System Wide Information Management (SWIM)

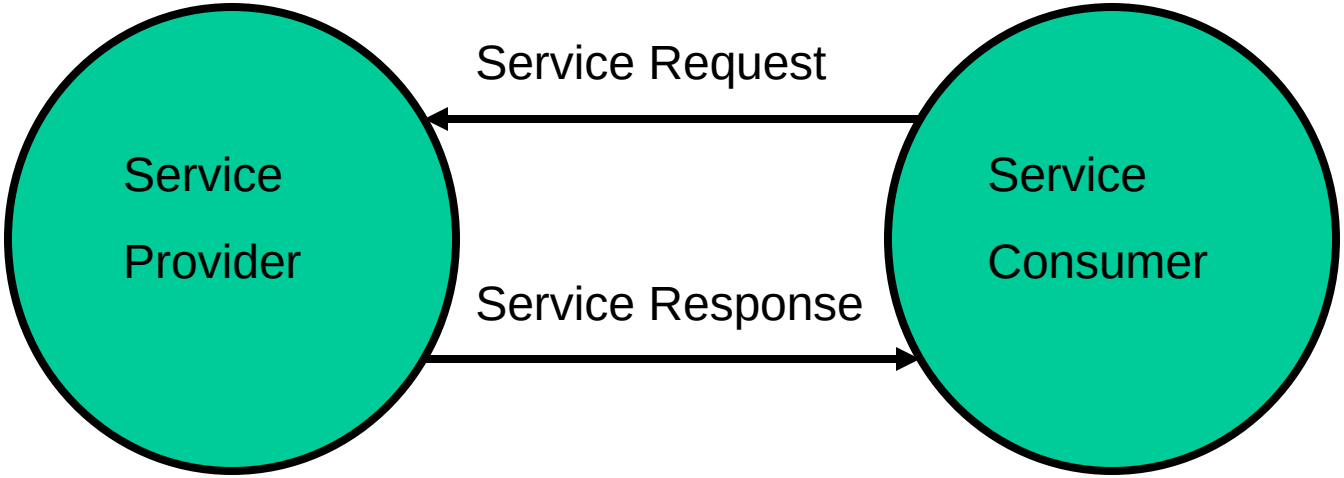
Agenda

- SOA
- SWIM Mission Need & Benefit
- SWIM Concepts
- SWIM Implementation

What is SOA

- SOA – **S**ervice **O**riented **A**rchitecture

SOA Basic Example



Provider and Consumer runs on different machine and/or software

What is service?

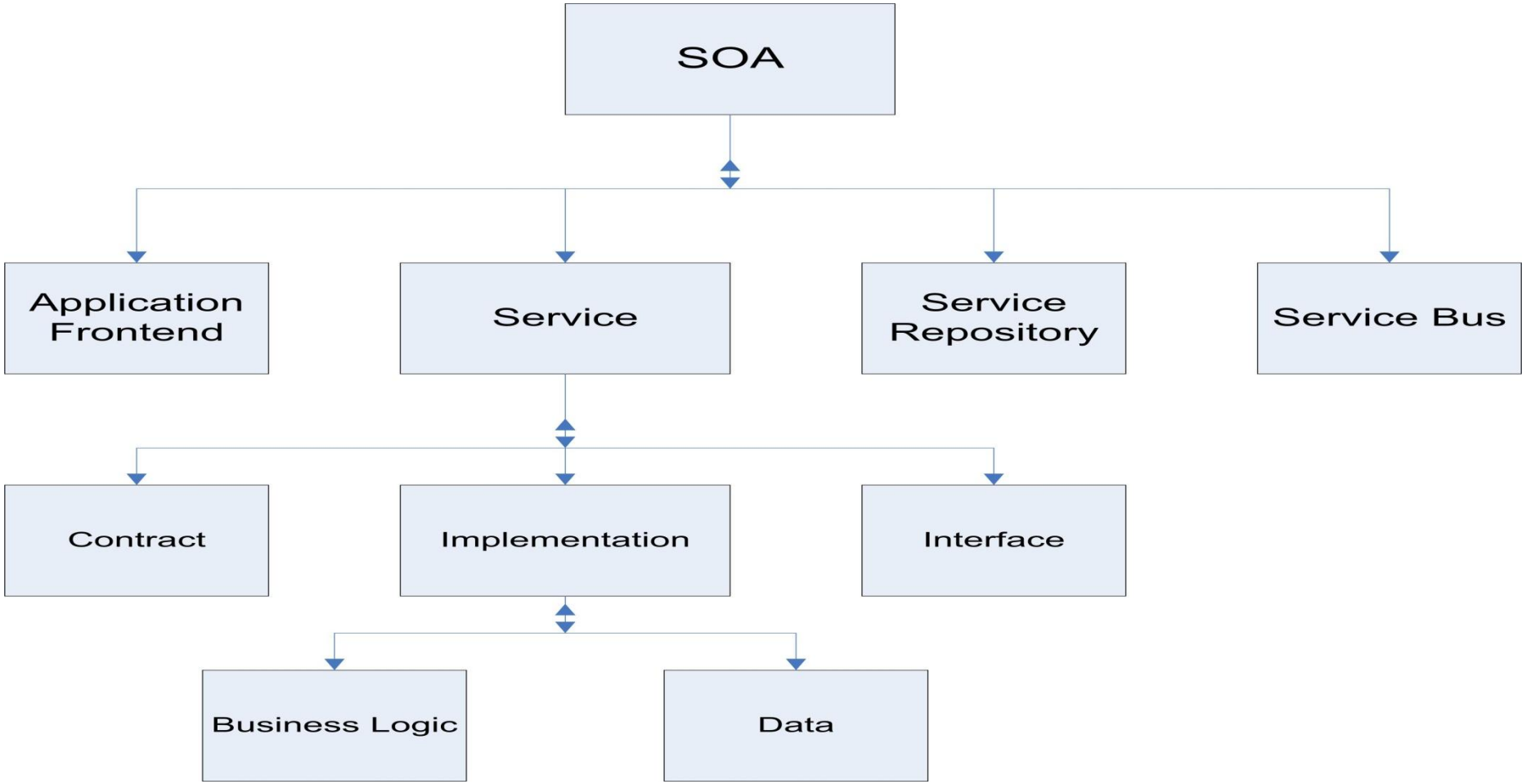
E. G. Taxi Service, Airline reservation service, Pizza Delivery Service etc..

What is the service?

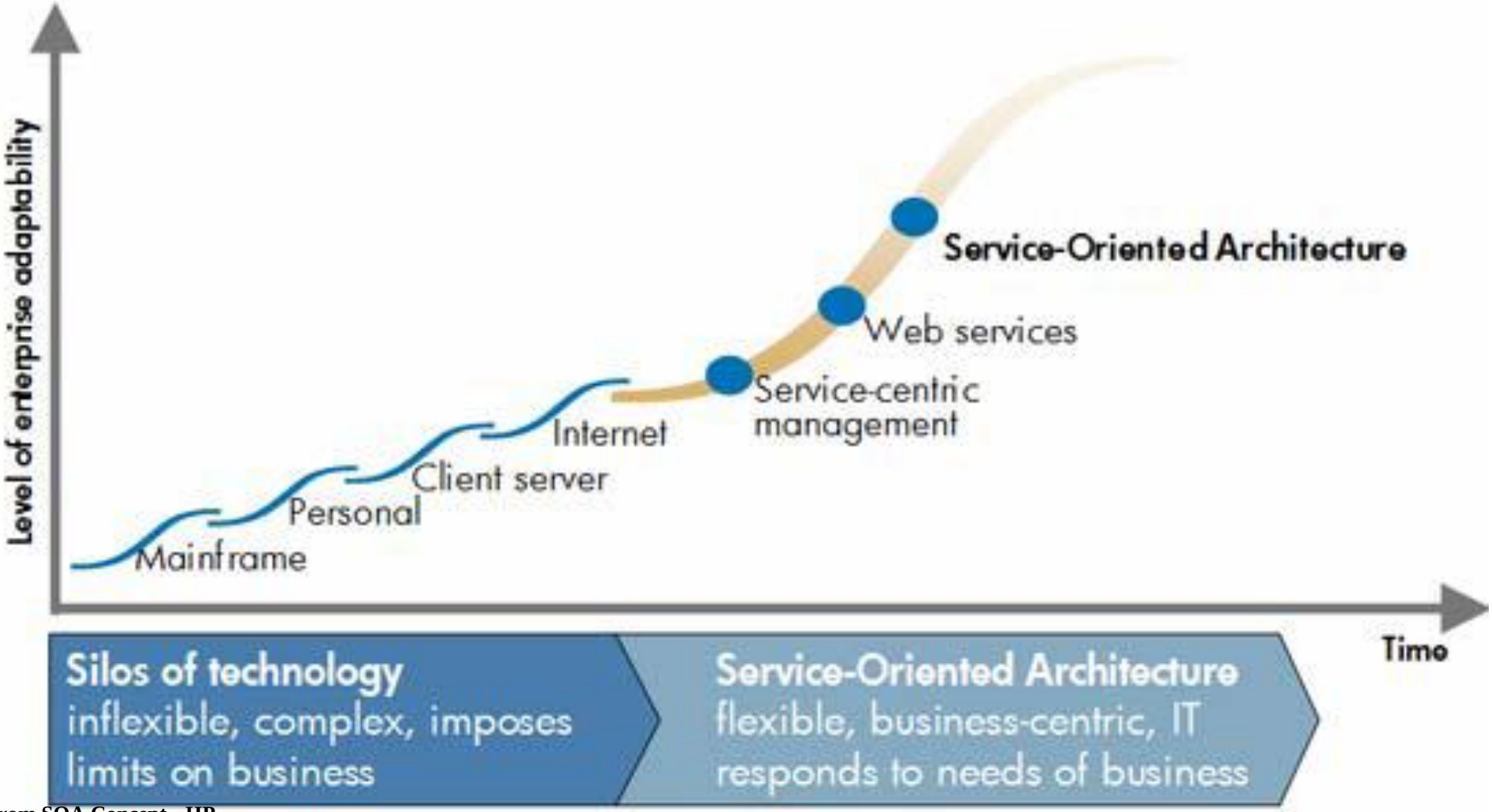
"A **service** is a fundamental building block of an **SOA**. It consists of a service contract, one or more service interfaces, and a service implementation. We distinguish different categories of services, namely basic services, intermediary services, process-centric services, and public enterprise services. "

- A service-oriented architecture is essentially a collection of services. These services communicate with each other. The communication can involve either simple data passing or it could involve two or more services coordinating some activity. Some means of connecting services to each other is needed.

Service Oriented Architecture Model



Evolving to more flexible architecture



From SOA Concept - HP

Historical Context – SWIM Pre-Dates NGATS

- *ATS Concept of Operations for the National Airspace System in 2005* (September 30, 1997) identified general need
- *National Airspace System Concept of Operation and Vision for the Future of Aviation* (RTCA, November 15, 2002) introduced common information network concept to manage data at a NAS level
- *ICAO Global Air Traffic Management Operational Concept* (2005) adopted the SWIM as an enabler to promote information-based ATM integration
- *NGATS 2025 Concept Brief, Concept v4.8* – JPDO Working Document, August 31, 2005 identified concept as fundamental to making data available, securable, and useable in real time to support new decisions and new decision makers

FAA Mission Need for SWIM

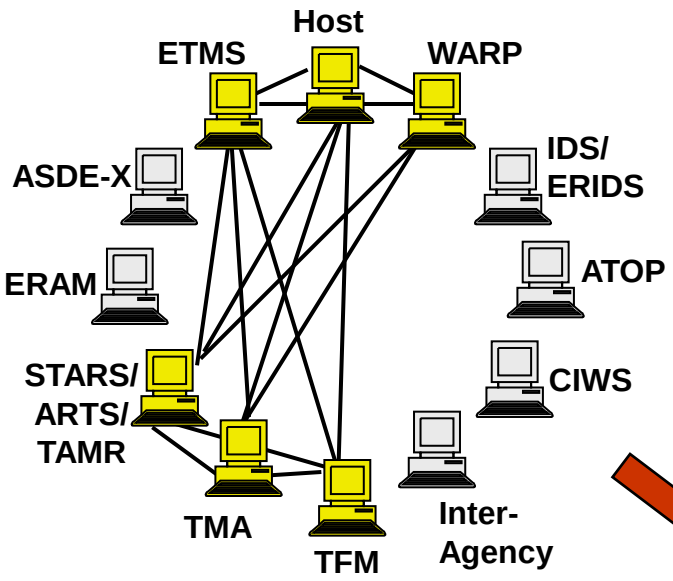
Today's National Airspace System to Next Generation Air Traffic System Evolution Challenge:

- Today's NAS is a hardwired collection of systems designed for specific types of decisions and decision makers
  - Dedicated point-to-point interfaces defined by custom interface control documents
  - Each interface designed, developed and maintained separately
- Next Generation Air Transportation System must allow:
  - Easy access to information by more system users and service providers
  - More efficient data management
  - System transparency to link decisions from strategic planning to tactical action

The Challenge

Today

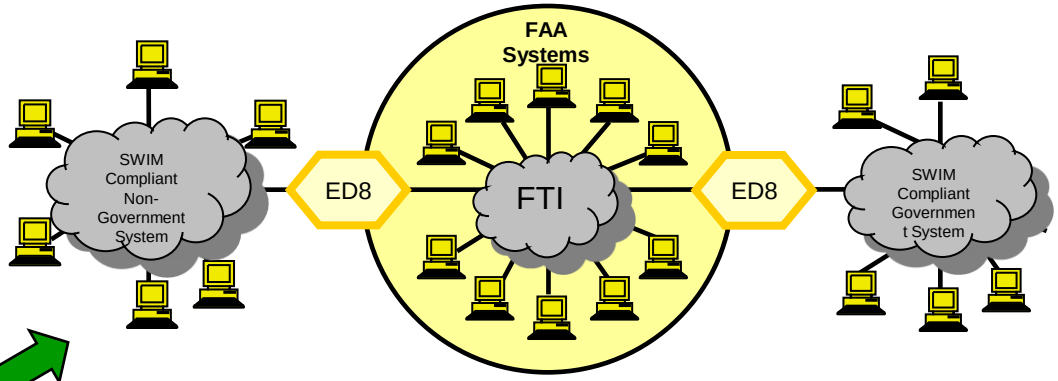
NAS data remains relatively unavailable to the FAA Enterprise

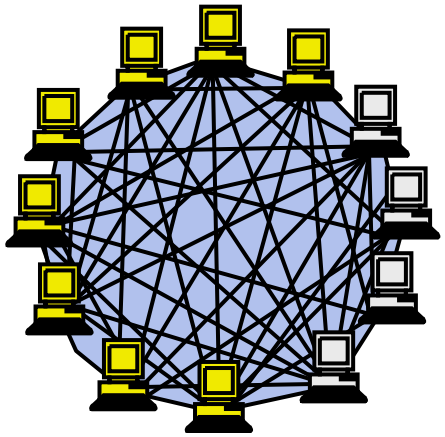


- Existing point-to-point, hardwired NAS
- Unique interfaces, custom designs

Tomorrow

Enterprise Management





Business as Usual

(NextGen without SWIM)

- More unique, point-to-point interfaces
- Costly development, test, maintenance, CM
- New decisions linked to old data constructs
- Cumbersome data access outside of NAS

Program Concept

SWIM is an IT infrastructure program that will operate in the background to provide data to authorized users

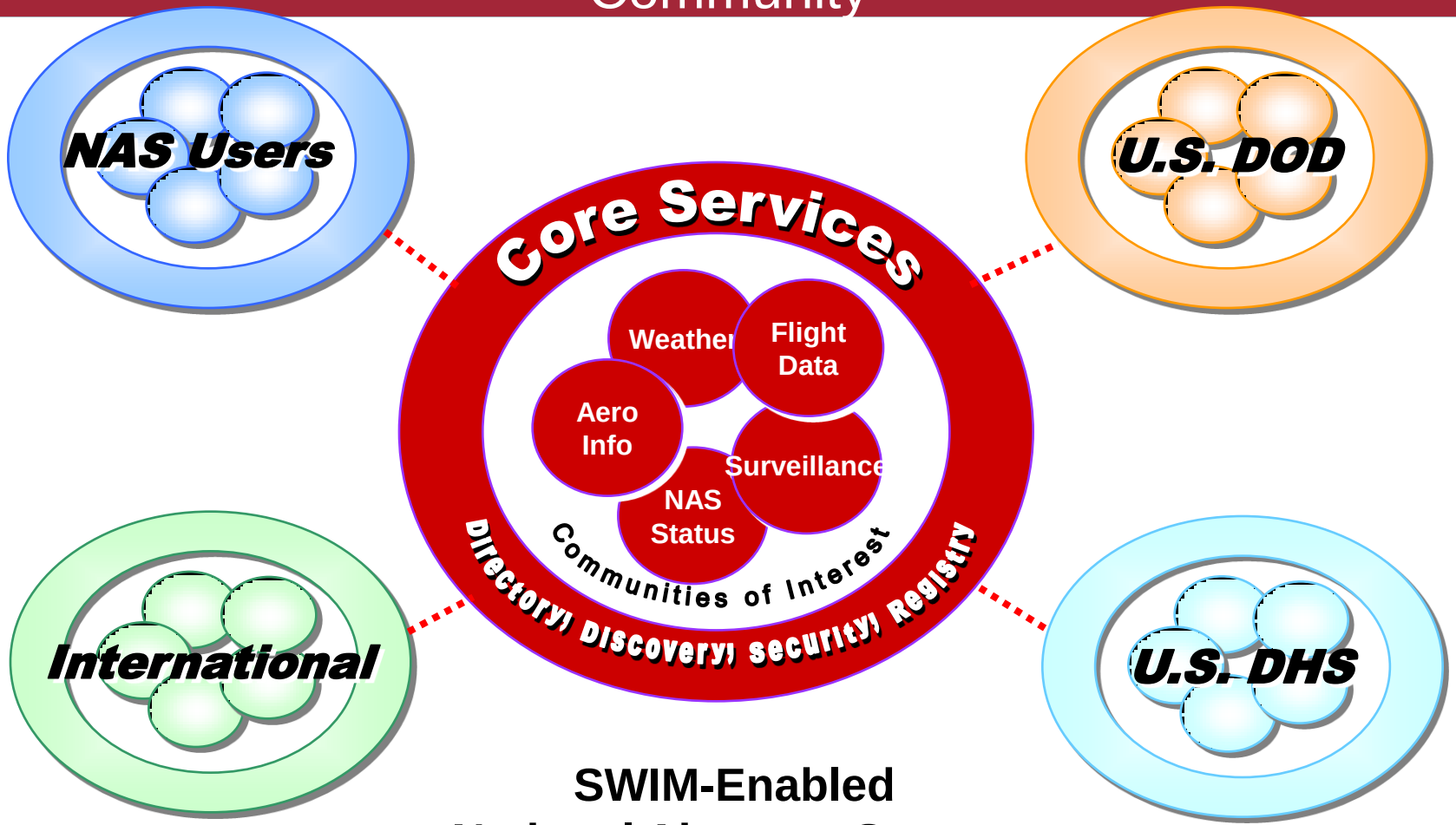
SWIM will:

- Identify industry standards, best practices and COTS products for use by NAS programs
- Establish governance policy, process, mechanisms and metrics
- Implement a Service-Oriented Architecture (SOA) in the NAS

In order to:

- Ensure interoperability between systems as required by NextGen
- Lower costs for information exchange
- Reduce time and cost needed to establish new interfaces
- Increase common situational awareness
- Increase NAS agility

Broader Government-Industry Network-Enabled Community



SWIM-Enabled National Airspace System

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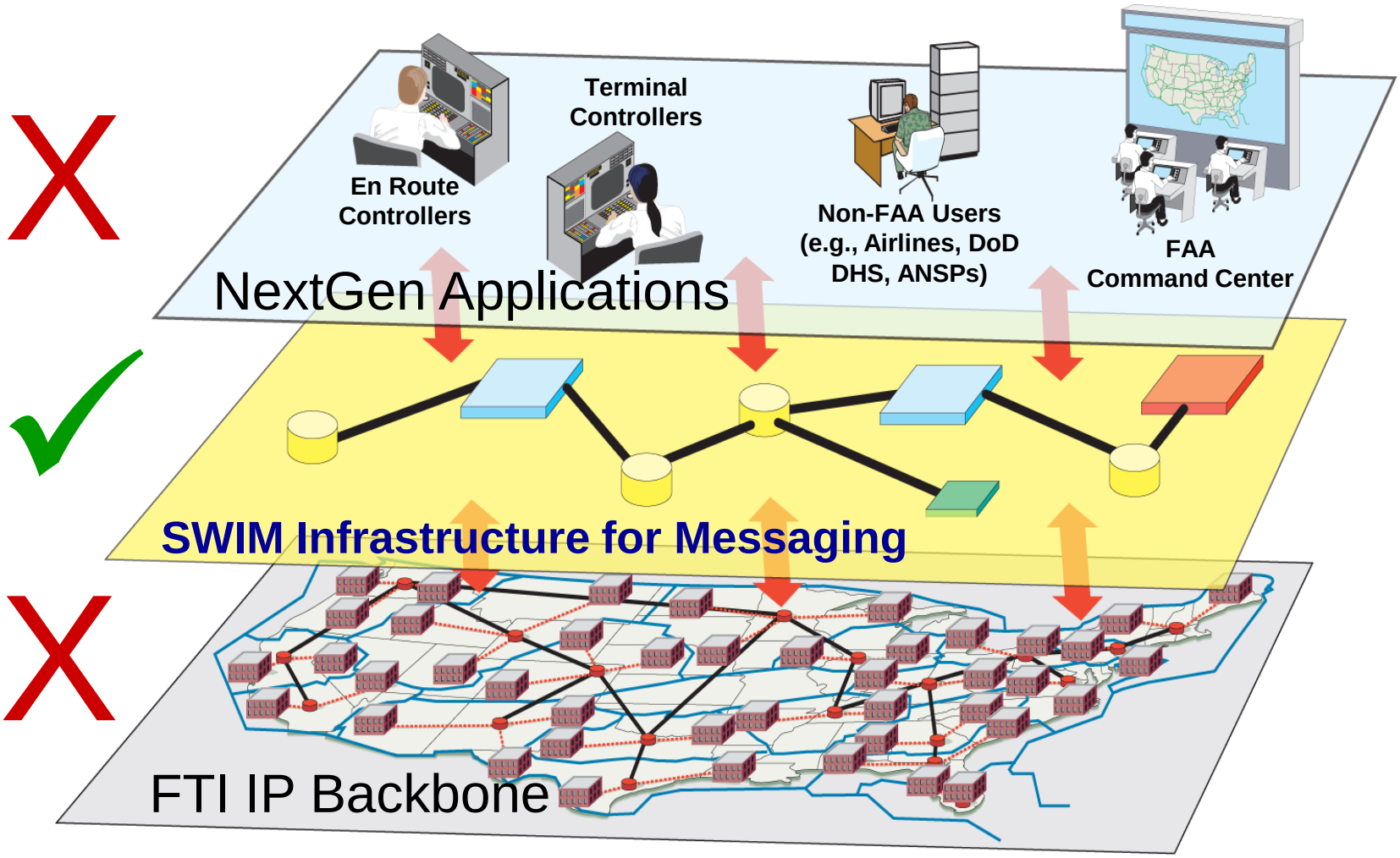
- SWIM Mission Need & Benefit
- **SWIM Concepts**
- SWIM Implementation

Conceptual Overview



Service Oriented Architecture

- Service Oriented Architecture (SOA) is an approach to integrate application programs using industry standards
- Each application is exposed as one or more services providing useful functions that can be used by the business or enterprise
- Services are chosen according to the business' needs and are chosen so as to be useful to multiple consumers

SWIM Is's and Is Nots

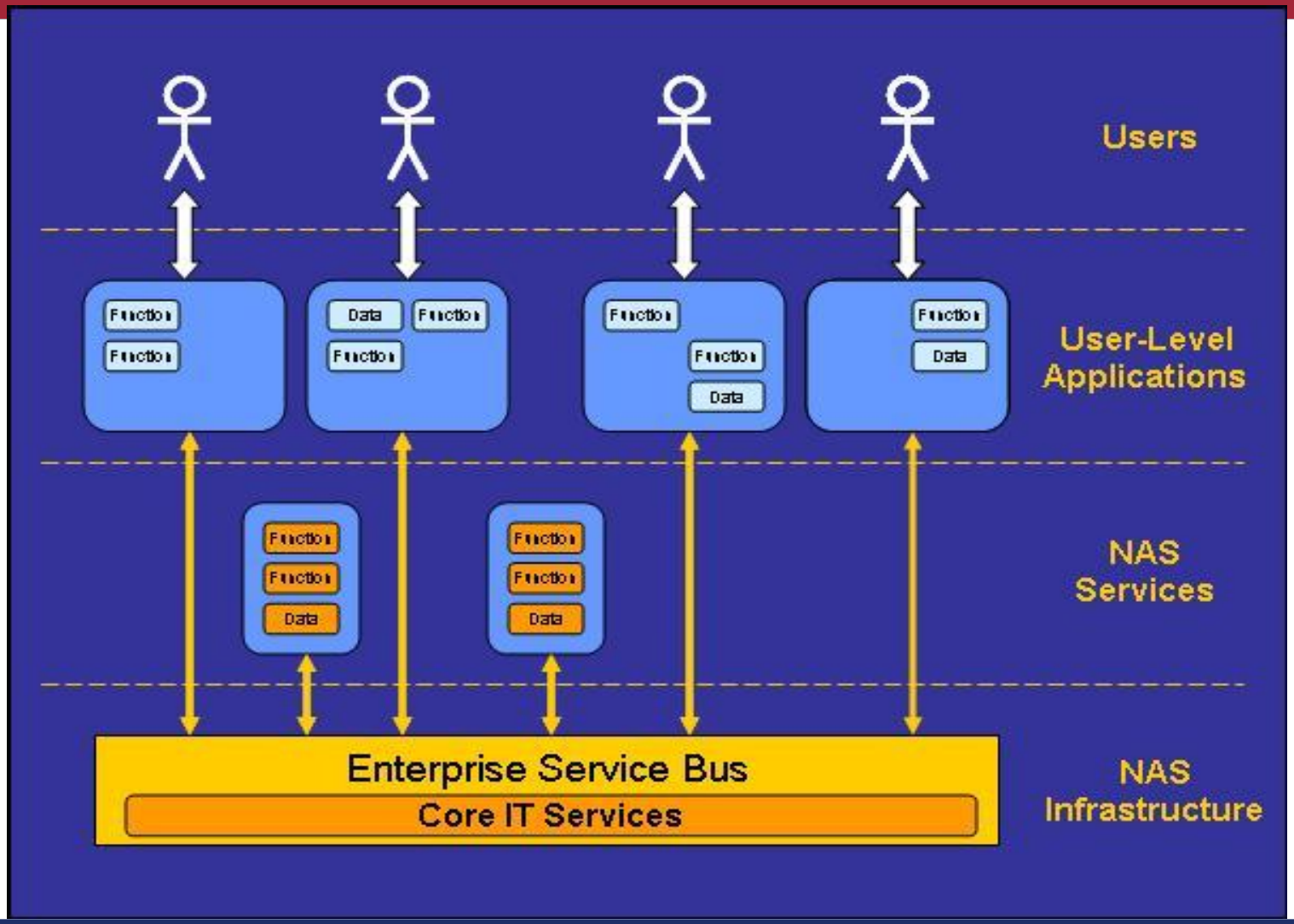
SWIM is:

- NAS Information Standards & Policies
- NAS-wide information distribution and access mechanism for current and new applications
- Built on top of existing telecommunications infrastructure
- At least 50% commercial software
- Non-proprietary, scalable, flexible solution to cost effectively meet current and future information requirements

SWIM is not:

- A giant database
- A substitute for NAS modernization programs
- A new application
- A big system requiring new facilities or large space requirements
- A telecommunications replacement

Service Definition Methodology



SWIM early Core Services Provide the Means

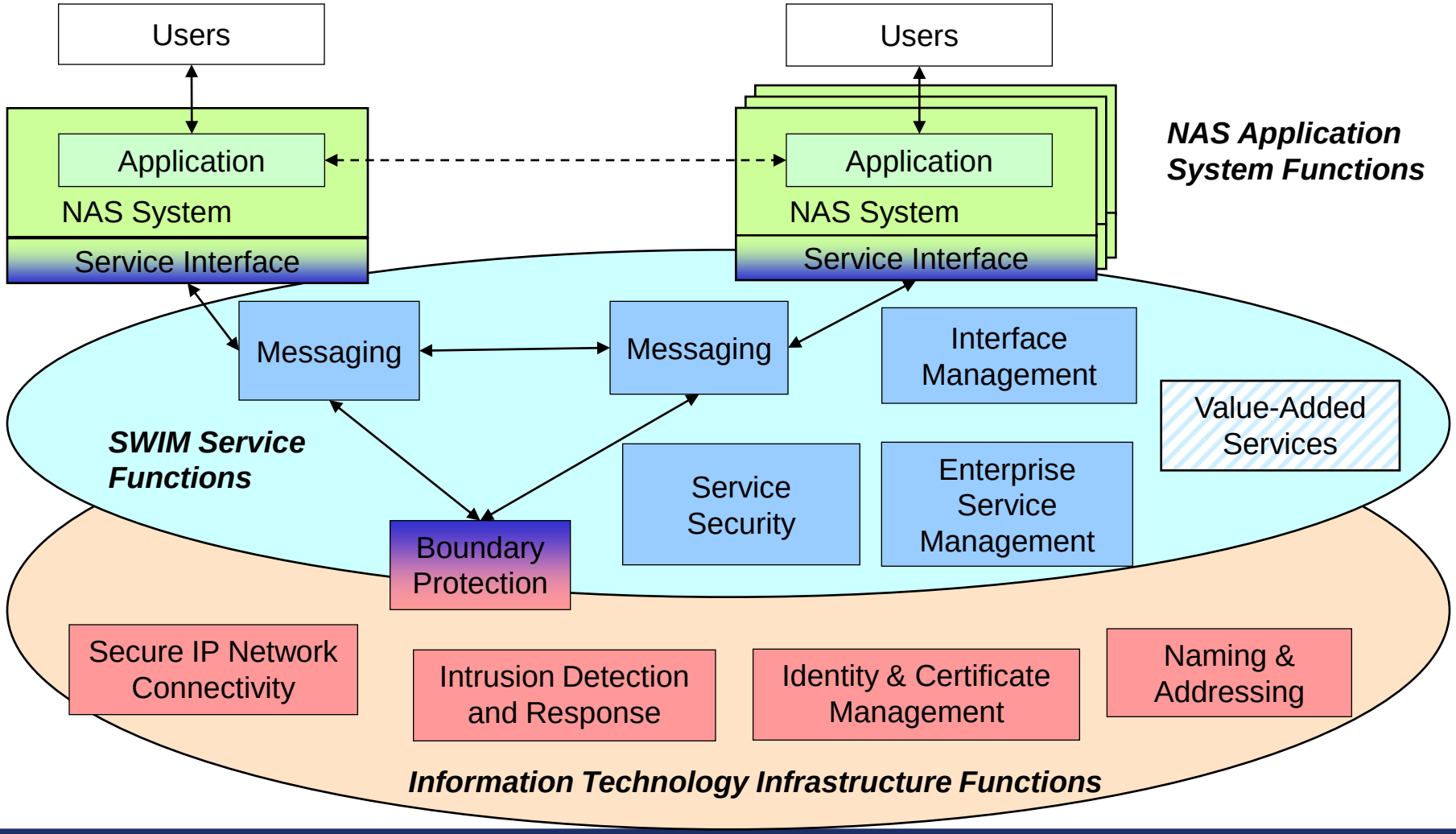
- Directory/Registry Service
  - For telling SWIM what data you have and what data you need
- Interface Service
  - Manages your connection to the SWIM network
- Brokering Service
  - Matches available information to information needs
- Infrastructure Management Service
  - Provides end-to-end performance monitoring, configuration management and problem detection/resolution as well as resource accounting and addressing (of SWIM specific assets)
- Enterprise Security Service
  - Addresses vulnerabilities in networks, infrastructure services, or systems
  - Protects the integrity of data
  - Regulates which systems and users can access what data, by what means, and how often

Note: **This description of Core Services is based upon currently understood concepts of use and may change as program requirements evolve**

SWIM Core Services

- **Interface Management**
  - Enables providers to expose services and consumers to discover and use services
- **Messaging**
  - Supports various service styles and data exchange protocols as well as Quality of Service that includes priority and response time
- **Security**
  - Service & message level security such as role-based access to data and services
- **Enterprise Service Management**
  - Service monitoring and configuration
  - Monitoring service and enterprise to insure that key service requirements are being met

SWIM Functional Architecture



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- **SWIM Implementation**

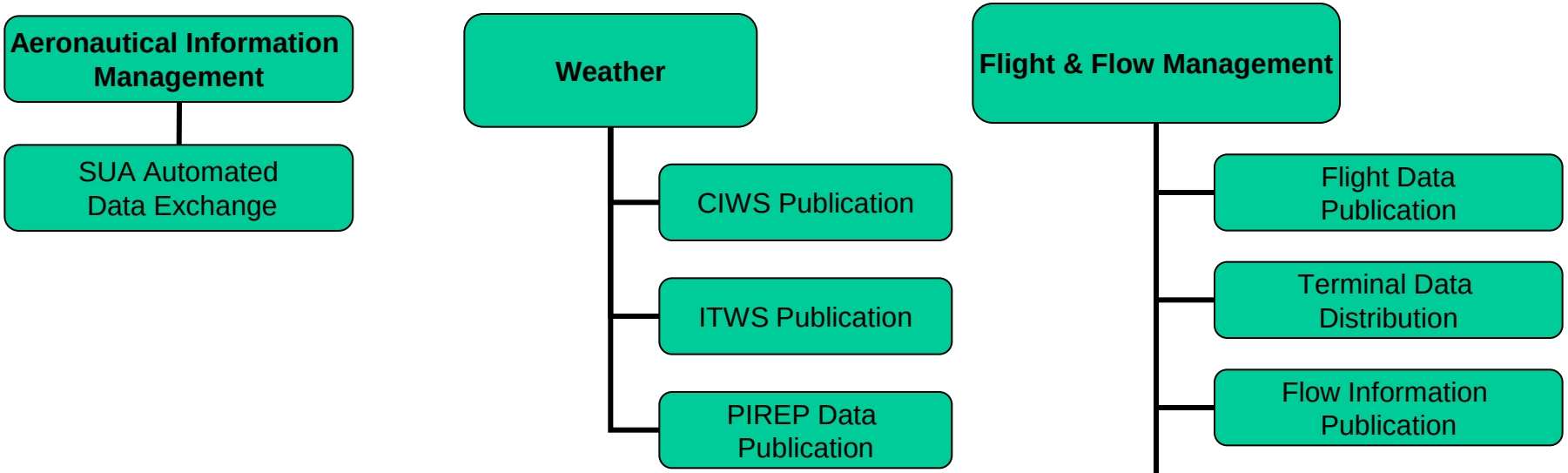
SWIM Implementation

- SWIM will be developed incrementally based upon the needs of various data communities, maturity of concepts use, and segments that are right-sized to fit reasonable cost, schedule, and risk thresholds.
- In Segment 1 Core Services will be implemented by the SWIM Implementing Programs (SIPs)
  - Through use of common commercial software provided by the SWIM Program Office
  - By development and/or procurement by SIPs of software that meets SWIM Program Office mandated standards

Segment 1 Overview

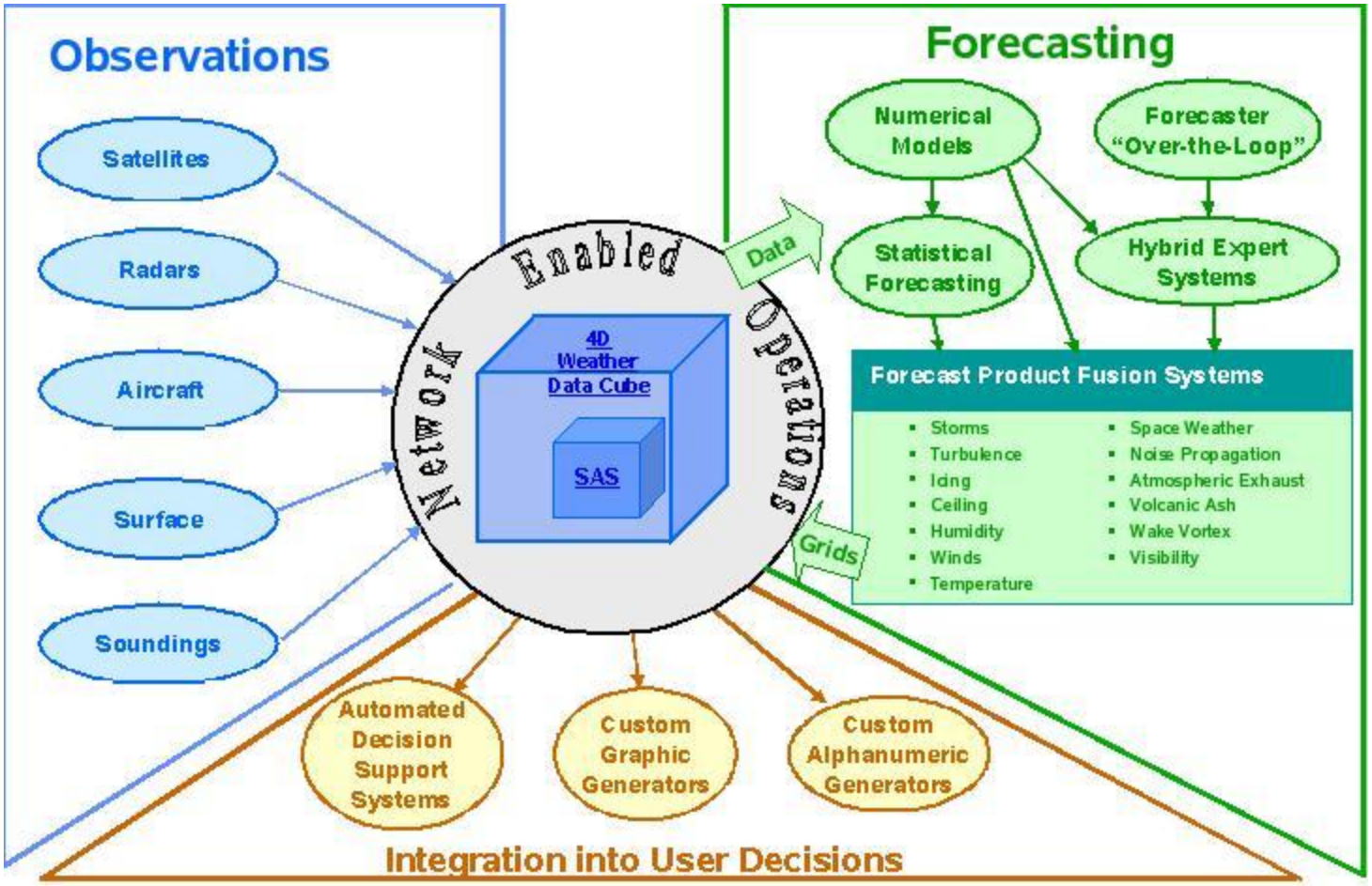
- **SWIM will meet its Segment 1 Goals using a "Federated Architecture"**
  - SWIM will leverage existing infrastructures, processes, resources, and logistics chains that are part of the program offices implementing the SWIM capabilities
  - SWIM Governance will establish operating rules for the stakeholders and their services to ensure use of common protocols and interfaces,
  - Common commercial software products for some Core Services will be mandated to ensure interoperability
- **Nine Segment 1 capabilities were derived from Communities of Interest:**
  - ✈ Aeronautical Information Management (AIM)
  - ✈ Flight & Flow Management (F&FM)
  - ✈ Weather

SWIM Segment 1 Business Capabilities

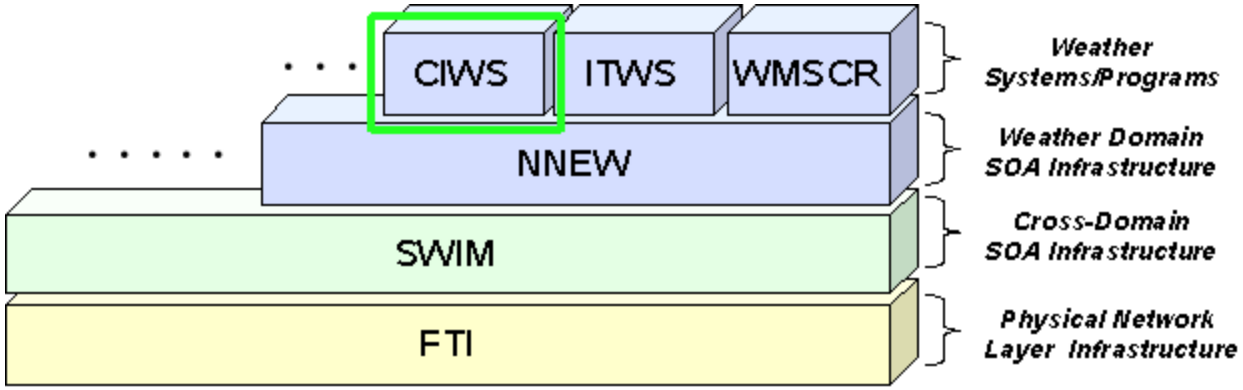


Capabilities will be implemented as (multiple) services by SWIM Implementing Programs over the next five years

Corridor Integrated Weather System

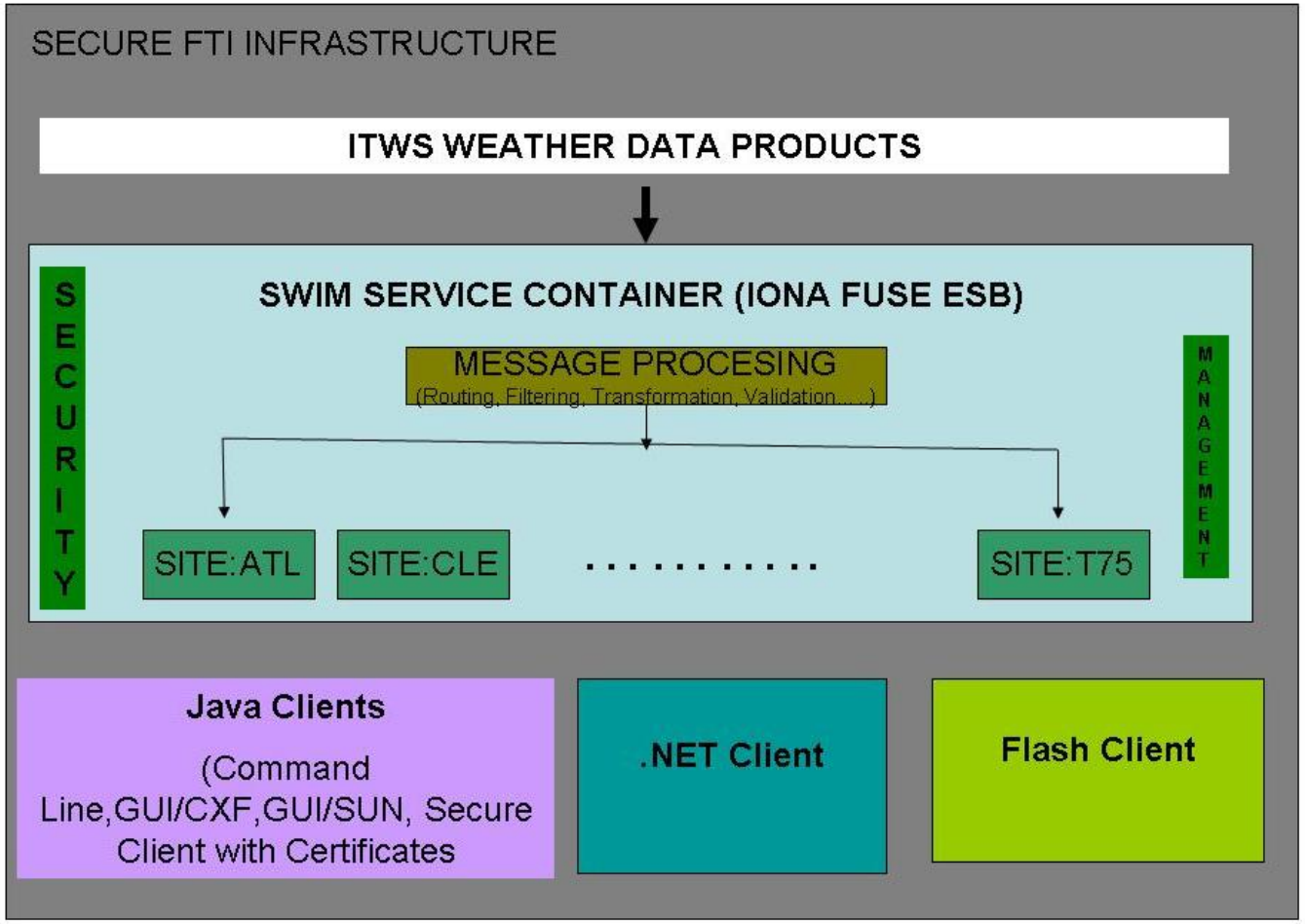


NextGen Network-Enabled Weather

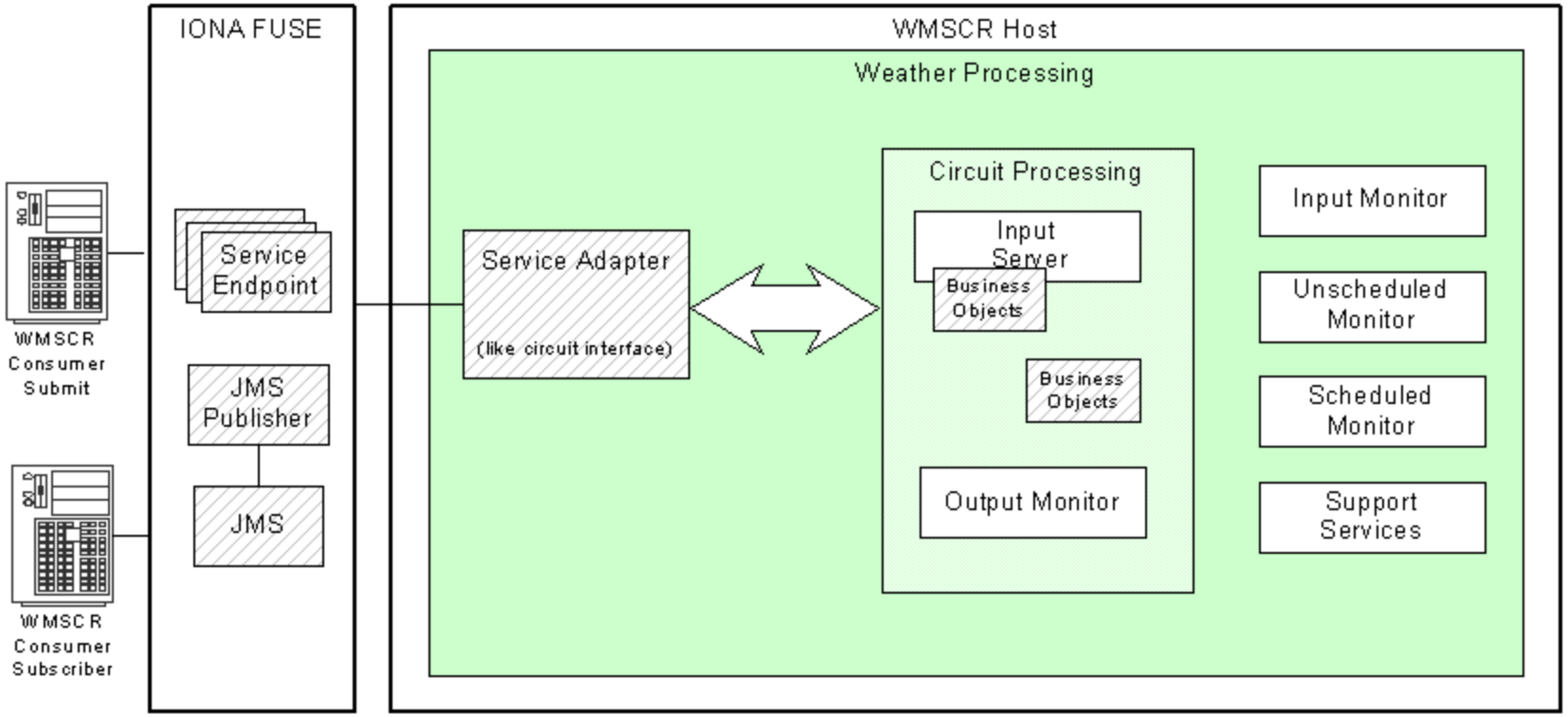


CIWS viewed in the context of the layered NextGen program stack

Integrated Terminal Weather System

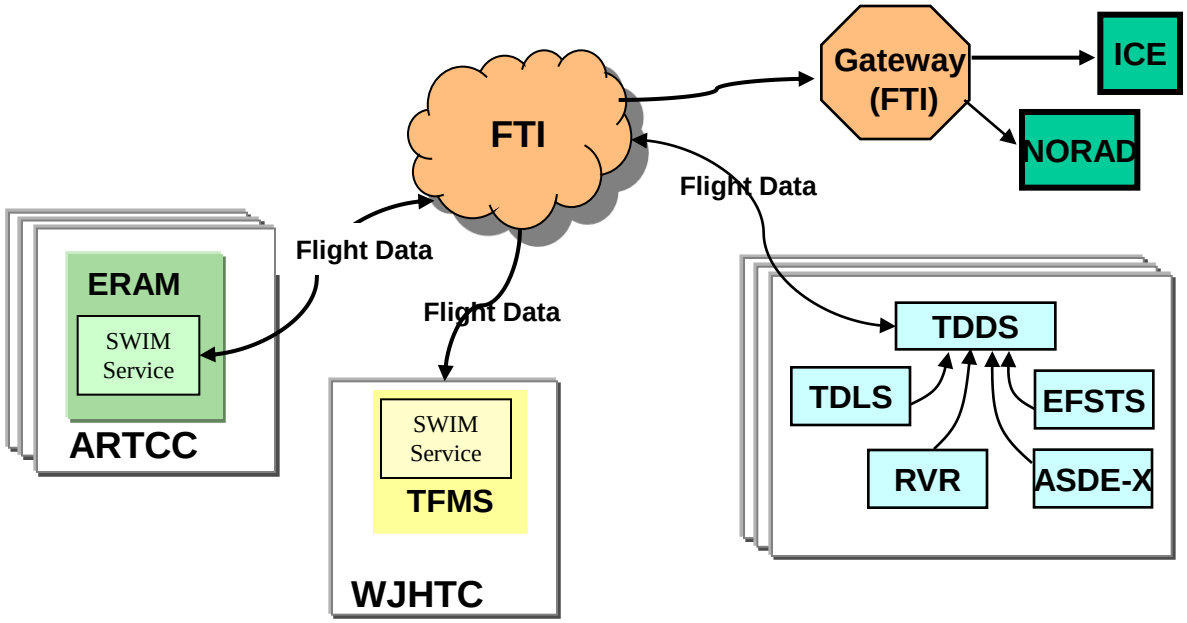


Weather Message System Center Replacement



En Route: Flight Data Publication

- Goals
  - Ensure consistency of flight data across the NAS
  - Consolidate the flight data maintained by multiple systems into a distributed flight object accessible by all



Terminal Data Distribution System (TDDS)

- Goals
  - Provide an IP-based front end to Terminal legacy systems to allow for bidirectional flow of information