

# System Wide Information Management (SWIM)

## **Governance Plan**



Version 3.0

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**SIGNATURE PAGE**

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## Revision History

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1.0	June 1, 2008	Initial Draft
2.0	Sept. 26, 2008	Final
2.1	March 9, 2009	Minor Revisions
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## 1.0 Introduction

### 1.1 Purpose

This plan documents the System-Wide Information Management (SWIM) Program goals, guiding principles, structure, and responsibilities for governance of the SWIM Service Oriented Architecture (SOA). The plan also describes a framework to guide deployment of SWIM SOA Governance.

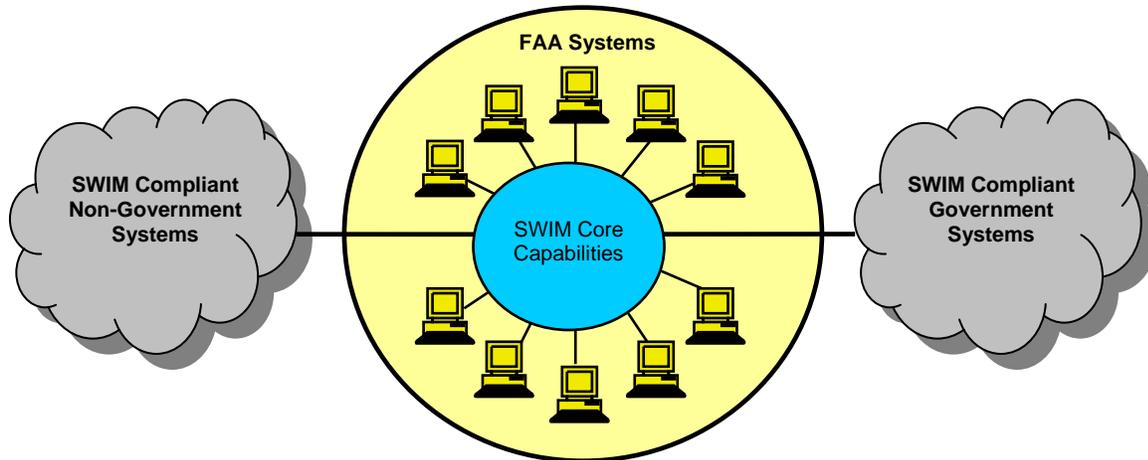
### 1.2 Scope

This plan applies to all SWIM participants, stakeholders and activities. Activities sponsored by SWIM will support the objectives of this plan; however, requirements and specific responsibilities for Segment 1 SWIM implementing programs (SIP) will be specified in Program Level Agreements (PLA) between SWIM and each of the SIPs.

### 1.3 Background

The Federal Aviation Administration (FAA) is developing and modernizing many complex interdependent Air Traffic Management (ATM) systems using modern technologies, software methods, and system architectures that provide fundamental support to the transition to network-centric ATM operations. Concurrently, the evolving service-oriented computing paradigm leads to National Airspace System (NAS) interfaces being defined, developed, and implemented as services, rather than as system-dependent functions. This approach will provide simplified interoperability, greater potential for software re-use, and reduced total cost of ownership.

This modernization is occurring alongside formulation of revolutionary new ATM concepts and the process re-engineering of every facet of operations (e.g., separation assurance, strategic flow management, dissemination of aeronautical and flight data, and airspace user interaction with NAS infrastructure). The Joint Planning and Development Office (JPDO), through its development of the *Operational Concept for the Next Generation Air Transportation System (NextGen)*, targets the completion of this effort for the 2025 timeframe. Achieving NextGen requires a suite of Core and Enterprise Services comprised of both the net-centric infrastructure providing connectivity and universal access to information, and by the services that provide the collection, processing, and distribution of information.



**Figure 1-1 SWIM-Enabled Interoperability**

The purpose of SWIM is to facilitate net-centric NAS operational improvements (including those proposed in NextGen). SWIM capabilities apply state-of-the-art information management and exchange technologies to ensure information is available to SWIM-compliant systems in order to improve the speed, efficiency, quality, and extent of distributed decision-making. Information can be automatically provided to users with a known need and to new users as needs arise – with far less expense and complexity than current methods. SWIM-compliant systems have the ability to request and consume information when they need it, subscribe for automatic receipt, and publish information and services as appropriate.

## 2.0 References

- [SWIM GPol] SWIM Governance Policies v1.0, July 27, 2009
- [SWIM GHbk] SWIM Governance Policy Handbook for Segment 1 v1.0, Aug 19, 2009
- [SWIM GPro] SWIM Service Lifecycle Management Processes DRAFT v0.8, May 31, 2010
- [SWIM CM] SWIM Configuration Management Plan v2.1, June 10, 2008
- [NG ConOps] Concept of Operations for the Next Generation Air Transportation System (NextGen), v3.0, October 1, 2009  
[http://www.jpdo.gov/library/NextGen\\_ConOps\\_v3\\_0.pdf](http://www.jpdo.gov/library/NextGen_ConOps_v3_0.pdf)
- [TOG SGF] The Open Group, SOA Governance Framework, Draft Technical Standard V2.4 (2009)  
<http://www.opengroup.org/projects/soa-governance/>

### **3.0 SOA Overview**

The SWIM concept leverages the Service Oriented Architecture (SOA) paradigm. SOA is an approach to integrating applications running on heterogeneous platforms using common standards. A service is a set of well-defined, self-contained functions (or operations) offered by a software system. With SOA, a service can be available using any SOA standards compliant communication protocol (procedure for transmitting and receiving data) and any SOA standards compliant data format. SWIM provides both the SOA technology infrastructure and the information management standards and processes needed for consistent service development, operation, and management enterprise-wide.

By establishing SOA standards and principles, SWIM enables service-oriented computing within the NAS. Systems on the network seeking services can invoke them without having to customize or adapt to the underlying implementation of the loosely coupled service. SWIM leverages the FAA Telecommunications Infrastructure (FTI) that replaces the functionality previously provided by several owned and leased transport systems. While FTI provides network-level connectivity and security, SWIM provides a means for systems to obtain needed information from other systems that provide that information (application integration).

The SWIM concept draws on the Department of Defense's (DoD's) Global Information Grid/Network Centric Enterprise Services (GIG/NCES) model to promote efficient interoperability among NAS operational systems. SWIM also can provide interoperability of these NAS operational systems with NAS mission support systems and other SWIM-compatible systems operated by non-Government NAS users (e.g., commercial air carriers), as well as other Government agencies such as the DoD and the Department of Homeland Security (DHS).

### **4.0 SOA Governance**

#### **4.1 Definition and Scope**

An often-quoted definition of SOA Governance from Gartner is: "Ensuring and validating that assets and artifacts within the architecture are acting as expected and maintaining a certain level of quality." To fulfill this, an organization must define what is being governed, how governance will be implemented and measured, and who will be responsible for each component of governance.

With the core FAA mission of safety and efficiency at stake, the NAS has evolved an Information Technology (IT) governance structure that tightly controls access to NAS components and infrastructure. As the NAS moves towards the net-centric concepts outlined in the [NG ConOps], SOA Governance activities must be integrated into this existing regime. SWIM Governance will build upon existing management and control practices in place for NAS systems and Enterprise Architecture (EA).

The elements of SOA Governance include policies and processes, organizational structures and their corresponding roles and responsibilities, and enabling tools and infrastructure technologies. Under the Federated approach taken in SWIM Segment 1, the scope of SWIM Governance extends only to the services provided by the SWIM Implementing Programs (SIPs) as described in Program Level Agreements (PLAs) with each SIP. As SWIM proceeds to a more comprehensive and centralized SOA core infrastructure in Segment 2 and beyond, SOA Governance must evolve to include broader organizational structures to bring a true Enterprise-wide focus on strategic goals over project-specific benefits.

## **4.2 Governance Objectives**

In order to justify the far-reaching impact of SOA adoption, there must be a focus on the business value that SOA brings to the NAS Enterprise above and beyond the technical strategy. To achieve the promised agility and interface development cost avoidance benefits, the primary objective must be intrinsic interoperability rather than custom integration. Developers of both service provider and consumer applications should not be constrained by the other parties to the interface. By adherence to well-defined standards, developers can work with confidence that their application will be interoperable with other applications built to the same standards. A corollary objective is enhancement of opportunities for service reuse by prioritizing flexibility over optimization. As interoperable shared services are developed, the cost of reuse will become much lower than today's paradigm of specific-purpose interface development.

## **4.3 SWIM Governance Framework**

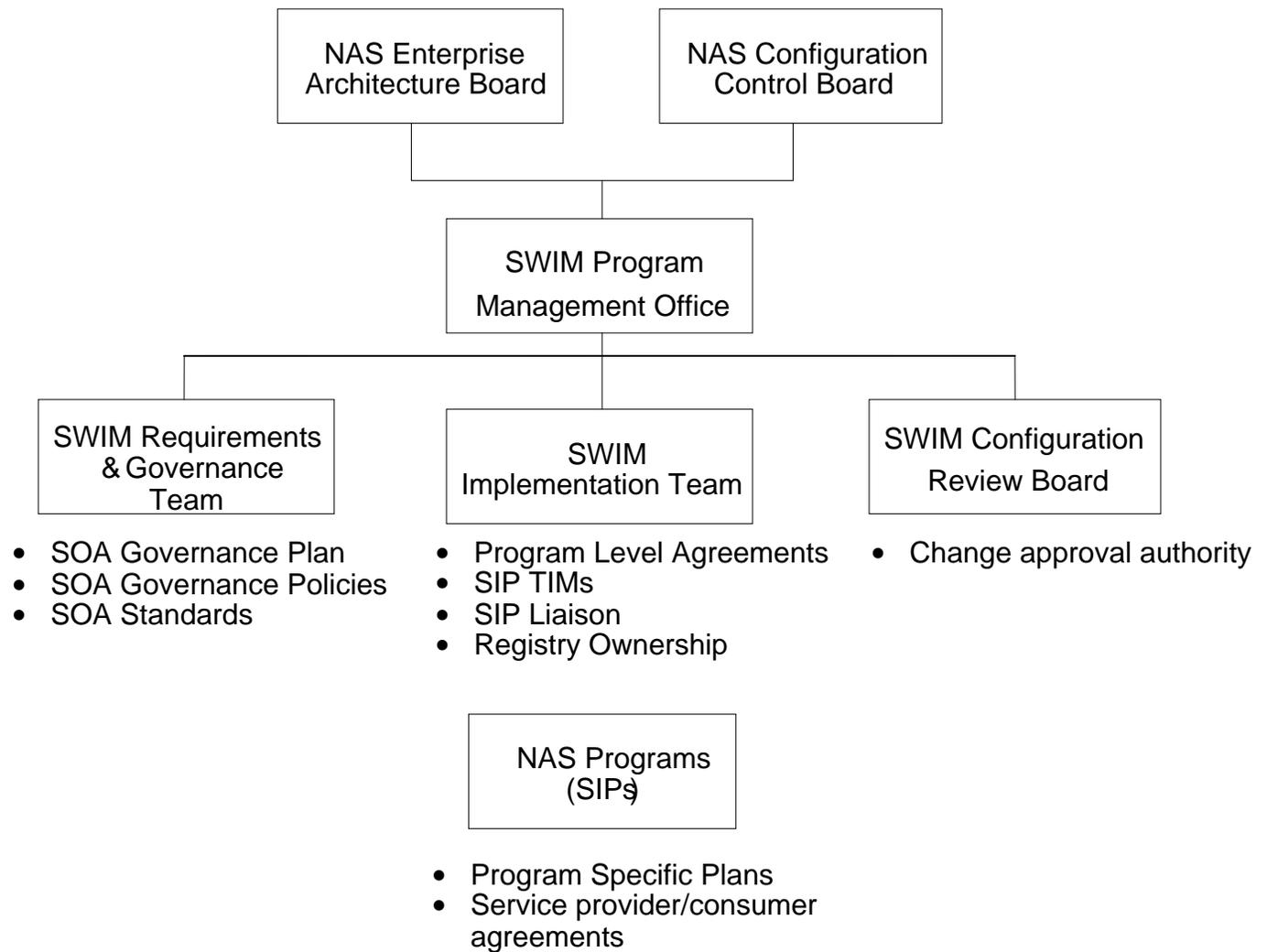
The [TOG SGA] outlines a Governance Framework to assist organizations in defining an incremental deployment of SOA Governance. The framework consists of two parts: a model

describing how Governance decision-making is implemented, and a method describing a feedback loop to refine Governance as the enterprise evolves. These two parts are described in subsequent sections respectively as the SWIM Governance Model, and the SWIM Governance Lifecycle.

## **5.0 SWIM Governance Model**

### **5.1 Governance Organization**

The SWIM Segment 1 Governance Organization is based upon a distribution of responsibilities among the NAS Enterprise Architecture Board (EAB), NAS Configuration Control Board (CCB), the SWIM Requirements and Governance team, the SWIM Implementation team, the SWIM Configuration Review Board (CRB) and NAS Programs. The limited scope of Segment 1 Governance is reflected in *Figure 5-1 SWIM Segment 1 Governance Model*. Given that SOA Governance extends NAS Governance, existing governance bodies such as the NAS EAB and the NAS CCB are necessarily reflected in the figure. For Segment 1, Governance is defined by the Requirements and Governance Team, monitored and controlled by the Implementation Team, and the configuration is managed by the SWIM CRB. Governance of the SIPs is provided through the oversight role played by the Implementation Team in accordance with the PLAs. The roles of each group are discussed in more detail in section 5.2.



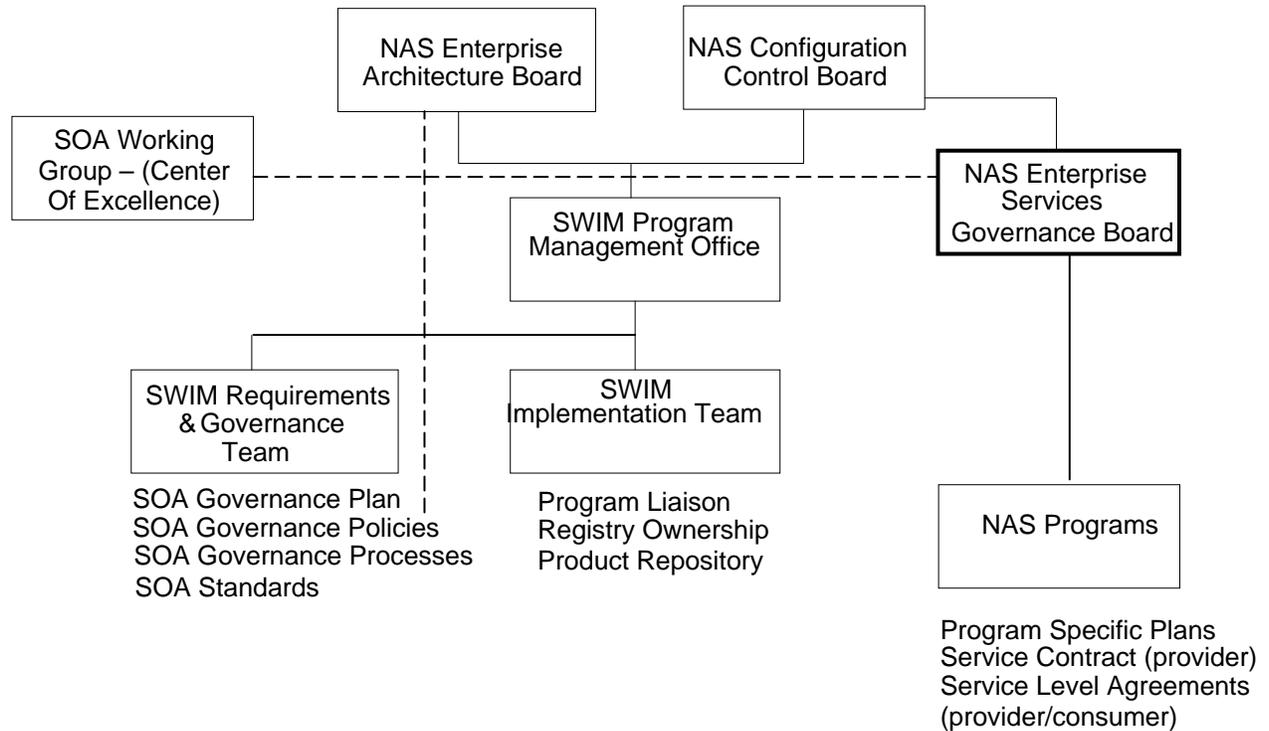
**Figure 5-1 SWIM Segment 1 Governance Model**

As the governance scope of future segments expands beyond the original SIPs, the model of governance must also expand. A proposed model is depicted in Figure 5-2. The major difference is the addition of two new boards. The SOA Working Group (WG) already exists. By its charter it is the “governing body for the approval of SOA standards related to the design, development, and implementation of SOA applications within the FAA.” The charter also establishes the scope of the WG as a SOA Center of Excellence (COE).

The NAS Enterprise Services Governance Board (ESGB) is a new, yet to be defined entity. Suggested responsibilities and membership for this board are detailed in section 5.2 below. Although the introduction of new layers of approval to get things done is generally discouraged, the existing NAS governance structure does not seem to provide an easy fit for the needed role.

While the NAS CCB typically has jurisdiction over interfaces between systems, its charter does not cover the analysis needed to manage the Service lifecycle. The ESGB will need to coordinate closely with the NAS CCB and EAB as the overall governance regime matures.

The SWIM Configuration Review Board (CRB) is not depicted here, since its scope will be reduced to managing configuration of SWIM internal documentation.



**Figure 5-2** Proposed SWIM Future Segment Governance Model

Another change of note is the reduced scope for the SWIM Implementation Team, since Service Providers and Consumers will take on much of the responsibility for Service Level Agreement (SLA) definition and maintenance, versus the Segment 1 model of PLAs.

## **5.2 SWIM Governance Roles and Responsibilities**

### **5.2.1 SWIM Program Management Office**

The SWIM PMO serves as the SOA oversight authority for all SWIM services. The SWIM PMO accomplishes this function through a combination of entities to include the SWIM Requirements and Governance team, the SWIM Implementation team, and the SWIM CRB.

#### **5.2.1.1 SWIM Requirements and Governance Team**

The SWIM Requirements and Governance team serves as the SWIM SOA governance authority for all SWIM services. The SWIM Requirements and Governance team accomplishes this function through the use of the SWIM Governance Plan, Policies and Standards.

Responsibilities of the SWIM Requirements and Governance team include:

- Designate a “Governance Lead” to coordinate and administer the actions of the various governance boards with the governance-enabling technologies;
- Develop and maintain all SOA policies and processes;
- Maintain a central registry/repository for all SWIM services and associated artifacts;
- Collect metrics on SWIM service usage and PLA compliance for quality review and program metrics;
- Participate in development and maintenance of FAA SOA standards for the NAS; and
- Assist Service Providers with analyses required for service lifecycle management (e.g. SOA Suitability.)

#### **5.2.1.2 SWIM Implementation Team**

The primary responsibility of the SWIM Implementation Team is to assist and support the SIPs in Segment 1 as they design, develop, test, and deploy their programs to facilitate SWIM. This will involve high-level governance with respect to SWIM-related functionality including, but not limited to, coordinating activities, reviewing documentation, observing testing, collecting and monitoring metrics and program data, and providing laboratory facilities. The SWIM Implementation Team will use the following mechanisms to accomplish these objectives:

- Program Level Agreements – The PLAs identify the tasks and activities that the SIPs need to perform in order to satisfy SWIM PMO requirements. The PLAs include Joint Resource Council (JRC)-approved funding levels, proposed schedules, required products, and a list of SWIM Government-Furnished Equipment (GFE). SIP-specific PLAs may alter program specific requirements.
- Earned Value Management – The SWIM PMO is responsible for maintaining an Earned Value Management System (EVMS) in order to plan and control costs, measure performance, and identify variances in costs and schedule. In turn, the Segment 1 SIPs are responsible for reporting this information on a monthly basis to the SWIM Implementation Team. The Cost Performance Reports (CPRs) reflect the efforts of FAA personnel, support contractors and development contractors.
- Documentation Review – In accordance with the PLAs, the SIPs will provide reports and products to be maintained on the SWIM KSN Home page during the design, development, test, and deployment of SWIM Segment 1 capabilities.
- Design and Program Reviews – Throughout the design and development process, the SIPs will conduct Design Reviews and Program Reviews. The SWIM Implementation Team Point of Contact (POC) will attend these reviews in order to monitor the status of the SIP's progress, identify any issues that may impact the SIP's ability to facilitate the SWIM capability, and provide technical assistance.
- Capability Testing Requests – Each SIP will provide a Test Management Plan (TMP) and test procedures or similar test documentation that includes a description of the plan for testing the capability as well as a matrix that maps which requirements will be tested in each phase of testing. Members of the SWIM Implementation Team will review and comment on all test documentation in sufficient time so that the SIPs will be able to respond and modify the plans and procedures prior to testing.
- Post-Implementation Reviews – The SWIM Implementation Team is responsible for ensuring that the SIPs plan for and conduct Post-Implementation Reviews (PIRs) for their SWIM Segment 1 services. The purpose of the PIR is to assess actual program results

against baseline expectations to determine whether the investment program is achieving performance and benefit targets, the investment program is meeting the service needs of customers, and the original business case is still valid. The PIR will assess actual investment costs, schedules, benefits, performance, and mission outcomes against appropriate measures of effectiveness.

In future segments, the responsibilities of the Implementation Team will shift from SIP oversight to administration of SWIM infrastructure and core service implementations.

### **5.2.1.3 SWIM Configuration Review Board**

The SWIM CRB serves as the SWIM governing body for all baseline changes related to SWIM services. Specifically the SWIM CRB:

- Approves and controls changes to approved SWIM system baselines and standards in accordance with the SWIM Configuration Management (CM) Plan;
- Serves as a forum for the disposition of SWIM upgrades/modifications and the resolution of design, interface, commonality, and schedule issues;
- Approves and control deviations and waivers to SWIM Policies and Processes;
- Administers change management process as defined by the SWIM CM Plan; and
- Approves and controls changes to developmental baselines and work products for Segment 1 programs.

In future SWIM segments, the SWIM CRB scope will be limited to internal SWIM CM, and will not include baselines or work products of service developers.

## **5.2.2 SWIM Service Providers**

### **5.2.2.1 Segment 1 SIPs**

SIPs are responsible for the implementation of capabilities as services in SWIM Segment 1: En Route Automation Modernization (ERAM), Traffic Flow Management (TFM), Aeronautical Information Management (AIM), Terminal Data Distribution System (TDDS), Corridor Integrated Weather System (CIWS), Integrated Terminal Weather System (ITWS) and Weather Message Switching Center Replacement (WMSCR).

Responsibilities of the SIPs include:

- Develop and implement services in accordance with [SWIM GPol] and PLAs;

- Manage the Service Lifecycle in accordance with the processes defined in [SWIM GPro];
- Identify a service owner for each offered service; and
- Review and comment on SOA governance and standards documents.

#### **5.2.2.2 Future Segment Service Providers**

In future SWIM segments, the characterization of service providers as SWIM Implementing Programs (SIPs) becomes invalid, since the implementation will not be made on behalf of the SWIM program, but as a capability to be offered in the NAS Enterprise. To reflect this, SWIM policy and process documents use the term Service Provider to refer to organizations which implement services in the NAS.

The responsibilities of Service Providers are the same as for Segment 1 SIPs, with the exception that development and implementation is not bound by PLAs.

#### **5.2.3 Enterprise Architecture Board (EAB)**

The NAS EAB retains its role of executing effective system engineering processes that establish and manage the NAS Enterprise Architecture to meet current and future demands, while ensuring compliance with Office of Management and Budget (OMB) requirements.

The primary SOA governance responsibility of the NAS EAB is to validate the implementation of a proposed capability in the NAS as a SWIM-compliant service.

#### **5.2.4 NAS Configuration Control Board (CCB)**

The NAS CCB will retain its role in managing configurations of NAS systems (i.e. systems providing capabilities as Services) and associated documentation such as Interface Requirements Documents (IRDs).

#### **5.2.5 NAS Enterprise Services Governance Board (ESGB)**

The primary role of the proposed NAS ESGB is to manage the NAS portfolio of services.

Whereas the NAS EAB determines whether a service “fits” into the Enterprise Architecture, the NAS ESGB determines how and when the service will fit. While the NAS CCB retains approval authority for changes to service interfaces, the NAS ESGB contributes analyses to account for the various service interdependencies.

Responsibilities of the NAS ESGB include:

- Coordinate with NAS EAB on initial validation of proposed capabilities as SWIM-compliant services;
- Evaluate requests to transition a service from the Definition stage to the Development stage, to ensure a “contract-first” methodology;
- Coordinate with In-Service Decision (ISD) authorities to approve transition of services to Production stage;
- Evaluate interdependency analyses to approve transition of services to Deprecated stage;
- Evaluate interdependency analyses to approve transition of services to Retired stage; and
- Evaluate requests for deviations from SWIM governance policies.

### **5.3 SWIM Governance Policies**

The SWIM Requirements and Governance Team has developed a set of SOA policies to provide guidance to the NAS Programs whether they are service providers or service consumers regarding responsibilities, workflow, and interdependencies. These policies are crafted to support the overarching goals of ensuring service interoperability, and promoting reuse of existing services. Policies are intended to be adopted by NAS Programs and are designed to provide specific guidance regarding best practices for implementation of a SOA based solution and are subject to enforcement via the governance entities described in section 5.2. The SWIM SOA policies defined in Appendix A are detailed in [SWIM GPol] and are grouped into the three categories defined below:

1. Strategic SOA Policies: set the overall direction and priorities of the SOA initiatives to ensure alignment between services and business priorities;
2. Service Design-Time Policies: guide the design, development, and operation of services and SOA infrastructure; and
3. Run-time and Operational Policies: guide the day-to-day governance that includes monitoring, auditing, demand management, and service utilization.

### **5.4 SWIM Governance Processes**

The SWIM Requirements and Governance team has built upon [SWIM GPol] to produce the SWIM Lifecycle Process Management Processes document. In this context processes are

defined as a documented and structured set of activities that support the implementation, maintenance, and enforcement of policies.

## **5.5 SWIM Governance Metrics**

In order to objectively assess the effectiveness of governance, the SWIM PMO will collect appropriate metrics. While many parameters associated with governance are easily quantified, care has been taken to identify those that measure progress toward achieving SWIM's stated goals of interoperability and service reuse.

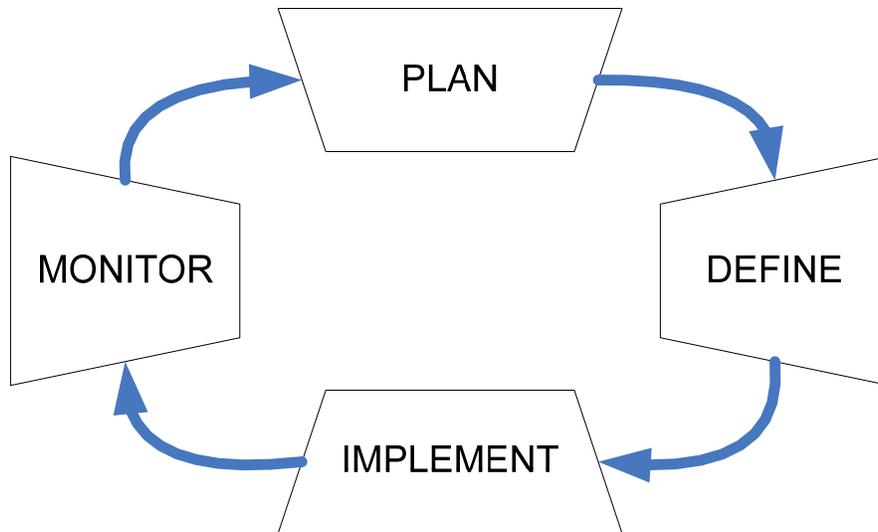
The metrics to be collected include:

- Percent of NAS proposals in Initial IA phase that undergo Suitability Analysis;
- Service Portfolio Usage Factor, calculated by number of Provider/Consumer SLAs divided by number of Services in the Portfolio;
- Service Lifecycle Stage Transition Approval Timeliness;
- Ratio of Policy Deviations to Production Services;
- Consumption Report Audit Accuracy, comparing reports from the Registry/Repository tool versus consumption reports from Service Providers;
- Percent of Design Time Governance Policies verified by automated tools; and
- Percent of Run Time Governance Policies verified by automated tools.

This list will be continuously reevaluated as described in the Governance Lifecycle below.

## **6.0 SWIM Governance Lifecycle**

The nature of technology is one of continual evolution. To maintain relevance, Governance cannot remain static, but must also evolve to incorporate new standards, methodologies, and organizational structures. To this end, the SWIM Governance Lifecycle is depicted in Figure 6-1.



**Figure 6-1** SWIM Governance Lifecycle

### 6.1 Plan SWIM Governance

As the title indicates, this document sets forth the PLAN for SWIM Governance. The scope and objectives of SWIM Governance are described in section 4.0 above. A description of existing governance structures and stakeholders is described in section 5.0. These form the basis for the DEFINE stage of the lifecycle.

Future iterations of the PLAN stage will incorporate observations and data collection from activities in the MONITOR stage. Decisions taken regarding the implementation of SWIM Segment 2, and evolution of NAS Governance bodies will also necessitate revisions of the Plan. Input from all stakeholders will be incorporated in the iterative process of continuous improvement.

Planning activities will include:

- Coordination with the SOA WG to determine SOA Standards adopted for FAA programs;
- Review of this document for currency; and
- Review of the [SWIM GPol] in consideration of collected metrics, lessons learned, and standards evolution.

## 6.2 Define SWIM Governance

Governance encompasses what must be done, how it must be done, and who will do it. The “what” is defined in the Governance Policies [SWIM GPol] document as outlined in section □. The “how” is defined in the Governance Processes [SWIM GPro] document as outlined in section 5.4. The “who” is defined above in section 5.2 “Roles and Responsibilities”. These documents will continue to be refined as part of the DEFINE stage of the lifecycle loop.

Definition activities will include:

- Update of [SWIM GPol] in accordance with the Governance Plan;
- Determination of metrics to be collected;
- Review and update of [SWIM GPro] in consideration of revised policies; and
- Define procedures for usage of core governance infrastructure (e.g. NAS Service Registry/Repository).

## 6.3 Implement SWIM Governance

In the IMPLEMENT stage, the defined governance solution is realized. Enabling technologies such as the SWIM Registry/Repository and Enterprise Service Management (ESM) are deployed. Any transition plans (e.g. redefined Governance roles/responsibilities) are put into action. Once the implementation is verified, the lifecycle can proceed to the MONITOR stage. Implementation activities consist primarily of deployment and administration of governance-enabling technologies.

## 6.4 Monitor SWIM Governance

The MONITOR stage of governance involves continuous review of process outputs to chart the future course of SWIM governance. This review includes monitoring any changes in organizational strategy (e.g. Enterprise Architecture Roadmaps), SOA technology improvements, and standards evolution.

Monitoring activities include:

- Collection of governance metrics;
- Collection of service performance metrics;
- Generation of performance reports; and
- Analysis of metrics, reports, and external factors to determine if adjustment of the governance regimen is warranted.

## **Appendix A – GOVERNANCE POLICIES**

These policies will be maintained on the Documents page of the SWIM Web Site at

[www.swim.gov](http://www.swim.gov)

### 3.0 STRATEGIC SOA POLICIES.

- 3.1 SOA Technology Acquisition Policies
- 3.2 Enterprise Architecture Policies
- 3.3 SOA Opportunity Management Policies
- 3.4 Interoperability, Reuse and Standards Policies
- 3.5 Registry Policies

### 4.0 SERVICE DESIGN-TIME POLICIES

- 4.1 Namespace and Schema Policies
- 4.2 Service Interface Design Policies
- 4.3 Services Technical and Design Policies
- 4.4 Information Security Policies
- 4.5 Service Development Process Policies
- 4.6 Service Lifecycle Management Policies
- 4.7 Service Registration, Publishing and Advertising Policies
- 4.8 Service Operational Readiness Policies
- 4.9 Service Provisioning Policies
- 4.10 Service Consumer Policies

### 5.0 RUNTIME AND OPERATIONAL POLICIES.

- 5.1 Messaging and Routing Policies
- 5.2 Operational Security Policies
- 5.3 Service Management Policies
- 5.4 Maintenance and Support Policies

## Appendix B - ACRONYMS

AMS	Acquisition Management System
ATM	Air Traffic Management
CM	Configuration Management
CCB	Configuration Control Board
CPR	Cost Performance Reports
CRB	Configuration Review Board
DHS	Department of Homeland Security
DOD	Department of Defense
EA	Enterprise Architecture
EAB	Enterprise Architecture Board
ESGB	Enterprise Services Governance Board
ESM	Enterprise Service Management
EVMS	Earned Value Management System
FTI	FAA Telecommunications Infrastructure
GFE	Government Furnished Equipment
GIG/NCES	Global Information Grid/Network Centric Enterprise Services
IRD	Interface Requirements Document
ISD	In-Service Decision
IT	Information Technology
JPDO	Joint Planning and Development Office
JRC	Joint Resource Council
KSN	Knowledge Sharing Network
NAS	National Airspace System
NextGen	Next Generation Air Transportation System
OMB	Office of Management and Budget
PIR	Post-Implementation Reviews
PLA	Program Level Agreement
PMO	Program Management Office

POC	Point of Contact
SIP	SWIM Implementing Program
SOA	Service Oriented Architecture
SWIM	System-Wide Information Management
TMP	Test Management Plan
TOG	The Open Group
WG	Working Group
XML	Extensible Markup Language