Next Generation Business Process Integration:

- Leverage Current IT Assets, Web Services and Application Servers with Service-Based Integration
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SUMMARY

Integration is more than one or more discrete projects—it is an ongoing business competency. To keep pace with both business- and IT-driven changes in integration requirements, IT organizations need the greatest flexibility and functionality when integrating the variety of discrete data, application functions, partner interactions and human workflow steps that make up the larger business processes that drive the business. With the trend toward using standards like Web Services and J2EE to ease basic connectivity and improve interoperability, enterprises are now finding that the most challenging and critical aspects of integration are at the business process level, such as gaining visibility to end-to-end processes, orchestrating process flows based on differing partner and transaction semantics and optimizing for better performance.

Business Process Integration (BPI) uses visual, business process-driven models to provide greater real-time operational visibility and control of strategic business processes that are currently fragmented across multiple systems, manual processes and trading partner interactions. BPI is the holistic approach that combines traditional Enterprise Application Integration (EAI) with higher value Business Process Management (BPM), Business Vocabulary Management, and Business Analysis and Monitoring, and provides a purpose-built infrastructure for agile ‘business’ integration. Adopting a comprehensive BPI solution that leverages underlying connectivity and messaging, and provides a foundation for agile, service-based integration, is the best approach to improve the business impact of integration while reducing technical risks and costs.

This paper sorts through the confusion about existing integration tools and technologies to explain the value of BPI. It includes specific details on how the latest BPI solutions build on the value of early generation products and describes how technologies such as Web Services and J2EE application servers can be leveraged into high value, service-based integration with BPI.

THE AGILE ENTERPRISE RELIES ON AGILE INTEGRATION

Integration is a top priority for many companies today. Many of today’s leading enterprises are using BPI technology to create a business infrastructure that delivers information where it is needed and when it is needed by integrating the previously fragmented components of strategic business processes. Becoming an agile enterprise requires agile integration.

Ultimately, enterprises should view integration as a strategic endeavor that will be an ongoing activity for the business. Choosing the solution that provides the greatest leverage of existing assets, including mainframes and client-server systems, as well as new service-based technology platforms, such as application servers and Web services, along with the most re-use from one integration project to the next, enables the most agility for the IT infrastructure. Through full leverage and quick re-purposing of existing assets with BPI, IT can transform formerly fragile and inflexible computing assets into reusable business services orchestrated by the BPI solution.

Business and Integration
Enterprises have been automating their important but discrete functional processes during the past decade using packaged or custom applications. As a result, they have enjoyed major improvements in operational efficiency from automated processes, substantial savings in operational costs and improved ability to service customers. These benefits have come from automating discrete business processes. Now these leaders are integrating a wide range of discrete business processes across boundaries of all types—from simple inquiries about a customer’s order involving two applications, to complex, long-lived transactions for processing an insurance claim involving many applications and human interactions, to parallel business events for advanced planning, production and shipping of goods along the supply chain involving many applications, human interactions and business to business interactions. When integrating on such a scale, enterprises need a greater breadth of
functionality to overcome the multiple challenges. Integration has to overcome the challenge of disparate standards and approaches at the technical, data, semantic information, analysis, process, and visualization levels. Many solutions are available today to integrate data from heterogeneous applications, as well as simple, short business processes. But, as customers move up to tackle integration of cross-enterprise end-to-end strategic business processes with a view to gaining real-time visibility and the agility to change and improve these processes, there are many promises, but only a few real solutions available.

**IT and Integration**

IT departments continue to custom code integration projects, but this approach leads to increased complexity and lack of flexibility when business requirements change. Over the past 5 years, these departments have adopted a number of off-the-shelf integration products and technologies to enable success and offset the risks of custom coding each integration project. Enterprise messaging products and foundational integration tools, such as gateways, application adapters and data transformation products are now used in many companies. IT is finding greater integration success with these ‘plumbing’ types of tools that enable platform interoperability and sharing of data among many applications.

But as business processes have become more real-time, and business leaders demand end-to-end automation and visibility into strategic processes, IT is adopting new tools and technologies to better deliver on these demands. EAI tools, Business-to-Business Integration and BPM tools have become more prevalent in integration projects as have application servers and Web Services tools. But even with the availability of more types of tools and technologies, many enterprises are still searching for answers to questions such as:

- How can we build on the value our enterprise messaging infrastructure is already providing?
- Are Web Services the solution to our integration problems?
- Do application servers with integration enhancements have sufficient functionality to integrate heterogeneous environments?
- How do we integrate our different integration solutions?
How can we componentize and reuse existing systems and processes to achieve end-to-end BPI?

How can we achieve the “single view” of business that delivers the highest business value?

The next sections of this paper will address these key questions and explain the kind of solution that best answers integration problems of all types and sizes. Among the many types of technology platforms companies use to solve integration problems, BPI stands out as the best solution with the functionality, flexibility and maturity to not only help companies integrate simple business processes, but evolve toward integrating highly complex, end-to-end strategic business processes.

CHARACTERISTICS OF HIGH VALUE BPI

BPI is a holistic approach to the integration of existing and new IT assets, people, partners and processes. BPI platforms include functionality to address integration at all its required levels, including:

- **Connectivity and Transport**: Messaging infrastructure, connectors for applications and support for reliable business-to-business connectivity across firewalls, using the Internet and private networks.

- **Business Vocabulary Management**: A unified means of maintaining and extending a vocabulary of data semantics among various application formats and business dialects such as SAP-BAPI, Siebel, COBOL, EDI, SWIFT, HIPAA or Rosetta NET. This enables fast transformation of data into the form the target system requires within a more manageable framework. This also includes semantic data validation capabilities.

- **Business Process Management**: A combination of automated process logic, human workflow and robust exception management that weaves systems, partners and people together into an integrated process to ensure successful completion of each business transaction. [For a deeper discussion of BPM please read “Ten Pillars of World Class Business Process Management” by Hurwitz Group and Vitria®.]

- **Business Analysis and Monitoring**: Real-time visibility into running business processes to trigger alerts, perform analysis, drill down to root causes and optimize performance, therefore completing the feedback loop for BPI.

KEY FEATURES:

- Solution-Level Modeling
- Solution Lifecycle Management
- Component-based Integration
- Transport Independence
- No Technology Lock-In

KEY BENEFITS:

- Solution Integrity
- Ease of Use and Change
- Agile Integration
- Reuse—Not Rebuild
- Total Cost of Ownership
- Leverage Current IT Infrastructure
These four levels require a technology investment, and the sum total of this technology is the underpinning for a total BPI solution. Additionally, expectations for the next generation of BPI solutions provide for more advanced infrastructure functionality that truly enhances the agility and business value of integration:

- **Solution-level Modeling**: Each step in a given end-to-end business process along with its requisite system, human and B2B interactions is represented visually and logically as a component in that process. Users can drill down, through a single environment, into each component and model its functionality to include sub-processes, workflow, analytics, transformation and connectivity. This provides a more powerful and easy-to-use “top level” modeling paradigm and preserves solution integrity.

- **Integration Solution Lifecycle Management**: A unified means of designing an integration solution, testing the whole solution to ensure its integrity, deploying the complete process and all of its components at one time, web-based administration, and optimizing the process to enable change based upon new process analysis data. Management of the integration infrastructure is essential to enable rapid change to the integration solution to promote business agility and lower total cost of ownership.

- **Component-Based Integration**: Promotes more efficient sharing and re-use by encapsulating integration functionality into components. A component could encapsulate a process, sub-process, analytics, transformation or connection to a system or partner. Each component has a description of its capabilities and a description of its relationship to other components in a common process. Components abstract the underlying messaging layer and can be flexibly invoked through various messaging protocols such as asynchronous messaging, synchronous and transactional calls from an application server or Web Services. In contrast to more time-consuming and repetitive hard coding of similar integration tasks, these components are easily linked together as services and operate as the reusable building blocks of integration within a service-oriented architecture.
Transport Independence: Capability to natively work with existing and proven legacy messaging infrastructure products such as IBM’s MQ, as well as work with newer, standards-based implementations of the Java Message Service and Web Services. The higher level BPI functionality can be layered on top of existing messaging infrastructure without the need to work through the proprietary messaging layer that comes with the BPI solution. This reduces the cost and complexity of managing multiple messaging infrastructures.

Freedom of Technology Choice: Computing solutions require different transaction models, and customers should have the breadth of choice to fit a specific situation. BPI must support synchronous connections that are typically used in application server transaction models, asynchronous connections in message-oriented models and batch processes for legacy applications. Native event-based and service-based architecture provides the flexibility to bridge these gaps. Neutrality also means working with any type of existing messaging infrastructures as well as orchestrating interactions between multiple application servers and client-server and mainframe resources. This protects customers from being locked into a specific technology or vendor implementation, thus preserving the value of best of breed technology products.

Scalable Federated Architecture and Load-Balancing: Enterprise class reliability, availability and scalability made available through distributed integration servers that have a single logical union, support for queue-based load-balancing and guaranteed once-only messaging.

A BPI solution that includes these core and advanced features allows enterprises to have the complete means to bridge application architectures of all kinds, including legacy, client-server, web applications, message-based applications and service-oriented applications. The solution will provide the greatest flexibility to use a transaction model of choice and natively interoperate with J2EE, .NET and Web Services.

This encompassing functionality is precisely what enables BPI to be the focal point for orchestrating interactions across the computing infrastructure. Its function is to unify the data, transport, applications, people and technologies so that business processes run as smoothly and efficiently as possible. In the next section we will see how other technologies, while they were not intentionally built to accomplish integration of heterogeneous IT assets and business process, can greatly contribute to, and work with, BPI solutions.
LEVERAGE AND ENHANCE EXISTING AND NEW ASSETS

BPI solutions are designed to leverage current IT assets as well as early generation integration technology. The key is that the latest BPI solutions not only make use of these investments, but they enhance and extend their value. BPI is the single point of orchestration for services and functionality that exist in various applications, foundational integration tools, Web Services and application servers.

**Foundational Integration Tools**

This class of tools is primarily focused on providing connectivity and transport mechanisms so that data and applications can be shared among disparate platforms and technologies. Products such as messaging, application connectors, adapters and gateways, data transformation tools and broker technology are included in this category. They each have an important place in the integration infrastructure, and their respective functions still provide value to companies, but do not address other essential layers of integration functionality needed to deliver expected results and business value. As such, companies can now preserve their investment in these technologies by simply layering BPI infrastructure on top of them. Additionally, with advances in the computing industry, some of these foundational tools are being replaced with newer technology and standards, such as Web Services and Java Connector Architecture.

**Web Services**

Web Services represent a very valuable advance in computing and will both broaden and accelerate the move towards BPI. Through their use of standards and wide adoption by all industries, Web Services lessens the pain when integrating disparate data and heterogeneous computing platforms by providing a standard for interoperability at the ‘plumbing’ layer of integration. Standards-based interfaces, protocols and XML enable data to be shared and business logic to be executed across platforms. As a result, companies will need to spend far less time and money on foundational integration services such as application adapters and B2B interfaces, by relying on standards for connectivity and interoperability. Web Services make foundational integration affordable for small and medium companies and allow enterprises to shift their focus from data integration to managing and optimizing strategic business processes. BPI solutions can leverage Web Services to realize significantly higher return on investment than was previously possible.

On the other hand, BPI can also accelerate the adoption and value of Web Services. Companies are beginning to adopt Web Services and, in doing so, are embracing a paradigm shift toward building a service-oriented architecture. A service-oriented architecture is based on providing the most
flexible means to reuse existing investments in data and application logic throughout the computing environment. It means building new applications with a more modular, component-based approach to improve flexibility and agility in enterprise computing. BPI solutions provide a powerful, point-and-click way to create “composite applications” from any combination of business processes, human workflows, data transformations and connections to applications and partners, which can then be exposed as a service, including a Web Service. For example, several parts of a complete order-to-cash process can be turned into reusable component services, such as price quote, credit check, inventory status, order approval and billing service. This is a powerful trend that is supported by Web Services and high value BPI solutions.

While Web Services are very promising, there are current limitations which restrict widespread adoption, such as security, transaction support, and reliability. Though many efforts are underway to establish improved security frameworks, transaction integrity and reliability mechanisms, more implementation experience is needed to reach full production status. Additionally, Web Services by themselves will never be the panacea to all integration problems as it is sometimes hyped to be. For example, Web Services do not, and were not intended to, address the higher-level business integration issues around semantic transformations, BPM, and Business Analysis and Monitoring. BPI solutions provide these capabilities which can then be exposed as Web Services. Web Services are therefore highly complementary to, and can be orchestrated by the BPI solution to deliver powerful results.

The synergy between Web Services and BPI will be further enhanced by the emerging standards efforts to describe a common language for representing business processes, such as Business Process Modeling Language (BPML) and Business Process Execution Language for Web Services (BPEL4WS). When these efforts converge and mature into a usable standard language for expressing business processes, BPI components can interoperate and execute across platforms that support the standard. Each enterprise will need a robust BPI solution that can leverage the standard to build the unique detail for each enterprise that make their respective business processes competitive, and provides a highly scalable and reliable execution engine to run the processes.

**Application Server Products**

Currently, one of the more prevalent ways to implement Web Services and a service-oriented architecture is by using a synchronous transactional model, often through the deployment of application servers. These toolset are built around the need to provide robust support for synchronous transactions that only require minimal data level integration with existing IT assets. An application server is typically most appropriate for integration of short, synchronous processes, because it was not designed to provide integration, management and visibility into long running business processes.

Even while forming the backbone of many newer applications and providing a coding-based environment to link components together, the application servers’ underlying architecture is not intended to provide a single point of integration for disparate technology. For example, application servers do not provide data transformation between different data structures and semantics, rules-based and syntax validation and intelligent routing of data. Nor do they provide the fundamentals of true BPM, which includes functionality such as: long-lived transaction support, time-based exception handling, real-time monitoring and analysis of running processes, and dynamic management and change of the process.

This gap in functionality between application servers and true BPI solutions leaves IT departments with a burden of custom coding when integrating various components and technologies through an application server environment — a burden that adds time, cost, complexity and risk to the success of the project while also making re-use and change more difficult for future projects. A BPI solution working with the application server is the best approach in this situation.
Some application server products come bundled with foundational integration tools. While this combination offers increased integration functionality, it has the same limitations as other foundational integration tools when it comes to higher value business integration. These products can also come with a technology bias. Because of the unique characteristics of each application server product, implementation and configurations will vary and result in decreased interoperability with heterogeneous components. For example, application and integration server suites from some leading vendors may not support full transactional interoperability with application servers from other vendors. Alternatively, they may be performance tuned to support a certain type of transaction model (synchronous or asynchronous) and not others. As such, enterprises are best served by choosing a BPI solution that is neutral and supports the variety of application server products currently available, including J2EE and .NET.

The Bottom Line with Current Integration Products

Foundational integration tools, Web Services, and application server-based integration are important in that they make it easy and less expensive to achieve data interoperability, connectivity and messaging interaction among applications. As a result, they broaden the market for integration, enabling small and medium enterprises to achieve basic but previously expensive connectivity and interoperability. Collectively, however, they leave the majority of the most critical integration requirements around data semantics, business process flows and cross-system visibility. Now that enterprises can achieve higher levels of cost-effective connectivity, they must turn their attention to solving the next level of integration issues - business process, business semantics, monitoring and analytics, and closed-loop optimization. The expected proliferation of cost-effective standards-based ‘plumbing’ allows BPI solutions to truly shine.

The following table summarizes different uses for Web Services, application servers, foundational integration tools, current BPM tools, and a highly advanced BPI solution, such as Vitria’s BusinessWare® 4.

<table>
<thead>
<tr>
<th>Integration Challenge</th>
<th>Type of Solution</th>
<th>Solution Description</th>
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<tbody>
<tr>
<td>Enabling interoperability among disparate computing platforms</td>
<td>Web Services</td>
<td>Simple and effective for moving data between computing platforms. Security, reliability and process standards are still maturing. No semantics capabilities.</td>
</tr>
<tr>
<td>Building new applications and connecting a few components in a synchronous fashion</td>
<td>Application Servers</td>
<td>Solid environment for building new applications and integrating like components in short, finite processes. Very code-intensive approach.</td>
</tr>
<tr>
<td>Asynchronous, message based communication among applications requiring application adapters</td>
<td>Foundational Integration Tools</td>
<td>Excellent base to solve technical integration problems and create robust application connectivity. Limited or no process and human interaction support.</td>
</tr>
<tr>
<td>Multi-step, business process involving human interaction and crossing organizational boundaries</td>
<td>Current BPM Tools</td>
<td>Improved process and human interaction support but limited by a single transactional model and lack of unified solution-level modeling and solution lifecycle management.</td>
</tr>
<tr>
<td>Multi-step, business process involving human interaction and crossing organizational boundaries requiring flexibility to integrate multiple technologies and change quickly</td>
<td>Next Generation Business Process Integration - Vitria’s BusinessWare 4</td>
<td>Most comprehensive approach for complete business process integration. Leverages all other approaches and adds higher value business process and lifecycle management functionality to provide IT and business agility.</td>
</tr>
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Leverageable Technologies for Integration
BUSINESS PROCESS INTEGRATION DELIVERS AGILITY

When it comes to integrating the most strategic and often most complex processes of a business, enterprises should consider agility. Agility comes from complete visibility into processes to monitor and manage them. It resides on a component approach to integration, which promotes the highest level of reuse, creating a cooperative integration infrastructure in which components can be shared among various integration teams. The result is a true service oriented architecture that enables computing services of all types to be orchestrated into business processes.

In summary, companies seeking true BPI should keep these points in mind:

1. Web Services improve the interoperability of disparate technology, but they do not resolve the semantic or business process issues.

2. Application servers were designed for building new applications with limited integration needs but were not designed for semantic or process integration.

3. While some application servers now bundle foundational integration capabilities, independent integration servers that complement application servers are the best choice for dealing with the variety of integration tasks at hand and for working across a heterogeneous mix of products and technologies.

4. BPI is the single point of orchestration for business processes, whether simple or complex, synchronous, asynchronous or batch, and across technology boundaries. BPI capitalizes on existing IT assets and processes, as well as investments in Web Services, application servers, foundational integration tools, BPM and human workflow tools.

BusinessWare 4 builds value on top of foundational integration capabilities, through comprehensive BPI functionality. BusinessWare 4 is the conduit through which existing processes and IT assets are converted into integration components or services so they can be orchestrated into agile business processes.

CONCLUSION

The nature of the integration challenge is changing. With the increased adoption of foundational integration tools, the increasing use of Web Services, and the shift toward a service-oriented architecture, companies need to turn their attention to implementing robust BPI solutions. BPI enables companies to have a high degree of visibility and control over strategic business processes; it operates as a single point of orchestration for human and computing services that exist across disparate technologies, and it leverages the value of previously implemented integration technology. It also provides the means for enterprises to inject agility into their business processes, making them flexible and able to meet new market requirements. Enterprises can at last deliver on the expected business results of integration through BPI.