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Phantom Works

Phantom

*6th Integrated-CNS Technologies  
Conference & Workshop*

**Transforming the NAS Through System  
Wide Information Management and  
Network Enabled Operations**

**Chip Meserole**



**May 1, 2006**

# Airspace Transformation II

## National Airspace System (NAS)

1950's

Drivers:

Safety

Defense



**Control by Radar**

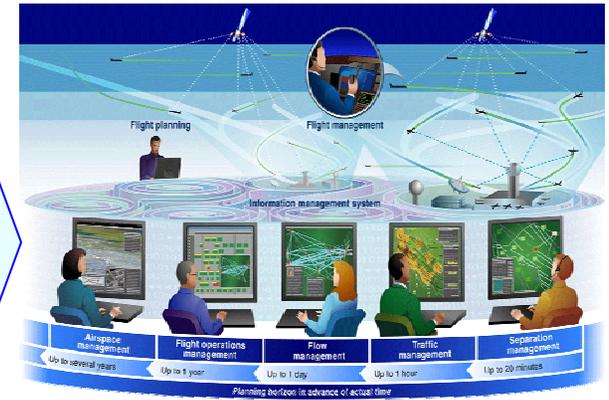
## Next Generation Air Traffic System (NGATS)

2010's

Drivers:

Capacity

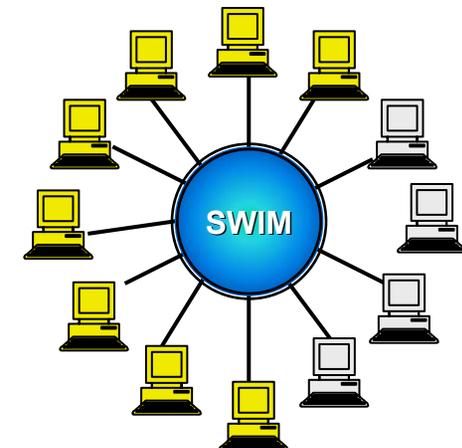
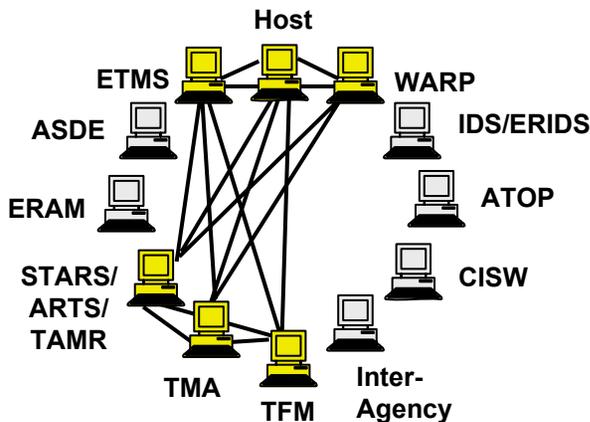
Security



**Management by Trajectory**

Traffic Growth

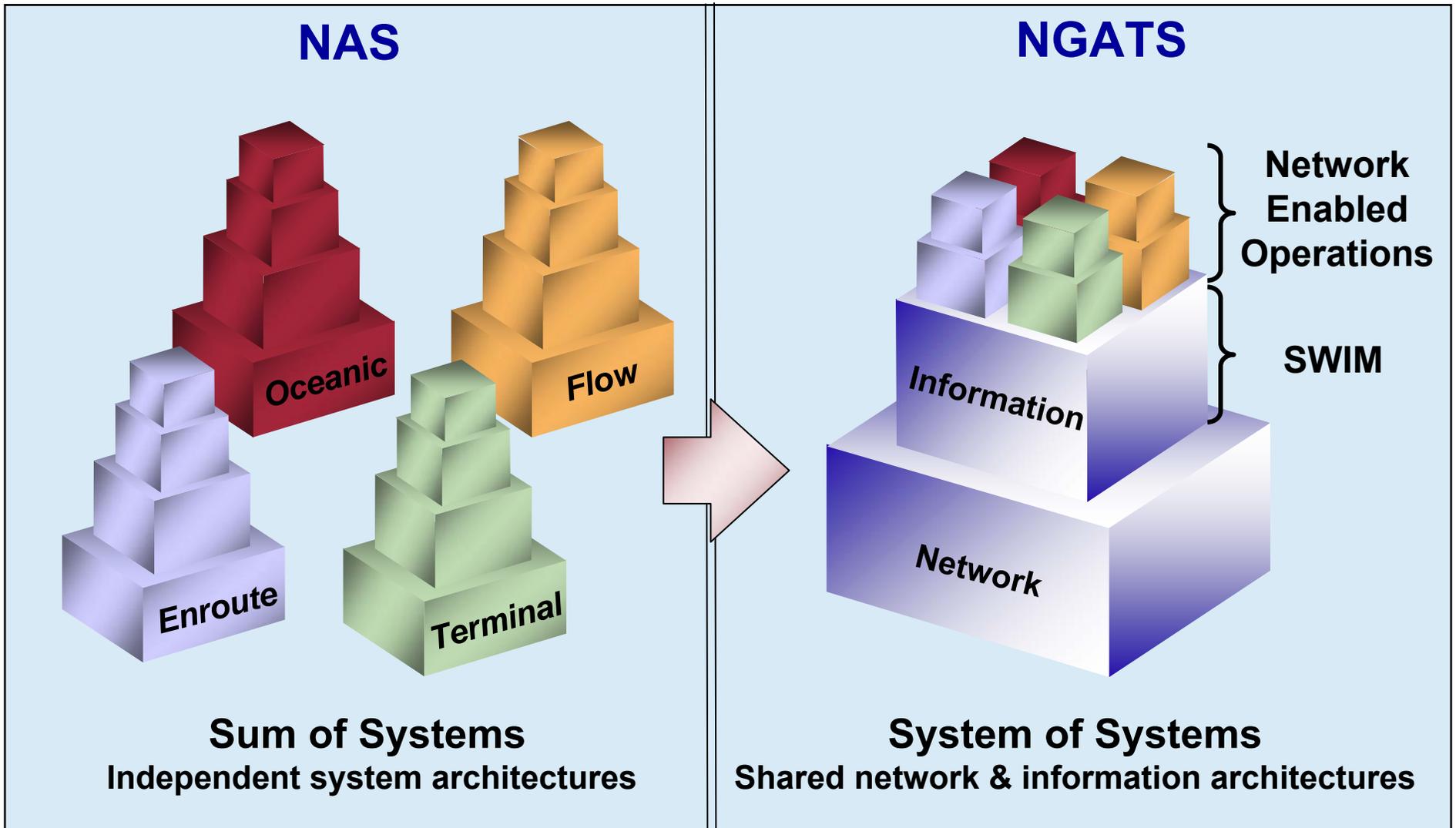
Scalability Limit



# NAS Transformation Creates NEO in ATM

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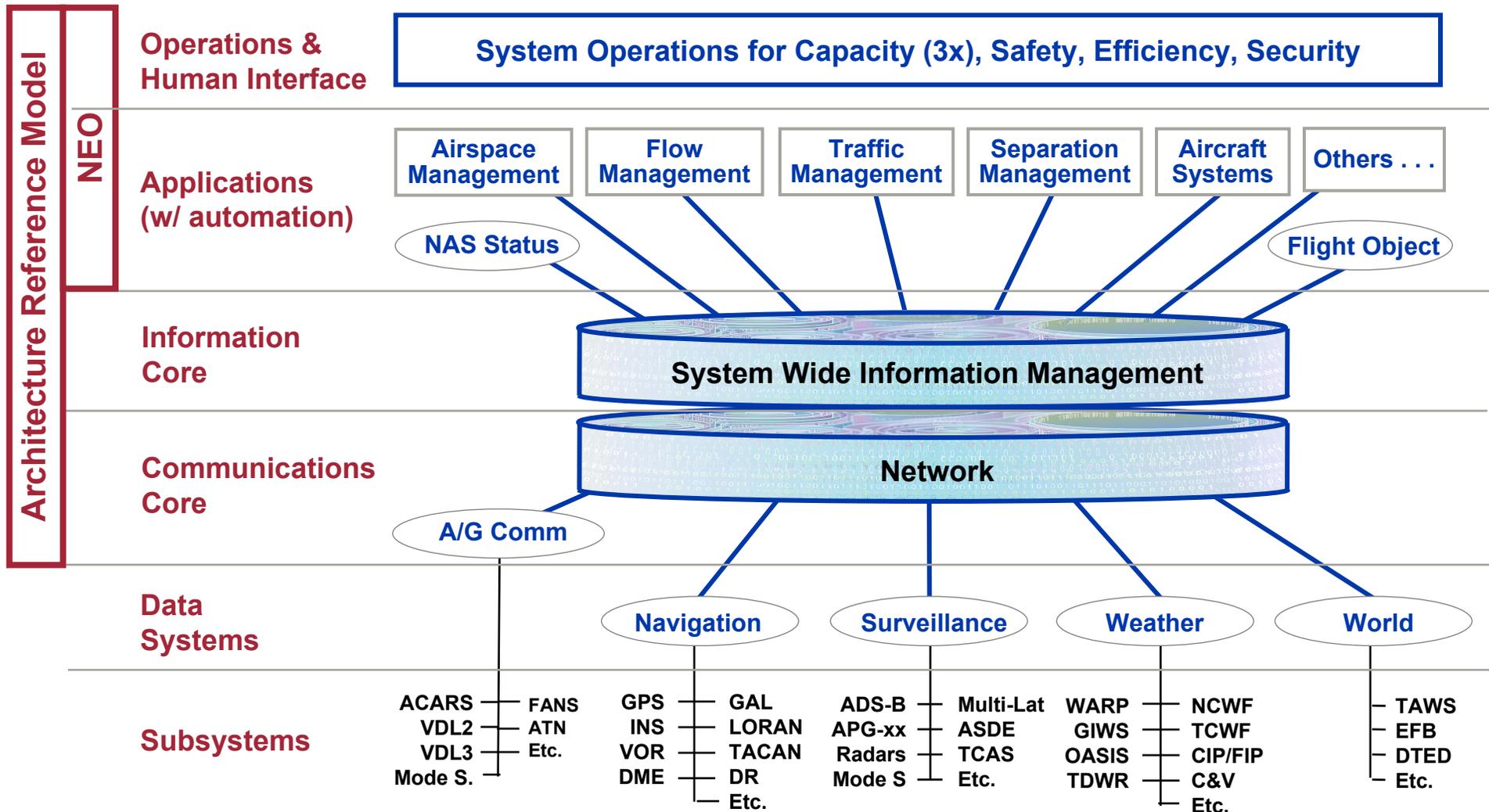
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# ATM Network Enabled Operations: Exploiting Shared Precision Information

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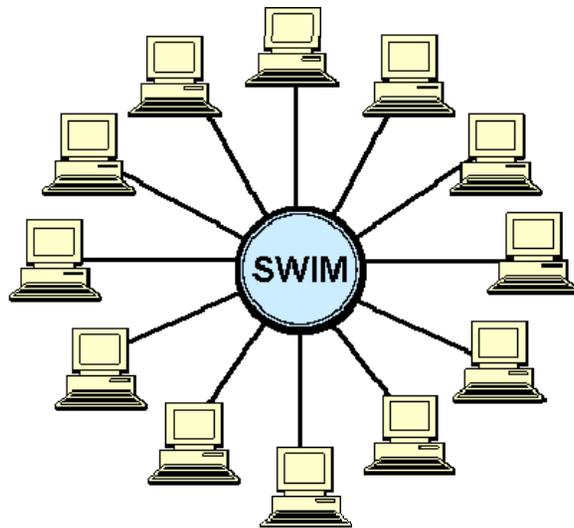
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# What is SWIM?

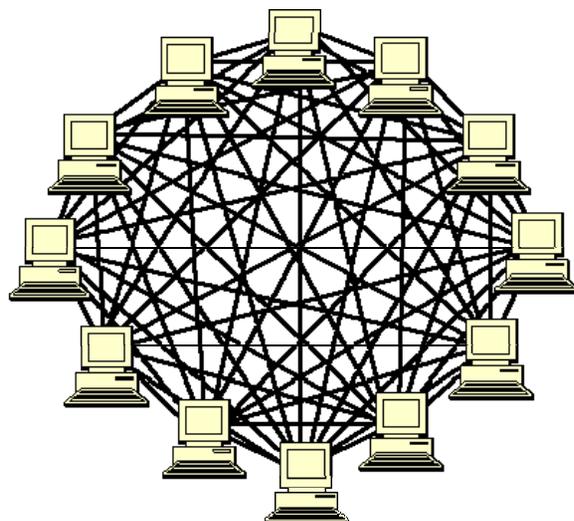
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## SWIM *is*:

- Common authorized access
- Core services for information
  - Directory & registry
  - Interfaces to multiple protocols
  - Message brokering
  - Security & assurance
- Data dictionary
- Secure messaging with other agencies
- Pathway to consolidated data processing



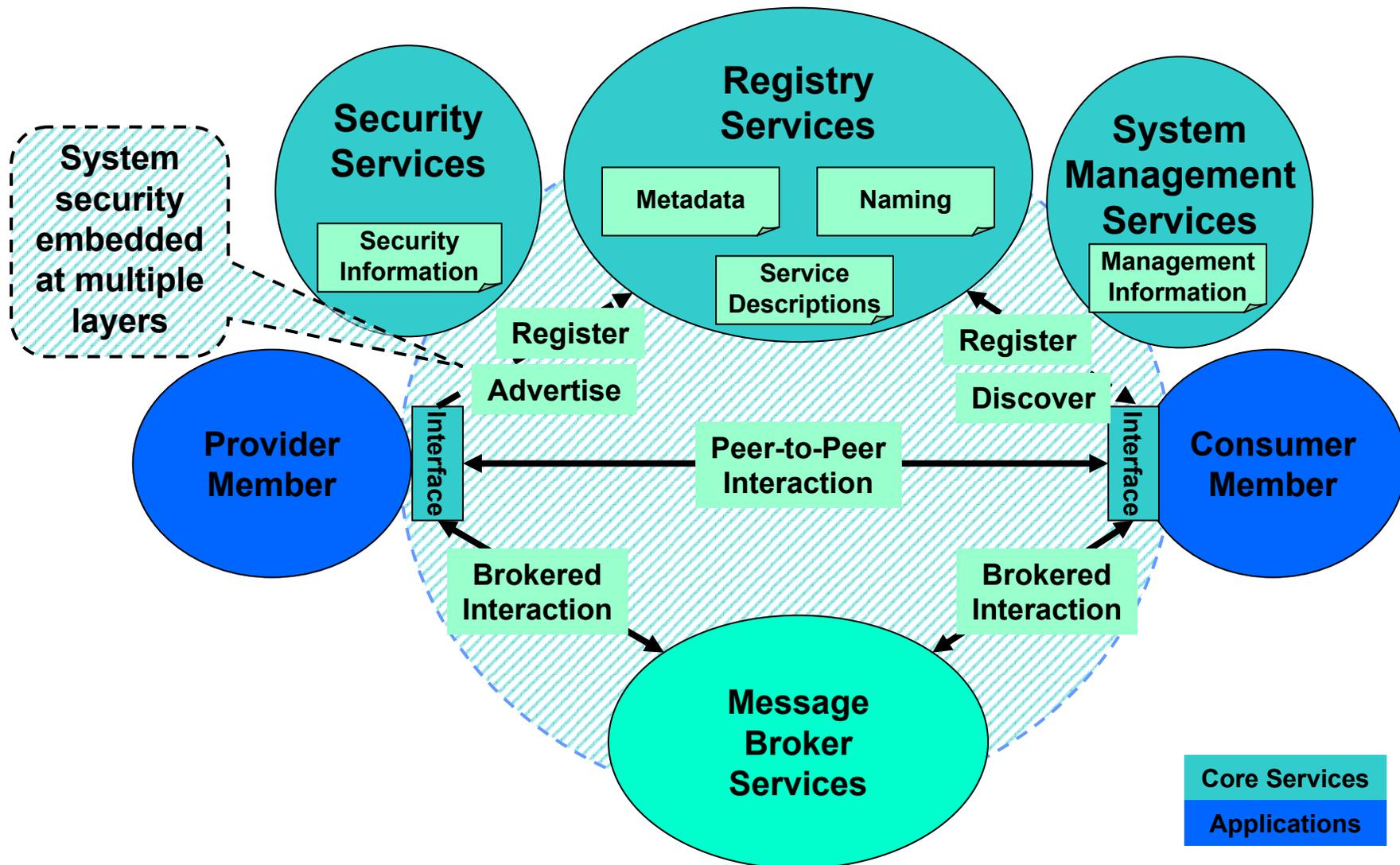
## SWIM is *not*:

- Point-to-point connectivity
- Telecommunications infrastructure
- Shared database
- IP protocol upgrades
- Automation enhancements

# SWIM Functional View (Core Services)

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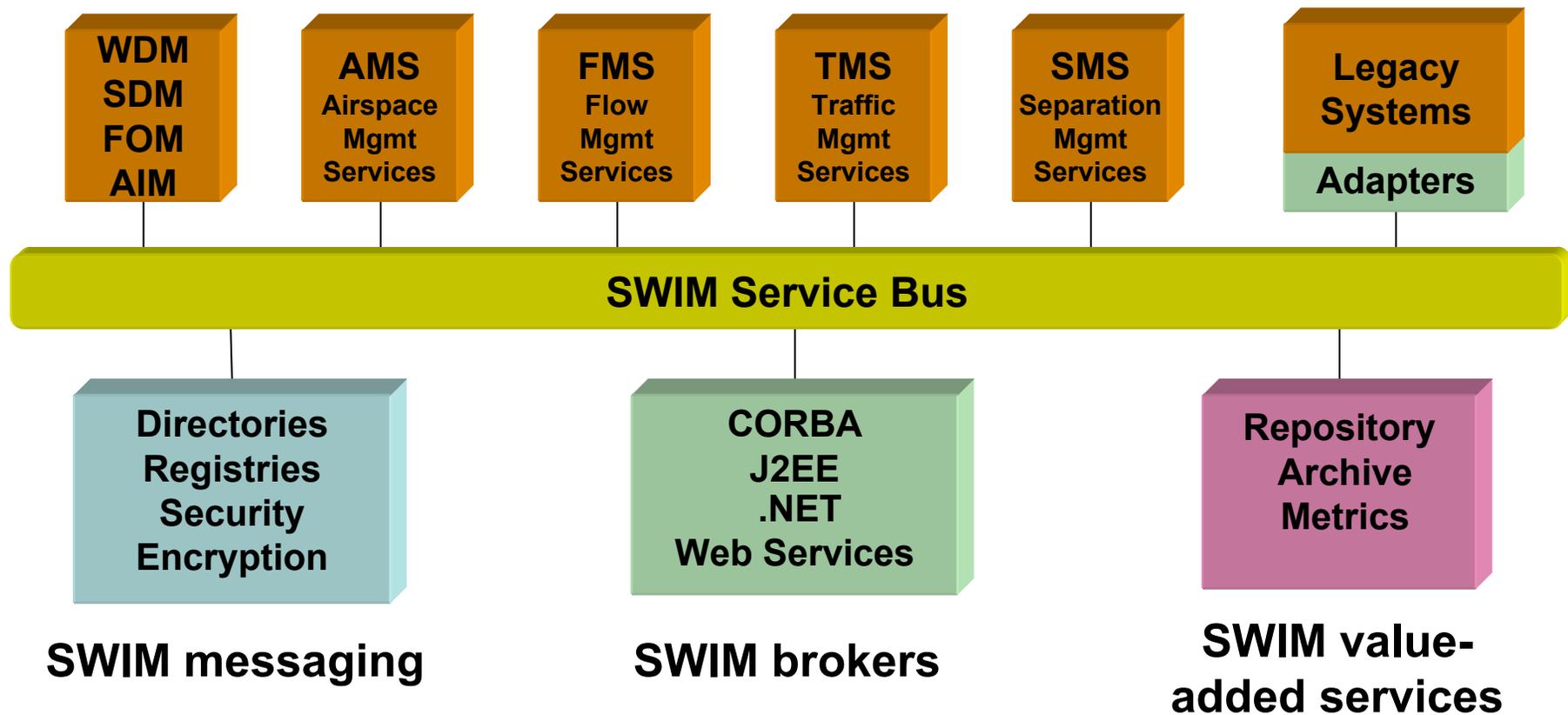


# SWIM Architecture – An Example

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## Integrated systems doing network enabled operations



# What Is NEO?

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*Network Enabled Operations are system functions that derive from a wide and timely information web*

**Synchronous detail**  
Data, Information, Knowledge



**Geographic scope**



**Coherence  
at large scale**

**...yielding “emergent” behaviors that transform**

# Cross-Domain ATM Integration

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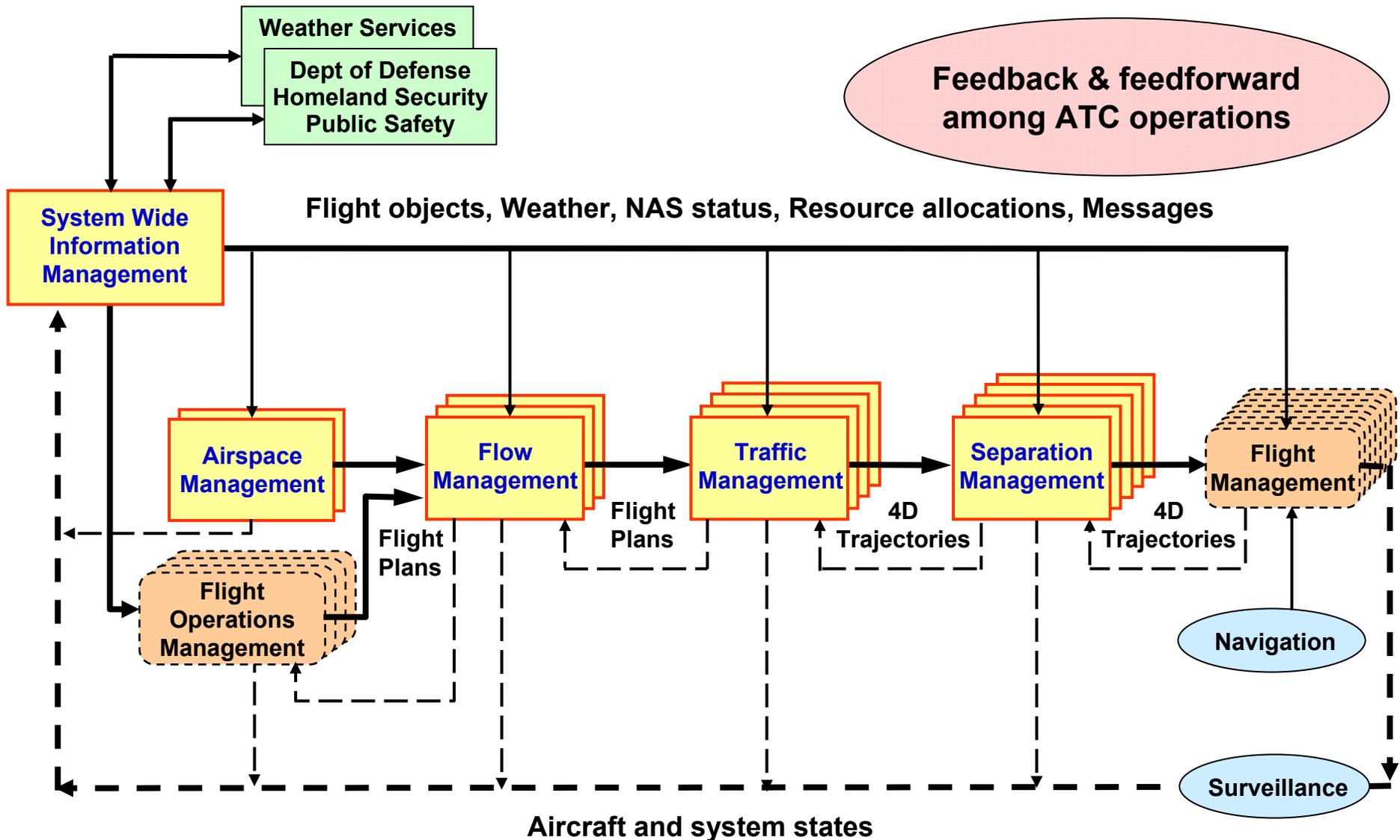
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# SWIM Enables Closing the Loop in ATC

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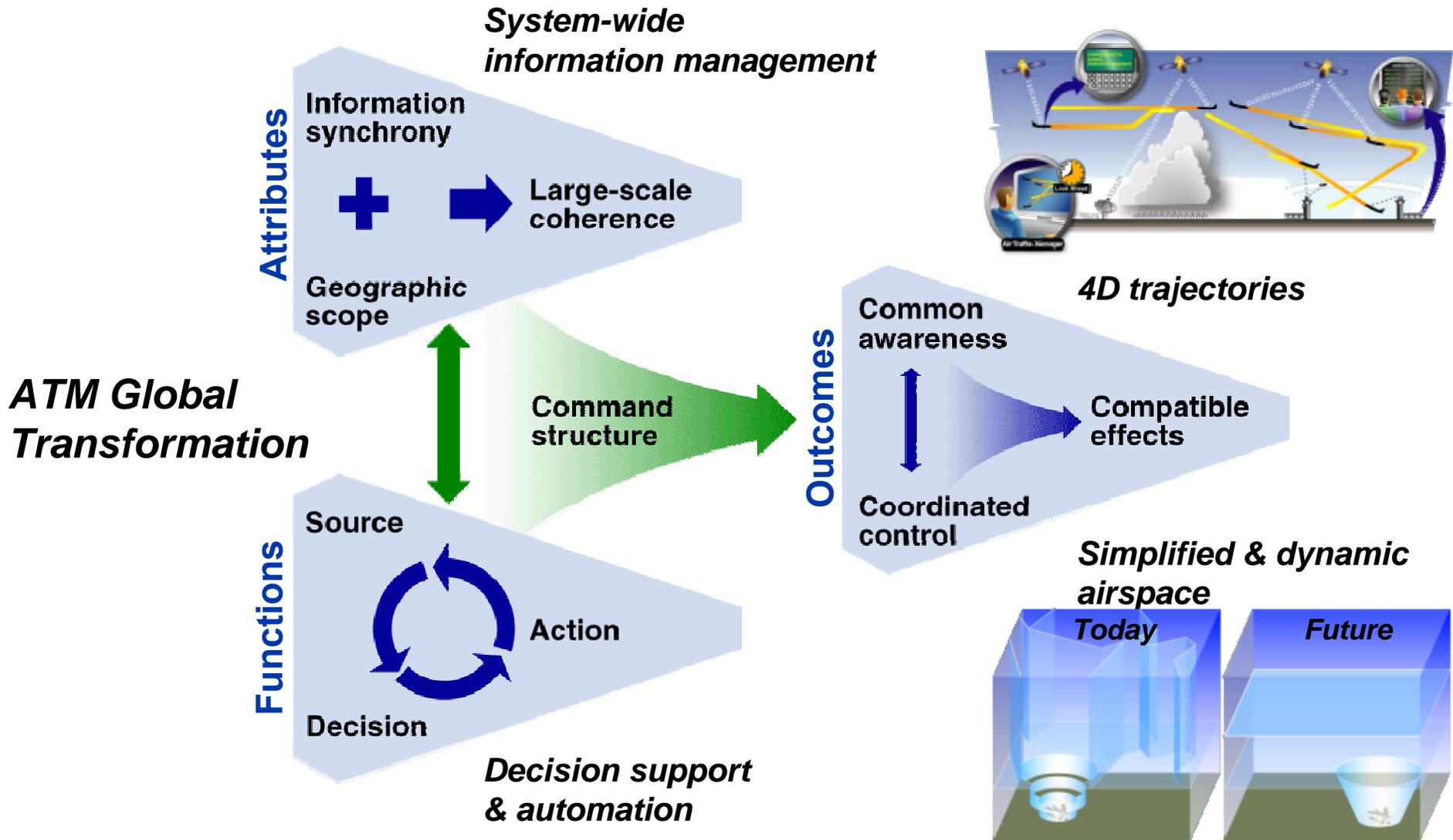
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# NEO for ATM

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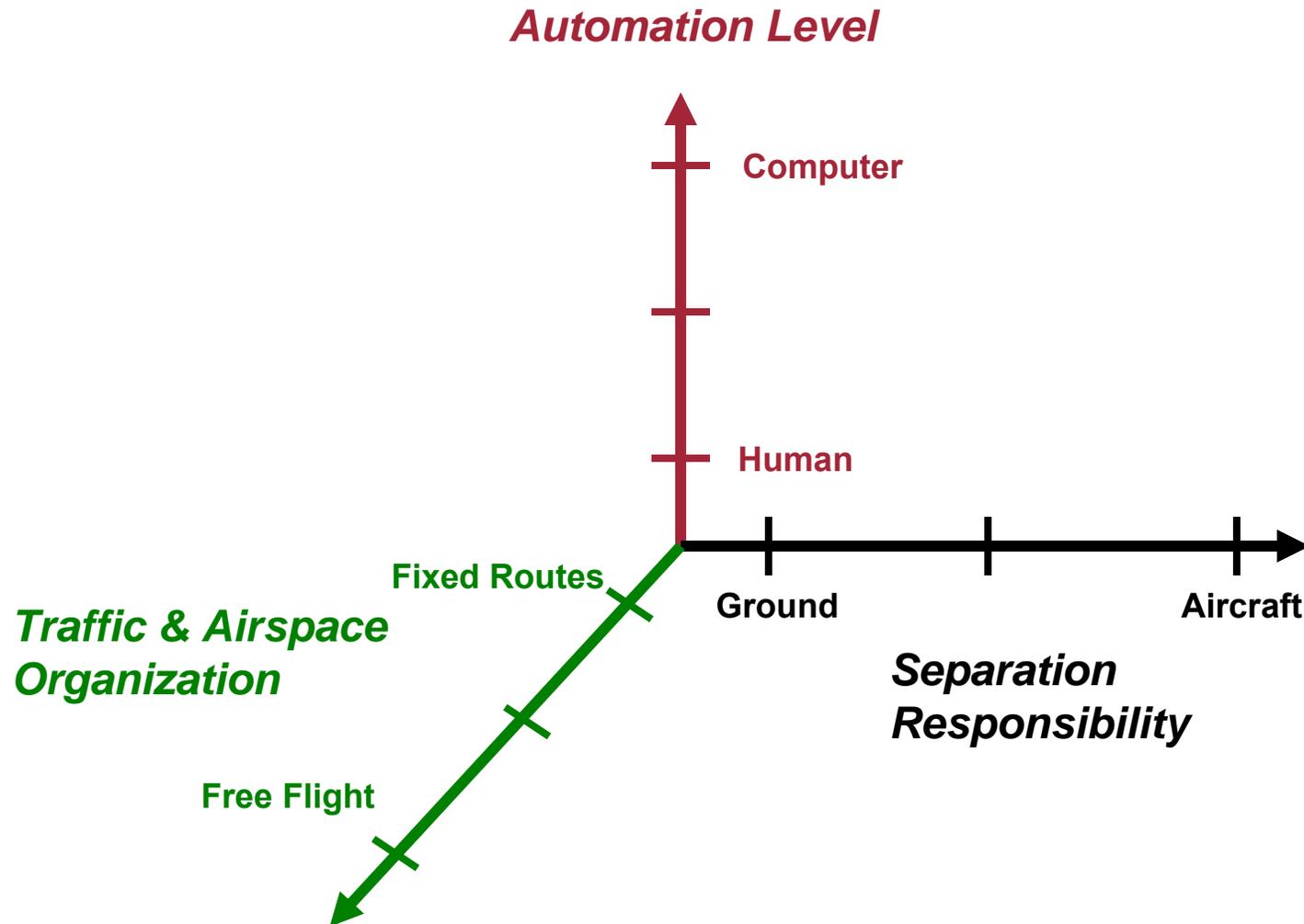
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# Key ATM Transformation Design Issues

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# NEO seven steps to deliver >3X airport capacity

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## *Exploiting Shared Precision Information*

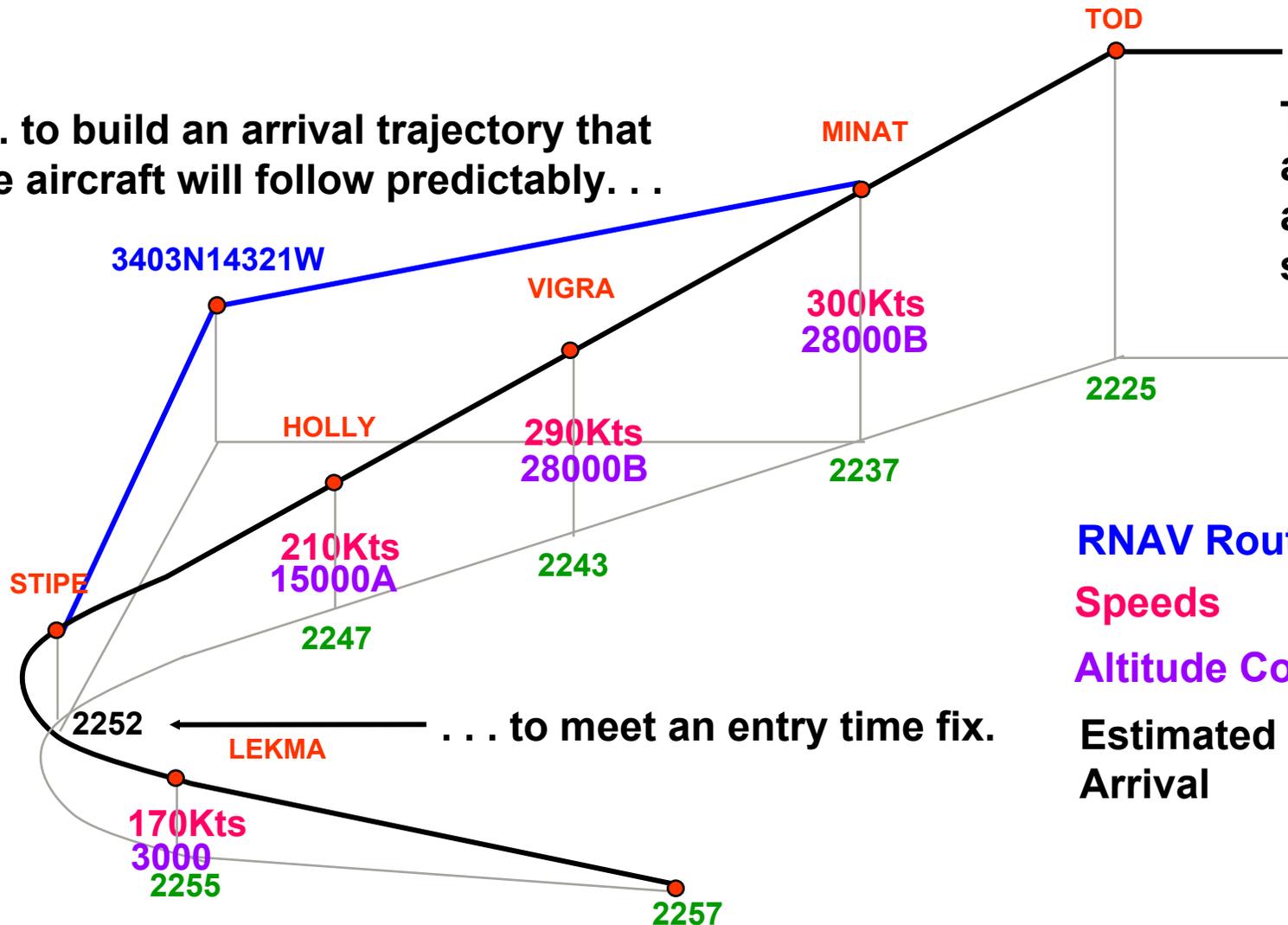
- 1) Equivalent visual operations**
- 2) Tailored arrivals at +/- 2 secs**
- 3) All safe airspace exploited**
- 4) 2-mile approach spacing**
- 5) Pave down the middle**
- 6) Multi-aircraft runway operations**
- 7) All suitable airports used**

# A NEO Example – Tailored Arrivals

... to build an arrival trajectory that the aircraft will follow predictably...



The FMC can accept routes, altitudes and speeds ...



RNAV Routes

Speeds

Altitude Constraints

Estimated Time of Arrival

# NAS Transformation to NGATS

- **Control by radar → Management by trajectory**
- **SWIM is needed foundation for NGATS**
- **Information core services are central to SWIM**
- **Air traffic NEO creates NGATS capacity and security**