



Service Oriented Architecture (SOA) Enabling An Agile National Air Space

- SWIM Provides the Pipeline Services -

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Agenda

- What and Why Agility for the NAS ?
- What is Service Oriented Architecture ?
- Apply SOA for the NAS
- Benefits of SOA
- Summary



What is Agility for the NAS ?

- Agility means responding more quickly to changing needs in the NAS
 - Enabling dynamic communication among users and application programs
 - Ending disconnects between individual LANs in a facility, and end multiple WANs within the NAS
 - Ending specialized or uniquely designed interfaces
 - Enabling dynamic access of Services in the same manner as “Plug & Play”
 - Remotely accessing Services with location transparency
 - New Services can be built on reusable services

Shift from stove-pipe implementations to federated Integration



Why Agility ?

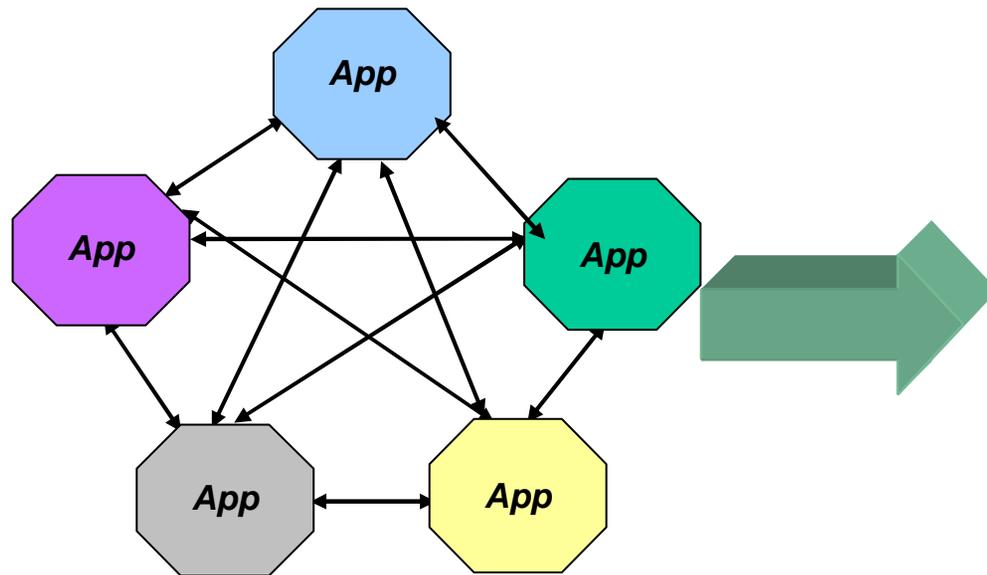
- Economically motivated
 - Lower cost to create and field new
 - Applications
 - Automation and other systems
 - Lower cost to maintain
 - Application software
 - Equipment
 - Reduce cost of Sharing Information for Common Operational Awareness
 - Allow dynamic adjustment to capacity to meet unforeseeable demand at affordable cost

The pipeline must expand and shrink to accommodate fluctuating demands



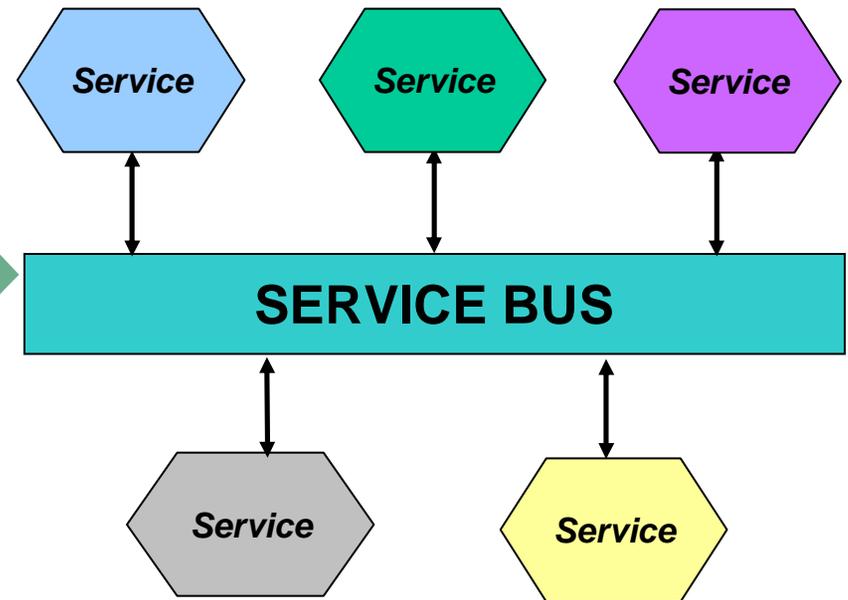
Service Oriented Architecture Provides Agility

Traditional “point-to-point” approaches



When business processes or requirements change, it must undertake costly upgrade and introduce new connections

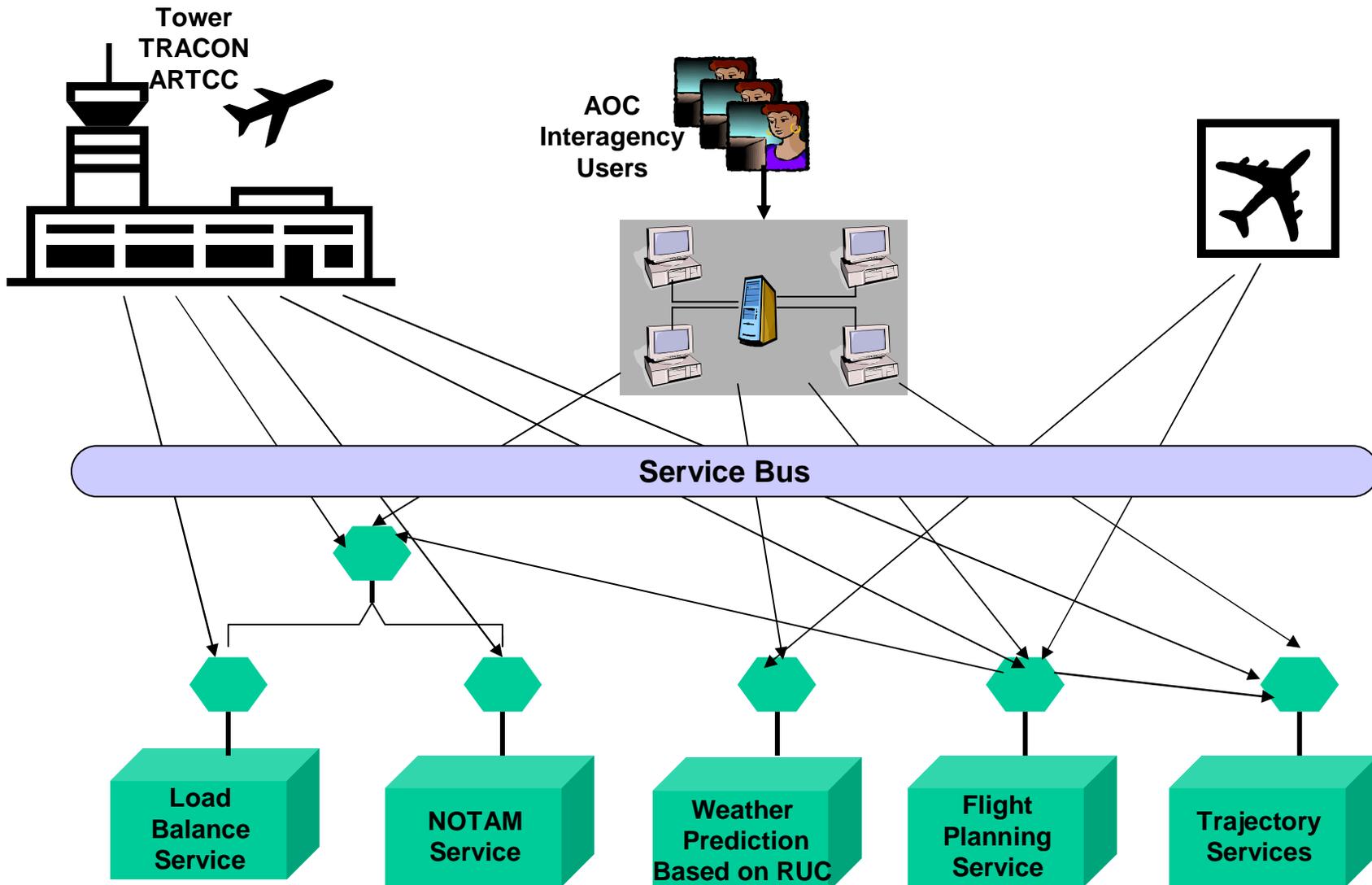
With SOA, applications are exposed as services that can be integrated through a unified service bus



Enables services to be “swapped in and out” or updated with minimal effect on connected services

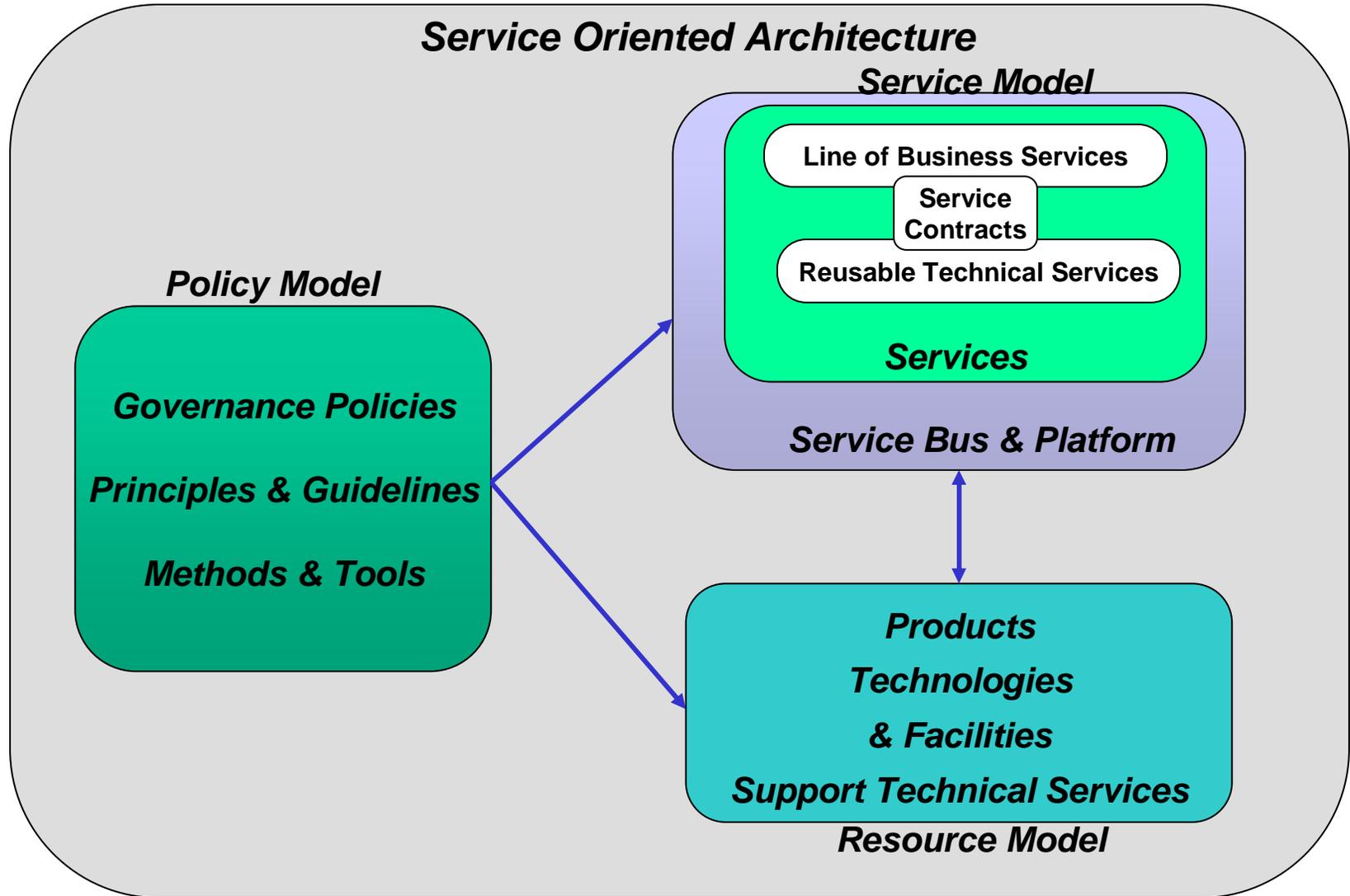


Accessing and Composing Services in the Service Oriented Architecture Environment





What is Service-Oriented Architecture ?



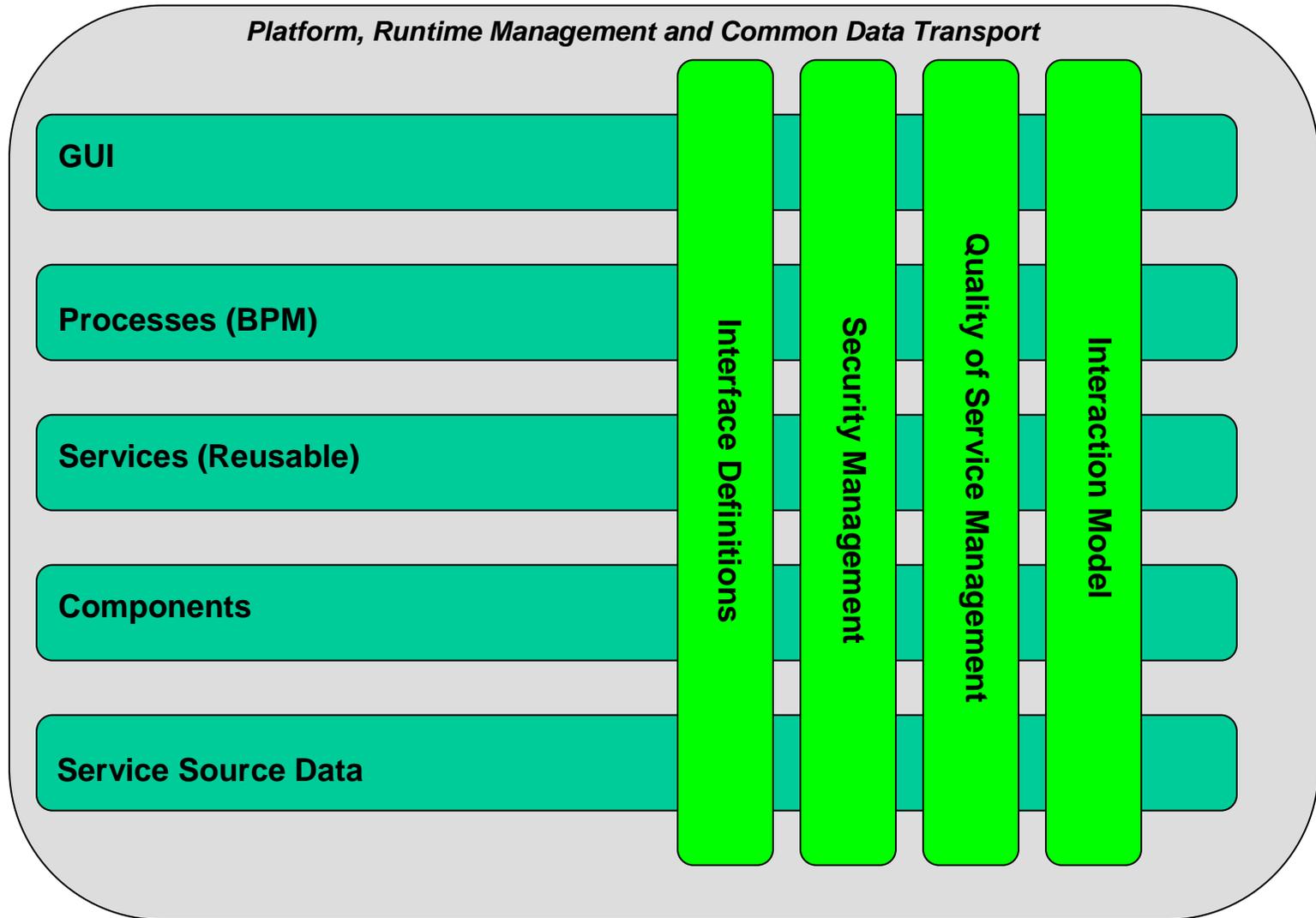


Characteristics of SOA Service Model

- Service Contract is the key
 - Provides description of the Service including details of functionality
 - Provides the details how to invoke the service
 - Provides the details of the interfaces
- Service Contract resides on a Service Registry
- Service can build on other services
- A deployed Service is a “Reusable” Service
- Service can be created independently of languages and platforms,
 - Consequently it can be used by other services without any knowledge of implementation details
- This is *AGILITY*



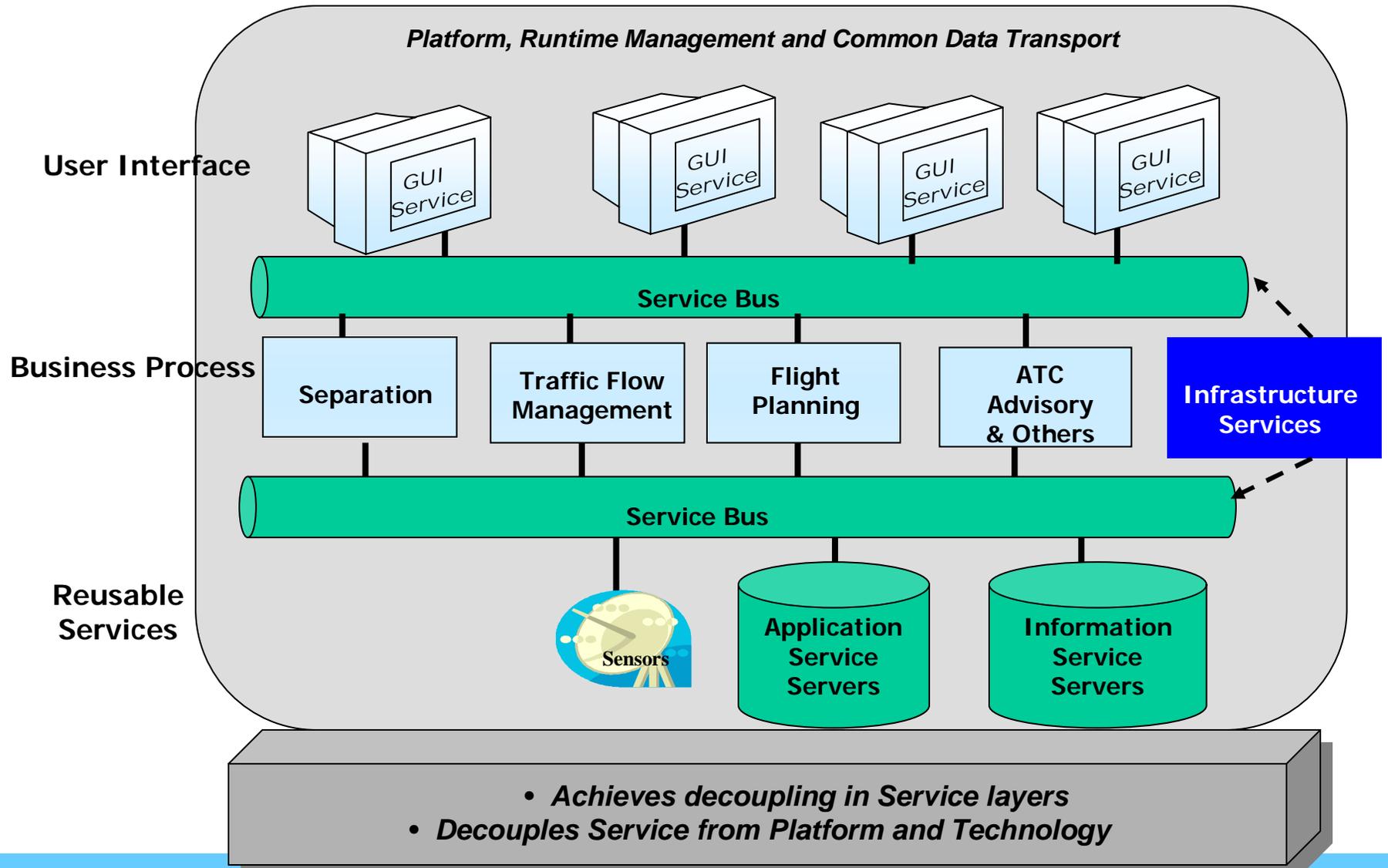
Service-Level Abstractions in SOA



Ref. Fig 2-4 page 59 of "Understand SOA with Web Services" by Eric Newcomer and Greg Lomow

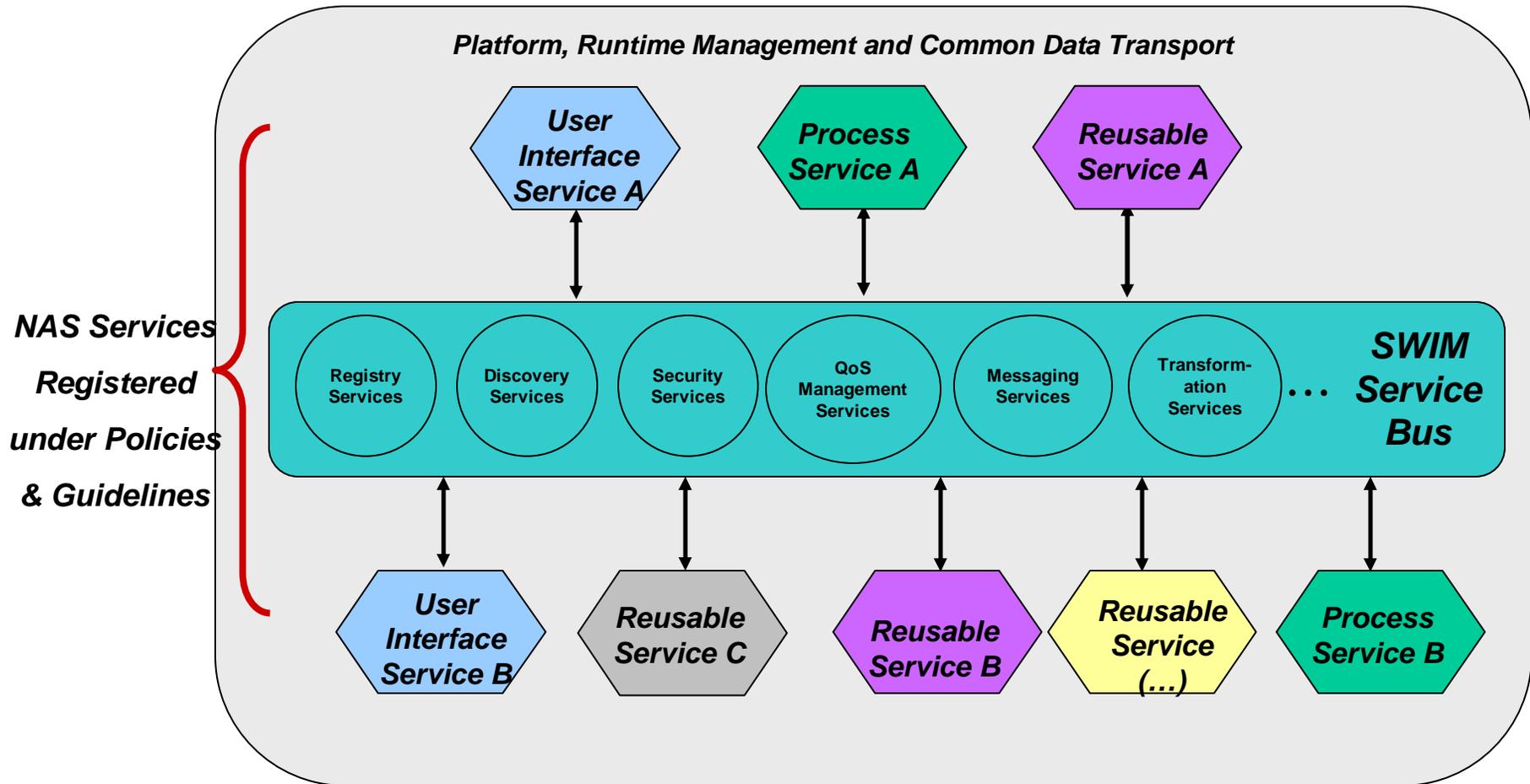


NAS Service Oriented Architecture Reference Model





SWIM Provides NAS Wide “Pipeline” Services



“Pipeline Services” are the Information & Interface Management Services



Benefit of a Service Oriented Architecture

- Applications Decoupling
 - Enabling reusable Services
 - Lowering cost with fewer requirement
 - development
 - testing
 - deployment
 - Maintenance
- Platform decoupling from applications
 - Reducing number of platforms
 - Enable separation of “ Front room” from “Back room”equipment
 - Lower costs by allowing moving“Back room”equipment into fewer centers



Summary

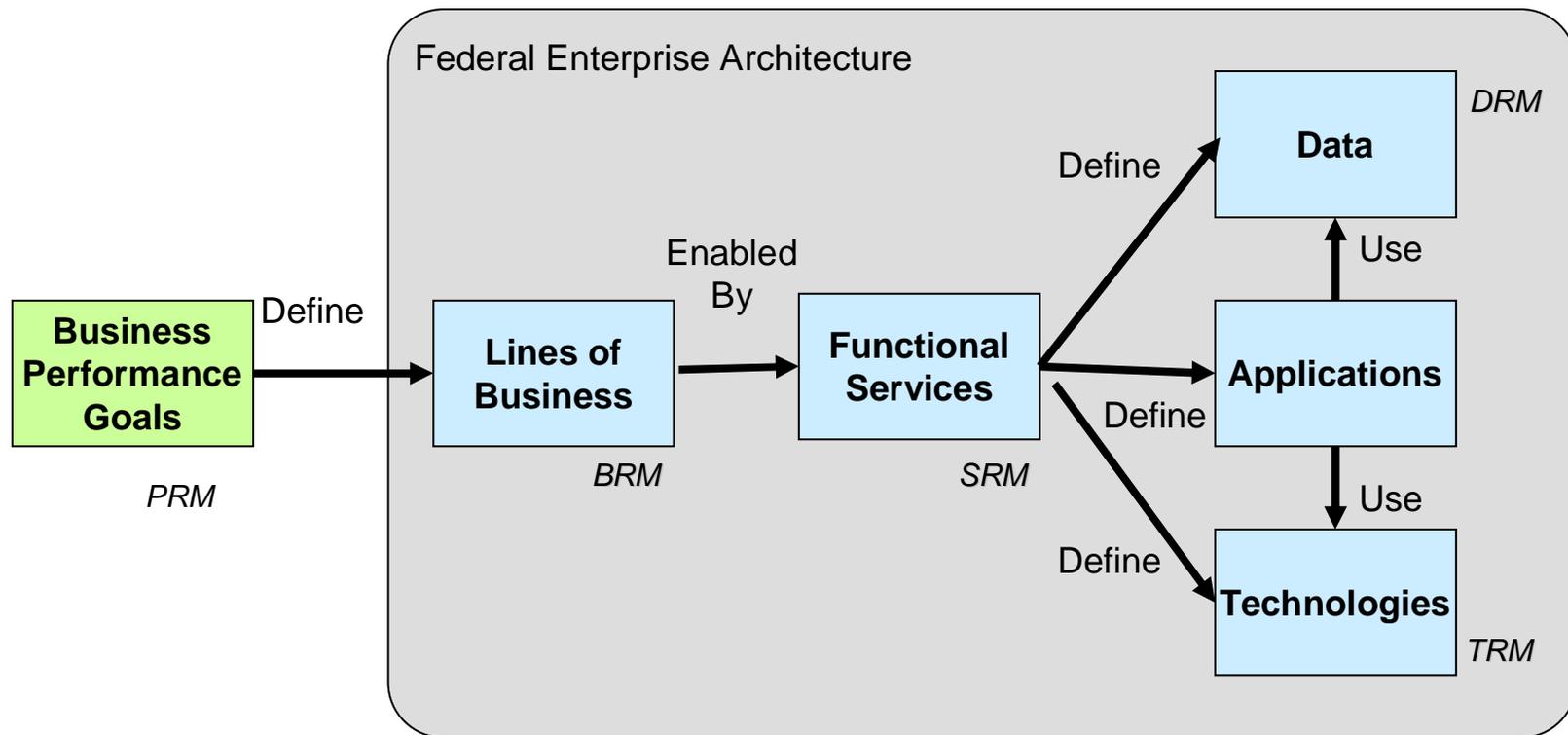
- Cost Reduction for Facility & Equipment with SOA implementation
 - SWIM is the enabler of Architecture Convergence for all NAS Systems
 - Weather, Surveillance and all Automation systems
 - Common Data, Common Automation Processing and Common Display
 - Reduce duplicate of data effort,
 - Authoritative Data by stakeholders
 - information become more accurate and trusted
- Cost Reduction for Operation & Maintenance with SOA
 - Fewer stove-piped applications, processing and display subsystems to maintain
 - Concentration is shifted to SWIM maintenance
- SWIM enables flexible messaging path between all members, and ability to adjust to unforeseeable demands on new connections or increased capacity



Backup Slides



Federal Enterprise Architecture Framework





Federal Enterprise Architecture (FEA) Reference Models Reapply to the Air Traffic Organization

- Performance Reference Model (PRM)
 - A common set of general outputs and measures for ATO to use to achieve business goals and objectives
- Business Reference Model (BRM)
 - Describes the hierarchy of ATM operations independent of the organizations that perform them, including defining the services to external users
- Service Reference Model (SRM)
 - Identifies and classifies service (i.e. application) components that support ATO business operations and promotes the reuse of components across ATM business operations
- Data Reference Model (DRM)
 - Promotes the common identification, use, and appropriate sharing of data/information across the NAS ATM services
- Technical Reference Model (TRM)
 - Describes technology that is to support the delivery of service components, including relevant standards...

*From GAO-04-798T



SWIM Architectural Layers (Previous Year)

Figure 3. SWIM Layered Architecture

