AberdeenGroup

Driving Efficiency into a Dynamic Value Chain

An Executive White Paper

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Driving Efficiency into a Dynamic Value Chain

Preface

In a 24×7, get-it-here-by-yesterday world, businesses are facing pressures from every direction imaginable. Customers want products of higher quality but at lower cost. Suppliers and partners push for higher margins and better terms, while global competition gets tougher. These relentless forces have sensitized companies to explore every aspect of their business — in ways previously unimaginable — to derive competitive advantage.

For example, a group of manufacturing companies team together to build a Net market to help them squeeze out inefficiencies that are common to each other's operations. This year, the three auto manufacturers, carrying forward decades of supply chain relationships and processes, have managed to steer over $40 billion — a large chunk of their collective spend — through the Internet-based Net Market. One of the manufacturers has already saved more than $1 million by using an Internet-based RFQ (request for quote) system to manage the bidding process for a $5 million project.

This process hub is just one example of how Internet connectivity has enabled, if not forced, companies to extend the enterprise to achieve process efficiency through rules-based process flow and access to better, up-to-date information. The result is expedited processes, better decision-making, and fewer transactional errors. This dynamic interaction not only provides efficiency, but fundamentally alters the traditional supplier-centric product flow from a make-and-sell model to one of sell-and-build.

The interactions between employees and these value chain functions now are more tightly focused and integrated than they've ever been before. Portals manage and synchronize the relationships between employees and the processes they support; roles can be mapped to various stages of workflow to support collaborative project efforts or procurement authorization. Meanwhile, employees can self-configure their interactions with networks to meet their individual requirements.

Clearly, Internet adoption has demonstrated that this is not your father's value chain. However, challenges must be overcome regarding how applications are built, implemented, and connected to support the new value chain. For these reasons, Web services are required for enterprises to be able to quickly and economically build process to support trade relationships. Aberdeen defines Web services as a combination of *self-describing* application components that are equipped to proactively discover and engage other components in a way that enables users, applications, and devices to interact with them.

This Aberdeen *Executive White Paper* describes how enterprises can overcome technology planning and implementation challenges that currently can drag value chain strategy into an execution quagmire. This paper also examines how companies are using Web services to execute against value chain processes. Moreover, it describes the exciting potential of what Sun calls "Services on Demand," and how that can help enterprises develop dynamic, context-driven value chain processes.

This document also demonstrates that Sun understands that the foundation for Services on Demand already exists in today's IT infrastructure. That means Sun can recommend an evolutionary path for implementation, not a wholesale revision and redesign. Sun envisions services built from information assets common to all organizations — databases, applications, reports, and "transactors" (DARTs). Together, these DARTs — i.e., information assets — are employed by products from the Sun ONE platform as available today and as planned over time. Finally, this document details key technology components to execute Web services in the value chain, as embodied in Sun ONE.

Value Chain Reengineering Provides Process Efficiencies

Internet-based commerce has had an irreversible impact on how trading partners interact. Prior to the proliferation of the Internet, a supplier-centric model drove the way in which products were made and then brought to market. In this model, customers were on the receiving end of the product manufacturing process. With Internet connectivity, now customers not only are involved in the early phases of the process but, to a large degree, also drive the process. For the purpose of this paper, Aberdeen focuses on the part of the value chain that has been fundamentally altered by the demand-driven dynamic of Internet connectivity on the supply chain.

Aberdeen research shows that, on average, it takes over four months to source a new production material, part, assembly, or service. For example, sourcing accounts for roughly one-third of the time-to-market cycles for many equipment manufacturers (Figure 1).

The adoption of Internet-enabled applications has enabled companies to interact internally and externally in ways that are more expeditious, more accurate, and more automated than ever before. Aberdeen research shows that companies that effectively use e-Sourcing technology and processes have achieved the following:

- Shortened procurement cycles by 8%;
- Reduced time-to-market cycles by 10% to 15%; and
- Negotiated an average of 5% to 20% unit price reductions.

For large companies that spend billions of dollars annually on procuring goods, these savings have a direct impact on profit margins. Aberdeen projects that businesses could save approximately $1.7 trillion globally by deploying effective e-Sourcing strategies.

Internet connectivity means that companies are not restricted to buying and maintaining large, expensive applications simply to enjoy the benefits of process efficiency. New models have emerged, such as storefronts, application service providers (ASPs), and Net markets, that enable buyers and sellers to plug in and leverage a hosted process on an as-needed basis.

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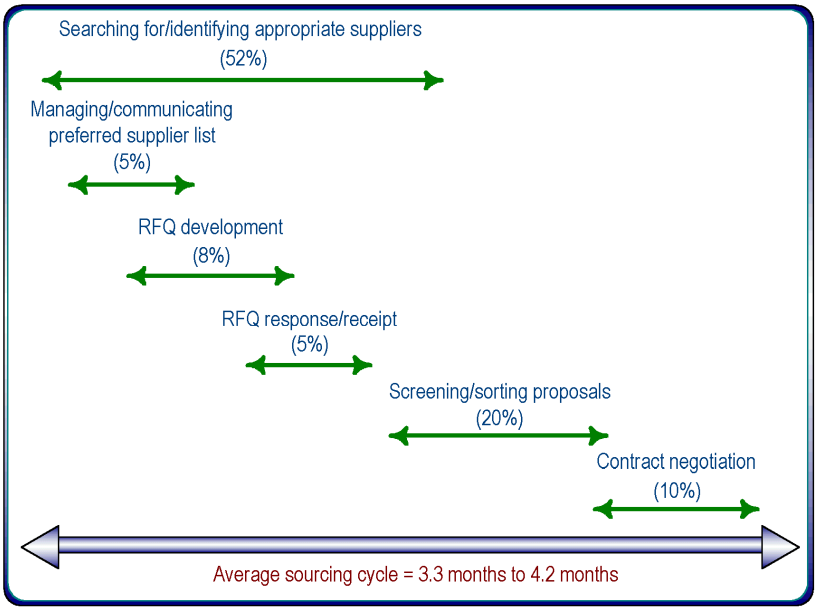
Value Chain Challenges

Value chain efficiency is predicated on the notion that a business will be able to conduct a wide range of interactions, in an integrated and often automated basis, with its trading partners. This task is daunting when the wide-ranging types of process interchanges are considered. And the task is compounded by the number of suppliers, customers, and partners with which a company conducts business. For example, it is not uncommon for a Fortune 500 company to have tens of thousands of supplier relationships to manage.

The path to process efficiency is wrought with challenges, including:

- Inter-business agreement: Trading partners have to agree that a specific trading process is a priority for reengineering. Aberdeen research demonstrates this to be a contentious issue for trading partners, each armed with its own agenda.
- Process function support: Industrial-strength e-Business applications are not implemented off-the-shelf. A high level of customization is required to support process interaction between trading partners. It is not uncommon for custom code to exceed the original base code for a trading partner application.

Figure 1: The Sourcing Cycle Provides Efficiency Opportunities



Source: Aberdeen Group, March 2001

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- Integrated applications versus best-of-breed: Either option provides challenges. Integrated applications involve paying for unwanted application functions, while lacking others that are needed. Best-of-breed applications inevitably call for a high level of integration effort and expense.
- Integration: Trading partner process interaction requires that process flow be mapped to each internal requirement. Business documents must be translated from EDI (electronic data interchange), XML (eXtensible Markup Language), or flat file formats. Data flow must also be integrated by developing code to exposed APIs (application programming interfaces).
- Extensibility: Aberdeen research shows that companies are adamantly committed to their back-end systems and expect to be able to extend, not duplicate, these processing functions to support trading partner processes.
- Total cost of ownership (TCO): When license, maintenance, and implementation costs are considered, the average procurement system — not considered to be the most complex of trading partner applications — can easily cost from $1 million to $2 million. These costs accelerate when efforts to alter, support, and maintain underlying infrastructure to support the new applications are added to the mix.
- Time to market: Depending on scope, an e-Business application implementation can take from three months to more than a year.

A New Software Development Model to Optimize Value Chain

To improve business processes between enterprises, networked value chain solutions must support collaborative inter-enterprise supply chain, procurement, and logistics processes in a heterogeneous environment. Components of the new business-to-business (B-to-B) paradigm will demonstrate the following traits:

- *Connectible*: The driving force behind the new B-to-B integration requires that processes be connected to speed the flow of process activity inside the enterprise and between trading partners. Therefore, application functions must either reside on or be immediately available to an accessible network.
- *Flexible*: To speed time to value, process functions must be deliverable in smaller, more digestible component sizes. The process functions must be loosely coupled from the application to provide trading partners with the maximum flexibility to build integrated process functions. These functions must map as closely as possible to existing process flows and accommodate trading partners' preferences.

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- *Able to integrate*: Trading partners must be able to communicate with each other and exchange business process logic, business documents, and data. In short, even the most extensive applications will still be forced to integrate with legacy systems within the enterprise as well as the myriad systems used by external trading partners.
- *Interoperable*: The reality is that IT shops are heterogeneous and approach B-to-B from various platforms and applications. It is imperative that value chain application components support value chain processes between separate enterprises and that all use existing as well as emerging Web standards, such as XML, UDDI, SOAP, and Java technologies.
- *Dynamic*: Though static value chain processes would be easier to support, the fact is that new trading relationships are formed, altered, and optimized on a constant basis. This continual flux calls for IT staffs to continually update trading process support. Ideally, value chain application components would be intelligent enough to dynamically alter their functions based on changes that happen elsewhere in the trading network.

Making the Case for Web Services in the Value Chain

Unfortunately, most enterprise value chain optimization efforts have bogged down in massive efforts to make existing back-end applications and databases Web-accessible to support trading processes. Though they often succeed in the "Webification" of the enterprise, they still struggle with negative side effects, such as poor Web site performance, lack of robustness, application rigidity, unnecessarily slow implementation, and inadequate security.

Attempting to raise security and limit variability and uncertainty, firms implement tightly controlled, fixed infrastructures for each e-Business application. The problem is that the use of this fixed point-to-point delivery model — which may have been successful in supporting static, back-end operational processes — will not succeed in supporting the trading partner infrastructure build-out.

Flexible Web Services Make e-Business Sense

Enterprises need an infinitely variable framework, where applications dynamically reassemble themselves based on the user's context, resources required, as well as platforms and bandwidth available at the moment of the request. Web services offer just such a framework. Built on a software infrastructure that is open, standardized, integrated, and "future-proofed," Web services complete complex tasks over the Internet by recombining a set of *self-describing* application components. Each component is equipped to proactively discover and engage other components while exposing enough information about itself to allow users, applications, and devices to find out what it does and how they should use it.

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Web services focus application delivery on specific points of service, such as the user's current location (instead of the user's fixed desktop) or the specific application process required for the current task (instead of the entire application). Developers of service-point architectures write Web services as network services, where one copy is accessed by any user or resource. Table 1 details the advantages and benefits of delivering software as a service.

Web services enable enterprises to attack the forecasted multi-trillion-dollar potential market exploiting three qualities inherent to a well-designed Web service:

1. The service point is not fixed, allowing multi-location and multi-device access by end-users (home or office, PC, or PDA) and dynamic delivery adaptation to changing resource and application requirements.

Table 1: Benefits of a Web Services Approach

Web Service Feature	Technical Advantages	Business Advantages
• Publish features and availability through standard schemas	• Expose business functionality • Hide code-level complexity	• Per-process flexibility to adjust to swings in business and regulatory environment on a consistent basis
• Dynamically discover and engage other Web services based on runtime requirements	• Engage only resources required for each transaction • Use existing applications, infrastructure, and hardware without wholesale upgrades	• Customize responses to individual requests • Decrease development costs • Improve user service and satisfaction
• Element-level, runtime decision-making ability	• Flexibly adapt to changing network and resource demands and availability	• Decreased operating costs, employing available resources instead of creating new ones
• Easily reusable	• High availability and interoperability • Simplified development	• Less complex integration — reduced time-to-market of new business services
• Based on open Internet standards (e.g., XML, LDAP, SOAP)	• Increase interoperability • Per-element upgrade without affecting entire application • Broaden usable resources	• Reduce supplier lock-in • Reduce repair and maintenance time and costs

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2. Internet-based clients (browser, instant messaging) that run on devices with limited processing resources (PDAs or cellphones) or over low access (wireless or dial-up).
3. Customized, context-specific services integrate changing user roles, customer history, application availability, and database functionality.

Web Services Enable Value Chain Connection

It is obvious that the trading processes of most businesses are too complex to be addressed by any one concentric application approach. Process functions are specialized and need to connect to specific services to support their process area. For this reason, Web services will play a key role in helping enterprises support value chain functions.

Although there is much buzz in the industry regarding Web services, the fact is that most people are already using them today. In the procurement space, for example, a Web service conducts a search for sources of supply. An auction house identifies itself as a service provider for this need, offering a Web service that ties a customer's procurement system to the auction system.

Preliminary research in this area suggests that organizations are benefiting from Web services. One Sun customer, a major bedding manufacturer, used Web services (catalogs, order management, and workflow) to revamp its value chain visibility. Using these services, the company built tighter integration between its Enterprise Resource Planning (ERP) and logistics systems, and better information regarding product availability and shipping status. The results for this effort are reduced inventory levels and the implementation of more efficient sourcing practices with customers and trading partners.

The fact is that companies are beginning to extend beyond the walls of their enterprise and beyond the supply chain model to connect into a matrix of process functions, called the Value Web. This Value Web will comprise procurement or auction sites, vertical Net markets, private trading exchanges, or even point-to-point connections with trading partners. Aberdeen regards the matrix of connection modes that will connect the enterprise's value chain processes to the Value Web as the business process network (BPN). The BPN is enabled by components that include Web application services, portals, and business process hubs.

- Web Services: As application functions are repurposed into Web services, the services are often deployed to run on business process hubs. Major ERP, SCM, and B-to-B vendors already plan to deliver components of their applications that will run as Web services on the BPH. Portable code (e.g., Java technology) and visual mapping techniques are critical to invoke services that can be processed on virtually any platform.

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- Portals: The portal integrates application resources within — and external to — the firewall. The portal provides control to the organization, while promoting productivity and process quality to employees and trading partners. The portal is integral to the logical and physical integration of application-level resources. By leveraging industry-standard directory structures (UDDI and LDAP), the portal will play a key role in enabling supply chain collaboration by enabling trading partners to interact with the enterprise in a controlled and secure fashion.
- Business Process Hubs: A Business Process Hub (BPH) is essentially a platform, like an application server, that is optimized to support the value chain functions between trading partners. In addition to providing the basic system management, security, integration, and networking functions for inter-enterprise connections, the BPH will also run the services that support the value chain processes.
- The BPN model provides a structure by which enterprises can quickly deploy process support services in a relatively rapid and incremental fashion, provided that the services can interoperate with each other over the same application server.

For example, to build procurement functionality, the enterprise could buy a basic procurement service that would run on its application server. It needs a collaboration tool for trading partners to communicate and collaborate in real time to discuss order changes or product availability. This function could be addressed via an instant messaging service. If the service describes itself in a standard way and runs on the Java platform, it would not require many of the integration aspects now required to mix application functions.

This BPN model for supporting Web services provides obvious time-to-market and cost-efficiency advantages over the fixed, point-to-point application approach. It also sets the stage for the next wave of e-Business on the value chain, where dynamic, context-based services, delivered on demand, provide a high level of process efficiency and flexibility.

Delivering Value Chain on Demand Requires Services on Demand

Services on Demand is about combining and leveraging enterprise assets to build and deliver services to communities. It is about using traditional application, Web application, and Web service methodologies as appropriate in the value chain.

As an increasing number of Web service components become available, and as each component is infused with increasing intelligence, the Web services themselves become more contextual — understanding the type, moment, and requirements of the incoming request — and can dynamically recombine freestanding components to create the best and most effective response to the request.

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Services on Demand: For the Entire Organization
With Services on Demand, everyone wins. The CEO gets increased flexibility to develop business strategies that shorten the time necessary to capitalize on new opportunities, or react to changing business conditions. The CIO can roll out innovative products more rapidly to outpace less responsive competitors, and reduce operating costs to more easily outsource business processes that are not directly related to the organization's mission.

Developers can focus on features and functions that are core differentiators for their solutions and use Services on Demand to access non-core functions. IT managers can manage and extend their infrastructures based on business needs, engaging as many or as few services as are required to meet those needs — thus removing the need to install, manage, and pay for large, monolithic applications.

Trading partners win by being able to identify process components and define those as macro services, tied together via a directory to make a macro service. Trading partners win by being able to identify individual processes as micro Web service components, tied together as desired to form macro Web services discoverable via a Web service directory.

Moving Cost-Effectively to a Services on Demand Value Chain
The process of moving to a Services on Demand architecture to leverage Web services for e-Marketing initiatives should be straightforward. There are two cases:

1. *New applications* — identify and standardize on one architecture, portal user interface, infrastructure software, and development process; and
2. *Existing applications* — gradually "encapsulate" functions from each application in the Web services infrastructure.

Implementing Web Services
Before choosing an architecture, the enterprise should evaluate the business process and communities to be served by the Web service. Line of business managers and IT architects should work together in this process to identify the new services that are targets of immediate opportunity and that have the greatest potential ROI.

Once the manager identifies applications that would be most useful as Web services, the IT architect can then identify the availability of enterprise DARTs. All through this process, the emphasis is on the business and service level requirements of each community being served.

Next, the company should create the foundation on which to build the Web services. This process involves the following actions:

1. *Standardize on standards*: Select the standards that will be used to communicate within and between the elements (e.g., XML, SOAP, LDAP), and the development tools to create and maintain the Web services.

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2. *Directory-enable the Web services elements*: Build a schema for registry development, and then move identity information about the community (user profiles, permissions, and policies); the resources; and application elements (configuration, access, and availability) into the directory.
3. *Define a standard portal interface*: The interface separates front-end format issues from back-end feature/function issues. With a portal interface, customers, partners, and employees can access services via any device that supports a Web browser. The back-end infrastructure can be integrated, updated, and revised without affecting the service level.
4. *Lay the foundation:* Deploy infrastructure elements that support (or plan to support) critical Web services technologies such as XML, SOAP, UDDI, WSDL, ebXML, LDAP, and J2EE.

Field experience has demonstrated that this process — thoughtfully conducted with current and future business conditions in mind — must be enthusiastically supported from the highest levels of an organization. Furthermore, because the quality of this exercise will have direct bearing on an enterprise's future capabilities, Aberdeen recommends seeking first-rate professional assistance from the outset. There is too much at stake to risk a false start.

The Sun Microsystems Model: No Revolution, Just Cost-Effective Evolution

Sun's definition of Services on Demand is the delivery of services anywhere, at any time, and on any device by leveraging and tying together different technologies, including legacy applications, Web applications, and Web services to address specific business issues. In short, it's a matter of evolution, not revolution.

The Sun Open Net Environment (Sun ONE) is Sun's standards-based software vision, architecture, platform, and expertise for building and deploying Services on Demand. It provides a highly scalable and robust foundation for traditional software applications as well as current Web-based applications; moreover, it lays the foundation for Web services and Services on Demand. The Sun ONE comprises four key elements:

1. *Vision* — a model in which an enterprise's infrastructure is able to provide information, data, and applications to anyone, anytime, anywhere, and on any device;
2. *Architecture* — an open, standards-based, end-to-end software architecture for easy integration today and a solid foundation for future services;
3. *Platform* — an open, easy-to-integrate product portfolio solves business requirements, enabling current and emerging Web services; and
4. *Expertise* — Sun has 20 years of experience in delivering cost-saving, business-ready networked solutions from Sun Professional Services, iForce partners, and SunTone certified partners and programs.

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Sun's vision articulates the business objective of Services on Demand as the ability to build, maintain, grow, and ultimately monetize communities — be they shareholders, customers, suppliers, partners, or employees. The key challenge is to deliver Services on Demand in real time to any target community.

Because today's competitive reality demands that quality of service increase while costs simultaneously decrease, services need to be built from information assets that are already common to all organizations — databases, applications, reports, and transactors (i.e., anything that initiates or acts on transactions), hence Sun's "DART" acronym. The Sun ONE platform employs solutions from the Forte, iPlanet, and Solaris product lines to enable Services on Demand (Figure 1). The Sun ONE platform includes:

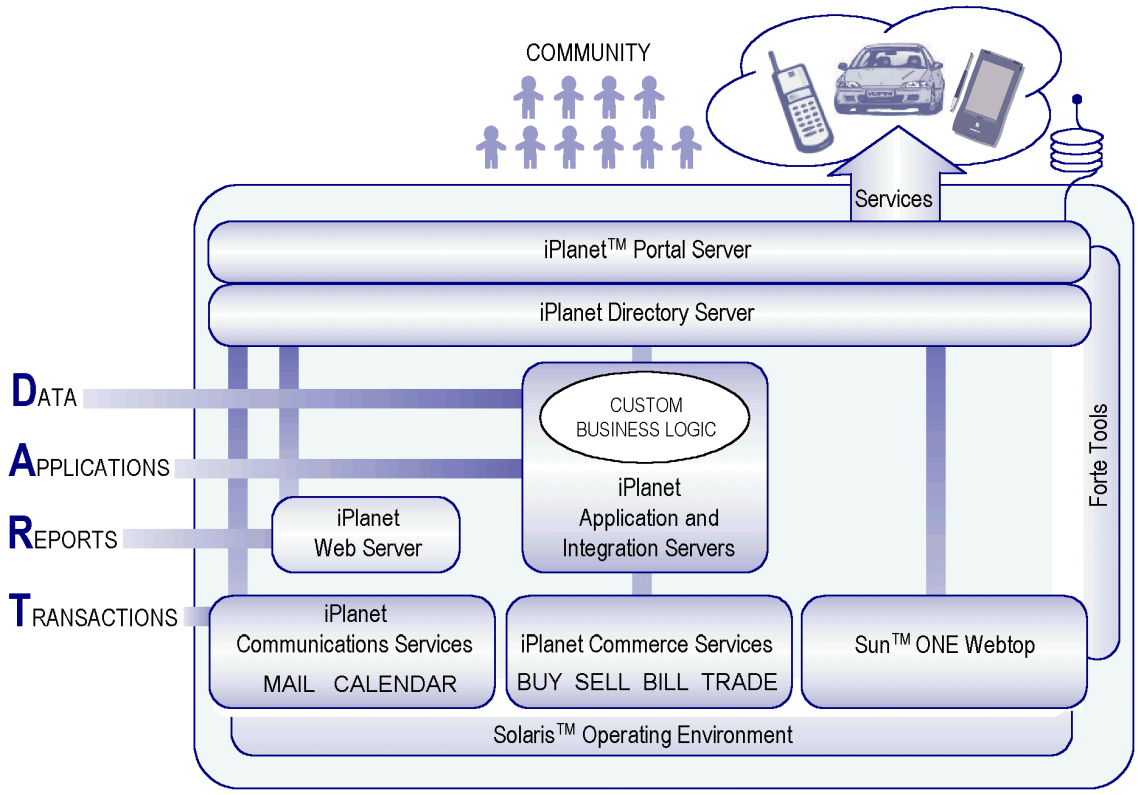
- *iPlanet Directory Server* — LDAP-based directory servers that enable user management to create a community with defined profiles, permissions, and policies. It provides a high-speed, scalable, self-replicating, self-synchronizing data structure and leverages multi-master capabilities to provide unified directory services across multiple directories.
- *iPlanet Portal Server* — provides next-generation presentation and interaction, enabling personalization, custom layout, syndicated content, secure remote access, and wireless remote access.
- *iPlanet Web and Application Servers* — enable the delivery of Services on Demand with a highly scalable platform for business logic written in the Java programming languages, with hooks to legacy databases and applications. Architected for horizontal scalability, the servers are based on Java technology and Java 2 Enterprise Edition (J2EE).
- *iPlanet Integration Server* — provides service interoperability and application integration with legacy, packaged, or custom systems, as well as new back-office environments. Its workflow-based engine allows a business analyst to pull together workflows from various systems to create services. iPlanet ECXpert allows secure document exchange using EDI and XML. The suite includes EAI Edition, B2B Edition, and iPlanet Message Queue for Java, a message-oriented middleware (MOM) solution.
- *iPlanet Communications Services* — include mail, calendar, and enterprise-class instant messaging.
- *iPlanet Commerce Services Portfolio* — provides services to buy, sell, bill, and trade products and services. Built as Java components running on iPlanet Application Server, they include iPlanet BuyerXpert for E-Procurement, iPlanet SellerXpert for online selling, iPlanet BillerXpert for Internet bill presentment and payment, and iPlanet Market Maker for auctions and exchange-based services.

- *Forte Tools* — enable developers to design, create, and assemble Services on Demand. They include Forte for Java, Forte Developer, and iPlanet Unified Developer Server.
- *Solaris Platform* — Sun Solaris Operating Environment and Sun Cluster provide a high-reliability foundation on which to build and deploy Services on Demand.

Leveraging Sun's Services on Demand Expertise

Sun's extensive installed base with service providers and enterprises has put its services group, its iForce program, and its system integrator partners on the leading edge of experience in Services on Demand development and deployment. Sun experts — in concert with partners such as Accenture, Cap Gemini Ernst & Young, CSC, Deloitte Consulting, EDS, and PricewaterhouseCoopers — assist firms to architect, deploy, and manage an open and scalable Sun ONE product infrastructure for Services on Demand from today's applications and Web services to new kinds of services yet to emerge in the future. These experts have a "best practices" knowledge base to achieve operational efficiencies and speed delivery of new applications.

Figure 1: Technologies and Products in the Sun ONE Architecture



Source: Sun Microsystems, October 2001

The Role of Sun Partners

Sun's open standards framework encourages collaboration with customers and partners. Though the Sun ONE platform provides all the tools needed to build Web services, Sun works closely with partners for specific business-level Web services and interoperability support. The SunTone certification program ensures maximum technical interoperability as well as co-marketing and cross-selling opportunities for SunTone partners.

Sun's Differentiation in the Web Services Market

Web services is an industry-wide concept — the clear direction in which the technology industry and business requirements are moving. Services on Demand and the Sun ONE platform make up Sun's vision for anytime, anywhere access to the best, most appropriate service based on the user, resource, or application context. Sun's differentiation can be summed up in three concepts:

1. The Sun ONE platform solution is evolutionary, embracing existing systems and ROI models while affording Services on Demand flexibility.
2. The Sun ONE platform is open — a non-negotiable factor for effective delivery of Services on Demand — built on open interfaces and industry standards such as LDAP, J2EE, IMAP4, SOAP, UDDI, and ebXML, with a commitment to embrace other standards as they emerge. This open architecture lays a "future-proofed" foundation that also leverages the past.
3. The Sun ONE platform is easy to integrate. Architected to consist of well-integrated products, the solution also readily accommodates products from other suppliers who also employ open standards.

Sun starts from a powerful base with its commitment to Java technology — now well accepted as an enterprise-application development platform. The Sun ONE vision builds on this platform with proven hardware and infrastructure software from Sun and iPlanet for Web Services, and for creating, deploying, and maintaining Services on Demand.

Aberdeen Conclusions

Although the current set of Internet-based value chain applications have provided efficiencies — cutting duplication, errors, time, and cost-out of current value chain processes — huge process inefficiencies remain. As the Net market experience has demonstrated, enterprises need a better way to integrate application data and process flow between themselves and trading partners in order to reap the rewards of the value chain evolution. And they need to do this in a way that leverages existing applications.

The Web services construct goes a long way toward resolving nearly all the technological challenges that businesses face in this endeavor. Enabling an enterprise to

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deploy application components, or services, rather than having to build full-blown, customized systems, holds the promise of an easier, faster, and more cost-effective path to reengineering value chain processes. Better yet, this path is an evolutionary one, in which enterprises can leverage their existing infrastructure investments.

Separating business logic from application logic enables business managers to better control the realignment of value chain processes to better execute on strategy. And the promise of Services on Demand and contextual Web services holds the potential of achieving "value chain nirvana," where trading partner processes can be dynamically updated to support change or respond to disruption in the network.

Aberdeen asserts that industry standards are key to fulfilling the promise of Services on Demand. Web services must be interoperable, easy to integrate, and run in virtually any operating environment. Sun's record for supporting these processes — and delivering products that run on them — bodes well for the company's ability to deliver on its Services on Demand vision. Aberdeen recommends the Sun ONE architecture as a solid foundation on which to build an infrastructure for value chain innovation today — one with a vision for tomorrow and products that have already proven their mettle in the market.

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Aberdeen Group is a computer and communications research and consulting organization closely monitoring enterprise-user needs, technological changes and market developments.

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