

zapthink white paper

LOWERING IT TOTAL COST OF OWNERSHIP WITH WEB SERVICES





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Abstract

IT managers realize that attempts to lower the total cost of ownership of IT investments can be an error-prone, risky endeavor. Today's business and technology environments are simply too dynamic and unpredictable to make accurate calculations of IT TCO. Companies need an approach to technology that reduces the risks inherent in these changing landscapes—an approach that can help them leverage change to their best advantage. Web Services open the door to this new approach to technology. Companies that build centrally managed, loosely coupled Service-oriented architectures with Web Services can achieve the business agility that provides the key to reducing IT TCO in an ever-changing business world.

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I. The Problem of Lowering the Total Cost of Ownership

TCO includes money spent on people and processes as well as technology, and necessarily incorporates the present and future costs of a project—even though future costs may be difficult or impossible to predict.

Enterprises can use Web Services to build Service oriented architectures that can provide the business agility needed to lower the true TCO of IT in the enterprise, but only with the appropriate management infrastructure.

As companies begin to implement Web Services across the enterprise, questions inevitably arise about TCO. *Total cost of ownership* (TCO) is a complex, elusive measure of the success of capital expenditures, especially when considering the intricacy of information technology investments. TCO includes money spent on people and processes as well as technology, and necessarily incorporates the present and future costs of a project—even though future costs may be difficult or impossible to predict. Time and again, it is this inability to accurately predict future costs that has made lowering TCO a black art.

Naturally, predicting the future is by definition an imperfect process. The most common approach to “business clairvoyance” is to assume that the future will be much like the present—the extrapolation approach. Business analysts love extrapolation, because spreadsheets are so good at it—simply enter data for the last few years, drag and drop, and voila!— a neat prediction of the future.

The problem is, the world doesn’t work like the extrapolation feature in a spreadsheet. If there’s one thing we’ve learned from the last decade, it’s that change is constant—and inherently unpredictable. Companies need a new way of dealing with future costs—a different approach to lowering the *actual* TCO of a technology investment, rather than simply lowering the straw-man estimate of TCO that a spreadsheet will give us. Lowering IT TCO is far more complex than that. Instead, we need a different approach to technology that proactively manages the unpredictability inherent in businesses that depend on that technology, because mitigating risks, minimizing unpredictability, and dealing with the unexpected are the critical tasks needed to lower the true TCO of technology.

Fortunately, Web Services can open the door to such an approach, using an architectural approach that we call *Service orientation*. As this paper will show, enterprises can use Web Services to build Service oriented architectures that can provide the business agility needed to lower the true TCO of IT in the enterprise, but only as long as they use the appropriate management infrastructure—what we call *Service-oriented management*. Service-oriented management is also known as *Web Services management*, but goes beyond simply managing Web Services to managing entire Service-oriented architectures.

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Mitigating risks and dealing with change

There are many risks inherent in any technology project: risks of security breaches, missed deadlines, changing requirements, cost overruns, quality problems, and personnel issues, to name just a few. All such risks stem from the inherent unpredictability of both the business and technology environments. If developers and business analysts had a clear, accurate picture of what the business required from the technology ahead of time, and those requirements never changed, then running IT projects would be a simple matter of planning, building, and running the technology. In reality, however, business requirements do change, often during a technology project as well as after completion. Technology that cannot easily adjust to a changing business environment can easily send the actual cost of ownership through the roof.

The secret to minimizing TCO in a dynamic environment is to proactively leverage change to the company's best advantage, rather than simply reacting to changing circumstances. It is not sufficient simply to build what is needed; companies must build an infrastructure that is designed from the ground up to adjust to changing requirements. Building such an infrastructure is not easy, but fortunately, there are approaches today that provide the roadmap to achieving such an agile IT environment. If companies can follow these approaches, then the TCO benefits they could realize are potentially enormous, because such IT agility can mitigate the unpredictable risks that cost so much to deal with today.

For too long technology has been the bottleneck in the enterprise. Building IT infrastructures that can proactively deal with business change means reversing this equation, finally enabling business requirements to drive technology decisions.

II. **The Key Business Driver in the Enterprise: Business Agility**

Business agility is the ability for businesses to proactively manage change and use changing business environments to their advantage.

Business agility is the ability for businesses to proactively manage change and use changing business environments to their advantage. Change comes in many forms: changes in the marketplace, in technology, in the world at large. Companies that can make effective use of a changing environment are better able to compete and thrive in any business climate, but especially in tough economic times like those we have since the bursting of the dot.com bubble.

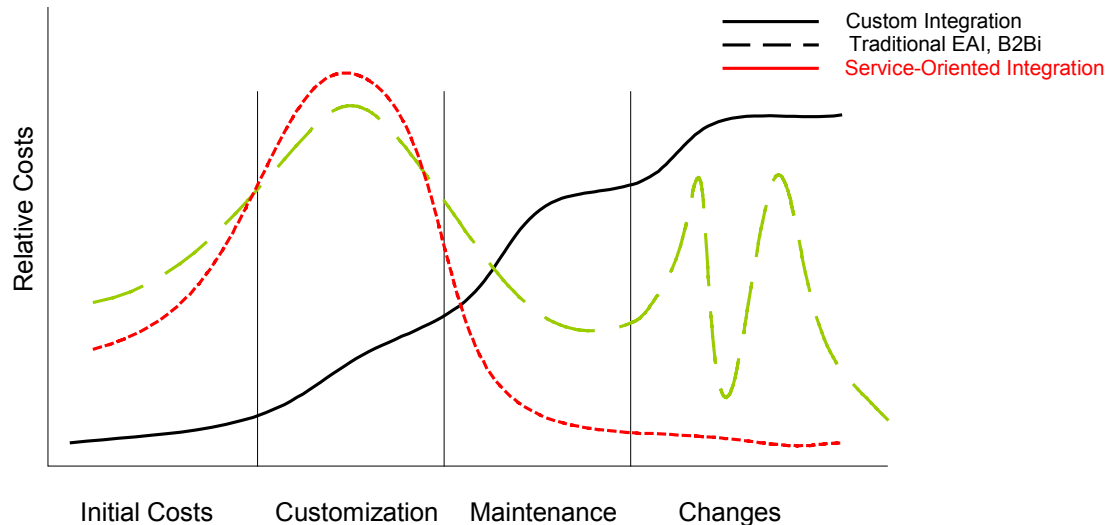
Information technology is often the area most relevant to discussions of business agility, because achieving agility begins with removing the bottlenecks that impede it, and IT is usually where the bottlenecks are. In fact, companies are so used to the fact that IT creates a bottleneck within their organization that technology and its limitations often drive business decisions. Service orientation, however, has the potential to reverse this equation, and enable business decisions to finally drive the technology. On the other hand, building Service-oriented infrastructures is not easy. It requires investment and commitment on the part of enterprises. The long-term business benefits of Service orientation, however, can justify such an investment.

To understand Service orientation, it is important to grasp three related concepts: *Service-oriented integration* (SOI), *Service-oriented architectures* (SOA), and *Service-oriented management* (SOM), as illustrated in Figure 2 in the next section. Each of these three concepts plays a critical role in building agile technology infrastructures that lower the true TCO of IT to the business.

Business agility requires managed Service-oriented integration.

The costs of a typical integration project go through four distinct phases: the initial setup costs, the cost of configuring and customizing the integration project, ongoing maintenance costs, and costs involved when any of the elements of the integration project change. We will compare three approaches to integration—custom integration, traditional EAI and B2Bi approaches, and SOI.

Figure 1: Relative Costs of Different Integration Approaches



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Traditionally, companies spend most of their time and money maintaining existing integration projects and then dealing with the changes that occur in those systems as business requirements and technology change.

The solid curve represents *custom integration*, which means dedicating current IT resources to the task of achieving some application goal that requires integrated results from multiple systems. Such custom integration involves the smallest up-front cost, because the skills and tools necessary are typically already in house. However, as the project progresses, it consumes an increasing amount of developer time, in proportion to the complexity of the integration task at hand. During the maintenance phase, then, things start to get costly. Traditionally, companies spend most of their time and money maintaining existing integration projects and then dealing with the changes that occur in those systems as business requirements and technology change. With custom integration, the costs for both maintaining and changing systems can become exorbitant.

The second approach to integration lumps together traditional approaches to *enterprise application integration* (EAI) and *business-to-business integration* (B2Bi), as shown by the green line in Figure 1. Traditional EAI and B2Bi solutions solve many integration headaches by presenting an architecture that efficiently manages and maintains connections among systems. The primary downside of EAI is that up-front costs are much higher than custom integration, as shown in the first column of the graph. In a typical EAI solution, end-users must spend from tens of thousands to millions of dollars on software licenses and server systems prior to completing any integration. The actual integration project itself costs many times more than the initial costs and can easily dwarf the costs of any custom integration project.

However, EAI and B2Bi achieve their real win during the maintenance phase of an integration project. As long as the business environment doesn't change, the costs of running an EAI solution over the long haul can be substantially lower than that of custom integration projects. The hidden cost of EAI, however, is when things do change. That's when EAI system costs can spike, as shown in the fourth column of the graph. In fact, we say that EAI systems "pour concrete on business processes," since they tend to solidify existing processes rather than enable an IT environment that allows companies to deal easily with change.

Enter Web Services. By enabling standards-based approaches to integration, Service-oriented integration turns the EAI/B2Bi cost curve on its head. Web Services technologies allow architects to build loosely coupled Service-oriented architectures that expose coarse-grained business functionality. The real costs in building and integrating such SOAs is in the system re-architecting. Businesses must spend time analyzing their business processes and creating business Services at varying levels of granularity, perhaps even requiring the orchestration and choreography of multiple layers of Web Services to accomplish a single task. This support for multiple levels of granularity enables the SOA to support frequent changes in the underlying systems, as well as changes to business processes and underlying business assumptions, without the need to make interface changes that break the loose coupling of the Services. The real win with SOI, therefore, is in the dramatic reduction of cost at the maintenance and change phases of integration, as shown by the red dotted line in the graph.

This cost reduction takes several forms. The most pronounced advantage that companies implementing an SOA is in the area of application development and testing. In traditional component development, projects—both new development as well as changes to existing systems—tend to be large, expensive, and risky. The fundamental reason for this unpredictable nature of enterprise application development is that the various components and systems that make up a traditional IT architecture are tightly coupled with each other. As a result, changes in part of the environment necessitate changes in other parts, and the effects of an application change can ripple through the entire IT environment in unpredictable ways. SOI approaches that leverage the loose coupling inherent in an SOA mitigate these costs and associated risks substantially.

While loosely coupled SOAs are still an emerging trend in the enterprise IT arena, there have been some notable successes. Companies in the financial services and manufacturing industries have reported cost reductions as high as 90% when performing integration with Web Services over traditional integration approaches using EAI. In some cases, the cost savings are so dramatic that the companies' entire approach to planning and budgeting for IT improvements must be completely revamped. If the cost of integration facing a typical enterprise drops from 60% of the IT budget to less than 10%, what could that enterprise do with the extra money?

Business agility requires centralized policy management separate from application development.

A second area where there can be dramatic cost reductions during the maintenance and change phases of an SOI project is the area of policy management. Broadly speaking, policies are the business rules that describe and constrain how people and other systems interact with the elements of an IT infrastructure. In traditional architectures, such business rules are typically coded directly into the business logic inside each application. As a result, changes to policies can require changes to application code, which can be quite expensive and risky. In other cases, applications have abstracted their policies into a management layer, so that the appropriate person can manage the

If the cost of integration facing a typical enterprise drops from 60% of the IT budget to less than 10%, what could that enterprise do with the extra money?

policies that apply to that application without requiring any changes to that application.

Even when an application's policy management is abstracted into its own interface, however, the costs of managing those policies can be high, because the typical enterprise has a large number of such applications. In a real-world scenario, therefore, an IT administrator must keep track of dozens of different interfaces to multiple applications and systems, and a single policy change (deleting a user when they leave the company, for example) can result in multiple changes to many different systems. Such a process is time consuming (and hence expensive), and also risky, because of the relatively high probability of human error.

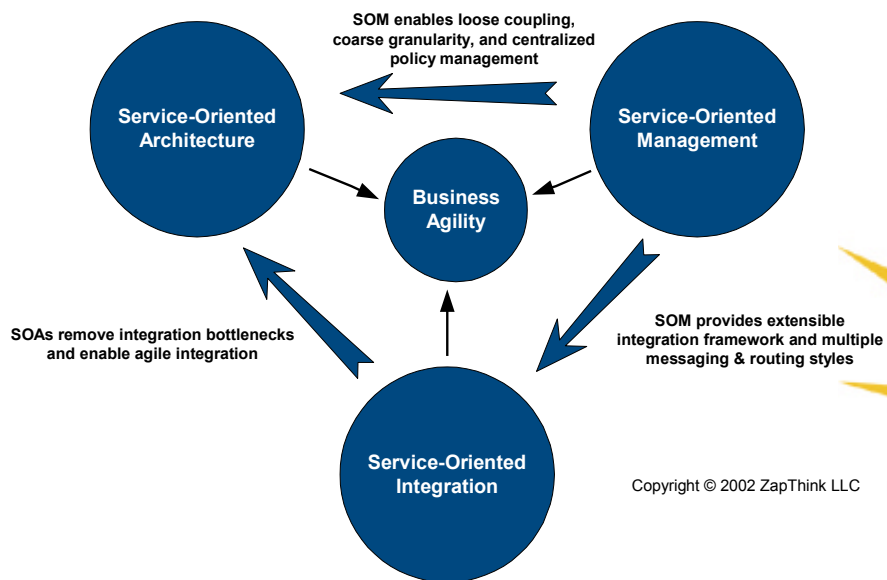
In an SOA, however, policy management itself is abstracted into a coarse-grained business Service. Not only is this management separate from the application code, but it is also centralized, removing the need to administer individual applications. Deleting a user, for example, is now a simple task that occurs in a single place. Furthermore, the policies that involve managing users—who can delete users and when, for example—are also centrally managed. An SOA that offers centralized policy management therefore reduces the costs and risks inherent in policy management in traditional IT infrastructures.

Enterprise-class Service-oriented architectures require Service-oriented management.

Loosely coupled, standards-based SOAs are an approach to distributed computing that considers software resources to be Services available on the network. Ideally, the Services available on the network expose the functionality of the underlying software in terms of business concepts. Companies must successfully rearchitect their IT infrastructures into SOAs in order to take advantage of SOI and remove the integration bottleneck, thereby connecting different systems in a flexible, cost-effective manner. By removing the integration bottleneck, such companies are able to achieve their desired business agility, as illustrated in Figure 2 below.

Loosely coupled, standards-based Service-oriented architectures are an approach to distributed computing that thinks of software resources as Services available on the network.

Figure 2: Service Orientation Relationships



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Service-oriented management is the management infrastructure that companies need to support the ongoing functionality of a SOA.

Companies should not wait for the maintenance and change phases of their SOA initiative to take advantage of the cost savings of centralized management.

Rearchitecture does not take place in a vacuum; companies must transition their systems from the existing architectures to SOAs in a manner that does not impede the ongoing necessary functionality of the technology. Furthermore, the act of rearchitecting is not sufficient enough by itself to guarantee that the resulting business Services will meet the needs of the business. The enterprise also must have a management infrastructure in place that can support the monitoring of Services performance as they are being moved into production as well as once they are available for public consumption.

Finally, in order to encapsulate the underlying software components and systems with Web Services interfaces and then compose these fine-grained atomic Web Services into coarse-grained business Services, companies must have a set of management tools that can establish and maintain the connections between the software on the one hand and the Services on the other. Service-oriented management is this management infrastructure that companies need to support the ongoing functionality of a SOA.

III. Lowering TCO with Web Services Management

How, then, does a Web Services management application lower the total IT costs facing an enterprise? What must it offer to be a true Service-Oriented management application? What is the management infrastructure necessary to take fine-grained, atomic Web Services and compose them into coarse-grained, enterprise class business Services? Here are four key sets of functionality that an SOM application should offer:

- *Cleanly separate IT policies from the application logic.* If IT policies are both separate from application logic and centrally administrated, enterprises can make frequent changes to the policies without having to make expensive and risky changes to applications. In fact, the sooner an enterprise separates policy management from application logic, the greater the improvement in TCO. Companies should not wait for the maintenance and change phases of their SOA initiative to take advantage of the cost savings of centralized management.
- *Centralizing security management and monitoring.* Managing security is a large part of mitigating risk in the enterprise, and is most cost-effective when managed and monitored in a centralized manner. In a SOA, Services are location independent, no longer tied to the systems that provide them. However, access control and enforcement are more important than ever. A Web Services management platform should provide a centralized approach to security that coordinates the access to the underlying systems.
- *Providing management visibility with Service-oriented monitoring and management tools.* For human managers to be agile they must be well-informed about their operations. Service-oriented monitoring and management provides this level of visibility to IT and line-of-business management. By providing visibility into the operation of the SOA for business managers as well as IT managers, it is possible for a Web Services management application to offer visibility into business process execution—an essential part of letting business requirements drive technology decisions.
- *Deploying an extensible integration framework and loosely coupling systems with multiple messaging and routing styles.* To be Service oriented, enterprises must combine multiple systems with different

interfaces into coarse-grained business Services—not just those back-end systems that happen to offer Web Services interfaces. To break out of the brittle EAI pattern of “poured concrete” integration and obtain the long-term cost savings of SOI, a Web Services management application must offer an extensible integration framework. In addition, enterprises can reduce the TCO of integration with Web Services management applications that provide multiple messaging and routing styles. Some systems can provide synchronous responses, while others offer asynchronous interfaces. In many cases, an SOA offers Services on a “publish and subscribe” basis, while the back-end systems that offer that Service are most often synchronous. In other cases, Service consumers use different transport protocols than the ones that underlying systems provide. The Web Services management application must loosely couple these consumers from the underlying systems in order to provide the flexibility and agility that reduce the cost of building and supporting a heterogeneous IT infrastructure.

IV. Confluent Software: Enterprise-class Web Services Management for Lowering IT TCO

Confluent Software’s CORE suite includes three separate modules, each of which has a role in providing the management capabilities necessary for lowering the TCO of the IT infrastructure. The CORE suite offers all of the TCO-lowering features discussed in section III above. The *CORE Integrator* is a Web Services integration platform that enables loosely coupled SOI, and also offers centralized control for administering security, quality of service, logging, and change management policies. The *CORE Manager* is a monitoring and management platform that delivers operational visibility into Web Services integrations, by going beyond the monitoring of individual Service metrics to support the monitoring of business process flows and their interactions with Web Services. Finally, the *CORE Analyzer* offers a business activity monitoring interface that provides business managers with visibility into business performance indicators.

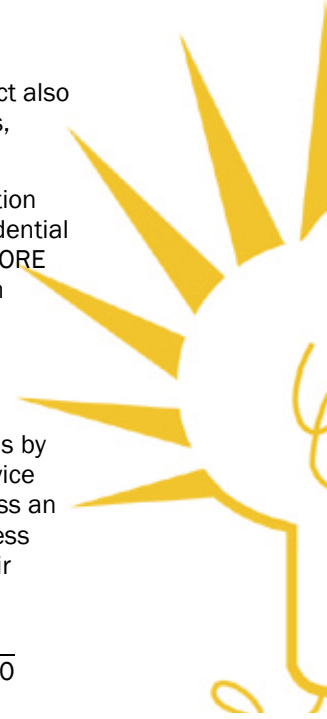
Centralized Policy and Security Management

CORE Integrator centralizes the definition of policies for handling Service invocation failures as well as offering a variety of exception-handling mechanisms, including message queuing, failover, and retries. The product also offers configurable logging that centralizes the logging of Service requests, responses, and various performance metrics.

In addition, CORE Integrator offers centralized enforcement of authentication and authorization policies, role-based access control, and automated credential mapping. Administrators can define roles and access policies directly in CORE Integrator, or configure CORE Integrator to work with existing definitions in existing directories or single sign-on products.

Service-Oriented Monitoring and Management Tools

CORE Manager delivers operational visibility into Web Services integrations by enabling IT operations staff to monitor system-level metrics including Service performance levels, downtime and security violations for all Services across an enterprise. CORE Manager also supports the monitoring of business process flows and tracking of dependencies between business processes and their



underlying Web Services. In addition, CORE Manager enables root-cause analysis of application problems across the IT infrastructure.

Extensible integration framework

The CORE Integrator's plug-and-play pipeline architecture allows companies to customize integration by adding new message-processing handlers. The CORE integrator comes with library of pre-built handlers for access control, logging, protocol transformations, data transformations, caching and metering of Web Services. The CORE integrator supports multiple deployment models, including interceptor and intermediary modes. One of the most interesting capabilities of the CORE integrator is its integration with third party business process engines such as BEA Systems' WebLogic Process Integrator.

Multiple Messaging and Routing Styles

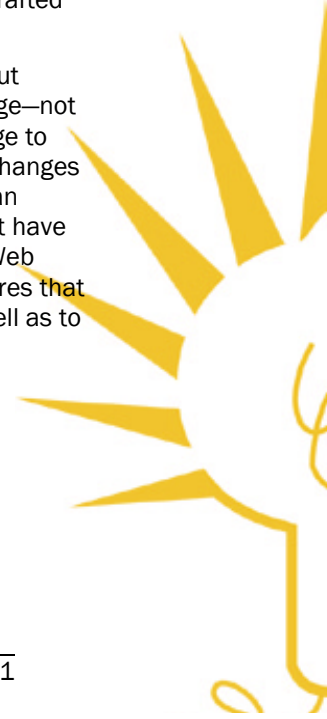
The CORE integrator supports multiple messaging models, including synchronous request/response messages, asynchronous messaging with callbacks, and event-based publish and subscribe. In addition, CORE integrator supports both remote procedure call and literal mode invocation styles, as well as supporting a variety of transport protocols, including HTTP, JMS, IBM WebSphere MQ, and others. CORE Integrator also enables quality of service-based routing decisions, including the dynamic routing of Service requests based upon requester priorities, requester roles, or other real-time quality of service metrics.

V. Conclusion

Calculating the total cost of ownership for an IT investment is tricky for two basic reasons: first, it involves predicting the future, which is notoriously difficult when talking about technology; and second, the true cost of an investment includes many "soft" expenses that go beyond the hardware, software, and professional services expenditures that are more predictable. Of all the fundamental forces that can sway the true TCO of an IT infrastructure, the most significant is *change*. Change in the business environment, changing requirements, and the hidden costs inherent in people's resistance to change can all throw a carefully crafted spreadsheet out the window.

What's most important, however, is not making TCO easier to calculate, but actually lowering the TCO. And lowering the TCO means dealing with change—not just reacting to change more efficiently, but also actually leveraging change to one's own advantage. When a company's IT infrastructure can adjust to changes faster than the competition's, this agility can not only reduce costs, but can actually provide a substantial competitive advantage over enterprises that have brittle, rigid infrastructures. That's the fundamental value proposition of Web Services—an approach to building, integrating, and running IT infrastructures that provide the business agility that companies need, both to lower TCO as well as to compete in a world where change is the only constant.

The fundamental value proposition of Web Services is as an approach to building, integrating, and running IT infrastructures that provide the business agility that companies need, both to lower TCO as well as to compete in a world where change is the only constant.



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About ZapThink, LLC

ZapThink is an IT market intelligence firm that provides trusted advice and critical insight into XML, Web Services, and Service Orientation. We provide our target audience of IT vendors, service providers and end-users a clear roadmap for standards-based, loosely coupled distributed computing – a vision of IT meeting the needs of the agile business.

ZapThink's role is to help companies understand these IT products and services in the context of SOAs and the vision of Service Orientation. ZapThink provides market intelligence to IT vendors who offer XML and Web Services-based products to help them understand their competitive landscape and how to communicate their value proposition to their customers within the context of Service Orientation, and lay out their product roadmaps for the coming wave of Service Orientation. ZapThink also provides implementation intelligence to IT users who are seeking guidance and clarity into how to assemble the available products and services into a coherent roadmap to Service Orientation. Finally, ZapThink provides demand intelligence to IT vendors and service providers who must understand the needs of IT users as they follow the roadmap to Service Orientation.

ZapThink's senior analysts are widely regarded as the "go to analysts" for XML, Web Services, and SOAs by vendors, end-users, and the press. They are in great demand as speakers, and have presented at conferences and industry events around the world. They are among the most quoted industry analysts in the IT industry.

ZapThink was founded in October 2000 and is headquartered in Waltham, Massachusetts. Its customers include Global 1000 firms, public sector organizations around the world, and many emerging businesses. ZapThink Analysts have years of experience in IT as well as research and analysis. Its analysts have previously been with such firms as IDC and ChannelWave, and have sat on the working group committees for standards bodies such as RosettaNet, UDDI, CPExchange, ebXML, EIDX, and CompTIA.

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

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