A Practical Guide to SOA
for IT Management

June 2006

A Practical Guide to SOA for IT Management
A Systinet White Paper

Systinet, a Mercury Division. One Van de Graaff Drive, 5th Floor Burlington, MA 01803
Phone: 1.781.362.1300
www.systinet.com

A Practical Guide to SOA for IT Management

Contents

Executive Summary

As a strategy for creating a flexible and agile IT infrastructure, service-oriented architecture (SOA) has gained considerable momentum in recent years, largely due to the advent of standards-based Web services that simplify interoperability, and governance technologies that make SOA scalable and predictable. Those organizations without a strategy for SOA risk being outpaced and outperformed by competitors that are better equipped to serve customers, seize opportunities and respond to change. Few other innovations in computing offer the transformative potential of SOA, and Gartner estimates that by 2007, 80 percent of IT initiatives will be service oriented. Some of the basic business drivers for implementing SOA today include:

▶ **Business Agility.** SOA makes IT more responsive to changing business demands, and more flexible to changing business processes. Reconfiguring loosely coupled business services is simple, fast and low-cost.

▶ **Cost Savings.** Organizations implementing SOA have the potential to achieve significant cost reductions by reusing sharable business services, rather than recreating functionality to address the needs of each application initiative. SOA simplifies and accelerates application development, which enables organizations to do more with less.

▶ **Maximizing IT Investments.** SOA doesn't require organizations to rip and replace existing IT investments, but it allows organizations to wrap and reuse existing IT investments and make them available to a wider audience. SOA encourages reuse and avoids unnecessary duplication and reinvention.

▶ **Aligning IT to Business Processes.** SOA transforms IT systems into self-contained services that accurately reflect business processes and operational requirements. With SOA, IT mirrors business operations, which improves the utility IT delivers to the business.

This paper discusses the business value of SOA and introduces a management framework for implementing SOA and capitalizing on the advantages it promises. It reviews the critical elements of visibility, trust and control in implementing SOA; provides a context for understanding the SOA ecosystem; explores the importance of governance; and reviews the role of Systinet 2 as the basis for implementing and governing SOA.

The Business Value of SOA

SOA is a design style for maximizing IT interoperability, and for sharing and reusing business services in a distributed environment. Service orientation isn't a new approach to software design, but it has become increasingly viable because of the widespread adoption of Web services technology that makes creating an SOA practical and cost effective. SOA offers distinct advantages over traditional architectures.

SOA makes interoperability an innate characteristic of IT applications. Applications built using SOA-based services become shared resources that are completely platform-independent, language-independent and very loosely coupled based on universally accepted industry standards. Organizations no longer need to invest inordinate amounts of time and resources writing custom adapters to integrate applications, only to have to recode them when changes are made to support new business processes. With an SOA, all IT systems have interoperable applications, so the problem of integrating them becomes far less relevant.

SOA makes IT more agile and more responsive to changing business demands. New business processes can be supported and integrated across organizational and IT systems on demand, and organizations can easily compose reusable, shared services to respond to new business challenges. In addition, since services are represented in high-level business terms, IT is encouraged to think in terms of business functions. With SOA, IT systems quickly and accurately adapt to organizational goals and processes. SOA makes IT highly tolerant of change, and reconfiguring loosely coupled services becomes a simple and economical process.

Overall, SOA offers an easy way to speed time-to-market, respond quickly to changing business conditions, reduce duplication of effort and maximize the value of existing assets. The result is a very positive effect on the bottom line. Organizations can implement SOA initiatives and IT managers can better prepare their organizations to:

▶ **Respond to Change:** SOA enables organizations to rapidly respond to unpredictable changes within the business environment, such as competitive assaults, mergers and acquisitions, reorganizations and new channel opportunities.

▶ **Differentiate:** SOA allows companies to differentiate their offerings by developing innovative, value-added services, such as a customer-facing tools and applications.

▶ **Drive Revenue:** SOA enables organizations to drive incremental revenue by simplifying the process of selling through new channels or enabling single views of data to support cross-selling initiatives.

▶ **Mitigate Risk:** SOA enables organizations to mitigate risks by ensuring corporate, IT and regulatory compliance by enforcing policies enterprise-wide within an operating environment.

Management Guidelines

As your organization begins planning for SOA, there are a number of things to bear in mind. IT managers should consider the following guidelines as they approach an SOA rollout:

▶ **Plan for Incremental Deployment.** A complete conversion to SOA principles and practices does not happen overnight. SOA can easily be deployed incrementally and still show business value. For example, an SOA can show immediate value on projects with multi-point integration involving heterogeneous or legacy applications. Reuse of legacy code and integrating diverse platforms is an ongoing challenge for most enterprises, but that challenge is easily met using SOA. Define a long-term plan with an overarching vision for SOA, but focus on discrete projects to build momentum and show business value.

▶ **Focus on Interoperability.** Innate interoperability is a key benefit of SOA and it is important that interoperability standards are defined upfront and governed as business services are created and deployed. An organization must define an interoperability architecture and policy to manage all integration efforts. IT must also specify how services will be used and what standards must be defined and enforced. Organizations should also define a reference architecture for migrating point-to-point Web services to reusable business services.

▶ **Focus on Business and IT Agility.** Business and IT agility should always be a primary and over-arching goal of an SOA strategy. IT systems begin to mirror business processes, making it easier to map business change to system change. SOA technology makes it easier to implement IT change because systems are composed of loosely coupled business services. This means that changes in services do not interfere with connections between services, and reconfiguring processes is straightforward. For example, if the business rules for processing payroll are changed, the retirement plan system that depends on the payroll service is unaffected. The business services that compose an SOA represent a coarse-grained view of IT assets — i.e., it defines services around business concepts rather than technical details. This allows business analysts to easily understand and work with business services to implement change without turning to IT.

▶ **Think in Terms of Business Services.** At its core, SOA is about business services, which are the reusable components at the heart of an SOA. Business services represent a common unit of work — they're expressed in business terms and must be widely relevant and understandable to the business. This defines the level of granularity for creating services. Examples of business services may be, "Get portfolio balance," "transfer funds" or "execute trade." "Settle books for the quarter" would be too coarse grained to be practical or applicable, and "encrypt transaction" would be too fine grain to be relevant in business terms. The right definition of business services is a key contributor to the success of an SOA and it shouldn't be overlooked.

systinet™
A MERCURY DIVISION

▶ **Recognize the Cultural Implications of SOA.** SOA dictates process and behavioral changes and initiatives cannot be successful if essential human factors are ignored. The two most significant cultural implications SOA introduces are trust and incentives. Potential consumers of services will typically develop their own capabilities before they'll reuse a service they can't explicitly trust. That is why the assurance of quality — and the proof of quality — are absolutely essential to the effectiveness of an SOA. Incentives are another cultural implication of SOA. SOA demands changes in the behavior of IT professionals who are used to creating and managing monolithic applications in highly siloed business settings. Developers need incentives to contribute services for reuse. IT and business line management need to implement incentive systems that encourage developers to think beyond their immediate business silo and contribute to the shared-service environment. This cultural change needs to come from the top, involving senior-level sponsorship of SOA, and it needs to be reinforced by processes and incentives that encourage compliance with an SOA style of development.

▶ **Think Beyond Web Services.** Some organizations confuse the use of Web services with a bona fide SOA initiative. The reality is that usage of Web services is only part of the picture. A complete SOA strategy requires organizations to answer the following types of questions:

> ▶ Are you aware of all of the services that currently exist?
> ▶ Do potential consumers trust the services they discover?
> ▶ How can you adequately test and manage services for performance and quality?
> ▶ Do consumer and providers have a way to formalize a contract to bind their relationship?
> ▶ Do you have a way to monitor and report on service usage, compliance to policies and SLAs?
> ▶ Do you have a way to understand expected service demand for capacity planning?
> ▶ How will you handle charge backs for ensuring providers are properly compensated?
> ▶ Can you perform impact analysis to ensure service changes don't disrupt business processes?

▶ **Understand the SOA Governance Imperative.** In a traditional computing model, business functionality is buried in siloed applications and governance is hard-wired into the applications themselves. SOA introduces a whole new dynamic and a fundamentally different governance model. Business functionality is exposed as standards-based, shared and reusable services, and governance is dictated by the application context, which is in a constant state of change.

According to Gartner Group, "SOA governance isn't optional — it's imperative. Without it, return on investment will be low and every SOA project out of pilot phase will be at risk." This is because SOA introduces new levels of complexity that must be governed to ensure SOA doesn't turn into chaos.

This complexity comes in the form of relationships, both technical and human. Technical relationships involve issues of interoperability — services must interoperate with the applications they support and the other services and infrastructure they depend upon. This makes it absolutely essential to define interoperability policies and ensure consistent conformance to these policies.

Human relationships are equally important. Let's start with consumers and providers. Consumers and providers are at once both dependent upon one another and operating independently based on their own unique view of a service. Consumers and providers need complete transparency to avoid conflict and ensure a well-functioning relationship, but they also need the flexibility to work with the same services based on their own independent lifecycles. Since the specific needs of consumers and providers are rarely in alignment, they need a way to communicate and collaborate throughout the course of service usage. But trying to manage these relationships informally would be chaos, particularly because a provider will typically support many consumers.

Collaboration must also occur throughout the process of business service definition, creation and implementation. Business people need to get involved in the definition of services to ensure they map to specific needs and process requirements. Application architects and developers are responsible for developing services. Enterprise architects typically define policies and oversee the implementation and operational aspects of business services. These are just a few examples of the many participants involved in managing an SOA. Again, this collaboration cannot happen informally for an SOA to function effectively.
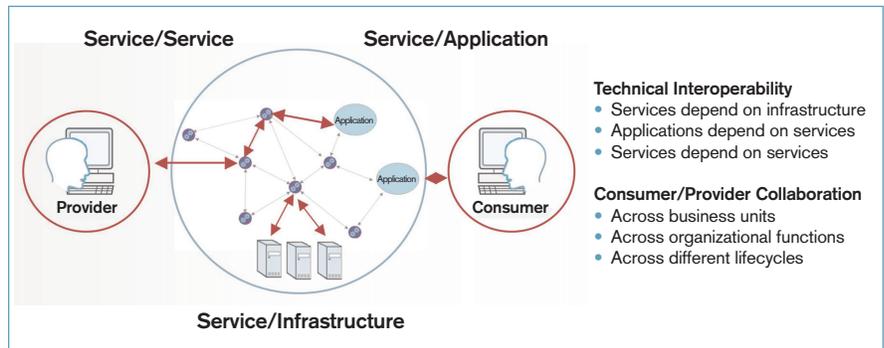
SOA governance consists of the corporate, business and IT processes and rules required to control and guide the business success of an SOA implementation. SOA governance provides a means to ensure the quality, consistency, predictability, change and interdependencies of services. Its overarching goal is to manage the complexity created by SOA by ensuring that organizations are able to capitalize on the powerful promise of SOA without sacrificing control, predictability and efficiency. Said another way, SOA governance is about blending the flexibility of service orientation with the control of traditional IT architectures.

SOA Requires Visibility, Trust and Control

An effective SOA is a marketplace of services, bringing together providers who publish services with consumers who discover and reuse services to develop new applications. But the reality is that like any marketplace, governance is required to create an effective, smoothly functioning and effective operation. At its most basic level, SOA governance is about ensuring visibility, trust and control.
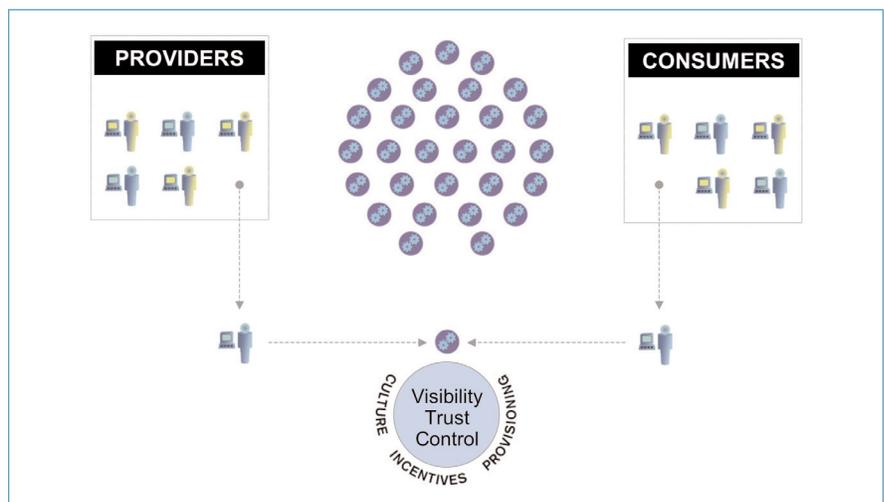
▶ **Visibility.** Consumers need to be able to find and understand services to gain insights into their intended functions, attributes, characteristics and operating performance to help them make better and more informed decisions. Additionally, other IT stakeholders need to understand a full breadth of information about these services to manage the overall health of an SOA. Questions these stakeholders may need to ask include:

> ▶ How many and which consumers are using this service?
> ▶ What is the impact of a service change on these consumers?
> ▶ To what extent does a service conform to specific IT, business and regulatory policies?
> ▶ Where is this service in its lifecycle?

To provide this visibility, organizations need a single "system of record" that captures all of the information about the business services at the heart of an SOA. This information includes service descriptions, policies, technical documents such as WSDLs and schema, contracts and other metadata that help consumers to fully understand the intent, operational realities and the trustworthiness of business services.
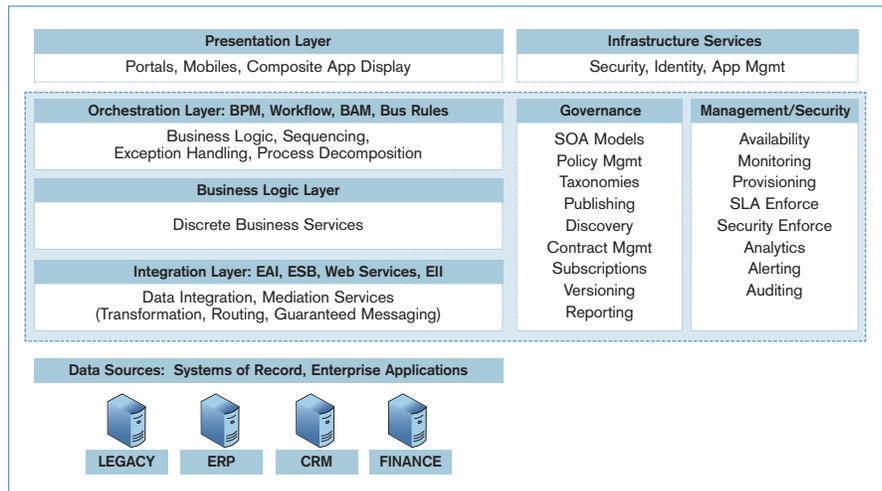
▶ **Trust.** A significant challenge to SOA adoption is that while the management of service quality is paramount, simply having quality is not enough. For the first time, quality must be proven and demonstrable to consumers to gain their trust and create an effective shared-service environment. Without trustworthy services, consumers will typically recreate rather than reuse, which undermines the overall purpose of an SOA. Creating a system of record enables organizations to capture the information necessary to create a "trust profile" that makes the quality and trustworthiness of a service visible and apparent to consumers.

Another aspect of trust is the ability to formalize consumer/provider relationships with an enforceable agreement that specifies service level expectations and any other terms, conditions and details that need to be agreed upon as the basis for service consumption. An informal consumer/provider relationship can easily lead to conflict and misunderstood needs and expecta-tions, which can create inefficiencies and potentially disrupt applications and business processes.

▶ **Control.** Organizations need to manage services just as they manage other high-value IT assets — from introduction to final retirement and at every step in between. This means managing access to services, ensuring they are visible and accessible to only authorized stakeholders. It also means enforcing specific processes for service introduction. Processes must be defined and people identified for reviewing and authorizing the introduction and publication of new services to minimize duplicate, nonconforming or poorly defined services and to assess overall fitness for use. Control is also about service change. As services evolve, organizations need to be able to anticipate the impact of changes to ensure modifications to a service do not disrupt other services and applications where dependencies exist.

Understanding the SOA Ecosystem

A practical guide to SOA requires an understanding of the complexities and interrelationships of the SOA ecosystem. It is important to recognize that no single vendor will deliver your "SOA solution." The reality is that many software vendors participate in the SOA ecosystem, and IT managers need a framework for analyzing the role a vendor can play in the creation of an SOA.

Presentation Layer		Infrastructure Services	
Portals, Mobiles, Composite App Display		Security, Identity, App Mgmt	

Orchestration Layer: BPM, Workflow, BAM, Bus Rules	Governance	Management/Security
Business Logic, Sequencing, Exception Handling, Process Decomposition	SOA Models	Availability
	Policy Mgmt	Monitoring
Business Logic Layer	Taxonomies	Provisioning
	Publishing	SLA Enforce
Discrete Business Services	Discovery	Security Enforce
	Contract Mgmt	Analytics
Integration Layer: EAI, ESB, Web Services, EII	Subscriptions	Alerting
	Versioning	Auditing
Data Integration, Mediation Services (Transformation, Routing, Guaranteed Messaging)	Reporting	

Data Sources: Systems of Record, Enterprise Applications

LEGACY   ERP   CRM   FINANCE

Data Sources consist of packaged or internally developed legacy applications, and they contain the data and the functionality that organizations will often want to repackage and expose as reusable services.

Integration Layer provides an intermediary to the underlying data that needs to be accessed and shared within an SOA. Organizations typically introduce this layer when they have large-scale requirements and need to maintain consistent performance and response times; or when they need to transform or otherwise enhance data. This layer typically includes technologies such as enterprise application integration (EIA), enterprise service bus (ESB) and enterprise information integration (EII).

Business Logic Layer consists of the commercial software applications that were developed based on a set of reusable and self-contained services that can be combined and composed to meet the specific needs of an organization's business processes. This layer represents the new paradigm for commercial software development and delivery, and will often figure prominently into an enterprise SOA strategy.

Orchestration Layer provides the tools for creating applications, defining workflows and assembling business processes. The orchestration layer is the focus of the business process management (BPM), workflow, business activity monitoring (BAM) and business rules vendors, and it is where IT and technically oriented business analysts assemble SOA-based components to build new applications.

Presentation Layer is how services and the applications they comprise are displayed to end-users. Examples include Web portals, composite application frameworks, mobile devices and PDAs.

Infrastructure Services are the tools and technologies that "keep the lights on." These services include capabilities for user provisioning, ensuring security and managing identity, as well as capabilities for application testing, monitoring and management to ensure services meet functionality, performance and availability requirements.

Governance includes a trusted and authoritative system of record for the discovery of services; capabilities for managing collaboration between technical and business stakeholders in an SOA; tools for ensuring the quality and conformance of services; and capabilities for formalizing consumer/provider relationships. SOA governance is centered on ensuring visibility, trust and control.

Management/Security includes Web service management (WSM) and XML security vendors. WSM focuses on enforcing policies within an operational environment to permit conforming and reject nonconforming service behaviors at run time. XML security encrypts and secures XML-based messages "over the wire" to ensure data is secured end-to-end and to preclude packet sniffing.

While governance is critical to the success and viability of an SOA initiative, it represents but one important piece of the puzzle. SOA is as much about people and process as it is about technology. But even in the narrow scope of technology (the intent and focus of this paper), beware of vendors who claim to have a "complete solution" for SOA — no single vendor can deliver on such a lofty claim. SOA is inherently heterogeneous, involving both existing "legacy" technology as well as point solutions from a number of different vendors. As such, be certain to evaluate interoperability and look for deep partner networks when selecting commercial software vendors.

Governing SOA: Introducing Systinet

Systinet, a division of Mercury Interactive Corporation, has been a leader in SOA for more than five years. Systinet has earned a distinguished reputation of trust by consistently building award-winning products and guiding customers of all sizes to design and deploy effective SOA infrastructures.

Systinet 2 is the most complete SOA governance and lifecycle management platform, providing a trusted system of record and a complete set of capabilities for establishing the visibility, trust and control critical to SOA success. Systinet 2 ensures consistent access, management and governance of the reusable business services, associated artifacts and information that enable SOA.
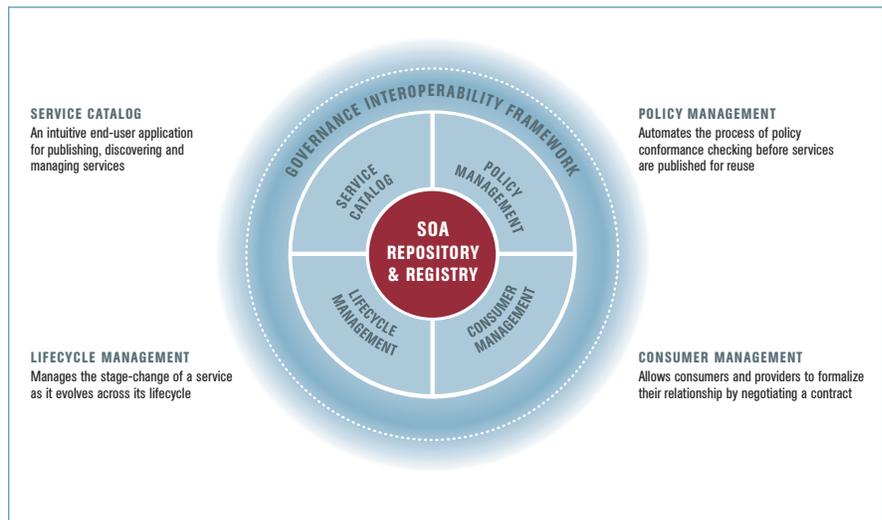
The promise of SOA cannot materialize unless organizations ensure visibility, trust and control within their SOA. This means creating a foundation for SOA governance that balances the flexibility and agility promised by SOA with the control and predictability of traditional IT. Systinet 2 provides capabilities for:

▶ Publishing and discovering services to ensure services can be found and reused
▶ Creating policies and validating conformance to ensure services put into production are high quality
▶ Creating consumer/provider contracts to minimize conflict and ensure transparency of expectations
▶ Managing the lifecycle of services to ensure the control of services from introduction to retirement
▶ Reporting on various dimensions, including impact analysis to understand how service changes will impact other services and ultimately business processes

Specific Systinet 2 capabilities include:

▶ **Standards-based Registry.** Systinet Registry has the widest adoption of any business service registry on the market today. It provides a simple and standards-based way to discover and publish reusable business service. It also integrates with the Systinet 2 repository to provide a complete "system of record" for all SOA information.

▶ **SOA Repository.** The SOA repository is the foundation for the rich governance applications Systinet 2 delivers. The repository provides a way to capture, catalog and discover all of the metadata, artifacts and relationships at the heart of an enterprise SOA. It also provides capabilities for rich reporting, impact analysis and synchronization with other repositories.

▶ **Service Catalog.** This capability simplifies process of publishing and discovering services with a straightforward and intuitive application for providers to publish and consumers to discover business services.

▶ **Policy Management.** This capability transforms design-time validation of services from a manual effort to the click of a button. This takes the time and complexity out of service validation and improves the quality and conformance of reusable services.

▶ **Contract/Consumer Management.** Promotes consumer/provider trust by facilitating service-level agreements and other terms and conditions that bind the service providers and the consumers who reuse services.

▶ **Lifecycle Management.** provides control over versioning and state-change of business services from initial introduction to final retirement.

Governance Interoperability Framework (GIF)

Because of the complexity and heterogeneity of an SOA, interoperability is absolutely critical. Founded by Systinet, the Governance Interoperability Framework (GIF) defines a set of technical specifications and brings together leading SOA vendors to ensure seamless interoperability. GIF spans management, security, integration, composite applications and business intelligence vendors, providing an easier way for an organization to deploy a multi-vendor SOA. In doing so, GIF enables and simplifies governance, compliance and policy-driven solutions for an enterprise SOA.

Through the GIF specification, software vendors have the ability to publish services and associated policy to a system of record in a standardized way, and have access to metadata about the range of services that make up an SOA. Systinet 2 supports GIF and can serve as the system of record for managing business services.

Looking Beyond Governance: A Lifecycle Approach to SOA

While governance is generally accepted as the starting point for scalable SOA initiatives, many organizations are now realizing that they must take a full lifecycle approach to managing their SOA implementations. This means that, in addition to ensuring visibility, trust and control, there must be broader considerations for testing functional and performance aspects of services and monitoring the behaviors of services within an operating environment. In addition to enterprise-class SOA governance offerings, Mercury also provides a broader set of SOA capabilities that build upon the company's strength and leadership in the areas of application testing and management. This helps organizations to make go/no-go-decisions with confidence; to understand the realities of services in an operating environment; and to answer key questions such as:

▶ How do I ensure services meet functional requirements?
▶ How do I ensure services will scale in production?
▶ How do I manage the complexity of testing dozens or hundreds of services?
▶ How do I quickly identify and resolve service problems in production?
▶ How do I understand the overall impact of service changes?
▶ How do I ensure services meet SLAs?

In addition to the Systinet 2 product line, Mercury SOA solutions include:

Mercury SOA Application Delivery — Control the Risk of Delivering Services

Mercury is the market leader of SOA Application Delivery with solutions and processes covering all aspects of Quality Assurance. Quality is the basis for trust and predictability within SOA. Mercury offers integrated Centers of Excellence solutions with functional verification, performance validation and quality management capabilities. These centers ensure that SOA services are tested, validated and optimized in order to align with functionality and performance requirements described by policies and contracts. Mercury's complete set of quality assurance solutions support the specific quality needs of service oriented architectures.

Mercury's Quality Center and Performance Center provide applications and services to manage the process of delivering quality SOA applications. These include:

▶ Automated functional testing (QuickTest Professional)
▶ Business process and manual testing (Business Process Testing)
▶ Load and performance testing (LoadRunner)
▶ Diagnostics for faster time-to-issue resolution (LoadRunner)

These integrated solutions:

▶ Drive the rapid delivery of SOA-based applications
▶ Make better-informed "go-live" decisions
▶ Reduce the cost and time of deploying new software or upgrades
▶ Decrease software defects
▶ Gain end-to-end visibility into performance throughout the lifecycle of an SOA application
▶ Ensure applications are ready to deliver their intended business results
▶ Facilitate increased collaboration among business analyst, developers and quality assurance teams through the use of a Web-based platform

Mercury's SOA Application Management — Ensuring Operational Business Value

Mercury's approach to application management for SOA environments deals first and foremost with ensuring that companies achieve the expected value from SOA-based applications during the normal day-to-day operations of the business. Mercury's Business Availability Center includes functionality that helps businesses manage and optimize SOA environments so that associated business services deliver as much value as possible.

Business Availability Center delivers value in SOA environments in three key areas:

▶ Service level management: enables business and IT to agree on, manage and ensure visibility into how a service-oriented architecture is delivering the actual business service in real-time and over time.

▶ Problem resolution: facilitates fast problem detection and notification so that despite SOA complexity, performance issues can be quickly diagnosed and mean time to repair can be reduced.

▶ Change impact: eliminates the risk of frequent changes in SOA environments by quickly detecting them and establishing their impact.

Mercury Business Availability Center consists of multiple applications that work together to deliver SOA management including a real-time, correlated centralized dashboard. Business Availability Center applications include:

▶ End-user Management which provides real and synthetic monitoring of end-to-end web service transactions.

▶ Service Level Management which enables setting, measuring and reporting on performance criteria as it relates to the business.

▶ System Availability Management which delivers agentless monitoring of the underlying SOA infrastructure including operating systems, hardware, applications, application components and networking, as well as third-party data.

▶ Application Mapping which automatically and dynamically discovers and maps SOA environments and provides the foundation for change impact.

▶ Diagnostics which supplies critical, low-level problem analysis and troubleshooting for J2EE and .Net environments.

systinet™
A MERCURY DIVISION

Conclusion

SOA makes IT organizations more flexible to respond to evolving business demands. SOA presents a tremendous opportunity for IT managers to help organizations respond to changing business conditions, differentiate their offerings, increase revenue and mitigate risks by ensuring corporate, IT and regulatory compliance by enforcing policies enterprise wide. But the reality is that SOA itself can introduce new risks that must be managed by starting with a foundation for governance. This enables organizations to capitalize on the promise of SOA without creating an uncontrolled and uncontrollable IT environment.

IT managers are increasingly leading SOA initiatives, and it is critical to ensure governance so that SOA environments can be managed and scaled over time to ensure a functioning marketplace of services for SOA consumers and providers. SOA can help IT management transform their businesses, but successful deployment of SOA requires governance based on visibility, trust and control. Managing the complexities of an SOA ecosystem is a major challenge for IT managers. Systinet offers a complete SOA governance and lifecycle management platform that provides a trusted system of record and a complete set of capabilities for establishing the visibility, trust and control essential for the success of SOA.

About Systinet

Systinet, a division of Mercury Interactive Corporation, provides a leading foundation for SOA governance and lifecycle management. Founded in 2000, Systinet's proven and standards-based products include Systinet Registry, and the broader Systinet 2 SOA governance platform. Systinet products help organizations to achieve the visibility, trust and control necessary for SOA success. This allows organizations to manage the complexity of SOA, mitigating the risk and optimizing the business benefits of SOA initiatives. For more information, please visit www.systinet.com.