



A Perspective on Emerging Industry SOA Best Practices[®]

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Using a service-oriented architecture (SOA) approach allows organizations to become both more efficient in meeting their current needs and more agile in meeting future—and possibly unknown—challenges. SOA, however, is not a panacea. As with any large-scale systems integration effort, there are challenges with employing SOA techniques effectively. This article presents industry best practices to deal with key SOA challenges.

Given the anticipated benefit of delivering business and operational value improvements—such as cost savings, better business processes, and increased accessibility to information—SOA has become a high-priority focus area for the federal government. As various organizations in the government research adopting an SOA, they often struggle with fundamental questions:

- **Why should we adopt an SOA approach for our IT portfolio?** Is it the best approach for our organization?
- **What are the inhibitors to an SOA approach?** What causes the failure of SOA initiatives and how do we avoid these pitfalls?
- **How do we reduce risk?** What are the approaches for reducing risk, given various implementation techniques, standards, and commercial products?
- **What results should we expect from implementing an SOA?** How should the organization govern its SOA to maximize the business value of its investment?

As the government evolves their architectures to a service orientation on a large scale, leadership will look for the lessons learned by industry and other government organizations. While practical experiences clearly demonstrating the benefits of an SOA approach will continue to emerge, research into initial experiences suggests that the following set of eight best practices can enable an effective SOA adoption strategy.

1. Determine if an SOA is the best approach

When used appropriately, an SOA approach can provide significant value to an organization—but it is not always the right approach or the best fit. In many situations, underlying business requirements make the adoption of contemporary SOA technologies impractical. For example,

specialized security requirements, an organization's inherent network limitations, or high bandwidth data feeds can be impediments to applying industry-standard contemporary SOA technologies.

It is possible to employ custom technologies to meet specialized needs; however, there is significant value in using industry standards when establishing an SOA portfolio. Implementations that need to deviate

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from standards are less likely to benefit from interoperability and later improvements in standards-based technology.

Before embarking on an SOA implementation, consider whether your underlying business and technical requirements can be met with contemporary SOA technologies and standards.

2. Start SOA activities with the focus of solving business and operational challenges

Federal leaders should employ services to support key business processes and SOA efforts should be driven by the organization's business and operational goals. Randy Heffner explains that an SOA is always best with a business process focus:

You can build a much stronger conversation around doing SOA on a project if you focus conversations on the business' high-priority process pain points and opportunities. [1]

Contemporary SOA approaches facilitate a reduction in an organization's IT portfolio by providing services that are commonly used across many business processes. These business process services enable an organization's needs to be reliably met by another organization's capabilities. Gene Leganza writes:

As government agencies re-engineer their business processes to provide horizontal integration to improve services to citizens, other government agencies, and their private-sector partners, SOA allows the agencies to design application components that instantiate the atomic elements of business service delivery in explicit pieces. [2]

When used properly, an SOA enables IT to support business goals. By focusing on services that provide business process capabilities reused across the enterprise, it is more likely that the enterprise will realize the value of the SOA investment.

3. Examine your data, realizing that an SOA does not solve data problems—and it may expose them [3]

The flexibility of SOA in decoupling applications from data may expose issues with semantic differences in data, data quality, and ensuring data availability.

Fundamentally, services share data and, unless providers and consumers have a common understanding of the data that constitutes the payload of a service, shared services will not be possible. When deploying an SOA, it is important to consider your data by defining a common data or abstraction layer, developing mappings

between internal schemas and a common vocabulary across the community, and paying special attention to the governance for maintaining data quality.

A proper focus on data will enable interoperability among consumers and providers and lower implementation risks for the enterprise SOA.

4. Start small, learn, and evolve

Employing the *big-bang* approach to SOA adoption is unlikely to be successful due to the inherent risks of very large-scale software development, requirements complexity, and the challenges of establishing a new architecture across large organizations with significant legacy infrastructure and diverse computing needs.

These factors, coupled with the risk of a large deployment, point us towards starting small, learning, and evolving. SOA initiatives should begin by addressing a business problem constrained in scope, focusing on piloting the architecture, ensuring that clearly defined success criteria exist, and capturing the lessons learned to educate the enterprise and improve future SOA implementations. Ron Schmelzer indicates that organizations should start with a small business problem, adding:

Service-oriented architects must ... maintain a pragmatic mental picture for how the organization can evolve iteratively while still maintaining a single, cohesive vision of the organization's architecture. [4]

Narrowing the initial scope of an SOA implementation to one or two business processes will help keep the SOA at a manageable and realistic size.

Employing a *start small, learn, and evolve* strategy will minimize risk and reduce the time it takes an organization to realize value from its SOA investment.

5. When establishing an SOA, have a long-term vision

The long-term vision for an SOA implementation is frequently organizational agility and reduced cost, allowing an organization to respond to changing needs quickly and utilize IT resources more effectively. These objectives can be realized through service reuse, ease of interoperability, reduced integration and maintenance costs, and the ability to deploy new capabilities quickly.

An initial SOA implementation that is scalable and capable of expanding in scope and requirements will ensure its growth to meet future and unanticipated

needs. Heffner recommends to:

... craft your SOA strategy so that investments are made: 1) in line with work done and business value delivered today on each business technology solution delivery project, and 2) as investments across a portfolio of projects, maintaining a significant trajectory ... toward your long-term goals. [1]

SOA implementations should be designed with the expectation that requirements will evolve and should be built to allow for scalability and new capabilities.

6. Governance is a key component of the SOA

SOA technologies can be applied to individual projects, but the changes necessary for an enterprise-wide adoption can only be achieved by putting the right policies and processes in place to bridge the enterprise architecture with the business strategy.

Governance is an essential element of an SOA; it is the vehicle for creating, communicating, and enforcing SOA policies, roles, and responsibilities across the enterprise. The Organization for the Advancement of Structured Information Standards (OASIS) states that:

SOA governance should be considered an extension of existing IT governance that deals with the decision rights, processes, and policies that are put into place to encourage the adoption and operation of a SOA that may cross ownership boundaries. [5]

Example process areas that should be governed include service life cycle, service versioning, service monitoring, service registries, and service testing [6].

Governance is necessary for establishing trust so that consumers and producers have a set of established expectations for IT services essential to meeting their business needs.

7. Integrate security throughout the SOA life cycle

A primary objective of applying service orientation to a system's architecture is to facilitate broader user access to information stored within that system. A challenge is enabling information sharing while protecting and securing the information being shared [7].

This security challenge can be success-

fully conquered by dividing it into three major areas and systematically tackling each one: empowering unanticipated users (if an SOA will be used to implement an information-sharing strategy, which requires access privileges for unanticipated users), establishing trust across organizational boundaries, and mitigating newly exposed vulnerabilities. Federal leaders and security architects may need to establish enterprise-wide authentication and authorization mechanisms in order to support access by unanticipated users. Attribute-based access control and other modern security techniques can be leveraged to provide this capability.

The successful implementation of an SOA requires that the right security mechanisms are applied to the right services. Also, security should be balanced with other considerations, such as performance and scalability.

8. Set realistic ROI expectations during SOA implementation

One motivation for moving to an SOA is the promise of cost reduction in operations, reuse, and future systems integration.

While cost savings can be a realistic expectation, an organization should expect upfront costs when implementing SOA techniques for the first time. Causes of upfront costs can be the learning curve associated with modifying legacy applications to create service offerings, the lack of technical staff familiarity with the technologies, and the need for new infrastructure. Infrastructure costs may include middleware (e.g., an enterprise service bus), security components, *quality of service* monitoring software, and hardware and network upgrades. James Kobielus articulates the investment consideration well:

The upside of SOA is that the marginal cost of building new applications will continue to drop as the service-reuse rate climbs. The catch is that there's a significant ramp-up cost, because adopting an SOA means you're going to need to rethink many of your traditional approaches to application modeling, development, integration, deployment and management. [8]

Cost savings may occur at the enterprise-level eventually, but not necessarily at the project level.

An organization adopting SOA approaches needs to have a realistic expectation on how much investment is needed and the expected ROI.

Conclusion

The ability to leverage IT resources across the network—to adapt to evolving requirements and to rapidly deliver new functionalities to meet users' needs—is at the core of a networked enterprise.

SOA practices can help realize this vision by establishing shared and composable services. For example, DoD Chief Information Officer John Grimes stated:

One of our challenges, which is true for most large organizations—both public and private—has been the transition from an era where local commands built local-area networks and developed local applications for customer requirements to where organizations have to work together for interoperability to get the right information to the right person at the right time around the globe. [9]

The SOA best practices described in this article are intended to serve as a baseline for successful SOA implementations. They illustrate that an SOA is more than a group of systems or purely a software architecture; SOA changes the character and agility of the underlying IT infrastructure that is available to an organization's senior leadership team and decision-makers. While technology is a key part of employing SOA techniques, other IT management issues—such as changing the organization's culture toward providing and consuming services and implementing effective governance processes to continually align the IT portfolio with business requirements—are equally important. ♦

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