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white paper

REAL WORLD PROCESSING WITH EVENTS, SOA & WEB 2.0

REAL WORLD, REAL TIME, REAL BUSINESS RESULTS

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Abstract

Today's exploding numbers of business events, both combining with and driving the exponential growth of information in the business world, are increasing the need for Business Event Processing (BEP). This increased reliance on business events also leverages thethe collaborative, Internet-based technologies of Web 2.0, as well as Service-Oriented Architecture (SOA), providing a flexible approach to obtaining value from events. The combination of these three approaches provides a foundation for flexibility, visibility, composability, integration, and scalability.

The bottom line, however, is the business story. BEP, combined with Web 2.0 and SOA, are bridging the gap between business and IT better than any of these approaches can separately. Today's organizations require real time visibility into their business, as well as the ability to process business events to solve business problems, what we call Real World Processing.

Such solutions will have broader impact on the business itself and can create new competitive models in any industry where forward looking companies implement them. Furthermore, companies who exploit the power of BEP will be better positioned to understand threats and take advantage of opportunities, and will therefore have a competitive advantage within their industry.

I. The Context for Business Event Processing

An exponentially increasing amount of information and activity is bombarding today's businesses more than ever before. As a result, such organizations risk losing value because they cannot see the opportunities or threats that lay ahead of them. They must sift through the immense volume of incoming information in order to separate the important information from the noise, so they can identify what they should act upon, and what they should ignore.

The risks facing firms who do not properly understand and interpret this fire hose of information are enormous, including unaddressed threats such as credit card fraud or value lost through missed opportunities. From fluctuating interest rates to customer transactions to manufacturing processes, business events drive the business while simultaneously causing the creation and movement of information. In many ways, it is the quantity and variety of information on the move, in combination with information at rest, that defines the modern business world.

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In particular, it is the tight interrelationship between *business events*—occurrences in the real world that are relevant to the business, and what we might call *software events*, which are messages that such events generate, that creates both a problem as well as an opportunity for businesses. Such software events can come from many sources, often in very high volumes. Events may contain structured or unstructured information, and may also appear in high-volume streams. The sheer quantity and variety of events promises to swamp any organization unprepared for the onslaught of network traffic that today's business generates. But on the other hand, business events are also the lifeblood of the organization, as everything the business may appear in real time in the event traffic on their network.

The critical focus on business events derives from several forces that are changing the landscape of events, including the following:

➢ Real world data – Today's business world offers a plethora of sensors available with different price points and form factors, resulting in information flooding in from numerous sources, for example, Radio Frequency Identification (RFID) devices.

➢ Web 2.0 – The increasing reach of the Internet and involvement of ever greater segments of the population, along with the emergence of new collaboration models and tools is changing the nature of business communications.

➢ Service-Oriented Architecture (SOA) – Enterprises are organizing their IT infrastructure into Services that they can then orchestrate into new solutions, enabling event processing solutions that can cross business boundaries in ways that weren't possible before.

➢ Open standards – Industry progress with open standards provides a foundation for openness and interoperability in heterogeneous environments which is critical for an event processing solution to have impact across business domain boundaries.

Sometimes the patterns business events exhibit are easy to identify, but more often they are hard to detect and correlate. Events often promise to swamp the business, so that filtering the noise and identifying relevant events becomes a critical capability. If a business is not interpreting events, then routine network

traffic can fully disperse the value of such events. The key to taking advantage of business events is a business understanding the power of such events, and putting the processes in place to capture and process the events.

Fundamentally, organizations must process and leverage business events to provide visibility and insight into the workings of their organization in order to run the business and empower the people within it. Therefore, event processing enables businesses to process and leverage business events to uncover potential threats or opportunities for the organization. Events can thus provide information to decision makers in real time, resulting in the right decisions to continue to move the business forward.

What is Business Event Processing?

Strictly speaking, business events are occurrences in the real world that are relevant to the business, like a stock trade, a phone call, or a package arriving on a loading dock. Fortunately, most such events cause a corresponding occurrence in software, in the form of a message on the network. The key to leveraging such business events, then, is to apply software that processes software events—the messages on the network—in such a way as to gain insight into, and control over the business events that generate them. Such software is known as *Business Event Processing* (BEP).

BEP software helps businesses detect, filter, aggregate, analyze, and respond to complex events to take advantage of emerging threats and opportunities, handle unexpected exceptions, and redirect resources as necessary—essentially, dealing with business events on the business level, independent of the technology context for those events. The goal of BEP is to detect and interpret business situations in the context of business patterns in order to understand trends which can impact the business, resulting in effective business decision making. BEP enables organizations to extract events from multiple sources, detect business situations based on patterns of events, and then derive new events through aggregation of events as well as by adding new information. BEP software helps companies identify patterns and establish connections between events, and then initiates a new event, or a *trigger*, when an important trend emerges.

BEP is becoming increasingly important across the business environment because it enables a wide variety of organizations to proactively analyze and respond to small market changes that can have significant business impact. BEP also has a variety of other uses, for example:

> ➤ Retailers' BEP solutions proactively alert them about the success or failure of a product as goods move off the shelf, allowing them to make real time changes to pricing, inventory, and marketing campaigns.

> ➤ E-commerce vendors leverage BEP to help identify fraud and reduce abandoned shopping carts.

> ➤ Trading markets use BEP to uncover and compare minute changes throughout global markets to support buy/sell decisions as well as to ensure the timely execution of bids.

> ➤ The massive multi-player online game industry uses BEP to uncover unauthorized activities among hundreds of thousands or even millions of actions per second.

The goal of Business Event Processing is to detect and interpret business situations, resulting in effective business decision making.

> ➢ Fleet management companies leverage BEP to help them make instantaneous decisions on how to deal with products that are lost in transit or delayed due to unforeseen circumstances.

II. Leveraging SOA for Business Event Processing

BEP describes a wide range of ways that enterprises approach events. Opening an account, making a withdrawal, buying an item, changes in sensor or meter readings, or sending an invoice are all examples of common business events. Organizations must both recognize new events and understand the importance of business critical events in a noisy environment. Only by recognizing and acting upon important business events in near real time will such companies be able to leverage their IT systems and business processes to speed response, automate processing and drive new opportunities.

Events, however, do not exist in a vacuum—they depend upon various applications and systems across the IT infrastructure to create and consume them. And for every type of application, there are potentially new types of events. The BEP challenge, therefore, is dealing with environments of broad heterogeneity, separating what's important to the business from the underlying complexity of the technology.

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In other words, BEP does not stand alone in the IT organization. It requires a flexible architecture that can abstract the underlying heterogeneity the IT environment presents. Many of today's enterprises are implementing SOA for this purpose. SOA is a set of best practices for organizing IT resources in a flexible way to support agile business processes by representing IT capabilities and information as Services, which abstract the complexity of the underlying technology from the business.

Businesses then define events and their responses through the IT perspective of interacting with Services. While event processing capability can exist as a standalone capability, when attempting to integrate it into the enterprise, a SOA approach offers important best practices. It's important to look at the whole enterprise and be able to understand all of the components that both capture and respond to events.

Placing Event-Driven Architecture into Context

This notion of BEP leveraging SOA is an important point. After all, it is debatable whether it is possible to take an alternative architecture approach that consists of an integrated set of systems and infrastructure that monitors events, recognizes significant occurrences as they take place, triggers alerts, disseminates information about the event and initiates rules-based responses. Such architecture is known as *Event-Driven Architecture* (EDA). Note, however, that EDA is not truly a separate architectural approach, but is actually consistent with how many companies implement SOA, and distinguishing EDA as a separate architectural approach is little more than a red herring.

The bottom line is that it's possible for an EDA not to be Service-oriented, but for most practical purposes, the distinction between the two approaches is more of a technical detail than a difference that has any importance to the business. So, what we should be talking about is not a separate concept called EDA, but rather "event-driven SOA" as a coherent melding of the two concepts, where an event processing solution can use SOA to be more effective, for example, by making it easier to extend the reach of the solution across business domains.
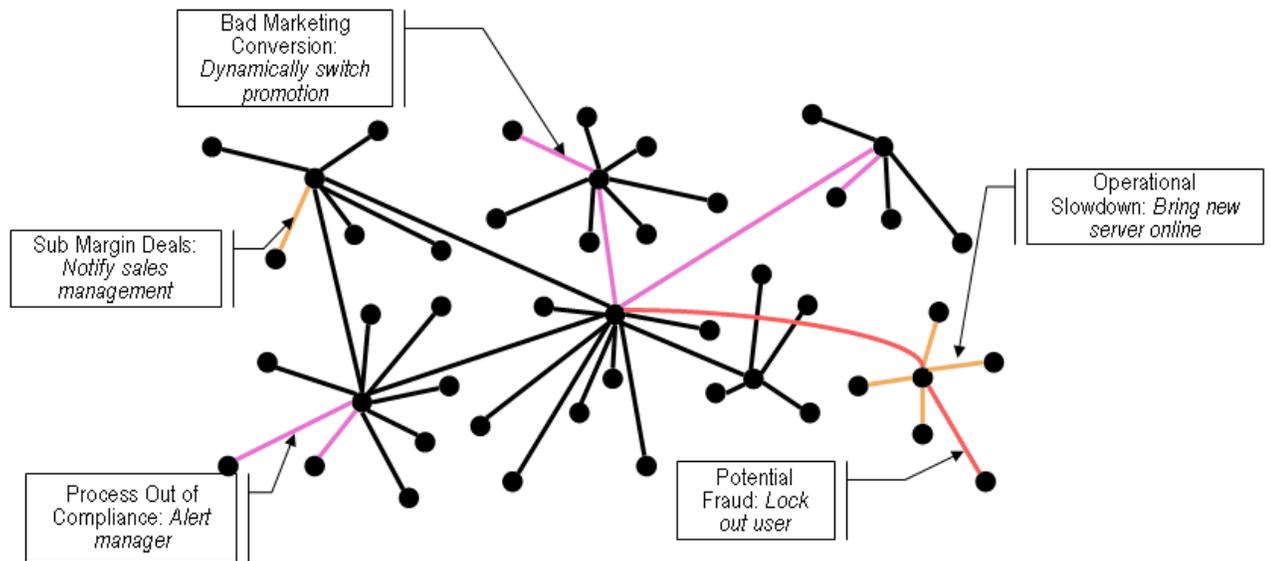
Furthermore, the decomposition of processes into Services that SOA espouses enables a more flexible, business driven approach to event processing, by opening up new opportunities for customers to structure their SOA-based applications in an event-centric fashion. Even though Services should typically behave asynchronously, there is a broad misperception that Services should follow a synchronous, "request/reply" exchange pattern. By thinking instead of Services as sending or receiving events, architects are better able to build flexible processes in a combined SOA/BEP environment.

Leveraging SOA with Business Events: Heterogeneity and Flexibility

The story of how to apply SOA to business events takes place simultaneously on two levels: above and below the Service abstraction. Above this abstraction is the business environment, where the business is able to leverage BEP to glean real time information about the business independent of the underlying technology. In contrast, below the Service abstraction, events are messages moving from one Service endpoint to another, typically (but not necessarily) in XML format.

It is below the Service abstraction, in fact, that applying SOA to business events provides much of its value to the organization. Service interfaces, by their nature, send and/or receive messages, so the broader the SOA implementation, the more the message traffic between Service endpoints represents the operations of the business. From the BEP perspective, it is often desirable to think of such messages as events, and because of the nature of Service interactions, such messages provide visibility into the business in an *ad hoc*, real time manner, as shown in the figure below:

Business Event Processing in a SOA Environment

Bad Marketing Conversion: *Dynamically switch promotion*

Sub Margin Deals: *Notify sales management*

Operational Slowdown: *Bring new server online*

Process Out of Compliance: *Alert manager*

Potential Fraud: *Lock out user*

Source: Service Integrity

In the figure above, the dots represent Service endpoints and the lines represent message flows. As indicated, applying BEP to the message flows can reveal important, real time business information into marketing, sales, process compliance, fraud prevention, and other aspects of running an organization. Note also that even though this diagram represents message flows beneath

the Service abstraction, the dynamic nature of BEP is nevertheless able to leverage the agility benefit of SOA, because of the focus on exposing broad capabilities and information as Services.

The more Service-oriented a company becomes, in fact, the more business events become the information lifeblood of the organization, in combination with stored information for understanding exceptions from the norm in order to elevate threats and opportunities and then act on the exceptions. BEP, therefore, extends the value of SOA. Following event-driven SOA best practices can leverage the value of BEP, as SOA hides the complexity of the IT environment from the business aspects of the solutions. The bottom line is that SOA and BEP combine to meet the needs of the business more effectively than any one or two of the approaches can separately.

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III. Business Event Processing and Enterprise 2.0

This discussion of business events and SOA makes perfect sense to a technical audience, but the businessperson is still left a bit in the cold: yes, SOA provides greater agility, and BEP offers real time visibility and insight, but how does the business interact with such approaches in a collaborative manner?

The answer lies in a loose collection of new technologies and approaches known as *Web 2.0*. Web 2.0 generally refers to a broad collection of collaborative, Internet-based approaches that provide rich user interface capabilities, focus on collaboration with diverse user communities, and decentralize creation of content and application capabilities. Web 2.0 includes wikis, blogs, mashups, sites and tools that focus on user-generated content, and many other tools and enabling technologies. Not all of Web 2.0 is relevant to the business, however. That part of the Web 2.0 story that has the robustness and governance necessary in an enterprise environment goes under the name Enterprise Web 2.0, or simply *Enterprise 2.0.*

In addition to the collaboration/community aspect of Enterprise 2.0, the reach of the Web itself is an important part of the story. The Web is real time, personal, and ubiquitous. In the context of BEP, Web-enabled devices can be event sources. Business can thus use the Internet to reach consumers, employees, and others well beyond the traditional boundaries of the business.

One way of looking at the role of Web 2.0 in this story is that it brings events to the decision makers, enabling them to create a system that monitors for the right situation and triggers the correct action. Lightweight Web approaches and protocols like Ajax, Atom, and Really Simple Syndication (RSS) running over the Web-friendly Representational State Transfer (REST) bring events to the browser in real time.

Furthermore, since these protocols are standards themselves or based on standards, the browser could easily be on different devices or operating

systems, essentially making the client technology irrelevant. Such protocols also enable access to people more directly via mobile devices as opposed to passive browser representation. This standards-based flexibility enables the use of real time events to push information to field service personnel, emergency responders, and other people who may not be in front of a standard-issue PC.

While Enterprise 2.0 encompasses a range of collaborative tools and approaches, one important part of the Enterprise 2.0 story is the enterprise mashup. According to Wikipedia, a mashup is a Web site or Web application that seamlessly combines content from more than one source into an integrated experience. What mashups bring to BEP as well as SOA is the rich interface and user empowerment, while what SOA brings to mashups are governed, loosely coupled, abstracted business Services, and BEP brings a real time view of the business. The enterprise mashup, therefore, combines mashup capabilities with SOA and BEP, enabling flexible, composable, real time, and collaborative business applications with rich user interfaces.

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In essence, then, it is enterprise mashups' user-driven capabilities that give IT one way to fulfill the promise of both SOA and BEP. The synergies between enterprise mashups on the one hand and SOA and BEP on the other also include the following:

➢ Mashups can lead to the creation of simple abstracted Business Services even when the full SOA infrastructure is not yet in place. Such Services may not have the full robustness that SOA can provide, but they can provide a good measure of business value in the meantime regardless, and incorporate the visibility into real time events, once BEP is in place.

➢ When mashups drive Service design, they can contribute to the selection of the appropriate level of granularity of the underlying Services. If the Service has the proper granularity to support a mashup, then it's likely to have the right balance of business value and reusability. For those Services that generate events, this value proposition reinforces the value of the BEP solution.

➢ Mashups promote reuse broadly as well, as mashup platforms provide a visual catalog of available Services, and in general, business event sources, thus facilitating the discovery and use of such Services and events, especially in unpredicted or *ad hoc* ways.

➢ Mashups can incorporate both internally and externally provided Services and events. Business Services and business events should ideally be location-independent, where the governance infrastructure determines access roles and privileges automatically. Mashups can inherit this location independence from the Services being mashed, and mashup software should make the actual location of a Service or any event source irrelevant.

It is important to note, however, that while mashups have a role in BEP, it is not necessarily the key role. Mashups provide a straightforward way to present various sources of information to a Web-based device for an end user. As such, mashups imply someone sitting at a screen watching for events. One premise of BEP, however, is that it will detect events and apply a level of logic to them to cause an action without human intervention.

Other examples of how Web 2.0 might complement BEP would be to use Atom feeds as part of the event input, to use mobile notifications to dispatch service

personnel, or to establish an automated process for dealing with RFID feeds. BEP enables systems to generate events based on a variance, and then route such events to the appropriate processing point (for example, an inventory control system), where that system then takes an appropriate action, for instance, placing order with closest supplier.

Web 2.0, Business Event Processing and SOA: Real World Processing

From the business perspective, then, combining the real time visibility and insight of BEP, the agility of SOA, and the business empowerment of the full Web 2.0 range of tools, leads to a broader, more business-focused approach to dealing with business events we call *Real World Processing*. Real World Processing leverages the innovation and agility of several underlying trends: business event processing, real time information, and collaborative intelligence. The figure below illustrates the relationships among SOA, BEP, Web 2.0, and Real World Processing.

Real World Processing leverages the innovation and agility of business event processing, real time information, and collaborative intelligence.

Real World Processing: Synergy among SOA, BEP, and Web 2.0
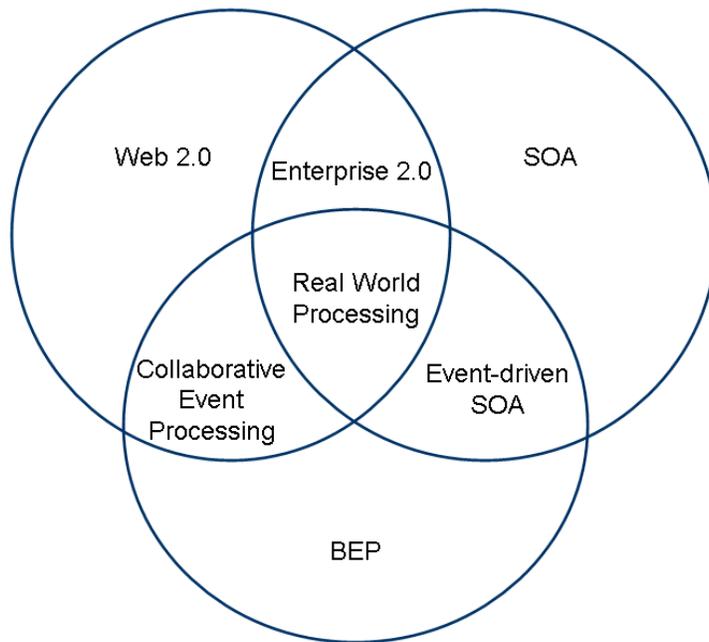
Source: ZapThink LLC

Real World Processing makes more information available to line of business users in real time, including for example location-based tracking, remote healthcare, RFID tracking, surveillance, and more. By feeding the results of processing events to browsers, mobile devices and other user interface form factors, mashups enable the extraction of even more value from the information that flows through the business, and use the breadth and ubiquity of the web to collect information, process and analyze it, and then bring the results back to the right point. One event can provide valuable information on its own, but when people mash up multiple sources of information they can see visual representations of concurrent events, enabling the software to identify patterns in real time.

Here are some examples of Real World Processing in action:

➢ In today's real estate industry, existing mashups harvest information from Google, public information on demographics and schools, as well as Multiple Listing Service (MLS) information. BEP can show real time information about available homes as information changes, and Real World Processing correlates the available information to schedule a viewing when a home that meets a buyer's criteria becomes available.

➢ Medical devices currently provide large amounts of valuable information, often in a variety of proprietary formats. With BEP, doctors can correlate medical device information, drug interaction data, and patient information to increase the level of care, where the real time aspect can literally be a matter of life or death. The power of Web 2.0 can encourage connected health communities that bring together doctors, patients, families and others to manage the same disease, increasing patient empowerment.

➢ Electric power utilities already use events to manage their energy grids. With Real World Processing, these companies are leveraging information from the home to reduce energy use, enabling a lower carbon footprint. By incorporating Web 2.0, relevant energy information can surface and neighbors can collaborate to discover new ways to conserve.

IV. The ZapThink Take

The exponential growth of information in the business world continues unabated, and there's no reason to expect it to slack off in the future. Such growth promises numbers of events far beyond what the enterprise has been experiencing to this point, requiring today's systems to evolve to handle these increasing volumes of events. This growth is driving the need for BEP, as well as the enabling technologies of Web 2.0 and the underlying architecture of SOA. The combination of these three approaches provides a foundation for flexibility, composability, integration, and scalability. At the heart of this synergy are open standards, which facilitate all the various interactions among systems that goes into Real World Processing. Furthermore, existing security, governance, and BPM technologies round out the set of enabling technologies that feed this confluence of approaches.

The bottom line, however, is the business story. BEP, combined with Web 2.0 and SOA, are bridging the gap between business and IT. Only the business knows the relevance of business events, SOA abstracts the underlying technology, and Web 2.0 provides an empowering interface to increasingly powerful, real time capabilities and information.

The challenge with discussing this synergy among BEP, SOA, and Web 2.0 is that no one term does it justice. SOA is a critical part of this story, but is only a part. SOA delivers a set of principles for organizing an organization's resources to provide a business-centric abstraction, because the business doesn't care what server, network, or data center the implementation underlying a Service runs on. All they care is that the Service works as advertised, providing the required functionality and interoperability.

While the SOA-enabled BEP story offers business value beneath the Service abstraction, the benefits to the organization above the abstraction are every bit as important. After all, as the pace of business accelerates, there are business benefits from optimizing how the organization handles business

As the pace of business accelerates, there are business benefits from optimizing how the organization handles business events. Improved customer responsiveness, more optimal usage of physical assets and better management of complex value chains all benefit from improvements in event processing.

events. Improved customer responsiveness, more optimal usage of physical assets and better management of complex value chains all benefit from improvements in event processing. Furthermore, if managers have visibility into business events, then they can then take more effective, proactive steps to optimize production and reduce costly slowdowns.

Similarly, BEP can improve customer service and increase customer satisfaction. Because BEP can identify important events and deliver the right information to the right place at the right time, managers can mitigate or avoid a wide range of problems. Such benefits accrue not only in individual instances, but also across business processes, as well. Visibility into events helps line of business managers deal with changes in business process, thus making the business more reactive. Furthermore, harnessing the breadth of sources for event data, the flexibility of SOA, and the speed and reach of networks provides substantial opportunity for competitive advantage in an increasingly fast-paced, complex world.

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ZapThink is an Enterprise Architecture (EA) strategy advisory firm. As a recognized authority and master of Service-Oriented Architecture (SOA) and EA, ZapThink provides its audience of IT practitioners, consultants, and technology vendors with practical advice, guidance, education, and mentorship solutions that assist companies in leveraging SOA to meet their business needs and presenting viable SOA solutions to the market. We provide this audience a clear roadmap for standards-based, loosely coupled distributed computing – a vision of IT meeting the needs of the agile business.

ZapThink provides IT practitioners strategic insight and practical guidance for addressing critical agility and change management issues leveraging the latest EA and SOA best practices. ZapThink helps these customers put EA and SOA into practice in a rational, well-paced, and best practices-driven manner and helps to validate or recover architecture initiatives that may be heading down an unknown or incorrect path. ZapThink assists with solution vendor, technology, and consultant selection based on in-depth, objective evaluation of the capabilities, strengths, and applicability of the solutions to meet customer needs as they relate to EA initiatives and as they map against emerging best practices. ZapThink enhances its customer's skills by providing education, credentialing, and training to EAs to develop their skills as architects.

ZapThink helps to augment consulting firms' EA offerings and intellectual property by providing guidance on emerging best practices and access to information that supports those practices. ZapThink provides frameworks for product-based consulting based on ZapThink insight and research, such as SOA Implementation Roadmap guidance, Governance Framework development, and SOA Assessments, and provides a means to endorse and validate consulting firm offerings. ZapThink also accelerates consulting firms' efforts to attract, retain, and enhance the skills of EA and SOA talent by providing education and skills development

For solutions vendors, ZapThink provides retained advisory for guidance on product strategy, as well as marketing, visibility, and third-party endorsement benefits through its marketing activities, lead generation activities, and subscription services. ZapThink enables vendors to leverage ZapThink knowledge to transform their offerings in a cost-effective manner.

ZapThink's Managing Partners are widely regarded as the "go to advisors" and leading experts on SOA, EA, and Enterprise Web 2.0 by vendors, end-users, and the press. Respected for their candid, insightful opinions, they are in great demand as speakers, and have presented at conferences and industry events around the world. They are among the most quoted experts in the IT industry.

ZapThink was founded in October 2000 and is headquartered in Baltimore, Maryland. Its customers include Global 1000 firms and government organizations, as well as many emerging businesses. Its Managing Partners have worked at such firms as IDC, Saga Software, Mercator Software, marchFIRST, and ChannelWave, and have sat on the working group committees for standards bodies such as RosettaNet, UDDI, and ebXML.

Call, email, or visit the ZapThink Web site to learn more about how ZapThink can help you to better understand how SOA will impact your business or organization.

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