VIRGINIA IT AGENCY

Commonwealth of Virginia

Enterprise Technical Architecture [ETA]

Service Oriented Architecture (SOA)
Topic Report
Integration Domain

vita.virginia.gov

April 24, 2023

Service Oriented Architecture Requirements: Version History

Revision	Date	Description
1.0	January 03, 2013	Original
1.1	April 24, 2023	Administrative update for accessibility

Review Process

This requirements document was posted on VITA's Online Review and Comment Application (ORCA). All agencies, stakeholders, and the public were encouraged to provide their comments through ORCA. All comments were evaluated, and individual commenters were notified of action(s) taken.

Standards and Agency Exceptions

These standards are incorporated within the COV Enterprise Architecture Standard (EA-225), and the requirements defined within this document are mandatory for Executive Branch agencies. Agencies deviating from these requirements must request an exception for each desired deviation, and receive an approved *Enterprise Architecture Exception* via Archer, prior to developing, procuring, or deploying such technology, or not complying with a requirement specified in this document.

Glossary

As appropriate, terms and definitions used in this document are in the COV ITRM IT Glossary. The COV ITRM IT Glossary is available on the ITRM Policies, Standards, and Guidelines web page at the VITA website: https://www.vita.virginia.gov/it-governance/glossary/cov-itrm-glossary/

Contents

Introduction

According to industry experts, SOA is:

- "A style of multi-tier computing that helps organizations share logic and data among multiple applications and usage modes." Gartner
- "SOA is an evolution of distributed computing and modular programming. SOA provides a modularity of logic that can be presented as a service for a client (as in client-server architecture) and at the same time function as a client for other services." Wikipedia
- "An application architecture within which all functions are defined as independent services with well-defined invokable interfaces which can be called in defined sequences to form business processes." IBM
- "A software architecture for building applications that implement business processes or services using a set of loosely coupled black-box components orchestrated to deliver a well-defined level of service." SOA for Dummies

The quotations above point out the diversity of thinking regarding SOA architecture.

The Enterprise Technical Architecture (ETA) Service-Oriented Architecture (SOA) Topic Report addresses the principles, requirements and recommended practices to help ensure SOA-based services are designed to meet agency and state business needs and are architected for Tier One enterprise use. It's intended to be use by:

- Application Managers and Designers
- State's multi-agency SOA Governance teams
- Business Analysts
- Service Providers and Consumers
- Enterprise and Application Solution Architects

[1] Source: Service Oriented Architecture, Charles F. Leonhardt, Georgetown University, Washington DC, Accessed 04 June 2012
[2] See: Definition of Key Terms

Purpose

The intent of these requirements is to guide the purchase, design, implementation, and on-going operation of COV IT services and utilized technologies. For further information on the perspectives, please reference the most recent version of the Enterprise Technical Architecture (ETA) Requirements document.

Authority

- Code of Virginia, §2.2-2007. Powers of the CIO
- Code of Virginia, §2.2-2007.1. Additional duties of the CIO relating to information technology planning and budgeting
- Code of Virginia, §2.2-2009(A). Additional duties of the CIO relating to security of government information
- Code of Virginia, §2.2-2012(A). Additional powers and duties related to the procurement of information technology

Scope

This standard is applicable to all Executive Branch state agencies (hereinafter collectively referred to as "agencies") that are responsible for the management, development, purchase and use of information technology resources in the Commonwealth of Virginia. This standard does not apply to research projects, research initiatives, or instructional programs at public institutions of higher education.

[Is there a scope associated with this document? Put the information here. State what this document addresses/covers and also state what it does not]

In addition to the requirements below all COV IT technology solutions comply with the standards found on the VITA Policies Standards & Guidelines page.

Glossary

As appropriate, terms and definitions used in this document can be found in the COV ITRM IT Glossary. The COV ITRM IT Glossary may be referenced on the ITRM Policies, Standards and Guidelines web page at http://www.vita.virginia.gov/library/default.aspx?id=537.

Agency Exception Requests

Agencies that want to deviate from the requirements and/or technology standards specified in COV ITRM Standards may request an exception using the *Enterprise Architecture Change/Exception Request Form.* All exceptions shall be approved prior to the agency pursuing procurements, deployments, or development activities related to technologies that are not compliant with the standard. The instructions for completing and submitting an exception request are contained in the current version of *COV ITRM Enterprise Architecture Policy*. The Policy and exception request form is on the ITRM Policies, Standards and Guidelines web page at http://www.vita.virginia.gov/library/default.aspx?id=537.

To request an exception to all Security related ITRM Standards please refer to the *Process for Requesting Exceptions* section of the Information Security Policy - COV ITRM Policy SEC519 on the ITRM Policies, Standards and Guidelines web page at http://www.vita.virginia.gov/library/default.aspx?id=537.

Executive Summary

The principles, requirements, and recommended practices in the ETA Service-Oriented Architecture Topic Report are designed to enable service-oriented architecture (SOA) governance teams to help agencies plan, design, and maintain Tier One SOA-based services for enterprise use.

SOA requirements and recommended practices are expected to evolve as more SOA-based services are deployed and the multi-agency governance teams collaborate.

The purpose of this report is to establish an overarching technical and governance framework for the state's service-oriented architecture.

This document addresses the following:

- How state manages and controls changes to service interfaces;
- How state identifies versions of services, and associate sets of service artifacts with a version identifier;
- How state ensures that agencies reuse services properly, only creating variants of services when justified by a business case;
- How state ensures that services properly achieve their advertised "real world" effect ;
- How state ensures that service interfaces conform to the requirements of a service interaction profile within the architecture; and
- The standard issues that agencies should consider addressing in the service-level agreement (SLA) for a service.

This document provides principles, requirements and recommended practices to help ensure SOA-based services are designed to meet agency and state business needs and are architected for Tier One enterprise use. It's intended to be use by:

- State's multi-agency SOA Governance teams
- State's Service Offerings and Support Center (support center)
- Service Providers and Consumers

However, this document does not provide guidance on overall business issues. In particular, it does not suggest which services agencies should provide to one another, nor does it suggest which agencies should provide which services. These issues should be addressed by individual projects or system implementation initiatives.

[3] Real World Effect: The actual, desired result of the service (e.g., "Get customer information.") SOA-based services are designed to meet business needs. A service consumer is a participant that interacts with a service in order to realize the real-world effect produced by a capability to address a consumer need.
Source: OASIS SOA Reference Model http://en.wikipedia.org/wiki/OASIS_SOA_Reference_Model

ETA SOA Topic Report Scope and Purpose

Scope

The requirements of this report are applicable to all Executive Branch state agencies and institutions of higher education (hereinafter collectively referred to as "agencies") that are responsible for the management, development, purchase and use of information technology resources in the Commonwealth of Virginia. This standard does not apply to research projects, research initiatives or instructional programs at public institutions of higher education.

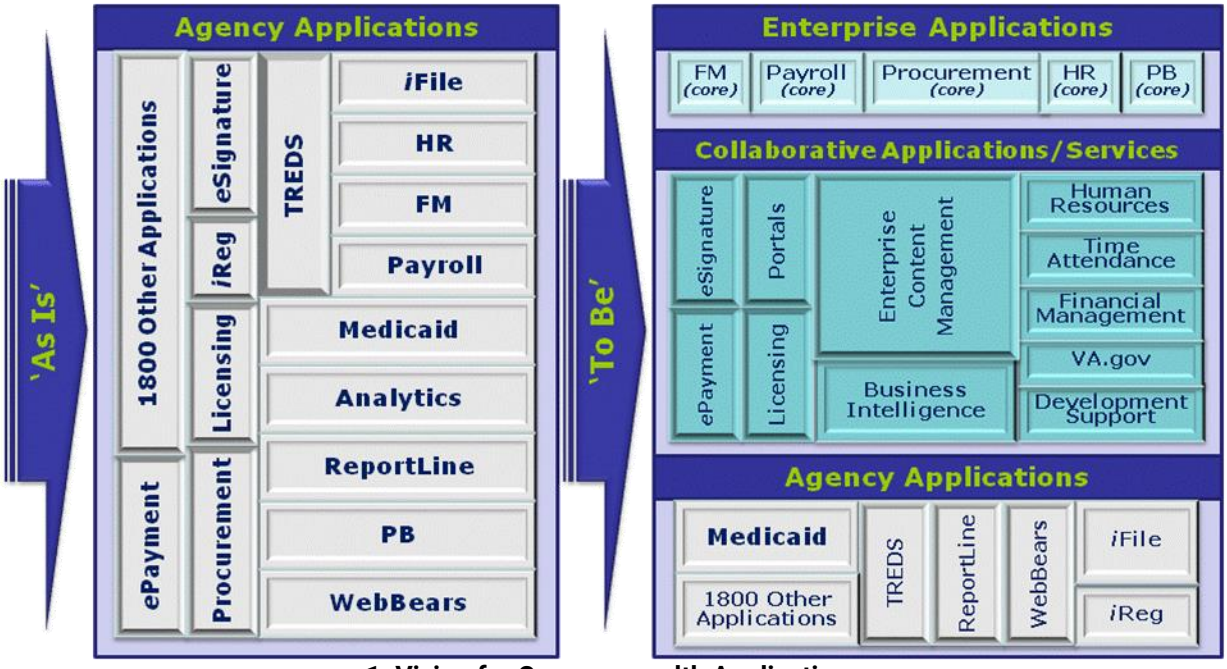
Purpose

The *ETA Service-Oriented Architecture Topic Report* provides the SOA principles, requirements and recommended practices, which include service conditions and application design principles to design, deploy, and maintain Tier One SOA-based enterprise services.

These requirements are not a detailed guide on how to develop SOA-based services; however, technical standards, guidelines, and reference architectures are expected to evolve from the multi-agency SOA Steering Committee and Technical Advisory Group as more services are published with the assistance of the state's Service Offering and Support Center.

This document contains primarily conceptual and logical level standards to help service providers design Tier One ready SOA-based services and enable SOA governance. Physical level design requirements and recommend practices are expected to evolve as more Tier One services are deployed and the multi-agency governance teams collaborate.

Vision for Commonwealth Applications



1. Vision for Commonwealth Applications

Figure 1 depicts the "As Is and "To Be" vision for Commonwealth applications. The applications are a collection of information systems (applications and components, purchased or custom-developed) supporting or related to the business functions and the Commonwealth's Enterprise Business Model. The above figure depicts an architectural method or design style that results in and supports shared, reusable SOA Tier One services.

Domain-wide Principles, Recommended Practices and Requirement

The following principles recommended practices and requirements pertain to all components, in all situations and activities related to the *ETA Service-Oriented Architecture Report*. Component specific principles recommended practices and requirements will be discussed in the next section of the report.

Domain-wide Principles

The following information is provided to help the reader understand general principles for planning and designing SOA-based services. Tier One SOA Planning and Design Standards are provided in the next section of the report.

SOA-P-01: Loose coupling reduces risk that a change in one application module will force a change in another application module

Rationale:

- Loosely coupled services may be joined to create composite services, or disassembled into their functional components, even if they use different system technologies.

SOA-P-02: Services shall adhere to a service contract as defined by one or more service description documents and maintained via a central registry.

Rationale:

- Starting from a service description (a contract), both a service consumer and a service provider should have everything they need to consume or provide the service.

SOA-P-03: Beyond what is described in the service contract, services hide their logic from service consumers.

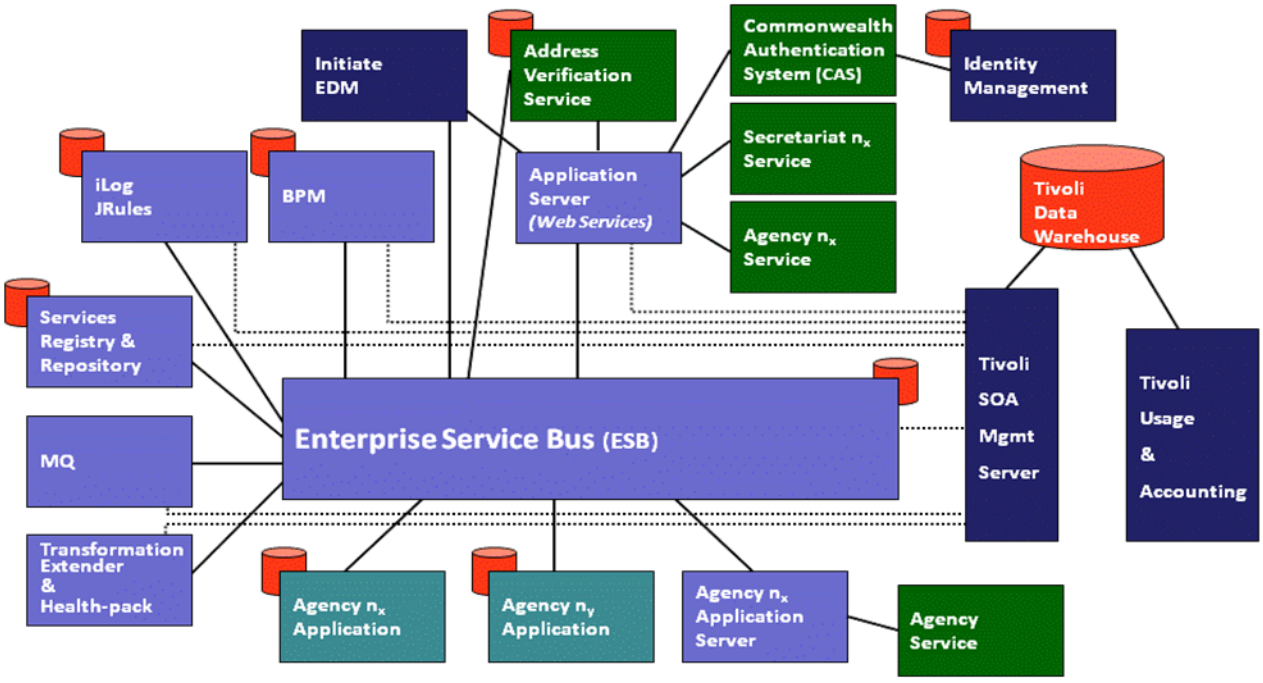
SOA-P-04: Services are not duplicated and logic is granularly divided in such a manner as to promote service reuse

SOA-P-05: Collections of services are assembled to form composite services. Composite services are composed of individual, unique, services that can be readily re-assembled, (or re-orchestrated), to assemble other composite services.

[4] The Services Registry (SR) is a registry for Web services, which is located centrally within an SOA landscape. The SR contains information about services provided in that landscape, with references to the services' relevant WSDL metadata and to the locations of the callable service endpoints. The registered services are classified using semantic-rich classification systems to enable browsing of services by classification.

The Services Registry is a central place for developers to find available Web services that they can reuse. Administrators can find available service endpoints and manage connections between consumer and provider systems. Source: http://help.sap.com/saphelp_nwpi711/helpdata/en/2e/8526937af346a0bc446905ea964ceb/content.htm Accessed 30 June 2012

Conceptual SOA Architecture- Commonwealth SOA Platform Component



2. Commonwealth SOA Platform Components

Figure 2 depicts the business models (groups of entities and relationships), governance roles (predefined set of roles into which users are assigned), and the governance lifecycles (predefined set of states and transitions that are applied to entities) in the “To Be” environment of the Commonwealth SOA platform

ETA SOA Topic Report Technical Topics

Service Conditions and Planning Design

SOA-based application modules are constructed to meet service conditions. Planning design standards are provided below in order for the service to meet the desired condition.

Service Conditions

SOA-R-01: All Tier One services shall be published on the state Service Offering and Support Center (SOSC) service registry, once it is created.

Rationale:

- The Service Offering and Support Center (SOSC) promotes the reuse of services and interfaces across and among agency systems.

SOA-R-02: Services shall have well defined interfaces, shall not share state, and shall communicate by messages.

Rationale:

- All of the elements of service-oriented architecture (SOA) are arranged to connect through business processes to deliver a precise level of service. SOA develops a basic arrangement of components that can collectively administer an intricate business service.

SOA-R-03: Services shall have authoritative control over the logic they encapsulate.

SOA-R-04: Services shall be constructed modularly, coded unambiguously, be highly secure, and designed for high performance and scalability.

SOA-R-05: The internal mechanisms and data structures of a service shall be hidden behind a defined interface. Service encapsulation separates the contractual interface from its implementation.

Rationale:

- This allows for changes and improvements to the service without impacting service consumers. It also allows the service to be replaced or superseded with another service that supports the same interface.

[5] See: Definition of Key Terms – Tier Definitions

Module Services

SOA-R-06: Services shall be designed to be loosely coupled.

SOA-R-07: Service interfaces shall be clearly defined and documented.

SOA-R-08: Developers shall enter interface metadata or use tools to generate interface metadata that specifies an explicit service contract so that another developer can find and use the service.

SOA-R-09: Everything needed by the service to provide its functionality shall be passed to it when it is invoked. All access to a service shall be via its exposed interface. No hidden assumptions shall be necessary to invoke the service.

SOA-R-10: Business analysts and architects shall collaborate to ensure business processes are unique, well defined, and documented, and that service candidates are capable of meeting business needs and changes.

Service Modeling

SOA-R-11: Each service shall exist within the context of at least one business process; a service plays a specific role in accomplishing a business process that achieves demonstrable business value.

SOA-R-12: The service provider shall maintain models for business processes, as well as those for structure and behavior to indicate the roles and functions of each service.

SOA-R-13: The description of each service shall include the business process model(s) for which the service was designed. This description may be maintained manually and shall be available on the state's service repository for Tier One services.

SOA-R-14: The description of each service shall include a contextual summary that establishes the name of the service and a brief (single paragraph) description of the real-world effect of using the service.

Distributable Modules

SOA-R-15: The service components shall be able to run on disparate computers and communicate with each other by sending messages over a network at runtime.

Rationale:

- Services are typically spread out over multiple physical locations. A service may be used by multiple consumers. SOA applications are inherently distributed applications.

SOA-R-16: The service provider shall be responsible for creating a Service Contract for each service and negotiating with each service consumer. Service contracts shall be posted on the state SOA Services Registry to communicate information about the service.

SOA-R-17: In addition to complying with the *ETA SOA Topic Report*, service providers and consumers shall follow the EA Standard (EA225-) for service application, integration, service bus, and messaging requirements.

Discoverable Modules

SOA-R-18: Services shall be easily identified by their purpose, and easily found by other agencies. Software developers shall write or generate interface metadata that specifies an explicit service contract, so other developers can find and use the service.

Rationale:

- Developers write or generate technical interface descriptions (interface metadata) so that another developer can find and use the service.

SOA-R-19: A centralized support center shall be built and empowered within the Virginia Information Technologies Agency (VITA) as the approach to structured application integration matures.

Rationale:

- The Service Offering and Support Center (SOSC) and the enterprise architecture group typically establish the SOA vision, the SOA reference architecture and a state SOSC service registry. An example of a centralized implementation and governance model organization is shown in Appendix A– SOA Centralized Implementation and Governance Model of the Application Domain Report Version 1.0 07-10-2006.

SOA-R-20: The state's SOSC service registry shall be an online catalog that contains the names and information about each service, including associated attributes like metadata.

SOA-R-21: Once designated as Tier One, services shall be registered in the state SOSC SOA Services Registry in order to enable discovery, minimize redundancy of duplicate services, and maximize reuse.

SOA-R-22: Software interface definitions shall be maintained in the state's SOSC SOA Services Registry, so they are available to application developers.

SOA-R-23: Agency Providers with Tier Two services that are likely candidates for adoption by other agencies shall review these standards before registering services in the state SOSC Service Registry. Agencies are encouraged to publish services for reuse. In order to be designated as Tier One, these services shall meet the design and governance conditions in the SOA Topic Report which establish requirements for qualifying Tier Two candidates.

Service Naming

SOA-R-24: Services shall be uniquely identified, secured and versioned. Services shall be unambiguously named based upon their purpose and to best represent the task in what is known as the real world effect. Services usually map to a business task.

SOA-R-25: The name of the service shall encapsulate the essential aspects of the real world effect of the service; that is, the name of the service shall represent

what the service accomplishes (in business terms), rather than how the service works.

For example, “verify zip code, verify correct address” are representations of services based or named after the real world effect and are easily understood by business and technical staff.

SOA-R-26: The name shall not indicate the underlying information system that implements the service, nor the agency or organization that provisions the service, nor any technical details about how the implementation works.

Notes: Additional service naming conventions may be developed by the multi-agency governance teams.

Service Description

SOA-R-27: Services shall contain a complete description of the real world effect of the service.

SOA-R-28: Services shall contain a list and brief (single paragraph) description of each of the actions that can be performed on the service.

SOA-R-29: Services shall contain a list and brief (single paragraph) description of the principal information and entities involved in interaction with the service via its actions.

SOA-R-30: Services shall contain a list of the principal metadata categories and values for the service (a future version of these standards or related guidelines may specify a standard set of metadata categories for services, based on experience implementing the integration architecture.

SOA-R-31: All aspects of the description shall be free of any implementation details or dependencies. The description shall not refer to particular databases or systems in the description of the real world effect; rather, the description shall describe the business effects of the service.

Service Metadata

SOA-R-32: Each service interface shall have a complete definition that captures its semantic meaning. Each attribute shall identify its data type and other parameters that specify the range of its values.

SOA-R-33: Each service interface shall have a set of metadata categories and values, as appropriate, to define the context of the element.

SOA-R-34: The metadata for a service shall include the service provider that owns and governs the structure of the service and the current version of the service and messages.

SOA-R-35: The name of each service interface shall encapsulate the meaning of the service in a way free of any reference to implementation detail.

SOA-R-36: Each exposed class and service interface shall include an identifier in service’s registered metadata.

Swappable Modules

SOA-R-37: The design of the service module shall allow it to be replaced by another module that offers the same service without disrupting modules that used the previous module. This is accomplished by separating the interface design from the module that implements the service.

Rationale:

- This separates the implementation (the service provider module's code and data) from the interface metadata. A copy of the interface metadata is accessible to other developers separately from the code that implements the provider component.
- This makes it possible for the consumer developer to use the service without having a copy of the provider software module. It also enables multiple development teams to create interchangeable provider modules.

- The consumer and the provider can use disparate programming languages, application servers and operating systems.

SOA-R-38: Services that make functionality or information available to other services shall do so through separate well defined interfaces.

SOA-R-39: Services shall be designed so that modules may be replaced without affecting the consumers.

SOA-R-40: Services that use functionality or information provided by other systems or services shall access that functionality or information in a way that minimizes dependencies on those other systems' implementation details.

Shareable Service Provider Modules

SOA-R-41: Services shall be designed and deployed in a way that enables them to be invoked successively by disparate applications in support of diverse business activities.

Rationale:

- Multiple agencies, departments or separate agencies and entities can use the same service.

- This service condition ensures each provider module in an SOA application can be invoked successively by disparate consumers.

- Developers can write different consumer application modules that use the same service as long as they conform to the conditions specified in the interface contract.

SOA-R-42: The service shall be posted to and made available on the state SOSC registry once designated as Tier One.

SOA-R-43: The service provider is responsible to ensure the service follows the requirements of the SOA design process while under development and implementation.

SOA-R-44: The service provider is responsible to ensure changes to the service follow

the requirements of the SOA governance and Consumers are made aware of all changes

Service Features

The following sections describe service design features, which are similar to application design. Services shall be tested to ensure they meet the following design features:

Security

SOA-R-45: Each service shall be designed to ensure provider and consumer security.

SOA-R-46: Services shall have the ability to be audited (also see Service Metrics.)

SOA-R-47: Vulnerability testing shall occur before services are deployed.
Rationale:

- Vulnerability Assessment is an emerging area of SOA testing. By creating specialized tests for a target web service, security officers can measure the vulnerability profiles of the target web service.
- Security Engineers need to ensure that web services vulnerabilities such as buffer overflows, deeply nested nodes, recursive payloads, schema poisoning and malware traveling over SOAP messages do not affect their critical web services.
- Web services vulnerability assessment is a crucial pre-production and post-production step that every developer and security professional shall take to ensure risk mitigation within their service oriented architecture.

SOA-R-48: Services that interface with legacy systems shall also ensure the systems are not exposed to vulnerable security threats or breaches.

Scalability

SOA-R-49: Service providers shall architect the service, so it is scalable to meet current and future consumer needs.

SOA-R-50: The provider shall identify the service capability, capacity, expected number of users, and the number of transactions per minute.

SOA-R-51: Services shall be designed to handle the number of users per each Service Level Agreement and architected to be scalable to several times the number identified in its current configuration.

Availability

SOA-R-52: The service component architecture shall be highly available, and fully redundant to allow for the addition of resources without system downtime. The service shall also enable scalability of backend applications through load balancing.

SOA-R-53: Scheduled maintenance periods shall be identified in each SLA and service contract. Service maintenance is performed when necessary (hardware and software upgrades, software patches, faulty hardware replacement, etc.)

SOA-R-54: The service provider shall coordinate with agency consumers in advance of scheduled maintenance that will affect agencies or users in accordance with the SLA.

SOA-R-55: The service provider's technical and operational support staff shall monitor availability and performance of the service.

SOA-R-56: Service monitoring and automated alerting and logging shall be implemented when possible to monitor each service as well as report state and utilization.

Performance

SOA-R-57: Service performance shall be monitored and reviewed to plan for the addition of resources before performance is significantly impacted.

SOA-R-58: Agency consumers, including backend applications shall be monitored for increased server utilization.

SOA-R-59: Service providers and consumers shall ensure adequate testing at initial deployment and every time a change is made in the system.

Business Continuity

SOA-R-60: The service shall be implemented as fault tolerant, with appropriate hardware, and software.

SOA-R-61: The service provider shall perform full-system backups for onsite and off-site storage on a scheduled basis.

SOA-R-62: Business continuity information shall also be included within the service contract, as well as services that require an SLA between the provider and consumers.

Problem Management

SOA-R-63: The service provider shall be responsible for problem management and shall ensure minimal impact to service consumers.

SOA-R-64: The service provider shall establish automated triggers and scheduled maintenance through use of monitoring tools.

SOA-R-65: service provider shall notify agencies of all events that have or may have an adverse affect on service delivery to customers.

SOA-R-66: service provider shall notify agency consumers of all failed processes.

SOA-R-67: The service provider shall provide seamless integration of processes that ensure agency consumer problem resolution satisfaction by tracking, alerting, escalating and solving problems.

SOA-R-68: The service provider shall provide help assistance for consumers via an

online knowledge base or Customer Service Representatives shall be available to assist by telephone.

Change management

SOA-R-69: All changes to the service shall follow the appropriate requirements in the *Enterprise Architecture Standard (225-)*. Changes shall be managed to promote or provide stability and minimize the impact of the changes to the agencies.

SOA-R-70: Changes shall be planned and communicated with agency consumers and the SOA governance teams.

Service Planning

SOA-R-71: Tier One services shall have a designated business owner and service provider

SOA-R-72: Agencies shall check the state's SOSC Doman Service Registry to share or reuse existing SOA services before building or buying new services.

SOA-R-73: based services shall support interoperability and portability and as much as reasonably possible be independent of any specific vendor's proprietary product.

SOA-R-74: Where applicable, Request for Proposals (RFP) shall require proposed vendors to identify and describe proposed solution's SOA readiness and SOA architecture.

SOA-R-75: SOA-based acquisitions shall include language for vendor to identify its architecture potential to loosely couple with the state's shared infrastructure and services, where applicable

SOA Governance

SOA as a method for solution architecture design is an inherently distributed approach for designing and implementing service characteristics requirements. Because of this distributed nature, it is critical that a stable and centralized governance framework is in place to support the development lifecycle and interests. The focus of governance in a SOA environment is to ensure that the service oriented strategy is realized in capabilities, assets, and processes that deliver on the required levels of business and technical adaptability; service design questions will influence how responsibility, authority, expertise, and work (RAEW) is distributed. SOA governance framework is a layered methodology consisting of[1]:

1. Governance of Services (GOS) – the governance activities that ensure the service architecture, design, and delivered services meet the real needs of the business.
2. Governing usage of Services (GUS) – the governance of activities that ensure the service execution has integrity and complies with quality of service requirements.

These two service components determine how oversight roles and responsibilities are designed, apportioned, and management of the three layers (Governance Policy and Strategy, Supply and Demand, Business Process) of governance and promotes the alignment of SOA practice elements (Service Strategy, Organization, Service Assets, and Capability) across each of the layers.

Governance Layers

As was noted previously, the governance framework consists of three layers through which the governance of SOA is exercised. This layering approach separates out the various governance concerns from a policy setting, design, and implementation perspective.

Conceptual SOA Architecture – Commonwealth SOA Infrastructure

3. Commonwealth SOA Infrastructure

Figure 3 is a notional representation of the framework for the Commonwealth SOA infrastructure.

[6] Source: https://www.cioindex.com/channel/enterprise_architecture.aspx accessed on 2/12/2012.

Governance Policy and Strategy

This layer is concerned with matters such as control, intelligence, and policy. Activities such as goals, context, and limits for the next layers as creation/acquisition and use of services are explored.

Supply and Demand

Supply and demand focus on questions relating adaptability and alignment – a coordination of service demand and supply processes ensuring that he lifecycle of a service is managed as a shred and reusable asset.

Business Process

SOA is all about business process execution orchestrated through a range of lifecycle objects (metadata, WS, WSDL, Policy, BPEL, etc.). Governance actions in this layer ensure that implementation and usage complies with policy and requirements set in prior layers.

Roles and Responsibilities

This layer establishes the roles of the state's SOA Steering Committee, SOA Technical Advisory Group (SOA TAG), state's SOSC and service Providers and Consumers for the governance of Tier One SOA-based services.
The multi-agency SOA governance teams with business and technical representation noted below are expected to collaborate and coordinate with the state's SOSC to update the related SOA Planning Design Standards as services, technology, and state business needs evolve.

SOA Steering Committee

The SOA Steering Committee provides the strategy and leadership to approve recommended Tier One services for enterprise use and ensure they are implemented in ways to achieve targeted benefits. Key responsibilities include:

- Approves Tier One services as delegated by the CIO Council or recommends those that require approval
- Provides leadership to ensure implementation of Tier One services
- Approves and endorses recommended strategies for services
- Exercises authority to make decisions, resolve issues and remove barriers
- Ensures funding models are identified and sustainable
- Ensures proposed services are properly vetted
- Articulates the business needs that shape the overall SOA strategy, services offering, and supporting infrastructure.
- Ensures Change Management policies and process are defined and followed

- Ensures the needs of consumer, provider agencies, and other stakeholders are satisfied by each service
- Partners with state's Service Offering and Support Center (SOSC) to:
    - Ensure services meet SOA Governance Standards and SOA Planning Design Standards.
    - Ensure service providers and consumers are utilizing the state's Backplane for Tier Once service integration and messaging rather than building point to point solutions.
    - Plan for potential service candidates that enhance business solutions.
- Help develop and evolve SOA standards and guidelines to recommend for statewide adoption.

SOA-R-76: SOA Steering Committee membership shall consist of VITA and other state agency information technology stakeholders.

SOA Technical Advisory Group

The enterprise SOA Technical Advisory Group (SOA TAG)[2] makes recommendations to the SOA Steering Committee, partners with the state SOSC, and agencies' service providers and consumers to ensure services are:

- Tier One ready –
    - Support multi-agency use with minimized risk and impact. Designed to meet SOA Planning Design Standards.
    - Are architected and tested to ensure security, scalability, availability, performance, business continuity, problem and change management, and sustained funding.
- Designed to meet state Enterprise Architecture standards
- Provider is defined and has capability and capacity
- Service level agreements are complete
- Ensure Change Management process meet Tier One technical requirements
- Services and service contracts are published on state SOA registry/repository
- Used where possible and best fit for purchasing new or upgrading legacy applications

SOA-R-77: SOA TAG membership shall consist of state agency architects, application developers, and business representatives or analysts to represent service providers and consumers.

[7] See Definition of Key Terms

Change Management

Change management standards define the way in which the state and agencies will manage and maintain new or acquired services, changes to service interfaces and design (both public and private), and the state shared service infrastructure. Change management includes the management of the initial deployment of a service.

Change management is the responsibility of the service provider, stakeholders, the SOA Steering Committee, SOA Technical Advisory Group, and the state SOSC, which will take the lead in responsibility for change management.

Service Provider

SOA-R-78: Each service shall have an agency responsible for provisioning the service. This agency is called the "service provider." The provider may represent the interests of several agencies through a program office or similar organizational unit; however, there is a single entity responsible for provisioning the service.

SOA-R-79: The provider shall be responsible for the implementation and proper functioning of the service.

SOA-R-80: The service provider shall follow SOSC established change management processes subject to the review and approval/endorsement of the multi-agency governance teams for Tier One services.

SOA-R-81: The Service Provider shall be responsible for identifying a group of stakeholders of the service.

Rationale:

- This should primarily include agencies responsible for current or planned consumer systems that use (or will use) the service but may also include other stakeholders.

SOA-R-82: The provider shall ensure known stakeholders are involved in the decision process when considering

Rationale:

- This consultation shall begin with a notification, using the service repository's notification capabilities and other appropriate mechanisms.

Infrastructure

The state's Service Offering and Support Center SOSC will not typically be the provider of a service yet will manage changes to the state SOA Backplane with supporting shared infrastructure.

SOA-R-83: The SOSC shall be responsible for notifying users of the infrastructure about planned changes, consulting with users, and coordinating with users' project schedules.

Configuration Management

SOA-R-84: The provider of a service shall be responsible for assigning version labels to each new version of a service, according to an accepted convention.

SOA-R-85: The service provider is responsible to ensure version updates are posted to the service repository to reflect the new version and all service consumers are notified of any changes.

Quality Assurance

Mechanisms are necessary to ensure that services reliably achieve their advertised real world effect, and that each service conforms to the requirements of the *SOA Topic Report*.

Assurance of Real-World Effect

SOA-R-86: The provider of a service shall be responsible for assuring the quality of the service, in particular making sure the service properly achieves the stated real world effect. VITA can assist the provider in fulfilling this responsibility (for example, by providing a version of the infrastructure platform dedicated to testing and service metrics for Tier One services utilizing the state Backplane), but the final responsibility rests with the provider.

Standards Conformance

SOA-R-87: Services identified in the state's service registry/repository or deployed on the state's SOA backplane or integration infrastructure shall conform to all Enterprise Architecture requirements and all information technology resource management policies and standards.

SOA-R-88: The SOA Technical Advisory Group (TAG) and state SOSC shall be responsible for ensuring that any service deployed on the state's shared, common SOA backplane, state SOSC Domain Service Registry or integration infrastructure conforms to all Enterprise Architecture requirements and all information technology resource management policies and standards.

Service Level Agreement

SOA-R-89: When establishing a service-level agreement for a service, the parties (provider and consumer(s)) shall address the following issues in the agreement:

a. Availability requirements (with what probability is the service available for interaction, provisions for negotiations and notifications for outages)

b. Responsiveness requirements (how quickly does the service respond, both synchronously and asynchronously)

c. Impacts, risks to enterprise and agency services, data stores, and systems.

d. Privacy requirements (what restrictions are there on what the parties may do with information that they obtain as part of the service interaction)

e. Change management processes.

f. Funding model or cost model.

g. The provider of a private service shall negotiate change management processes with consumers of the service.

h. Under what conditions (including how often) a provider may change the service's interface.

i. How far in advance of a proposed change the provider shall notify consumers of the intent to change.

j. How to resolve disputes between consumers regarding the viability or desirability of a change to the interface.

k. How the partners will fund and implement system changes that result from the interface change.

Service Reuse

Services and interfaces fall under the Enterprise Architecture, Applications Domain and The Integration Domain.

SOA-R-90: Services and interfaces shall be designated as Tier One common assets upon demonstration of a clear business case; once designated as such, a business case is required for an agency to invest in and provide a duplicate service or interface.

Rationale:

- It is the role of the state SOSC to promote the reuse of services and interfaces.

SOA-R-91: Processes for developing and defining Tier One services for reuse shell be defined by the SOA Steering Committee, SOA TAG and state SOSC as the services architecture and service metrics are documented.

Rationale:

- Providers can attach policies to services that govern their reuse and incorporate these policies into the service-level agreement associated with the service. For instance, a provider can prevent users from "repackaging" a service (simply wrapping the service interface with another service that the user provides) and changing the conditions of use (for instance, by charging users for access to the service.)

State Service Offering and Support Center (SOSC)

The state's Service Offering and Support Center SOSC is maintained and operated by VITA. It uses a

collaborative approach to provide shared-services based solutions for agencies and multi-agency applications.

SOA-R-92: The state SOSC model shall maximize collaboration and communication among the state SOSC and agencies. The state's SOSC also shall support the state SOA backplane with service registry, infrastructure, and system integration.

Rationale:

- The state SOSC is a key to the delivery of quality and reliable enterprise SOA and service integration services and is an important facilitator of an enterprise approach to SOA and integration.

- The main objective of the SOSC is to improve the efficiency and effectiveness of SOA-based services and system integration activities, through close coordination of shared SOA backplane and integration infrastructure with system implementation projects.

SOA-R-93: The state SOSC shall maintain and monitor the state's SOA backplane and integration infrastructure.

Rationale:

- The state SOSC SOA development support function helps agency project team in the design and build of their services and integration connections (adapters) into the integration infrastructure.

SOA-R-94: The SOSC shall assist agencies/service providers assemble and maintain service documentation (service metadata) for the application interactions.

Rationale:

- The development function also includes ensuring that agencies and projects are aware of available shared integration infrastructure and how to use it to accomplish project objectives.

SOA-R-95: The state SOSC shall maintain a single statewide registry/repository of Tier One SOA-based services and system interfaces.

SOA-R-96: The SOSC and multi-agency SOA TAG shall work with service providers to ensure service models are consistent in format and content across the enterprise, ensure that each model contains proper, consistent metadata, ensure the owner agency is identified as accountable for the service, and ensure that models reflect the reuse of existing services to meet the needs of new projects.

Rationale:

- Service reuse is more likely to occur when services are posted to the state's registry/repository. Service publication helps minimize redundancy and promote collaboration and coordination.

SOA-R-97: Each service shall have a set of metrics to measure its performance and reuse. Service metrics shall provide quality of service, performance, and reuse information for investment, design, deployment, and maintenance planning.

Rationale:

- Service metrics provide information for quality of service, performance and reuse. Helps agencies plan for and maintain services.

SOA-R-98: The state's SOSC is responsible for provisioning the state SOA backplane. The SOA backplane shall include mechanisms for lifecycle management such as registry/repository, policies, and service orchestration; business analytics for service metrics, development tools for security, management, and adapters; and communications for routing, naming, quality of service, and transformation.

Agency Service Offering & Support Center (Support Center)

SOA-RP-01: Individual agencies should form an organizational unit similar to the state's support center to support SOA services within an agency. The state's support center may serve as a resource and consultant to agency support center as needed.

SOA-RP-02: Services should avoid service nesting, where possible, to minimize service dependencies and reduce risk.

SOA-RP-03: Providers should consider providing tools to assist consumers in testing consumer systems that use the service. These tools should include:

a. Providing a standalone implementation of the service interface(s) that a consumer can use in developing a consumer system, including basic testing.

b. Deploying the service in a test environment managed by the SOSC to support more sophisticated testing and to test performance.

Definition and Terminology

This document presents architecture direction for agencies when planning or making changes or additions to their information technology through:

- **Principles** – high-level fundamental truths, ideas or concepts that frame and contribute to the understanding of the Enterprise Architecture. They are derived from best practices that have been assessed for appropriateness to the Commonwealth Enterprise Architecture. [COTS EA Workgroup, —Commonwealth of Virginia Enterprise Architecture – Conceptual Architecture‖, v1.0, February 15, 2001, p 5.]

- **Requirement(s)** – (context: Enterprise Architecture) numbered statements that provide mandatory Enterprise Architecture direction (example: NET-R-01) and strategic components of the Commonwealth's Enterprise Technical Architecture Technical Component Standards tables which are acceptable activities for current deployments and must be implemented and used for all future deployments.

- **Recommend Practices** – activities which are normally considered leading edge or exceptional models for others to follow. They have been proven to be successful and sustainable and can be readily adopted by agencies. They may or may not be considered the ultimate — "best practice" by all readers but for this place and time they are recommended practices and should be used and implemented wherever possible. Recommended Practices are optional.

- **Service-Oriented Architecture (SOA)** – architectural approach that presents a set of reusable software components that align with the agency's business goals and the Commonwealth's strategic objectives. The services are highly cohesive, loosely coupled, discoverable software components that are decoupled from hardware and network dependencies and that encapsulate the complexities of the underlying implementation.

- **SOA-based Services** – modular, swappable functions, separate from, yet connected to an application via well defined interfaces to provide agility. Often referred to as "services" throughout this document they:

    - Perform granular business functions such as "get customer address" or larger ones such as "process payment."

    - Are loosely coupled to a new or existing application.

    - Have capability to perform the steps, tasks and activities of one or more business processes.

    - Can be combined to perform a set of functions - referred to as "service orchestration."

- **SOA Steering Committee** – This entity provides the strategy and leadership to approve recommended Tier One services for enterprise use and ensure they are implemented in ways to achieve targeted benefits.

- **SOA Technical Advisory Group (SOA TAG)** – This entity recommends and ensures services are and remain Tier One compliant.

- **State SOA Backplane** - Shared, common infrastructure for lifecycle management such as a services registry, policies, business analytics; routing/addressing, quality of service, communication; development tools for security, management, and adapters.

- **Service Offering and Support Center (SOSC)** – The state SOSC is maintained and operated by the Virginia Information Technology Agency (VITA). The SOSC provides people, processes, and resources to ensure enterprise efficiencies and help agencies meet business and technical needs.

- **Service Providers and Consumers** - In general, entities (people and organizations) offer capabilities and act as service providers. Those with needs who make use of services are referred to as service consumers.

- **Tier Definitions:** Tier One – Services across/among agency systems; Tier Two – Services within an agency; and Tier Three – Sub-agency level.

Appendices

References and Links

State References:

Service Oriented Architecture (SOA) Planning Design Standards, State of Washington, Olympia, WA, Information Services Board, refer to: http://ofm.wa.gov/ocio/policies/documents/183.10.20.pdf

Integration Services Gouvernance, State of Washington, Olympia, WA., Information Services Board, refer to: http://ofm.wa.gov/ocio/policies/documents/183.30.10.pdf

Service-Oriented Architecture (SOA) and Federal Identity Management Vision, November 19, 2007, refer to: http://www.cioarchives.ca.gov/stateIT/pdf/California_SOA_and_IDM_Vision_122007.pdf

Federal References:

A Practical Guide to Federal Service Oriented Architecture, Architecture and Infrastructure Committee, Federal Chief Information Officers Council, refer to: http://www.cio.gov/Documents/PGFSOA_v1-1.pdf

General References:

The SOA Source Book, published by The Open Group; refer to: http://www.opengroup.org/soa/source-book/soa/index.htm

Interoperable Enterprise Business Scenario (K022), published by The Open Group; refer to: www.opengroup.org/bookstore/catalog/k022.htm.

Magic Quadrant for SOA Governance Technologies, Gartner G00219233, refer to: http://www.scribd.com/doc/76706515/Magic-Quadrant-for-Soa-Gover-219233