSphere platform, IBM can not only meet the needs for integration, but can also deliver added features that are essential to a successful software infrastructure.

WebSphere: the platform. WebSphere includes the products needed for any enterprise to meet all of the foundational needs for applications.

> ▶ **Development.** WebSphere Studio for Application Developers is a Java development environment for professional developers to create new applications and meet the changing needs of business.

▶ **Deployment.** WebSphere Application Server provides the transactional support services to robustly deploy applications for enterprise use. Also, because of its foundation on the J2EE specifications, WebSphere Application Server is an open, modular platform that is fully extensible and enables developers to connect standard objects and deliver scalable applications.

▶ **Integration.** The WebSphere family of integration products is very compelling. It provides a multitude of functionality for building integration solutions to meet any enterprise situation. Because the integration products are rich, a closer look is needed to fully outline how WebSphere can be a powerful integration solution. The component parts are:

- **WebSphere MQ.** The market dominating messaging product provides enterprises with a highly scalable and proven technology to build a comprehensive messaging environment. Businesses that are driven by the need to have data sources shared throughout the computing environment from the mainframe to the wireless device, will benefit from MQ Series. With its extensions through MQ Everyplace, robust, reliable messaging that connects multiple touchpoints in the enterprise can be a reality.

- **WebSphere MQ Integrator.** This established product maps very well for businesses that require high volume transfers of data to multiple systems in a fire and forget method. The benefits of this product come when applications are integrated in process automation scenario as outlined above. MQ Integrator provides an effective means for companies to provide application integration via high speed publish and subscribe models or set up automated business processes, which don't change frequently and don't rely on employees to make watershed decisions that could change a process.

- **MQSeries Workflow.** This product gives the enterprise the ability to empower its workers to coordinate their efforts in fulfilling a business process. Because integration should reflect the balance of automation and human decision making, a workflow engine is critical to ensuring that people can complete tasks at just the right time.

- **IBM/CrossWorlds Interchange Server.** This newly added product in the WebSphere platform gives businesses the power to integrate business processes for effective and seamless optimization. Built in Java, it works with the application server, yielding a robust means to integrate application components deployed on the application server as well as data and applications residing on other platforms. This integration is carried out from a process perspective, giving

business users a rich tool to ensure that IT assets are in coordination with business processes.

- **Partner Agreement Manager.** Because collaboration among businesses is critical to continuing success, IBM offers the PAM, a product that leverages XML for creating a solid B2B foundation. With this product in place, companies can bring their suppliers closer to them while keeping costs low and insulating the enterprise from volatile changes in technology in partnering organizations.

- **WebSphere Business Integrator.** This integrated platform offering combines the elements of information integration and process integration offerings along with application development offerings for an end-to-end solution which can be used for enterprise-wide integration projects or public or private marketplaces.

- **WebSphere Adapters.** Having connectivity into the myriad of packaged and custom applications is critical for an integration solution to be fully effective. WebSphere adapters bring out-of-the-box connectivity so that application heterogeneity is never a problem, and enterprises can take full advantage of their current application assets. These adapters are designed to allow them to be used across different product runtimes. Additionally, IBM has offerings to meet the J2EE Connector Architecture, which provides a standardized way to connect enterprise applications with components residing on the J2EE application server. IBM has the means to connect to systems built on J2EE standards as well as connect to proprietary applications through their respective APIs.

- **Process Modeling and Adapter Development Tools.** Development is also key when building integration solutions. With Interchange Server business analysts will be able to create processes that truly reflect how business gets done. Process modeling can become an essential part of best practices for the business. Also, IT will have a powerful development kit for building custom adapters to the applications that are not already covered by IBM's packaged adapters.

Web Services and integration: an emerging vision. Integration technology is rising up to meet the growing challenge of Web Services. Particularly business process integration functionality is manifesting as a key approach to making use of Web Services as well as publishing Web Services. Having a view of a service-oriented architecture from a top-down business process perspective will help enterprises understand the value of available Web Services and how those services will fulfill established business processes and the extent of the impact of a Web Service on a particular business practice. Hurwitz Group believes that Web Services is a visionary move for the industry, but building a service-oriented architecture is a daunting and complex task. Business process integration will smooth a service's

architecture. Ultimately, however, a process integration approach will need to be harmonized with underlying applications and data — some of which may not have been designed to fill a service-oriented approach. In this case, integration technology operating on several layers within the enterprise can be employed to expose IT assets, such as Web Services, in conjunction with new development efforts that are service-based from the start. Service-oriented integration is a complex and very nascent idea. The industry is still quite a distance from fulfilling this vision, but nonetheless, integration technology should remain as important or even more important in the next generation of enterprise architectures.

IBM's approach is not to create a new Web Services product or infrastructure; rather IBM has invested to make its entire product line fully enabled for Web Services as an evolutionary part of the e-business infrastructure. Users can expose services where appropriate as they explore dynamic e-business uses. As such, the WebSphere platform contains all the technology elements needed to ensure that the business imperative of integration can be successfully delivered by integration teams. From mainframe to wireless, real-time and batch, people and applications, internal and external processes — the business choice is yours; WebSphere means comprehensive software infrastructure.

Conclusion

The integration challenge is not going away; enterprises continue to build and buy new applications and continue to create new business processes that will ensure market success. But more than ever, business leaders recognize that market success is contingent upon having integration technology that meets a variety of needs and that will create strategic return through tactical success. There is no simple solution to integration success. It requires interdisciplinary teams with a broad tool set of products at their disposal. One size does not fit all for integration. With this in mind, enterprises should look for a comprehensive approach that gives IT the power to develop customized solutions and one that gives business the power to ensure that processes are being efficiently fulfilled throughout the extended enterprise. IBM's WebSphere is a comprehensive solution. The power to develop, deploy, and integrate is within the realm of WebSphere and within the reach of adopting enterprises.

About Hurwitz Group

Hurwitz Group, an analyst, research, and consulting firm, is a recognized leader in identifying and articulating the business value of technology. Known for its real-world experience, consultative style, and pragmatic approach, Hurwitz Group provides strategic guidance to its clients by delivering analysis, market research, custom content, and consulting services. Clients include Global 2000, software, services, systems, and investment companies.