

# The Real-Time Enterprise: **IT Becomes Strategic Again**

**Capitalizing on Real-Time Initiatives Through the Effective  
Application of Enterprise BI and Integration Technology**

**An Expert Series White Paper**

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## Executive Summary

The real-time enterprise (RTE) has emerged as a new computing paradigm that lets organizations create a flexible systems architecture to accommodate a dynamic business environment. The RTE allows companies to accelerate the velocity of information throughout the enterprise while automating, auditing, and continuously refining key business processes. The end result is faster decision-making and performance management, shortened business cycles, improved responsiveness, and an architecture that supports constant innovation and rapid change.

Companies that move quickly to build the RTE will enjoy significant competitive advantage and reduced costs. They will also realize increased return on their existing investment in packaged applications, many of which have not lived up to expectations, frustrating IT and senior managers alike. By achieving where first-generation business intelligence and point-to-point integration solutions failed, the RTE will dramatically increase the strategic value of IT in an organization.

Real-time solutions help companies realize better performance and accountability, comply with legal mandates and industry standards, effectively collaborate with customers and partners, and create a platform for strategic growth through mergers and acquisitions.

Built on Internet standards, the RTE is best attained through the right application of modern enterprise business intelligence and enterprise integration technology and best built incrementally so companies can realize near-term results that can be easily reused for future solutions. This requires partnering with an experienced vendor that provides both enterprise business intelligence and integration technology needed to support RTE efforts today and down the road.

## The Enterprise Systems Dark Ages

A great deal has been written over the last 12 to 18 months questioning the future of IT and its strategic value to the enterprise. Many business leaders and some vocal industry pundits have asserted that IT has become a commodity, and that it no longer plays a critical role in supporting a business strategy.

This talk reached a crescendo with the publication of Nicholas Carr's article, "Does IT Matter," in the May 2003 *Harvard Business Review*. Carr asserts that IT's ubiquity has limited its strategic importance, and argues that spending on IT initiatives isn't commensurate with the value it delivers. Carr advises IT executives to limit spending, holding that the risks of embarking on major technology projects generally outweigh their impact on the bottom line.

Carr's article struck a nerve with many senior executives, since it concisely articulated what they had been feeling for some time. The malaise toward information technology that has crept into corner offices at global 2000 companies reflects a general dissatisfaction with the results from the major wave of technology investment that began in earnest in the early 1990s and continued through the stock market crash in 2000. The technology investment that has soured executives called for major spending first on large-scale operational systems like ERP, CRM, and SCM, and then on the business intelligence (BI), data warehouse (DW), and point-to-point integration projects that were ostensibly supposed to fix them.

The initial spending on broad deployments of packaged applications promised process optimization, accelerated cycle times, and reduced costs; after lengthy deployments were complete and the results were deemed insufficient, companies turned to BI and point-to-point-EAI tools to optimize further. While all of these systems have delivered value, there is widespread belief that they – and the huge amount of consulting dollars spent to customize them – never fully delivered on vendor promises. This perception is the result of several factors.

### **A Fragmented IT Landscape**

While the investment in packaged operational systems did yield incremental process improvements, the choice of multiple disparate systems from multiple vendors created a fragmented IT landscape. Essentially, every functional area optimized locally rather than globally. This meant that enterprises were left with business-process and information "white spaces" that had to be filled manually.

An obvious example is the lack of integration between CRM and supply chain management systems. A supplier problem that would delay an order would never actually get communicated to a customer, since the systems couldn't easily share information. The combination of a disjointed process and the failure to get timely information pertaining to every component of the process likely meant that an enterprise would first learn of a problem when an angry customer contacted a service representative, who would have to pinpoint the source of the problem by getting information from different places across the company before responding to the customer. In most instances, this could potentially take several days, leaving a frustrated customer who might not return.

Scenarios like the one described above typify the business computing environment in the wake of packaged application implementation at most companies. The bottom line is that even after the tremendous time, cost, and effort put into implementing packaged software applications, the velocity of information throughout the enterprise is way too slow, and expensive business process inefficiencies still remain. Getting critical business information or consummating a business process often requires significant human information.

### **Discontinuous Innovation**

The horizontal and monolithic nature of operational systems and their tendency to set like cement after lengthy and costly initial configurations has made continuous innovation difficult. Furthermore, as a company's competitors quickly acquired the same technology, competitive advantage created by ERP, SCM, or CRM systems quickly eroded. The software infrastructure could not change rapidly enough to keep up with changing market requirements.

### **Band-Aid Fixes**

The initial attempts to fill in the information and business process white spaces have suffered from many of the pitfalls the packaged applications themselves faced. Again, the principal problem has been a tendency to optimize locally rather than globally. Historically, companies have looked to business intelligence and data warehousing solutions to address information gaps by accessing data in disparate systems and generating reports based on that data for analysis. The first generation of BI solutions has helped companies unlock siloed information and has made an incremental improvement in information flow. Unfortunately, the tactical

approach that most companies have taken still has too much latency, and the scope of the information flow is still limited for several reasons.

The first generations of BI solutions were departmental and attempted to eliminate very specific information gaps relating to a functional area or line of business, which has created a fragmented BI landscape across most companies. Without a unified BI environment, it's difficult for companies to roll out large-scale applications that take critical information buried in operational systems and deliver it in real time to anyone who needs it, regardless of where they are. This situation has also made it difficult to keep pace with rapidly changing business requirements.

First-generation BI solutions have also relied exclusively on enterprise data warehouse implementations. DW implementations, like ERP implementations, have been costly and have suffered delayed solution paybacks as well. The data warehouse plays an important role in enabling BI and reporting applications, by protecting operational systems when necessary and creating a comprehensive and accurate view of information locked in packaged applications. However, BI and reporting solutions that are based solely on the data warehouse contain too much information latency to satisfy rapidly emerging requirements for real-time information.

Organizations have taken similar approaches to filling in the business-process white spaces across the enterprise. Like BI, first-generation enterprise application integration efforts were quick fixes that addressed a business-processes inefficiency that pertained to a couple of different systems. This approach was limited for several reasons.

Companies “hard wired” these systems together with custom-coded integrations that were generally expensive, fraught with risk, and impossible to maintain once completed. There was an incremental improvement but once the initial solution was complete, there wasn't much opportunity to innovate further since the code was rarely reusable for subsequent projects. As a result, most enterprise architectures evolved from a series of siloed packaged applications to an even more complicated tangle of “spaghetti-code solutions” that initially decreased the size of the white spaces, but failed to eliminate them. These solutions simply lacked the flexibility to orchestrate a process that spanned multiple systems and people to complete a business transaction and could not evolve to support continually optimized processes based on changing conditions.

The failure to deploy global solutions was largely due to technical constraints. Companies turned to these incomplete solutions because they were the best option available until Internet connectivity and interoperability standards emerged in the mid-nineties. However, Internet technologies, which enabled the wide dissemination of information and transparent systems interoperability, didn't mature to support large rollouts until the end of the 1990s. In most cases, technology vendors hadn't evolved their products enough for companies to take advantage of these standards or, by the time mature, Internet-based products were widely available, the economy had turned south, and companies had cancelled most projects.

Yet it remains imperative for companies to seize the opportunity that now exists to transform their packaged applications for competitive advantage without succumbing to previous pitfalls. According to Gartner's Roy Schulte: "Enterprises that thrive in the future will be those that can rapidly assimilate packaged applications and re-use their existing applications in new ways. They know that I/S does not have the time or money to develop new application systems from scratch. They understand that systems built to change are ultimately more valuable than systems that are built to last."<sup>1</sup>

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<sup>1</sup> *Business Integration Journal*, "20 Questions for Gartner Group's Roy Schulte," Rich Seeley.

## Real-Time Renaissance

The real-time enterprise harnesses these new standards to permanently fill in the information blind spots and completely automate the broken processes that plague global 2000 enterprises today.

According to Gartner, “The ‘real-time enterprise’ describes this decade’s evolutionary trajectory of the traditional global organization – that is, an enterprise that must continually adapt to a totally unpredictable and rapidly changing business environment.”<sup>2</sup>

The real-time enterprise preserves business agility while reducing business cycle times. Companies gain better insight into enterprise operational and financial performance through immediate alerts based on events. Managers no longer have to manage by looking through the rearview mirror at old data, but can spot problems early and take immediate action. And companies don’t have to keep customers and partners waiting while data entry clerks rekey data from one system. Nor do companies have to wait months and years to evolve existing systems to gain competitive advantage. This is the basis of the real-time enterprise, which calls for marrying a company’s business strategy with a computing architecture that can be easily changed to meet new demands.

The RTE has emerged just in time to make IT strategic again. And while the cynics may scoff, several important, inexorable business trends make standing pat impossible.

### **Compliance Issues and Accountability to Shareholders, Customers, and Partners**

The recent spate of accounting scandals that has come to light has placed an emphasis on faster and more accurate reporting of business results. The Sarbanes-Oxley Act raises the bar for reporting accuracy and disclosing material problems. Companies can no longer afford lengthy accounting cycles full of error-prone consolidation of information into Excel. They must have a fluid environment that provides an up-to-the minute view of financial health, which includes event-based alerts that identify conditions that adversely affect the business materially.

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<sup>2</sup> Gartner, “The Modular Organization Emerges” (COM-21-4433), November 21, 2003.

The climate of accountability extends to a wide range of industry standards as well. Just about every industry has a major standardization movement that is either legally mandated or has been voluntarily adopted as an accepted business protocol. Prominent regulatory statutes and standards include the Sarbanes-Oxley Act, which sets financial reporting requirements for publicly held companies in the U.S.; the Health Insurance Portability and Accountability Act, which creates standards for healthcare transactions; the BASEL II Accord, which calls for the implementation of a credit-risk measurement framework by banks and financial services companies in 110 participating countries worldwide; a series of international anti-money laundering laws including the USA Patriot Act, which have changed the way banks and financial institutions must operate; and a number of mandates for securities firms to settle trades by the end of the next business day. Compliance with these standards often poses major technical challenges for firms. Companies that are nimble enough to comply with new business laws or industry-standard practices often realize an early-mover advantage through newfound efficiencies. In addition, standards are constantly changing, and compliance windows are shortening. Without a real-time infrastructure, future compliance hurdles could prove insurmountable for many companies.

Gartner has noted the particular importance business intelligence technology will play in enabling compliance: “BI tools and technology and data warehouses are powerful analytical tools that give business users greater insight into business processes and improve their decision making. Their effectiveness at gathering data has received additional attention as enterprises seek to collect the information required to comply with government reporting standards and regulations.”<sup>3</sup>

### **Value-Chain Collaboration and Straight-Through Processing**

The culture of accountability extends to building relationships and conducting transactions with customers and partners. This generally means providing them with real-time information related to their accounts, the status of an order and alerts to order status changes, availability of items, etc. Customers demand immediate answers. It’s no longer good enough for a customer rep to take a message. Value-chain efficiency also requires streamlining many of the actual back-end processes required to complete a business process. This means that these processes can’t rely

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<sup>3</sup> Gartner, “Predicts 2004: Business Intelligence and Data Warehousing” (AV-21-6910) December 5, 2003.

on latent data, and they must be able to execute in time to meet customer time expectations. Customers won't wait days and weeks for a transaction to run, and they expect it to be completed flawlessly, or they will go elsewhere. It's impossible to meet these requirements if every process requires a person to intervene.

## **Mergers and Acquisitions**

Mergers and acquisitions activity will always be an important part of the business landscape. Companies that create an agile infrastructure will reduce the time, cost, and risk of assimilating acquired companies. The real-time enterprise makes it easy to gain complete visibility into a new company by easily incorporating new data sources into reports. By raising the level of abstraction, new business applications can be developed and assembled quickly that isolate the target company's systems from change while seamlessly integrating the new company's systems with established processes.

## **What Is Real Time?**

So what exactly is meant by real time? In many cases, it's fine to have a report run daily against a database that is updated once each day. Yet, many times this is insufficient. Some define real-time as "analysis and reporting based on data entered into an operational system or database for reporting and analysis within an hour (*Computerworld*)." Yet to others, real time means any information entered in the previous hour, and to others it's information entered in the previous day (*Computerworld*). But there are instances where this isn't good enough. For example, a CRM system needs to immediately update call center requests, so a sales rep making a customer call knows if there is a problem before making the call. In cases like these, real time means instantaneous.

The reality is that different applications, and even different usage requirements for the same application, necessitate different degrees of information latency. As cycles continue to shorten, more business intelligence and transactional systems will rely on a hybrid of operational and warehoused data depending on the user need. An appropriate definition of real time is the ability to meet necessary latency requirements for an application or a user.

## **Real-Time Initiative Defined**

There are several key solution areas that build the real-time enterprise. And these are not bleeding-edge projects that depend on risky early adoption of technology. Nor do they rely on the deployment of a monolithic technology platform that carries a huge up-front cost. Established, practical enterprise business intelligence suites and enterprise application solutions form the cornerstone of the real-time enterprise. Companies can embrace real-time solutions in digestible bites and build incrementally, realizing value each step of the way.

RTE solutions fall into the following categories:

- Enterprise business intelligence and performance management
- Service-oriented integration and B2B collaboration
- Event-driven integration and business activity monitoring

## Enterprise Business Intelligence and Performance Management

Enterprise business intelligence is the solution for unlocking information buried in operational systems and accelerating the flow of information across the extended enterprise. While most executives are generally familiar with business intelligence and reporting as a means of gaining better insight and making better decisions, few have taken the necessary steps to realize the full potential of BI. In order to be a key enabler of the real-time enterprise, a BI solution must become ubiquitous. In order to do this, it must provide comprehensive data access, incorporate both staged and live operational data when required, deliver appropriate levels of information to anyone in the enterprise regardless of level or role, allow users to manipulate data in reports to reach further conclusions, and scale to accommodate increasing numbers of users.

Enterprise business intelligence is also the key enabler for corporate performance management. CPM allows companies to proactively monitor and eliminate impediments to performance before they impact financial results. Corporate performance management (CPM) is a real-time initiative that aligns everyone in the organization in support of a business strategy by proactively monitoring and measuring business performance and alerting key personnel at all levels when problems occur in time to take corrective action.

Successful CPM initiatives require a flexible and reliable reporting environment that unifies everyone from the CEO to a mailroom clerk to quickly resolve performance problems. CPM applications create shared accountability throughout an organization by different levels of reports pertaining to a particular performance area with varying levels of detail. For example, a senior executive may receive an update on days of inventory as part of a dashboard of high-level key performance indicators he views daily; simultaneously, the inventory manager receives a report showing the exact status of each piece of inventory with the ability to drill down to determine what might have caused a sudden change in inventory (e.g. a large number of returns or cancelled orders). The manager can investigate and take corrective action to rectify the problem. However, what if the senior executive is particularly concerned and wants to check throughout the day to see if there is a change. She has the option of getting a just-in-time update by performing the query in real time directly from the dashboard.

CPM exemplifies the power of BI in transforming an enterprise into a sense-and-respond environment based on improved information flow. Using BI to effectively measure overall business performance – as well as performance of specific functional areas or lines of business – will play an important role in creating a culture of measurement and accountability.

However, most BI implementations are plagued by barriers that limit the strategic value of BI as a building block of the real-time enterprise. Most companies have experienced the following pitfalls:

- There's no enterprise standard for business intelligence. With multiple departments running disparate tools on a local level, it's impossible to get answers to bigger questions or empower real-time decision-making by everyone in a company and its extended enterprise. Not only do these redundant tools cost companies money, but the answers to important operational questions are confined to a functional area or line of business.
- Almost all of these tools are based on client/server architectures rather than the Web. This complicates the delivery of information, by requiring a client installation for someone to receive reports or perform further analysis, which limits the usability of the product to a small minority – addressing the information needs of the few at the expense of the many. Even if the information is both timely and accurate, it has limited value if it has a limited user base. The real-time enterprise by definition is inclusive, and the inability to deliver intuitive reports via a browser makes sharing information beyond the company's four walls a virtual impossibility. To support information delivery on a broad scale, companies must standardize on an Internet-based product that allows users to access reports directly from their browsers.
- Data access and the exclusive reliance on a data warehouse. Data access and the ability to support scheduled and ad hoc reports from both transactional and reporting databases has serious implications for data architecture and management. Data access is fairly straightforward but its importance can't be overlooked. Without complete access, the information consumers (both end users and applications) will get an erroneous picture. For years, conventional business intelligence and data warehousing wisdom held that business intelligence applications should access information exclusively from a data warehouse to avoid putting a drain on operational systems. This, combined with the fact that most BI tools were optimized to report off a data warehouse and couldn't report directly off of operational systems, has meant that companies have undertaken massive data warehousing projects at a huge price and considerable risk, in order to have a suitable data infrastructure for business intelligence and reporting. Even with ETL tools to automate the movement of the data to the appropriate warehouse, operational data store, or data mart, project cycles and solution paybacks have proven lengthy.

The problem with this, in addition to its huge cost, is the amount of latency it creates. There are times when real time does mean instantaneous, especially when someone is trying to pinpoint a problem. Even if the data warehouse an application reports against gets updated on the hour, it's not good enough. As business cycles continue to shorten, and more businesses adopt real-time models, these situations will become more frequent. Without the ability to access live data, it's impossible to know whether or not you have the right answer. This could be the difference between making earnings estimates or receiving a warning.

Finally, scalability is a huge barrier. Again, BI products with client/server architectures can't grow to accommodate thousands and hundreds of thousands of users. As companies embrace the real-time enterprise, they will roll out applications that will deliver information to an ever-growing volume of users. If the BI application can't handle this, or requires prohibitive hardware spending, it's safe to assume that it's not the right tool for the RTE.

Standardizing on the right BI solution is a critical decision companies will make as they build the real-time enterprise. The following criteria should guide any evaluation of BI tools at any company with designs on the RTE:

- Create a BI competency center to guide the standardization process and evangelize the role BI plays in building the RTE. This will lead to the elimination of disparate tools and ensure the free flow of corporate information.
- Choose an integrated business intelligence suite that can address the needs of all of the users in the enterprise – not just business analysts. Make sure that it includes a range of reporting options, including ad hoc query, which solves 90 percent of user requirements for additional analysis.
- Choose a BI suite that can access any live data source on any platform. The BI suite must also integrate the data management features needed to build a data architecture that accommodates staged data and live operational data. The BI suite should allow data architects to build a hybrid data architecture by monitoring usage patterns. This balances the need for real-time information with the demands for instantaneous information. It also helps build a data warehouse practically, saving considerable time and money, over cookbook approaches. Look for a BI suite that includes reports with drill-through capability to allow certain users to view reports based on information in a live system.

- Not many BI vendors lead with architecture, but it's crucial to the success of a BI installation. While most enterprise BI rollouts will begin with a departmental solution to demonstrate value in a short period of time, it is important to ensure that the selected BI solution can support the enterprise from a technical standpoint, or the value proposition will be limited. Look for a native, Internet-based architecture. A product that isn't built on the very standards that make the RTE feasible probably won't fit the bill. And a BI suite built for the Internet will more readily meet the BI enterprise performance and scalability requirements without forcing you to buy lots of additional hardware.

## Service-Oriented Integration and B2B Collaboration

The next generation of integration solutions has emerged to eliminate the business process white spaces that constrain profitability and agility. Unlike the point-to-point solutions that marked the early era of integration, service-oriented integration maintains the flexibility required for continuous growth. This is why service-oriented architectures are so attractive. They employ open standards that allow development teams to rapidly assemble new applications by calling existing applications as “services,” maximizing the value of existing systems, raising the level of abstraction to the business process level, shortening deployment times, and reducing risk by limiting the amount of code required to build new applications. The service-oriented architecture’s flexible design means that its growth path is essentially unlimited. The bottom line is that service-oriented architectures allow companies to get projects into production quickly and without investing millions of dollars up-front or giving up the flexibility that they need to keep their businesses agile and profitable.

Gartner summarizes the critical technical advantage of service-oriented integration: “Enterprises are under pressure to reduce the cost of applications and to shorten the time it takes to develop or modify applications. This drives increased interest in reusing data and code through service-oriented architecture and Web services.”<sup>4</sup>

The maturation of Internet standards, including J2EE, JCA, XML, .NET, SOAP, and WSDL, makes the deployment of service-oriented applications that connect people and machines to automate business transactions possible. Furthermore, it’s these standards that make the entire concept of a service possible and make these applications resilient to change.

Two major types of applications comprise service-oriented integration – composite applications and multi-step processing.

Composite applications provide new functionality while incorporating transactions from existing packaged applications or legacy systems. They are often built to deliver a single new user interface that eliminates the need for users to interact with multiple systems separately, but they may also perform application bridging to let several applications share related business logic with each other. Composite applications function by creating new business logic on the middle tier that calls existing systems to perform a specific function that spans multiple functional

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<sup>4</sup> Gartner, “Client Issues for Application Integration,” (K-21-3290), November 6, 2003.

areas. Unlike point-to-point integrations, they are loosely coupled and isolate the service-enabled system from change. This makes them easy to evolve over time.

Multi-step processing, more commonly called straight-through processing (STP), manages a larger-scale integrated business process that uses many physically independent applications. Unlike composite applications that focus more on user interfaces or application bridging, STP emphasizes the interaction of highly complex processes.

An organization can build the RTE incrementally by deploying a series of existing composite business applications and then using an integration broker to build straight-through processes by orchestrating the composite applications. This exemplifies the “system of systems” that is one of the hallmarks of the real-time enterprise. By delivering a series of composite applications that provide process improvements and value and then reusing them for STP applications that close off the white spaces completely, companies can enjoy near-term results that can be used to fund higher-value straight-through processes. This also tends to mitigate the risk of building an STP application from the ground up.

Service-oriented applications can be easily extended to customers and partners by using an existing EDI connection or by making the application available as a Web service. While the Web services model is gaining momentum, the first scenario, best described as an edge-integration strategy, has the benefit of reusing existing EDI connections where they exist, while leveraging the security advantages of EDI and Internet EDI.

Here’s how the edge-integration scenario invokes service-oriented techniques to enable real-time inter-enterprise collaboration with no manual intervention: An incoming XML or EDI document arrives via a VAN or Internet EDI connection. It is then converted into the company’s canonical XML format at the edge of the enterprise for use as part of a business process that gets routed to multiple systems in a service-oriented architecture. This XML document is analogous to the manila folder that preceded electronic information sharing, which contained information defining the transaction and all of the information surrounding the transaction (e.g., approvals, contracts, etc.). The XML business document is continuously changed as it gathers the information from different enterprise systems needed to complete the transaction with the partner. When the process is complete, the document is converted into outbound XML or EDI and returned to the partner, letting them know if the transaction

is complete (or can't be completed for whatever reason) or that the next step in the transaction can begin.

This edge-integration scenario is an excellent way to maximize existing technology assets by allowing information to be shared with any XML-enabled application in the enterprise without worrying about breaking the other end of the pipe. Companies also can preserve existing traditional EDI connections over a Value Added Network that makes sense while expanding their universe of buyers, suppliers, and partners via Internet AS/2, or native XML using AS/2, SOAP, ebXML, or other transport mechanisms. Perhaps the biggest benefit comes within the enterprise, where the time and cost of processing the transaction has been completely automated using a service-oriented architecture.

In the Web services scenario, a company can make any system available as a service in a secure directory for consumption by a partner or customer. A partner's application will then discover the service and use it to trigger a process that consummates a transaction. The entire process, from publication to discovery to execution, runs in real time.

In order to successfully implement service-oriented-integration techniques and not fall prey to some of the same problems that constrained first-generation solutions, companies must meet a number of challenges.

The biggest challenge is enterprise connectivity. Service enabling existing operational systems by hand to support composite and STP applications will undoubtedly result in high cost and high failure rates. Custom service enabling of existing applications has several drawbacks. The first drawback is that the work will only pertain to a single transaction. While this represents a major improvement over point-to-point integration, since the service can be reused by many different applications, it still necessitates writing new code each time there are new requirements from an existing system. This is a costly and risky way to achieve service-oriented integration.

The second drawback is that custom integrations are extremely hard to maintain. This approach also requires maintaining a competency for each of the back-end systems that need to be tapped. A much more effective alternative calls for deploying an adapter framework that creates a single user interface for accessing any operational system. The major benefit of this approach is that it creates a single connection to each underlying system that can be reused over and over

again for any initiative. This eliminates the need to create a custom connection for each transaction. Once a system is turned on it stays on.

Another key challenge revolves around heterogeneous platform environments. Many organizations will have both .NET and J2EE-based platforms. While Web services theoretically offer a recipe for integration, there are still proprietary elements inherent in the different platforms that make interoperability challenging. By adopting an adapter layer on the middle tier, companies get true any-to-any connectivity. For example, a J2EE developer can access a .NET object, a Web service created in .NET, or a packaged application using the same tooling. And this tooling is equally accessible from any platform's development environment.

A third challenge to service-oriented integration isn't technical but cultural. Many companies have delayed service-oriented projects while waiting to make a major integration platform decision. In doing so, these companies are foregoing the real-time business process improvements of composite applications in the near term. Real-time integration does not have to be a big bang. In fact, moving directly to straight-through processing without building any foundation will result in projects of extremely wide scope and complexity. Companies should get their feet wet with more tactical solutions, provided that these applications are fully reusable by whatever integration platform ultimately chosen.

The following are recommendations for accelerating real-time projects via service-oriented integration:

- Avoid hand-coded integrations at all cost. Create a universal adapter and transformation layer that can service enable all operational systems using a single interface. This eliminates risk, shortens project time, and ensures reusability.
- Make sure that integrations created by your adaptation and transformation can plug into any leading integration platform IDE, and that it facilitates interoperability across platforms.
- Make sure that the vendor that provides the adapter layer can support all of the projects that you are planning, both inside the enterprise and beyond.
- Fill in the white spaces gradually. Don't think that you will dramatically reshape your enterprise in one stroke of a brush. Build incrementally instead. Deliver a series of composite applications, and then reuse them for STP applications. This will greatly decrease the cost of building the RTE by creating near-term ROI that can fund successive applications.

## Event-Driven Integration and Business Activity Monitoring

Event-driven integration is a special type of real-time initiative that spans multiple systems across the enterprise. Event-driven integration calls for creating applications that “listen” for business events, process them, and execute processes to resolve problems or recommend process improvements based on those events. Like service-oriented applications, event-driven applications are loosely coupled, modular, and fully encapsulated, which means that they don’t have to have an established relationship with any system they communicate with and can be changed without impacting any system in the enterprise or beyond. However, event-driven processes don’t rely on a request-and-response relationship between applications, but rather a listen-and-push metaphor. While most service-oriented applications occasionally “poll” for new requests, run a process, and then issue a response, event-based applications are always on, intelligently absorbing events, processing them, and immediately sending real-time messages to systems and people when a particular set of conditions are met. It’s this proactive “pushing” of real-time information and messages that distinguishes event-driven integration. Event-driven integration is the ultimate realization of the “sense-and-respond” business environment that defines the real-time enterprise.

Business activity monitoring (BAM) is an advanced instance of event-driven integration that is enjoying increased adoption. First described by Gartner in 2001, business activity monitoring is bringing business one step closer to the goal of the real-time enterprise. BAM deploys operational business intelligence and application integration technologies to continually refine automated processes based on feedback that comes directly from knowledge of operational events. In addition to auditing business processes (and business process management systems) and sending event-driven alerts that trigger process adjustments, BAM solutions also can be used to alert individuals to changes in the business that may require action. And BAM data points can provide aggregated insight to executives who are planning strategically.

Companies and government agencies alike are already implementing BAM solutions and continue to refine those solutions as they approach the joint goals of zero-information latency and self-correcting processes. Businesses can use BAM solutions in a continuous, iterative effort to fine-tune operations ranging from claims processing to inventory replenishment. Government agencies can use it to identify and thwart money-laundering schemes and bioterrorist attacks. BAM solutions also can help organizations track and forecast everything from package deliveries to crime patterns for most efficient resource allocation.

BAM improves an enterprise's effectiveness by identifying business process white spaces, or exceptions that could have catastrophic impact, and providing necessary information to the right people at the right time. This requires pushing different information about the problem to different people so they can intervene to minimize the impact of the event and change the process to prevent similar situations from recurring.

For example, the presence of an event indicating an inventory problem, which might cause an order to be delayed, would prompt an alert that would contain relevant detail for the inventory manager about new demand and supplier availability so the manager can take action to obtain the necessary inventory to increase production. The appropriate sales and call center personnel might also be alerted with information about the affected orders so they can reset customer expectations appropriately. Perhaps most importantly, the business process data that the BAM process has collected is then fed to a development manager, so the underlying application that supports the business process can be changed based on new knowledge about the process.

According to Gartner, BAM has three main components: event absorption; event processing and filtering; and event, action, delivery, and display.

Event absorption refers to the collection of events from multiple applications as they occur. ETL tools help provide access and transformation of these events into a usable data model, where they can be analyzed with historical contextual data from a data warehouse.

Event processing and filtering occurs when real-time events are analyzed in context and rules are applied to determine if there is an irregularity that needs to be reported. The application of these rules often involves a multi-step process that generates its own data.

Event, action, delivery, and display describes how the system handles alerting various key decision-makers when there is a problem. This entails generating reports based on the information generated in the BAM process.

BAM applications obviously need to access the different operational systems they are monitoring in real time. Without business application adapters, BAM simply cannot exist. At first glance, BAM seems like it solely requires real-time data feeds from operational systems, but it, too, carries multiple latency requirements. While the window of time for a BAM process to run

is quickly shrinking, it is not instantaneous. As more and more BAM solutions are deployed, however, the complete process will likely be narrowed down to minutes. While the event information is taken directly from operational systems, the contextual data used to help rationalize event information could easily come from a data warehouse that is refreshed daily.

Since BAM combines both enterprise business intelligence and enterprise integration solutions, all of the same barriers that apply to the successful implementation of those technologies also apply to BAM.

Companies seeking BAM solutions should pay attention to the following:

- Creating a flexible data architecture to support the complex latency requirements of BAM applications
- A comprehensive adapter framework that can adapt and transform events from any operational system for processing
- Developing a competency in handling events and event-driven integration
- Partnering with a vendor that has extensive knowledge of both business intelligence and integration products, since they are the building blocks of BAM. The key here is finding a vendor that can provide a low-cost, distributed solution for event absorption, processing, and filtering, coupled with a scalable enterprise BI solution that can deliver information in any format to anyone inside the enterprise and beyond

## About Information Builders

For more than 28 years, Information Builders has been providing award-winning technology and superior service to leading organizations around the globe. That's why more than 12,000 customers worldwide – including most of the Fortune 100 and most U.S. federal government agencies – rely on us to turn their enterprise data into actionable information that drives business results.

As the only vendor that provides both enterprise business intelligence and enterprise application integration as its two core competencies, Information Builders is uniquely positioned to help companies rapidly build and deploy real-time enterprise initiatives. Our WebFOCUS enterprise business intelligence suite and our iWay integration solutions are designed to work together to provide a foundation for the real-time enterprise. Our comprehensive solution includes over 250 adapters that provide fast, efficient, and reusable access to critical information assets; extract, transform and load (ETL) tools for building and managing data marts and warehouses; enterprise business intelligence and reporting software; and integration solutions to dynamically link transaction systems using service-oriented techniques to automate, audit, and refine crucial business processes. The depth and breadth of our technology, combined with our track record, makes it easy for organizations to build their mission-critical real-time applications at the lowest total cost of ownership.

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**Information  
Builders**

**Corporate Headquarters** Two Penn Plaza, New York, NY 10121-2898 (212) 736-4433 Fax (212) 967-6406

www.informationbuilders.com askinfo@ibi.com

**Canadian Headquarters** 150 York St., Suite 1000, Toronto, ON M5H 3S5 (416) 364-2760 Fax (416) 364-6552

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**For International Inquiries** +1(212) 736-4433



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