Service-oriented architecture
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Introduction to SOA governance and service lifecycle management.

Best practices for development and deployment

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Introduction

Implementing a service-oriented architecture (SOA) includes implementing a governance model that supports SOA. In fact, without a robust governance model, an SOA implementation cannot fully realize the benefits that SOA has to offer. With a governance model, the organization gains a framework that is key to making those benefits possible.

A governance model specifies the processes, polices, controls and governance mechanisms that are required to monitor the SOA. It also provides the organizational structure and defines the roles and responsibilities that are needed to operate the governance model. To be effective, SOA governance should be ingrained in the organization and viewed as an essential component of success. To accomplish this, SOA governance must be implemented in a collaborative manner, with all parties—business and IT—intimately involved in its success.

IBM's approach to SOA governance helps organizations assess their existing organizational and IT environments so that they can better understand what elements they need to consider when defining a governance model. This document describes that technique for defining and implementing SOA governance and management. The IBM approach is based on best-practice techniques developed from real-world engagements as well as published materials created both inside and outside IBM.

The focus is on implementation—not development—of an SOA governance and management method, with the intent of providing guidance in the design, development and deployment of the governance model.

This governance technique helps identify the degree of existing service integration capabilities within the organization and provides recommendations to achieve desired levels of SOA governance. The SOA Governance and Management Method (SGMM) from IBM can be conducted in combination with other business enablement activities and SOA offerings from IBM, such as the definition of an SOA strategy or SOA implementation planning. It also can be conducted as a standalone engagement.

Highlights

The SGMM approach considers the processes associated with SOA governance, and then it goes a step further to consider the mechanisms and components to implement and manage them.

The SOA Governance and Management Method

The SGMM presents a framework for the definition, design and implementation of SOA governance and service lifecycle management. Figure 1 is a visual representation of the governance and governed processes and the mechanisms and components that are needed to implement and manage them.

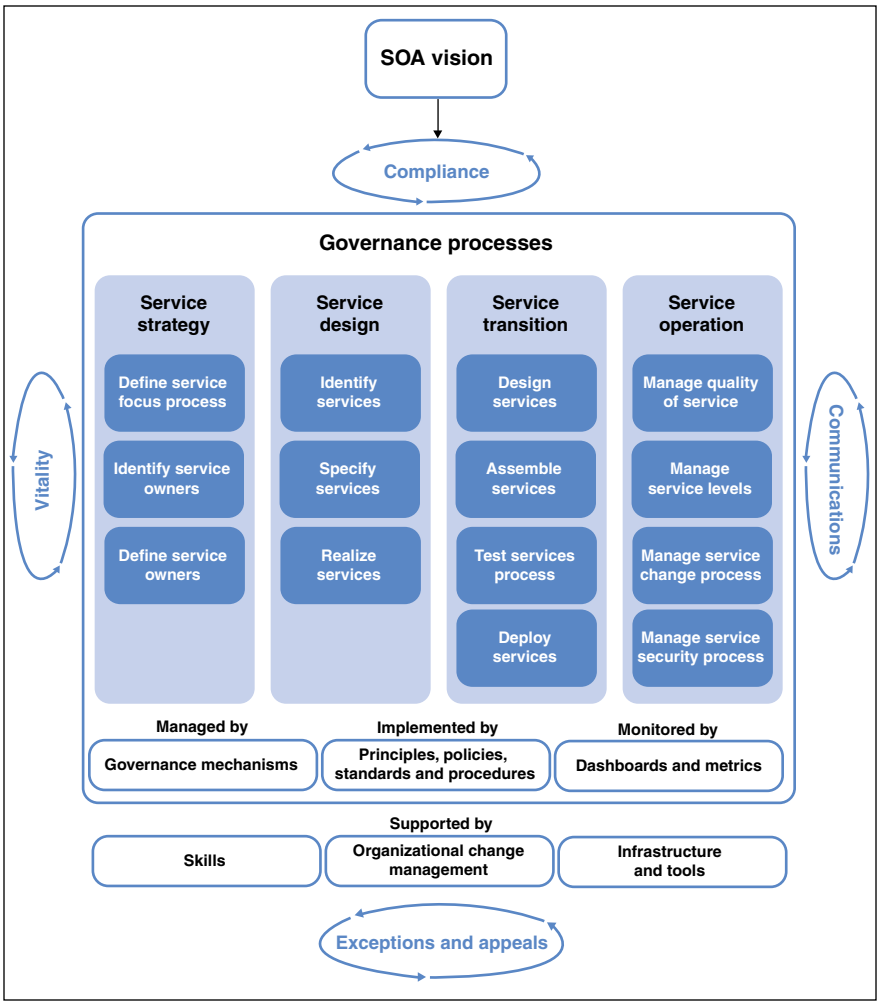

Figure 1: The key components of the SOA Governance and Management Method

Figure 1 illustrates the key components of the SGMM and how the governed processes form the centerpiece of the model. The complete set of components illustrates how a comprehensive governance model can be visualized for governance and management.

Highlights

Before you move forward with an SOA initiative, you need to conceptualize what your SOA will look like and what you want it to accomplish.

Effective SOA governance requires that you constantly keep sight of the four building blocks of any governance model: compliance, vitality, exceptions and appeals, and communication.

Development of the model begins with an SOA vision statement, as well as the policies and standards that have been created to define or refine the processes that will be executed. Each aspect of the governance model has specific processes that may require the definition of new decision rights, policies and measures—and possibly the modification of some of the existing IT processes.

SOA vision

The SOA vision statement should describe what is to be accomplished with the SOA implementation and—in a high-level overview—how the organization plans to achieve its goals. Optimally, the SOA vision statement would be the result of activities performed before defining a governance model, though it can be created as part of the SGMM engagement. In addition to the vision, the organization ideally will create a strategy and roadmap statement before the engagement begins.

Governance processes

Four governance processes form the foundational building blocks of any governance model—compliance, vitality, exceptions and appeals, and communication. These processes are applied to all steps—represented by dark and light blue boxes in figure 1—in the creation of the SGMM. Because they provide key input to every step, the four building blocks are shown around the perimeter of the figure.

Compliance

The compliance process provides the mechanism for review and approval or rejection within criteria established in the governance framework (for example, principles, policies, standards, roles and responsibilities). This compliance process is performed at various points during the SOA governance lifecycle.

Vitality

The vitality process maintains the applicability of the governance model by requiring it to be current and to reflect business as well as IT directions and strategies. The vitality process also refines the governance processes and mechanisms made up of organizational entities and their supporting roles to ensure their ongoing use and relevance to an implementation.

Highlights

Exceptions and appeals

Exceptions and appeals processes allow a project to request and gain an exception for the use of a solution, process, policy, investment or design that is not compliant with the established governance framework.

Communications

Communications processes are aimed at educating and communicating the governance model across the organization. Including the assurance that governance is acknowledged and understood, communications processes set up environments and tools to allow easy access and use of governance information.

Governed processes

The SGMM focuses on the process categories and governed processes presented in tables 1 and 2. The scope of the services lifecycle process includes the processes that are required to identify, design, develop, test, implement and manage services.

While you govern your overall SOA environment, you also need to govern your SOA services.

Meant to be a starting point only, this list of governed processes is not exhaustive, and it contains terminology that shouldn't be considered standard. Many organizations have their own categories, names and descriptions for these processes; the terminology used in these tables is IBM's.

Note that it is unlikely an organization will immediately deliver governance for all of the processes listed in table 1. Since organizations will ultimately require a focus in all aspects of SOA governance and management, they should develop a practical roadmap deploying subsets of these to satisfy immediate and long-term needs and plans. Note also that it is unlikely that a single engagement would comprise all of the processes listed in the table. Ultimately, organizations will require a focus in all aspects of SOA governance and management. However, many engagements will include only a subset based on immediate, rather than long-term, needs and plans.

Highlights

Services-governed processes are arranged into four categories: service strategy, service design, service transition and service operation.

Table 1: Governed processes: services-governed processes

Category	Process name	Process description
Service strategy	SOA strategy	Defines the desired degree of service orientation and service maturity; provides a mechanism for evaluating initiatives and/or projects with regard to the degree of service focus the organization desires
	Service funding	Establishes the rules for service funding for new and enhanced services and for providing incentives for service reuse
	Service domain ownership	Identifies and manages service domains and service ownership
Service design	Service modeling	Defines the key activities that are required for the analysis necessary to build services; describes the techniques required for the identification, specification and realization of services
	Service design	Addresses the detailed design and specification of services based on design techniques, patterns and standards
	Service architecture	Defines the SOA reference architecture, including architectural models, standards and design, as well as development and infrastructure design techniques
Service transition	Service assembly	Allows developers to create new services that follow defined rules and processes based on architectural standards
	Service testing	Provides for testing services at multiple levels to ensure that services meet the stated functional and nonfunctional objectives according to the service contract criteria
	Service deployment	Manages the registration and configuration of services and their release into production; handles service changes and versioning
	Service delivery	Manages the realization of service levels, organizational satisfaction and service availability; addresses capacity requirements
Service operation	Event management and service monitoring	Monitors workload and system events that could cause service outages or other problems
	Security management	Covers the lifecycle of security concerns, including planning, operational measures, evaluation and auditing
	Service support	Manages problems, incidents and the interaction with service users

Highlights

Effective SOA governance also involves keeping track of your services and recognizing which can be reused and shared.

Table 2: Governed processes: registry services–governed processes

Category	Process name	Process description
Service strategy	Service opportunity identification	Evaluates and identifies business needs and determines whether needs can be met through the use of shared services
	Service discovery	Completes the discovery phase of a project that has been identified as a candidate for potential services
Service design	Service inception	Gathers the high-level requirements for the services that will be developed as part of the potential services project
	Service elaboration	Further defines the high-level requirements from the inception phase into detailed requirements for construction to complete the service solution design and to take steps to prepare for the construction phase
Service transition	Service construction	Develops the integration components and integrates the services components per the design guidelines—while meeting or exceeding quality requirements so that the services can be deployed for general use
	Service transition	Transitions the services developed in the construction phase to the operations team responsible for ongoing service maintenance
Service operation	Managed services	Manages the services once they have been transitioned to the operations team responsible for ongoing service maintenance
	Exception/ escalation	Resolves issues that occur during the services lifecycle process

Highlights

As the tools that help you implement and operate your SOA governance processes, governance mechanisms should reflect your organization's culture and principles.

Governed process management: governance mechanisms

Governance mechanisms provide the structure required to implement and operate SOA governance. The mechanisms specify and describe organizational structures, roles and responsibilities, functions, purpose, and lifecycles. Reflecting the organization's culture and principles, carefully designed and implemented mechanisms are essential to effective SOA governance.

Governed process implementation: principles, policies, standards and procedures

This area documents the underlying general rules and guidelines that an organization follows to utilize and deploy services across the enterprise.

To be effective, all principles, policies, standards and procedures should be endorsed by both senior business and IT executives. The four areas are defined as follows:

The rules and guidelines that your organization follows regarding the use and deployment of services must be endorsed by senior-level business and IT executives.

- ***Principles***—*statements defining the underlying general rules. An organization uses principles to utilize and deploy business and IT resources and assets across the enterprise. Many types and levels of principles can be defined, but they should always include statements of motivation and implications. The SGMM focuses on business and IT principles associated with the deployment and governance of the architecture.*
- ***Policies***—*statements describing how the architecture will be managed or organized, including management goals, objectives, beliefs and responsibilities. Policies are normally defined at an overall strategy level and typically can be related to a specific area such as security or management. In many instances, policies reflect laws and givens that the organization must follow.*

Highlights

- ***Standards***—*predescribed specifications that are measurable and recognized as having authoritative value and that an organization chooses to implement as a basis for good practice.*
- ***Procedures***—*specified series of actions, acts or operations such as emergency procedures that must be executed in the same manner to consistently obtain the same result in the same circumstances. Alternatively (and less precisely), procedures can indicate a sequence of activities, tasks, steps, decisions, calculations and processes that, when undertaken in the established sequence, produce the described result, product or outcome. Procedures usually induce change and are the documented means of implementing the principles, policies and standards of the organization.*

For an SOA governance policy to work, you need to monitor its performance and then use those metrics to make adjustments where needed.

Governed process monitors: dashboards and metrics

The dashboards and associated metrics that measure and report on the performance of the SOA are a key component of the governance model. The SGMM documents monitoring metrics associated with the SOA components being implemented.

SGMM support

A successful SOA installation requires more than just key components. It also requires support. Skills support, organizational change management support, and infrastructure and tools support.

SGMM support: skills

Defining and specifying the skills required to implement and maintain the governance model are essential elements of the SGMM process. Required skills include business and IT specialties and the qualifications to implement an effective governance model.

Highlights

When you implement an SOA, you change the very basics of your organization: your business model, your operating model and your culture.

SGMM support: organizational change management

The implementation of an SOA creates a significant amount of organizational change—including shifts in the business model, refinements to the operating model and elimination of many functional or operational silos. The archetype that defines how the organization is run typically changes in order to reap the benefits of the SOA.

Elements of organizational change include governance planning, talent management, service ownership, business responsiveness and organization redesign—all of which must occur if the organization is to achieve agility from its SOA. These changes must be identified and planned in the organizational change management approach so that they can be implemented in the governance model.

SGMM support: infrastructure and tools

Underlying the SOA are infrastructure and tools that provide functions for security and directory services and for infrastructure and IT service management services, including:

Infrastructure and tools underpin an SOA environment to provide functions for security and directory services and for infrastructure and IT service management.

- ***Security and directory services****—functions involving authentication required for implementation. For example, one such function is the ability to provide single sign-on capabilities across a distributed and heterogeneous system.*
- ***Infrastructure and IT service management services****—functions that relate to scale and performance. For example, end services, clustering services and virtualization capabilities support efficient use of computing resources based on load patterns and related issues. The ability to leverage grids and grid computing are also included in infrastructural services. While infrastructure and IT service management services perform functions tied directly to hardware or system implementations, other services provide functions that interact directly with integration services provided in other elements of the architecture. These interactions also involve services related to SGMM and the associated tools necessary to monitor the performance of the SOA and the governance model.*

Highlights

The SOA architecture is a comprehensive architecture that covers the integration needs of an enterprise. Its services are well integrated and delivered in a modular way, allowing SOA implementations to start at a small project level. As each additional project is addressed, new functions can easily be added, incrementally enhancing the scope of the integration across the enterprise. In addition to supporting SOA strategies and solutions, the architecture itself is designed using principles of service orientation and function isolation.

When you need to add to or modify existing IT governance processes, you should apply SGMM governance capabilities.

SGMM governance capabilities

Any good SOA governance implementation that finds the need to add to or modify existing IT governance processes should apply SGMM governance capabilities. These capabilities are related to the SOA-governed processes (services-governed processes and registry services–governed processes) described in figure 1 and its accompanying text. They represent a more detailed and specific governance capacity necessary for effective SOA governance.

Figure 2 shows specific SGMM governance capabilities called domains that should be applied at various times in the SGMM engagement—and that affect various processes. Note that not every capability is invoked for every process. A detailed representation of how SGMM governance capabilities and processes relate to one another appears later in this paper as figure 3.

Highlights

Governance capabilities help you keep track of details as you modify your SOA.

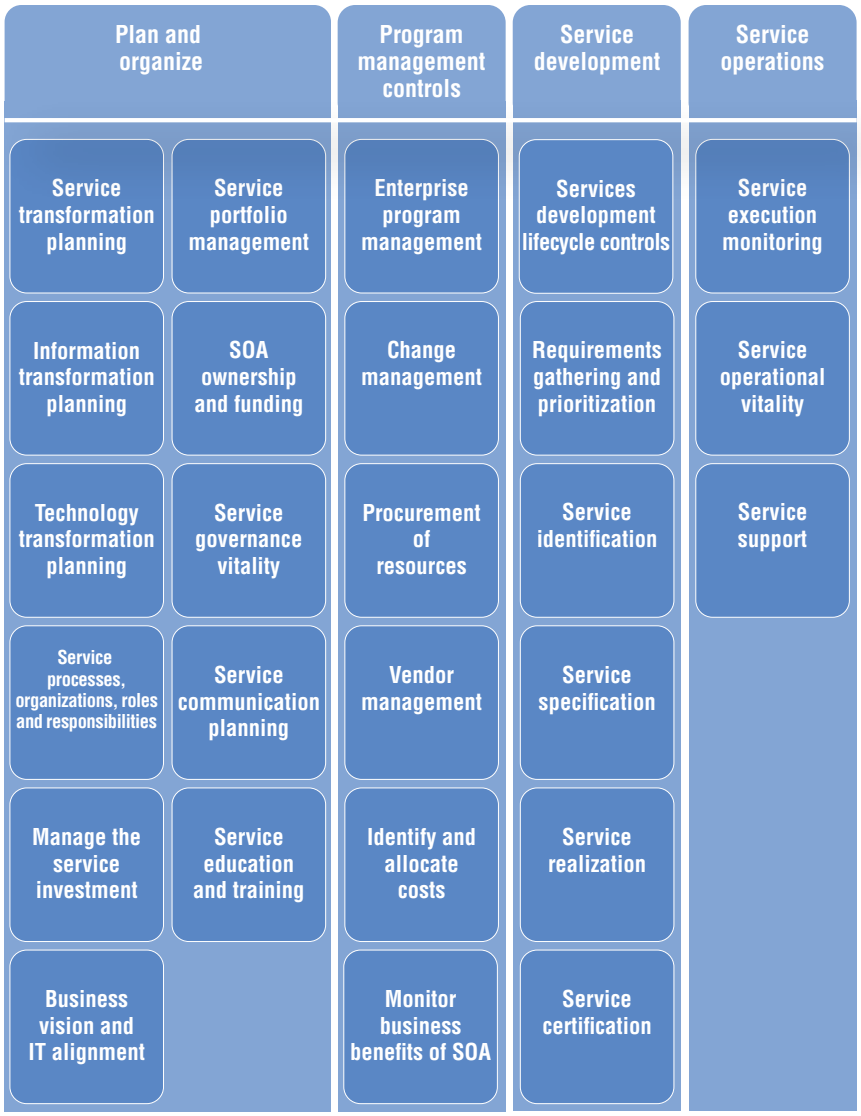

Figure 2: SGMM governance capabilities

Highlights

Your SOA needs to support your business objectives, so when you plan and organize your services, make sure they're reusable across the enterprise.

Plan and organize

This domain covers strategic planning and enablement of the SOA journey.

Implementation of an SOA likely will change the way in which the organization makes IT and business decisions. For this reason, the organization must give careful consideration and planning to the set of common services that need to be created to encourage reuse across lines of business while creating business services that enable agility and fast response to marketplace opportunities. Such consideration and planning imply that common patterns, standards, policies and reference architectures exist and will be governed and used across the SOA effort.

The process of aligning business and IT operations to identify business and IT strategy and tactics not only is important to the SOA effort, but also is one of the more sophisticated capabilities in the SGMM. To enable and speed the transformation to business and IT agility, the right infrastructure and tooling must be in place. Roles and responsibilities must be defined and understood. Clarity in service ownership and funding guidelines also must be ensured.

The governance activities in this domain need to be performed once, as part of planning, though the decisions made during the process should be reviewed regularly to ensure that they remain applicable. Initially, this level of strategic planning may not be possible. An organization usually gains experience and maturity first with the service development lifecycle and program management of the SOA services. But eventually this strategic planning is the key

Highlights

to unlocking business agility. It therefore will be necessary for executives to endorse and lead the changes throughout the organization that implementing an SOA will require. These include, for example, developing new skills, changing department compositions and roles, and providing new ways for operating units and external partners to interact.

Program management controls

This domain helps provide planning and governance for the SOA implementation as an enterprise-wide program that must manage individual development projects.

Program management controls help the business and IT determine which enterprise programs should be service-enabled for the SOA.

It is concerned with issues that enable a siloed program management approach to be expanded into a true enterprise capability across lines of business. The organization should repeat activities covered in this domain for every program in which it is considering an SOA approach.

Executives must ensure that the operating units that initiate development projects understand and support SOA initiatives. Business and IT management will need to consider the impact of SOA when justifying, planning and running future development. And program managers will need to understand how to deliver and manage projects that include the development of services and that span lines of business.

Highlights

The service development lifecycle domain defines the activities that govern the development, testing and deployment of individual services; the service operations domain covers activities that govern the quality of those services.

Service development lifecycle
This domain defines activities that govern the development, testing and deployment of individual services and automated business processes.

Enterprise models that describe business entities and business processes are critical inputs to service development. Because the eventual portfolio of services will become a major asset for the organization, governance of the service modeling activities is especially important. The success of the SOA implementation is directly dependent on choosing the right set of services and implementing them effectively.

Service operations
This domain covers activities that govern the quality of services delivered to service users, and the ability to monitor and report on the operational aspects of those services.

Initial mapping: SGMM processes to be governed and SGMM governance capabilities
The base governance model and the SGMM capabilities model are interrelated—so one role of the implementation is to identify the processes that need governance assistance.

Figure 3 is designed to help identify the SGMM capabilities that should be considered a priority for each governed process. It combines governed processes described in figure 1 (across the top) with capabilities described in figure 2 (on the side) to show which capabilities are invoked for which processes.

		Service strategy			Service design			Service transition				Service operation			Other SGMM elements						
SGMM capabilities domain	SGMM capability	SOA strategy	Define service funding	Service domain owners	Service modeling	Service design	Service architecture	Service assembly	Service testing	Services deployment	Services delivery	Even management and service monitoring	Security management	Service support	Governance mechanisms	Principles, policies, standards and procedures	Monitors and metrics	Skills	Organizational change management	Infrastructure and tools
Plan and organize	Service transformation planning	■		■			■													
	Information transformation planning	■		■	■	■	■													
	Technology transformation planning	■					■									■				■
	Service processes, organizations, roles and responsibilities	■													■	■		■	■	
	Manage the service investment	■	■												■		■			
	Business vision and IT alignment	■													■	■	■		■	
	Service portfolio management	■													■					
	SOA ownership and funding		■	■											■					
	Service governance vitality														■	■	■			
	Service communication planning	■													■	■			■	
	Service education and training														■			■	■	
Program management controls	Enterprise program management														■	■	■			■
	Change management														■	■				■
	Procurement of resources						■									■				
	Vendor management						■									■				
	Identify and allocate costs		■														■			
	Monitor business benefits of SOA	■	■												■	■				

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		Services strategy			Services design			Services transition				Services operation			Other SGMM elements					
SGMM capabilities domain	SGMM capability	SOA strategy	Define service funding	Service domain owners	Service modeling	Service design	Service architecture	Service assembly	Service testing	Services deployment	Services delivery	Even management and service monitoring	Security management	Service support	Governance mechanisms	Principles, policies, standards and procedures	Monitors and metrics	Skills	Organizational change management	Infrastructure and tools
Service development	Services development lifecycle controls				■	■	■	■	■	■	■	■	■	■	■	■	■			■
	Requirements gathering and prioritization				■	■	■									■	■			■
	Service identification				■	■	■									■				
	Service specification					■	■									■				
	Service realization						■	■	■							■				
	Service certification						■			■	■	■	■			■				
Service operations	Service execution monitoring						■				■	■	■				■			■
	Service operational vitality						■					■	■				■			
	Service support													■						

Figure 3: Mapping SGMM processes to be governed with SGMM governance capabilities

IBM SOA Governance and Management Method: implementation lifecycle

The SOA Governance and Management Method consists of the four execution phases outlined in figure 4. Each phase is repeated cyclically throughout the life of the SOA environment. As the SOA matures, it is expected that the SOA governance lifecycle will change and mature as well. Each cycle provides an opportunity for improving the governance approach.

Highlights

The four execution phases of the SGMM approach are repeated cyclically throughout the life of the SOA, enabling refinements to underperforming areas.

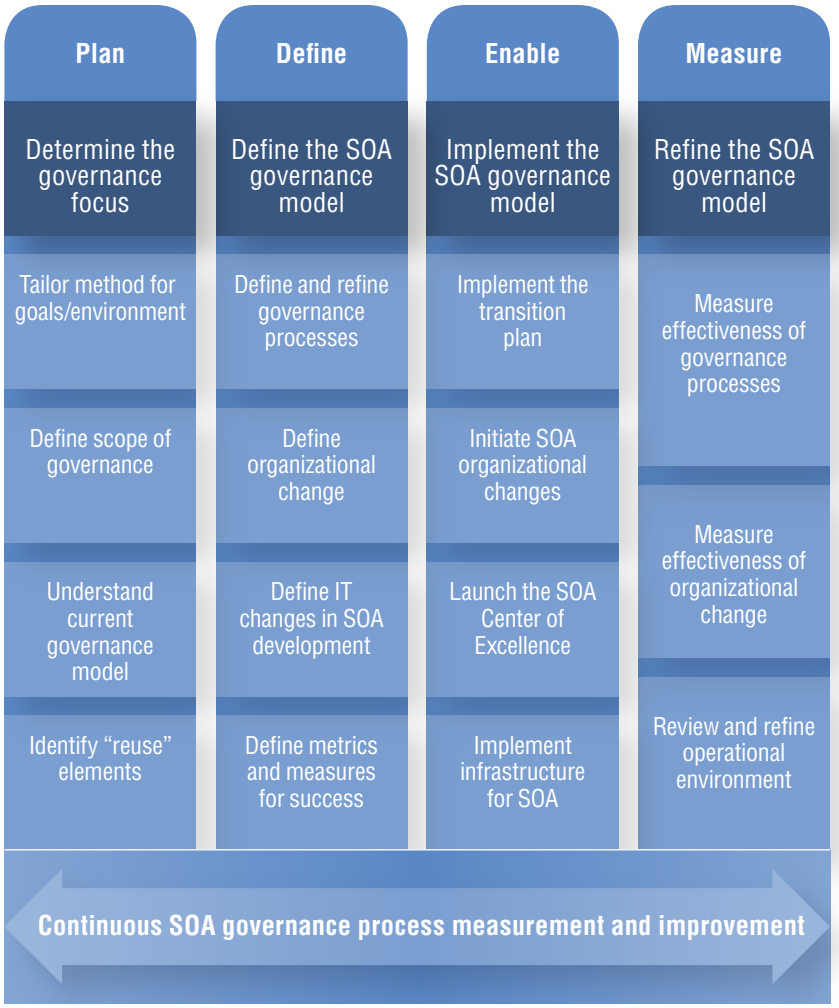

Figure 4: IBM SOA Governance and Management Method—implementation lifecycle

Highlights

Your SOA environment will be much more successful if you establish a framework to implement active decision making, accurate tracking, improved serviceability and better communication.

As far as possible, these execution phases and the steps within each are independent of any process. This independence enables the same technique to be used with different processes. Each step does, however, assume that certain other techniques have been executed beforehand and that follow-on techniques also will be performed.

Why IBM?

The increased flexibility and cross-organizational nature of business services that SOA makes possible require that organizations establish a framework to implement active decision making, accurate tracking, improved serviceability and better communication before, during and after the SOA implementation. The best-practices SGMM approach from IBM can help ensure that the necessary governance structure is in place, customized for unique requirements and actively managed.

With more than 6,550 clients in the SOA Foundation—IBM's comprehensive architecture and set of offerings, technologies and practices that address virtually all things SOA—IBM has developed a robust portfolio of services to help with the integration and infrastructure requirements of an SOA deployment. Additionally, the IBM approach has been accepted by numerous standards organizations, including the Open Service Oriented Architecture collaboration, the SOA Consortium and the Organization for the Advancement of Structured Information Standards (OASIS). From readiness assessments, strategy development and design to testing and optimization, IBM can provide a roadmap developed over the course of many SOA engagements that can help organizations rapidly improve their agility, protect their existing investments, and position enterprises for tomorrow's growth and business challenges.

For more information

To learn more about the IBM SOA Governance and Management Method, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/developerworks/webservices/library/ws-soa-governance

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