Future Global Communications In Efficient Flight Path Management

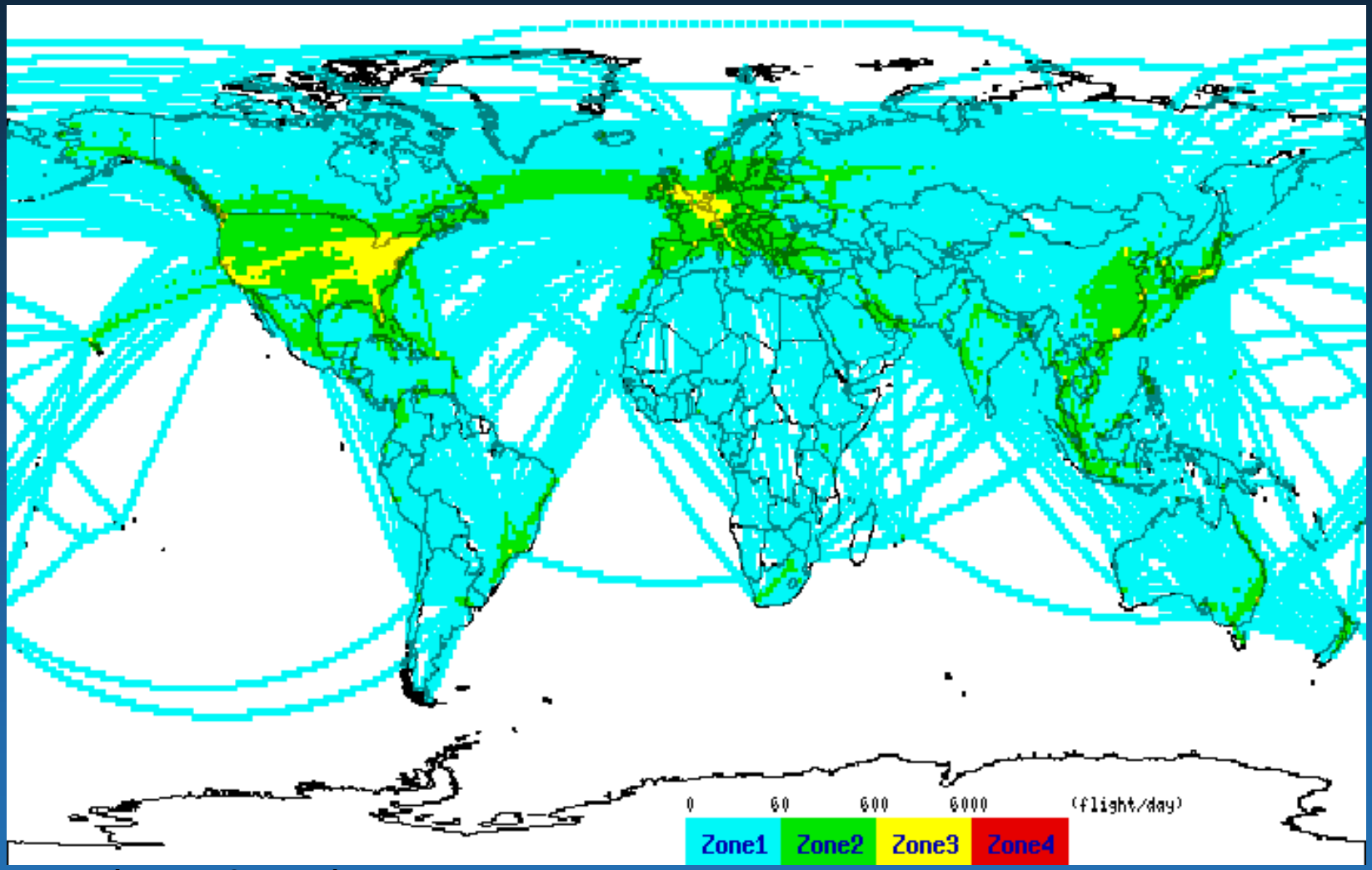
May 4, 2005

Transportation & Security Solutions

P.W. Mettus

Regional and Global Capacity Challenges

Where are the greatest problems in 2005?



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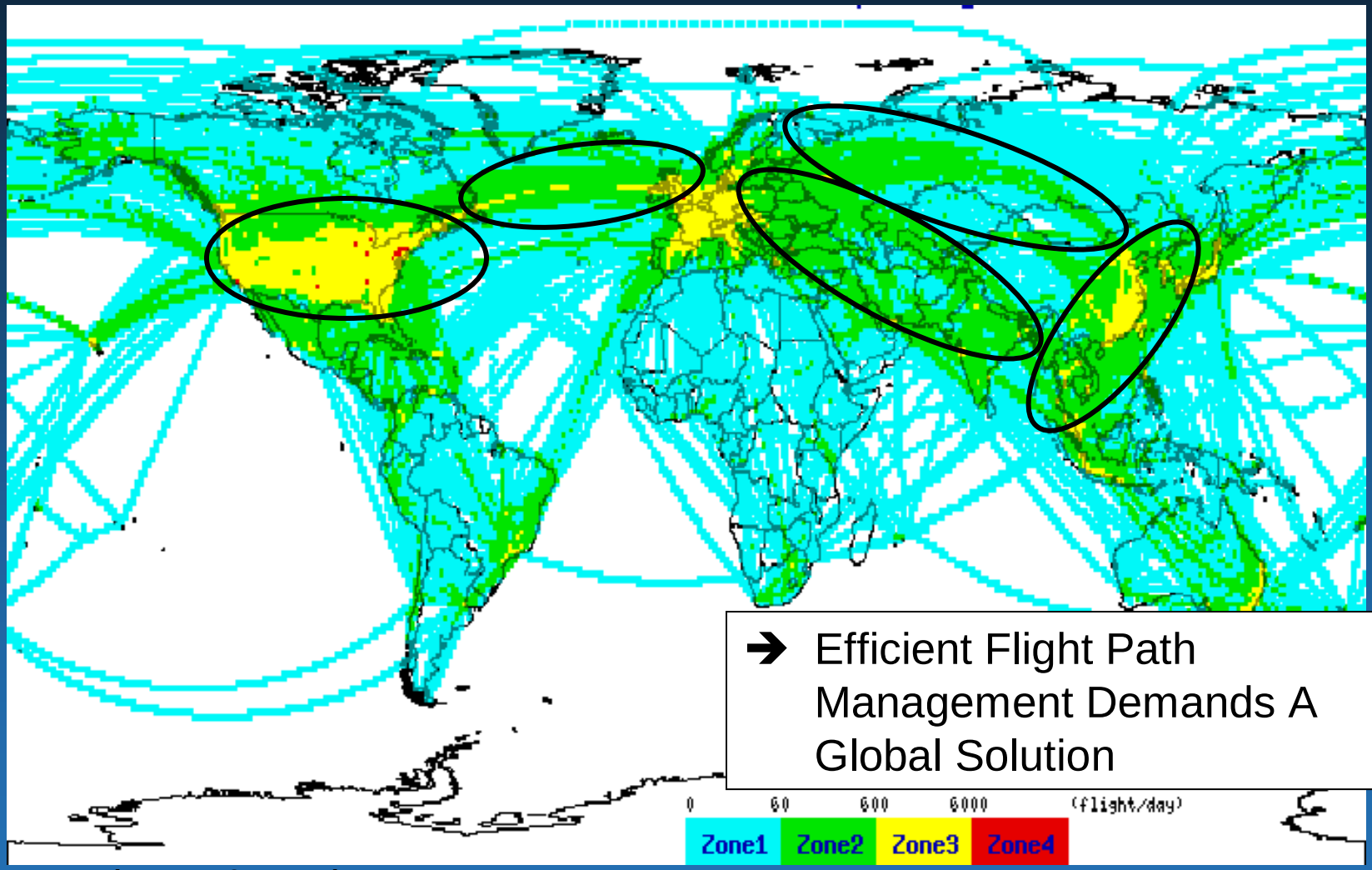
Regional and Global Capacity Challenges

Where are the greatest problems - 2025?



➔ Efficient Flight Path Management Demands A Global Solution

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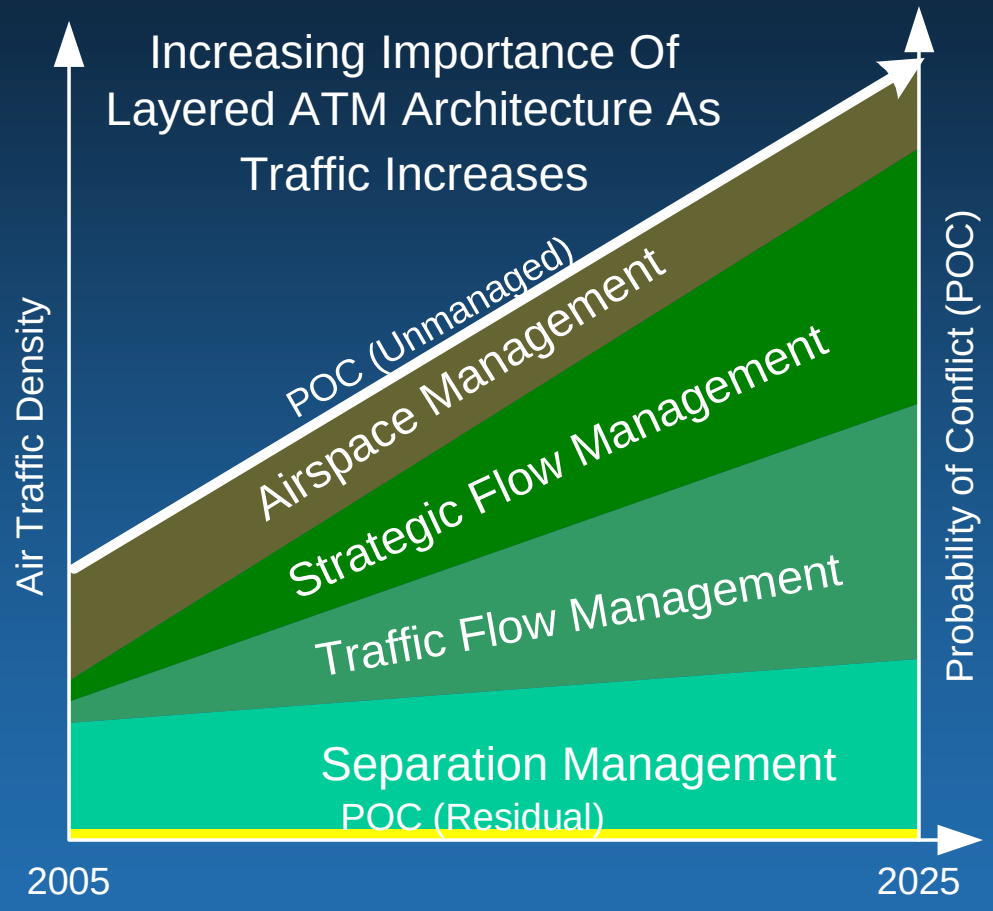
Key Long-Term Challenges

- **Reduce Unit Cost Of ATM**
  - ***3X Current NAS Capacity by 2025 With Current Workforce Size***
  - ***Eliminate Duplicate Automation System Services***
- **Efficient Flight Path Management**
  - ***User preferred profiles***
  - ***Longer Range Planning With Greater Accuracy***
  - ***Global Sharing Of System Services***
- **Universal Global Air/Ground Communications**

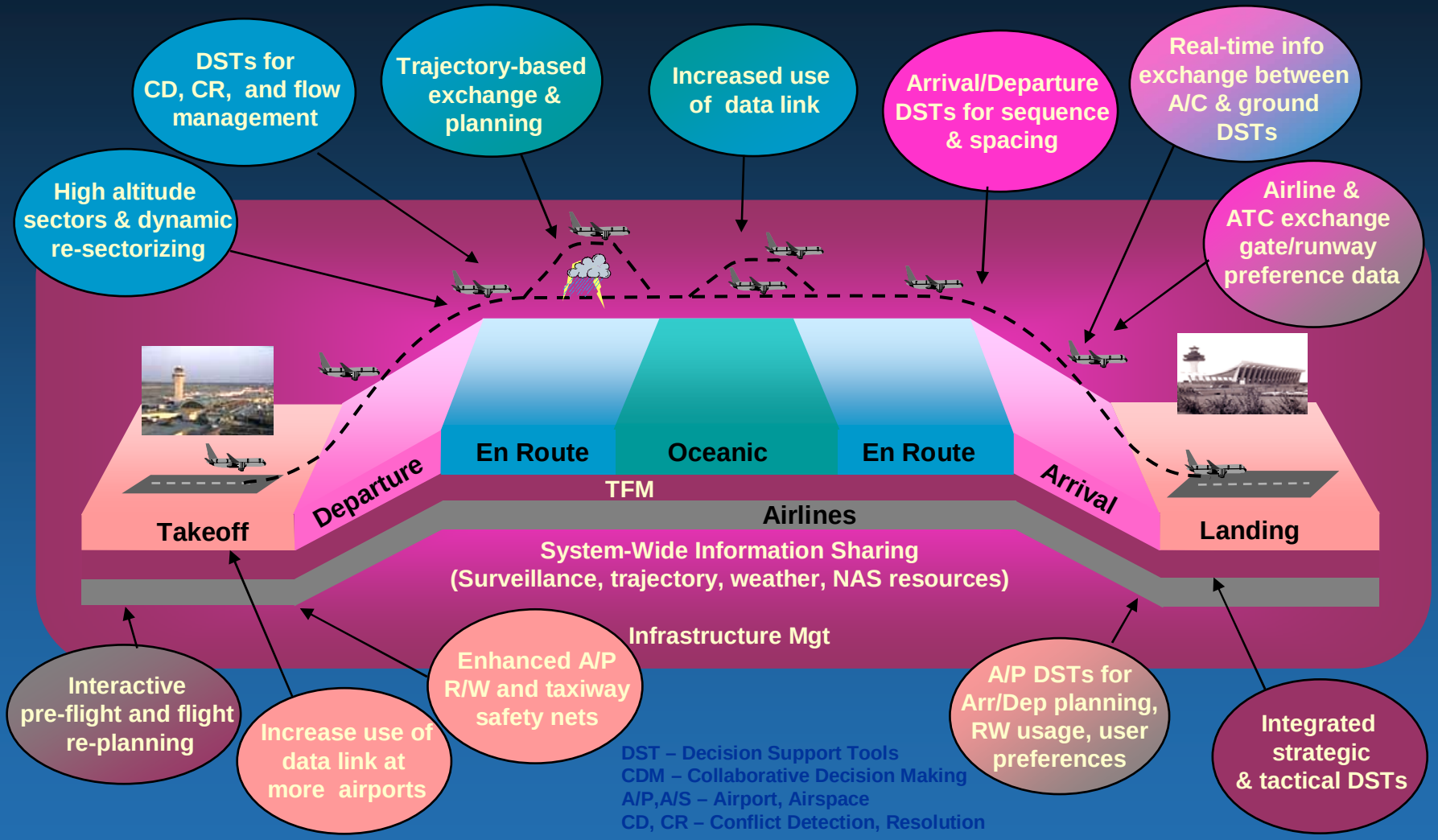
ATM Layered Model For Longer Range Planning

- **Airspace**
  - ***1-2 year Look-Ahead***
- **Strategic Flow**
  - ***24 Hour Look-Ahead***
- **Traffic Flow**
  - ***2 Hour Look-Ahead***
- **Separation**
  - ***Real-Time***



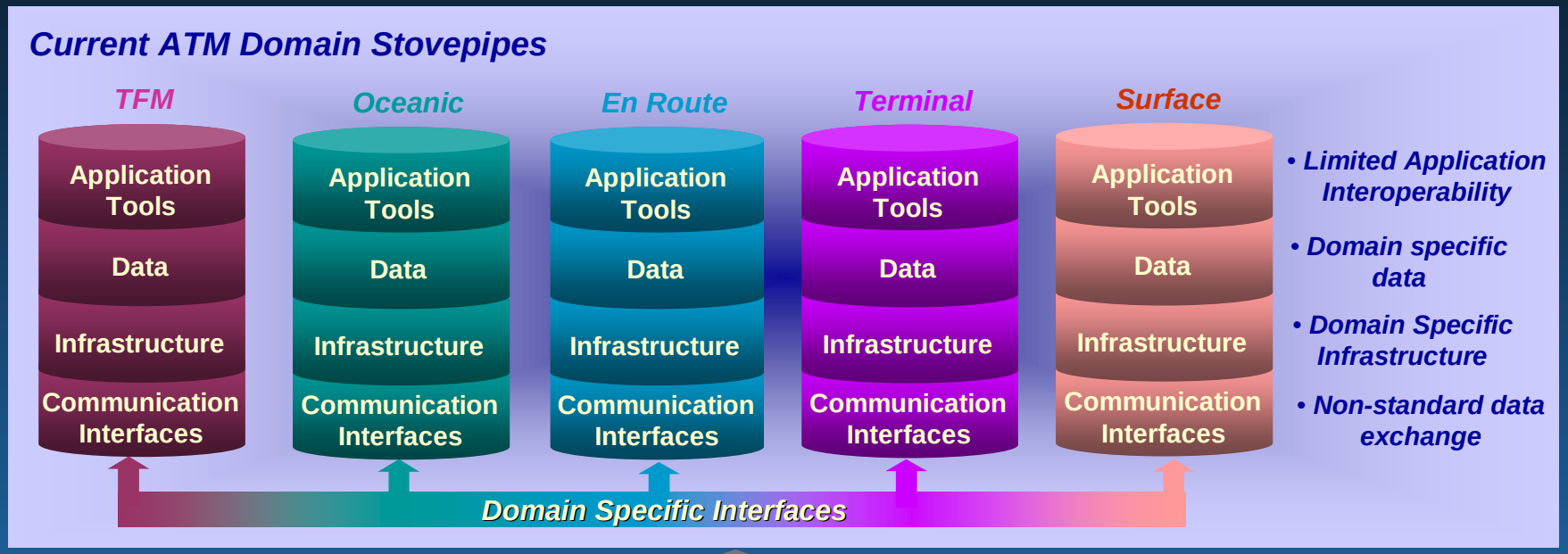
Future Operations Use Longer Range Planning With Increasing Effectiveness

A Future National Airspace System



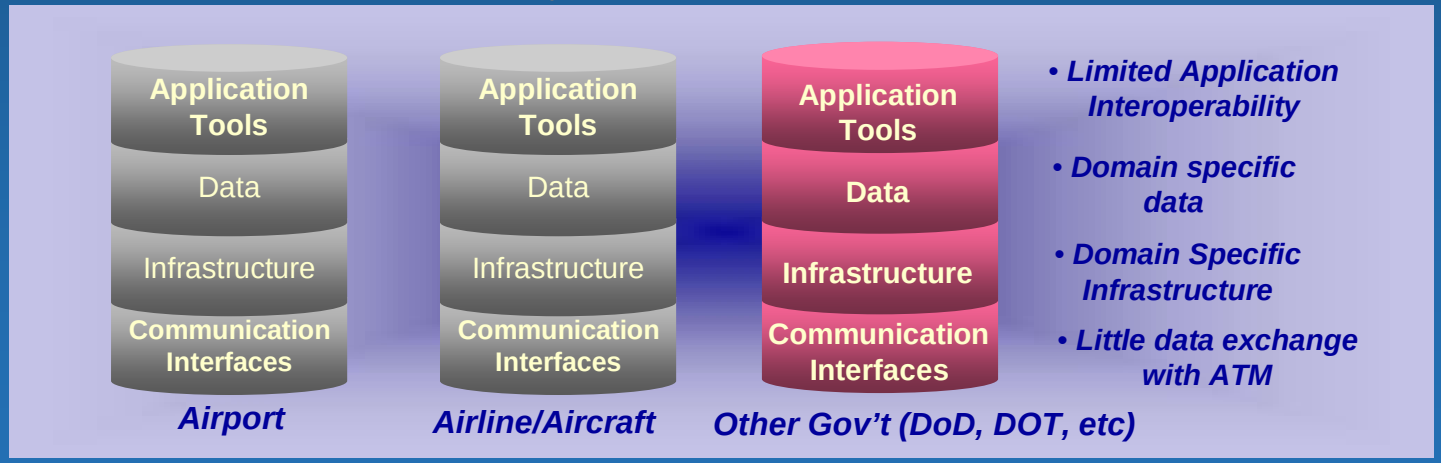
All stakeholders require CDM, new DSTs & common information sharing …

Today's Stove-Piped Architecture

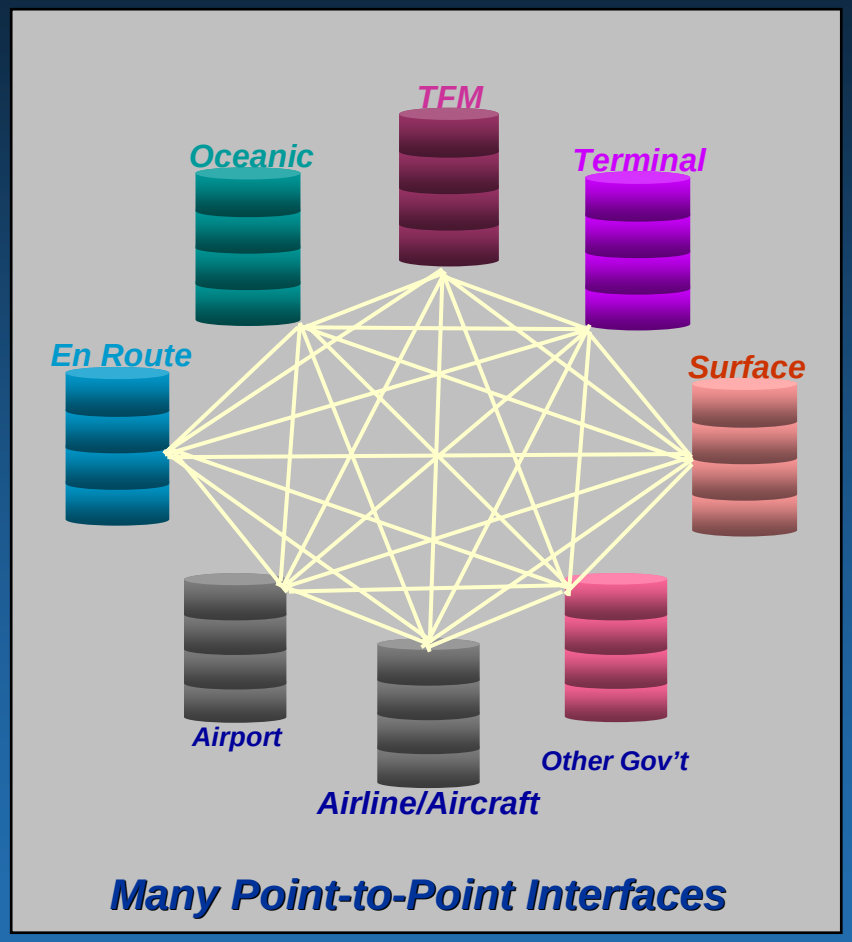


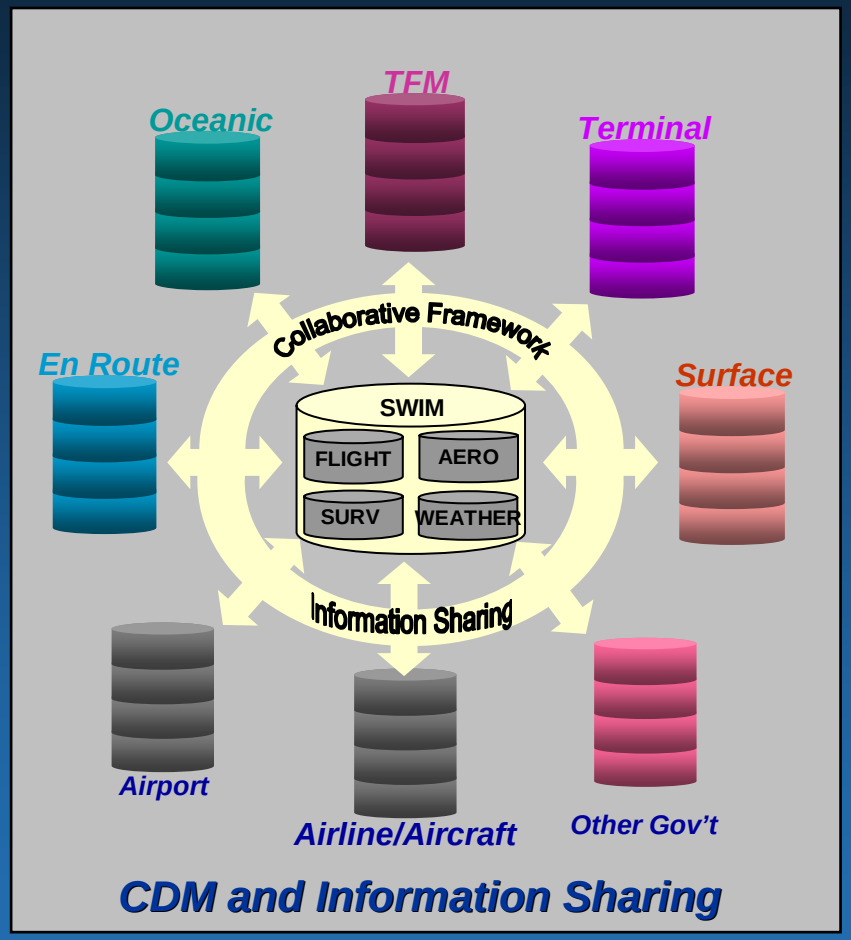
• Mostly manual (voice) coordination

Point-to-point Sensor Data Distribution



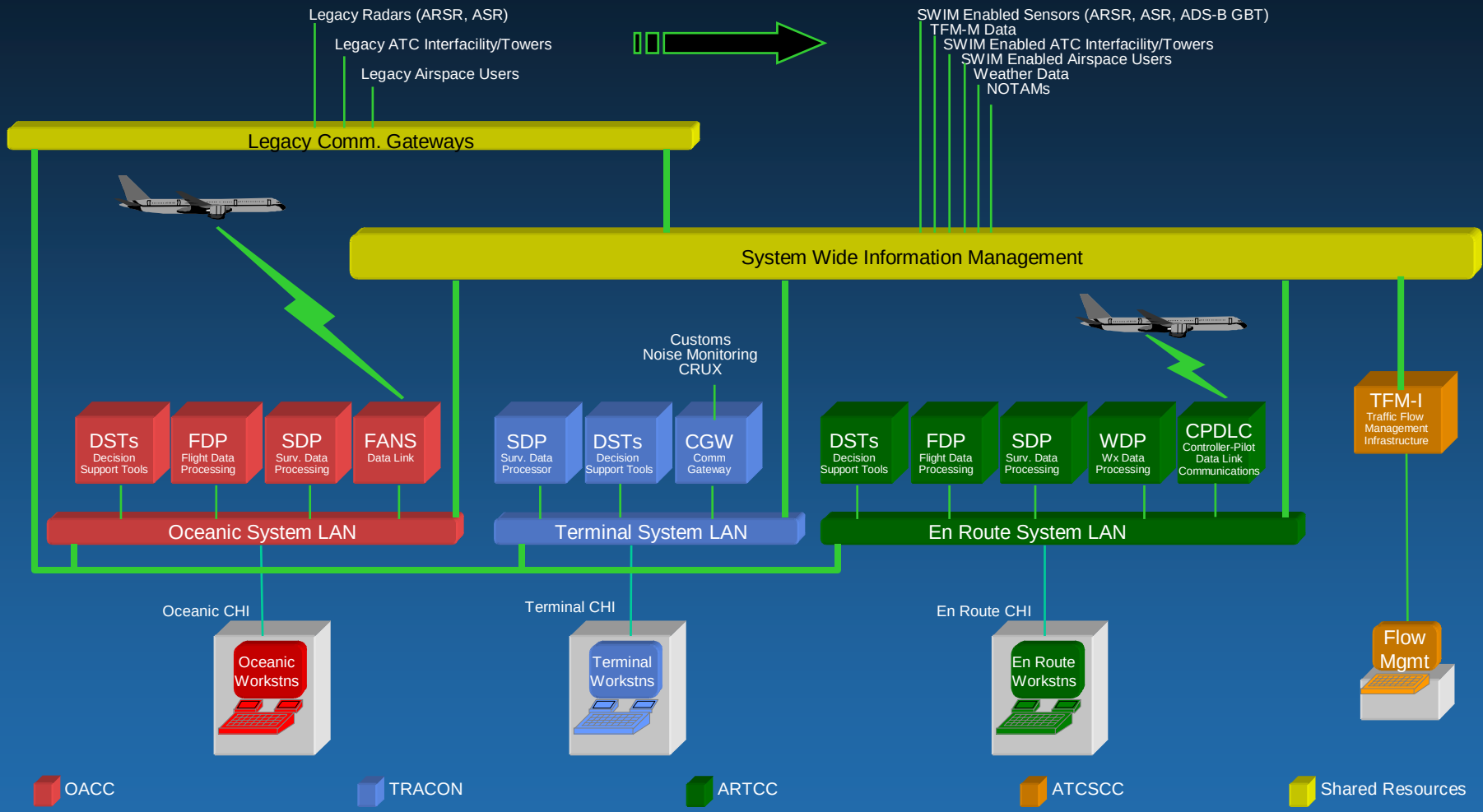
A Shift In Architectural Paradigms





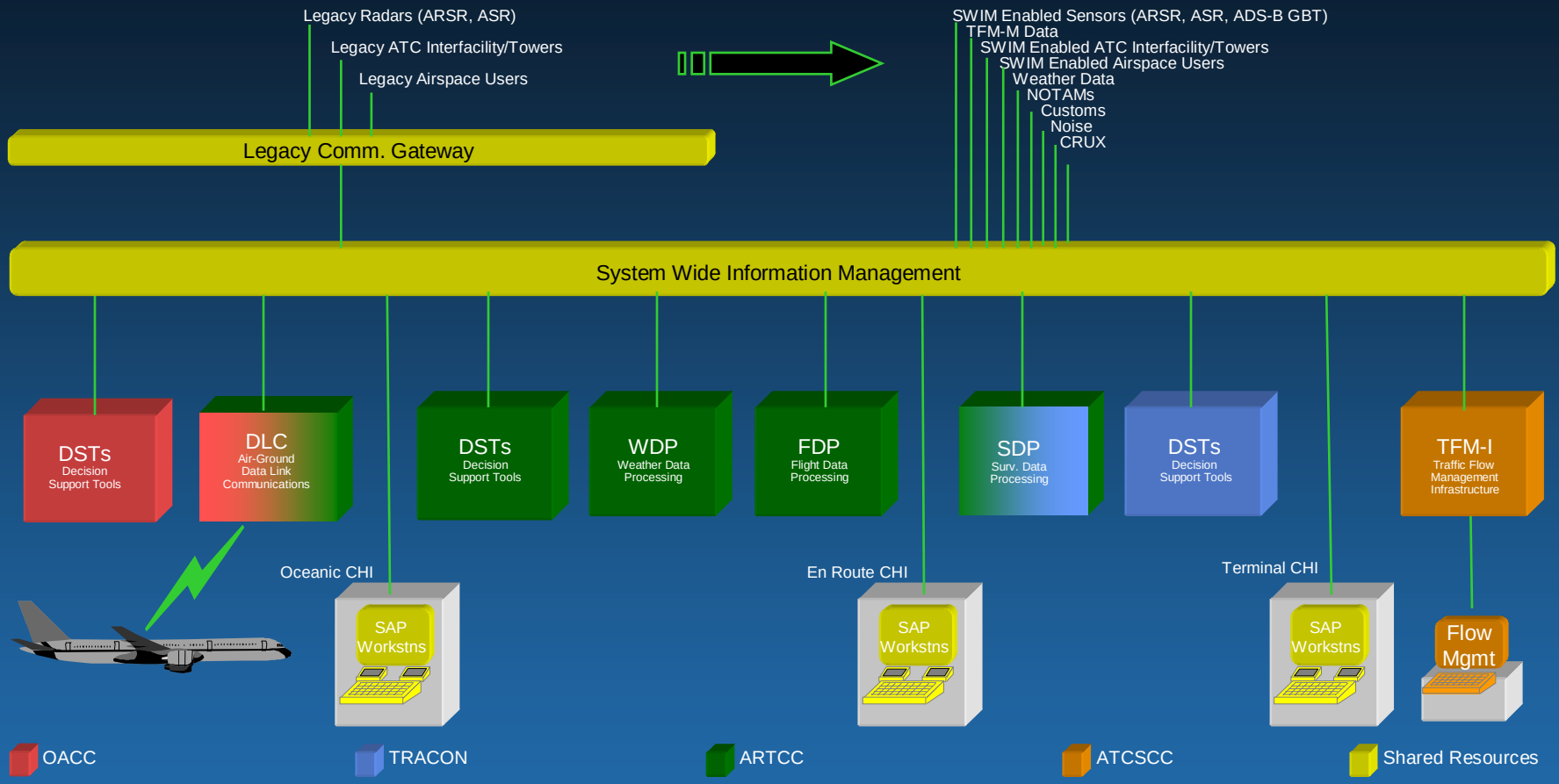
Information Sharing Demands a Network Enabled Approach

Harmonize Telecommunications Infrastructure



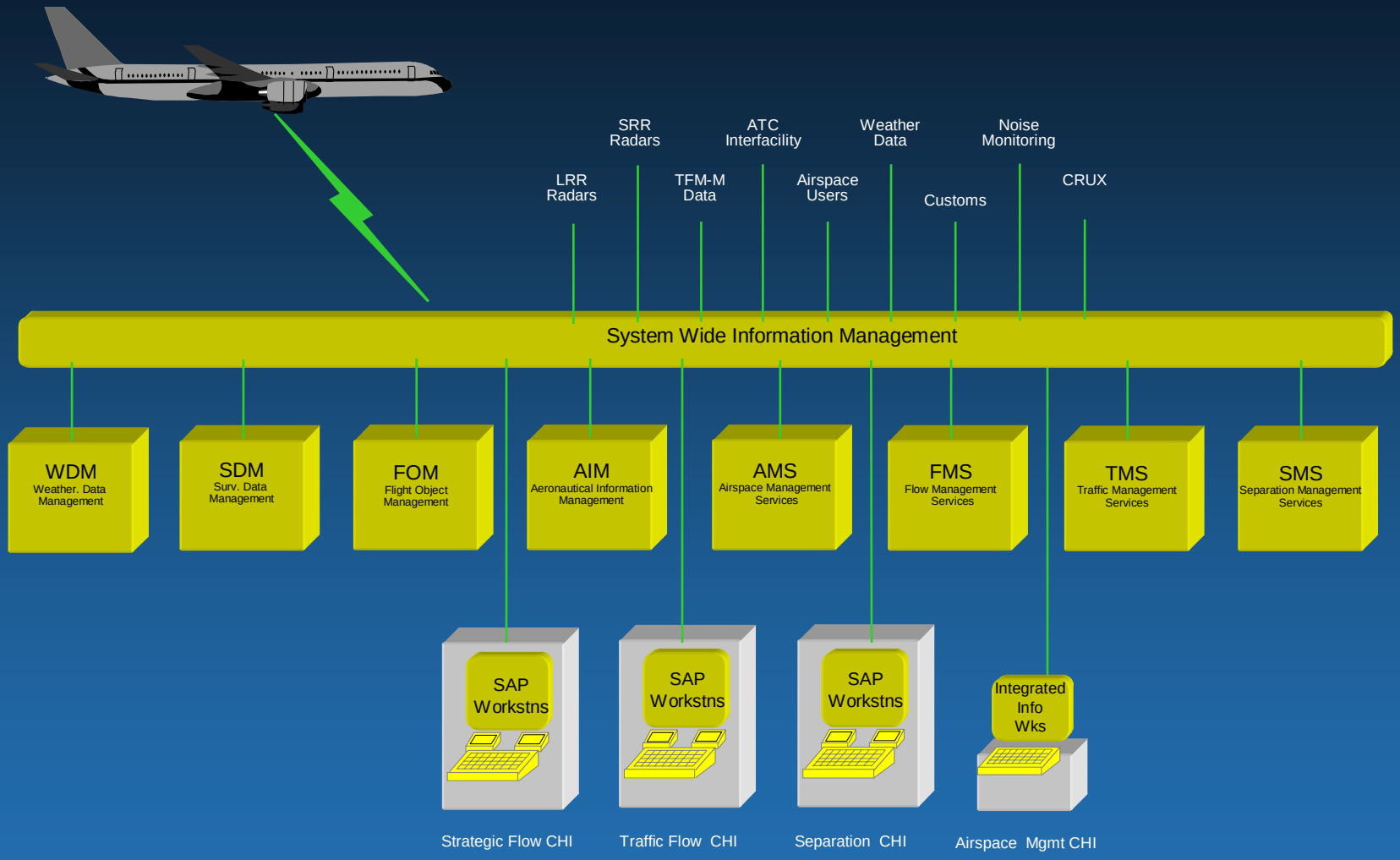
- ***Flexibly Replace Ad Hoc Point to Point Circuits With IP Networks***
- ***Eliminate Redundancy Where Practical***
- ***Consolidate Sensors Where Appropriate***

Harmonize ATC Application Infrastructure



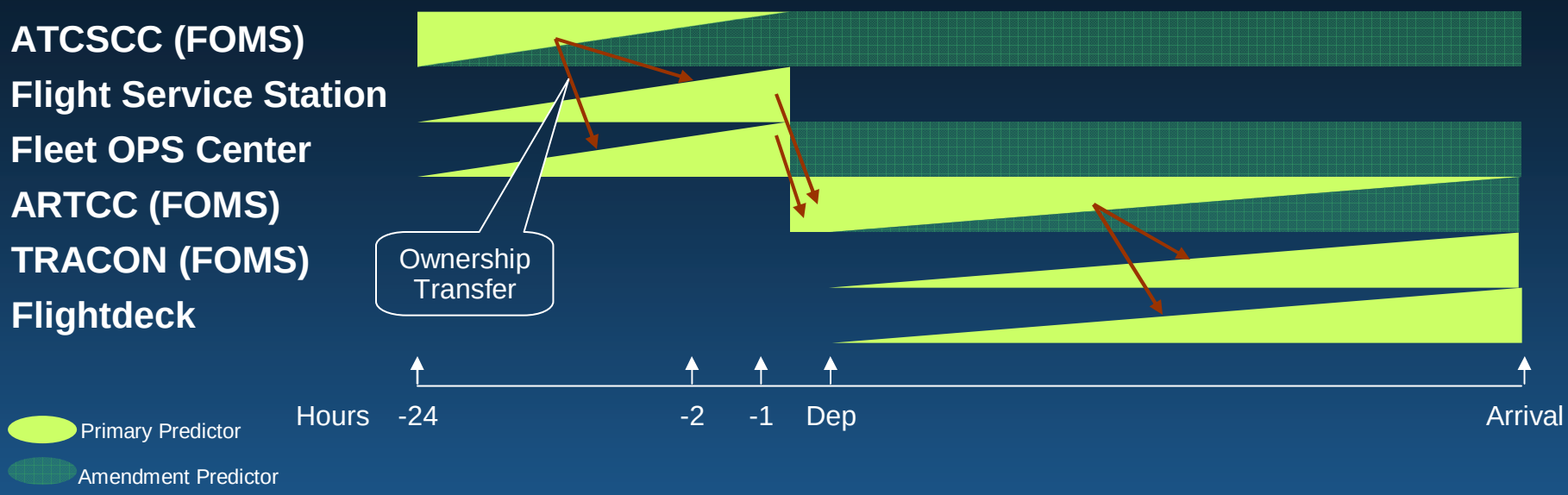
- **Minimize Data Migration By Standardizing**
  - ***Automation Platform Workstations***
  - ***Core Flight Data Processing***
  - ***Core Surveillance Data Processing***
  - ***Data Link Communications***

Harmonize Operational Concepts



- **Complete Flexibility In Air/Ground Functional Allocation**
- **Rationalize Decision Support Tools Across Domains**
- **Maximize Flexibility In Partitioning Airspace**

Example Trajectory Service Sharing



- **Some rationale for ownership changes in single trajectory model**
  - ***ATCSCC may need trajectories for demand forecasting before airlines are required to file flight plans***
  - ***Aircraft operators may optimize trajectories in accordance with proprietary business rules***
  - ***ANSP must check submitted trajectories for conformance with airspace constraints***
  - ***ANSP must provide continuously updated trajectories for ATC decision support where aircraft are not equipped to do so***
  - ***The aircraft maintained trajectories are not available prior to departure***
  - ***Not all aircraft will be equipped to share on board trajectories***
  - ***It may not be practical to provide all aircraft with enough information for extensive profile re-planning en route***

Principal Technical Dependencies

- **Gate To Gate Trajectory Management**
  - ***ATM Layered Model***
  - ***Air/Ground Functional Re-Allocation***
  - ***Comprehensive Definition Of Trajectory QoS Requirements***
  - ***NAS-Wide Information Sharing***
- **Air-Ground Trajectory Exchange**
  - ***Reduce Intention Errors***
  - ***Reduce Workload For Implementing TMIs***
  - ***Enable Finer Grain Control Of NAS***
- **RNP / RNAV**
  - ***Allow More Flexibility In Automatic Tailoring Of Arrivals***
  - ***Supports Use Of Intention Information In Terminal Area***
- **Comprehensive Direct Controller-Pilot Communications Over Oceans**
- **Automatic Surveillance Over Oceans**