

# **NAS EA 2025 OV-7 Data Models: Future Information Architecture**



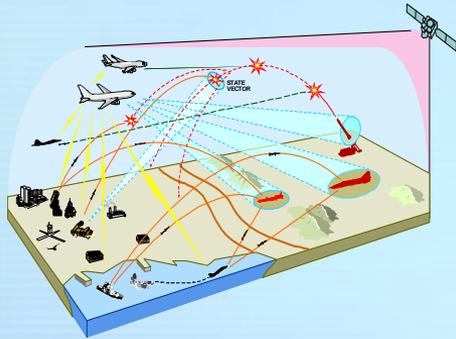
**June 24, 2009**

**Presented by: MITRE/CAASD**

**Presented for: FAA NAS EA Conference**

# Product Overviews

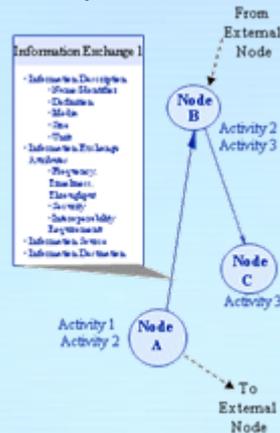
## High-Level Operational Concept Description (OV-1)



High-level graphical description of the operational concept of interest

Provides a quick orientation for architecture audience and decision makers

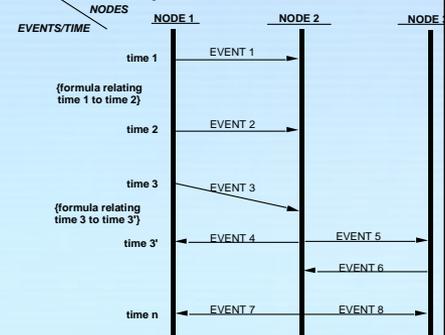
## Operational Node Connectivity Description (OV-2)



Operational nodes, activities performed at each node, node-to-node relationships, and information needlines

Shows who produces information and who uses it

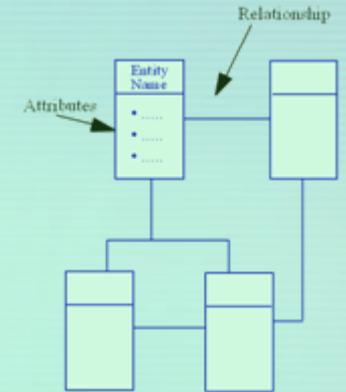
## Operational Node Connectivity Description (OV-6c)



Provides a time-ordered examination of the information exchanges between participating operational nodes as a result of a particular scenario

Valuable for moving to the next level of detail from initial operating concepts

## Logical Data Model (OV-7)



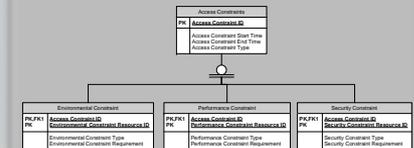
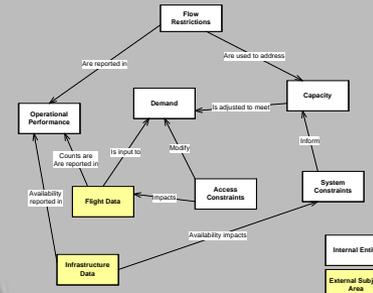
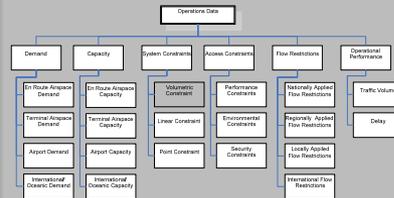
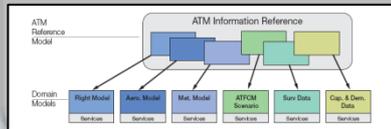
Describes the structure of an architecture domain's system data types, their attributes as well as interrelationships

Supports interoperability between architectures, since these definitions may be used by other organizations to determine system data compatibility



# OV-7: Development Approach

## SESAR Info. Reference Models



Identify data framework / subject areas

- Review existing data modeling efforts (e.g., SESAR)

Develop data hierarchy models for each data subject area

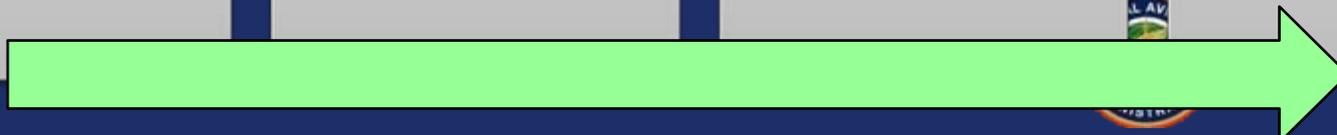
- Provided mechanism to ensure adequate coverage across NAS data elements

Develop high-level entity-relationship (ER) diagrams for each data subject area

- Checked for relationships across data subject areas

Develop detailed ER diagrams including attributes for each data subject area

- Decomposed data subject areas



# OV-7 Data Subject Areas

<b>Flight Data</b>	Flight Plan, events, and trajectory information including representation of multiple states (e.g., activation, approval, in negotiation, etc.) and versions (e.g., preferences).
<b>Surveillance Data</b>	Data about flights' position, vector, identify, and flight path intent as reported by sensors. This data also includes location and related data on ground vehicles and foreign object debris (FOD).
<b>Aeronautical Data</b>	Navigational and other data produced for pilots about the NAS airspace and the NAS air traffic control system and its assets. Data includes airspace definitions, navigational and communication aids and procedures, and changes to them including all NAS notifications (such as Notice to Airmen, NOTAMS) and other related reports.
<b>Weather Data</b>	Data about atmospheric or meteorological conditions in the NAS airspace; including collection of data from weather sensors to weather processing subsystems and the dissemination and distribution of weather products to and amongst ATC systems.
<b>Operations Data</b>	Data supporting capacity management and flow contingency management activities, including aggregated demand data, capacity of resources including airspace and terminal areas, operational constraints imposed to adjust demand, flow restrictions, and operational performance data.
<b>Infrastructure Data</b>	Data about the identity, location, description, operational status, and configuration of ATM/CNS infrastructure assets of the NAS, including ground facilities and systems, and personnel.



# OV-7 Data Subject Areas: Comparison across data modeling efforts

NAS EA OV-7	Eurocontrol SESAR	AIO FAA Data Architecture	NAS Flight Data Model Subject Areas	NAS EA- System Views (SVs)
Flight Data	Flight	Aviation Assets; Events/Flight Operations	Demand	Flight Data, Command & Control
Surveillance Data	Surveillance			Surveillance
Aeronautical Data	Aeronautical Information Management (AIM) (Aero)	Aviation Assets, Physical Environment	Capacity	AIM
Weather Data	AIM (Meteo)	Events/Weather	Weather	Weather
Operations Data	Capacity & Demand, Air Traffic Flow and Capacity Management (ATCFM)	Events/Flight Operations	Demand, Capacity, Traffic Management, Performance	Command & Control
Infrastructure Data		Physical Environment, Infrastructure		Command & Control



# **OV-7 Data Hierarchies: Overview**

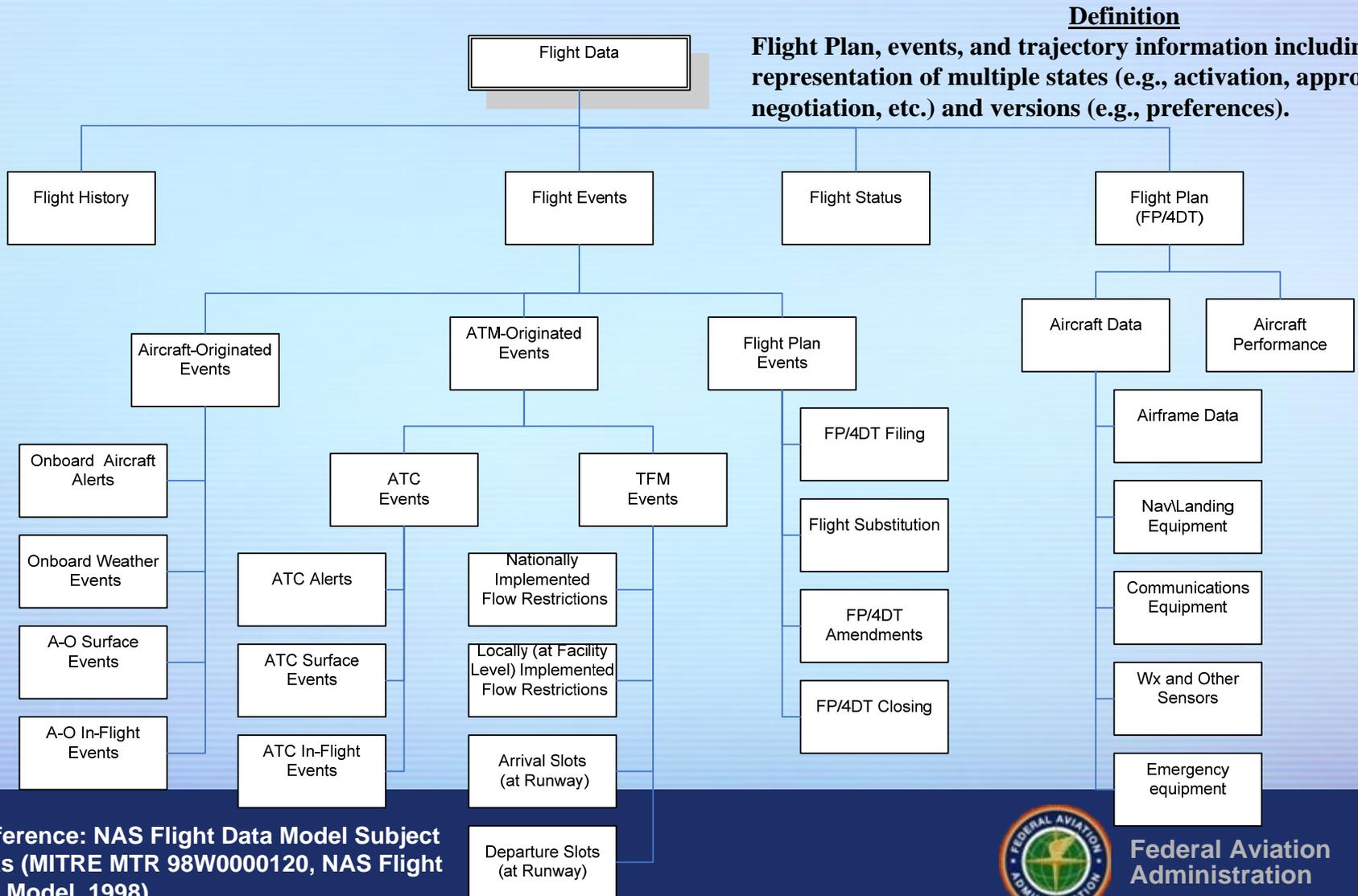


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# Flight Data: Hierarchy Diagram\*



**Definition**  
 Flight Plan, events, and trajectory information including representation of multiple states (e.g., activation, approval, in negotiation, etc.) and versions (e.g., preferences).

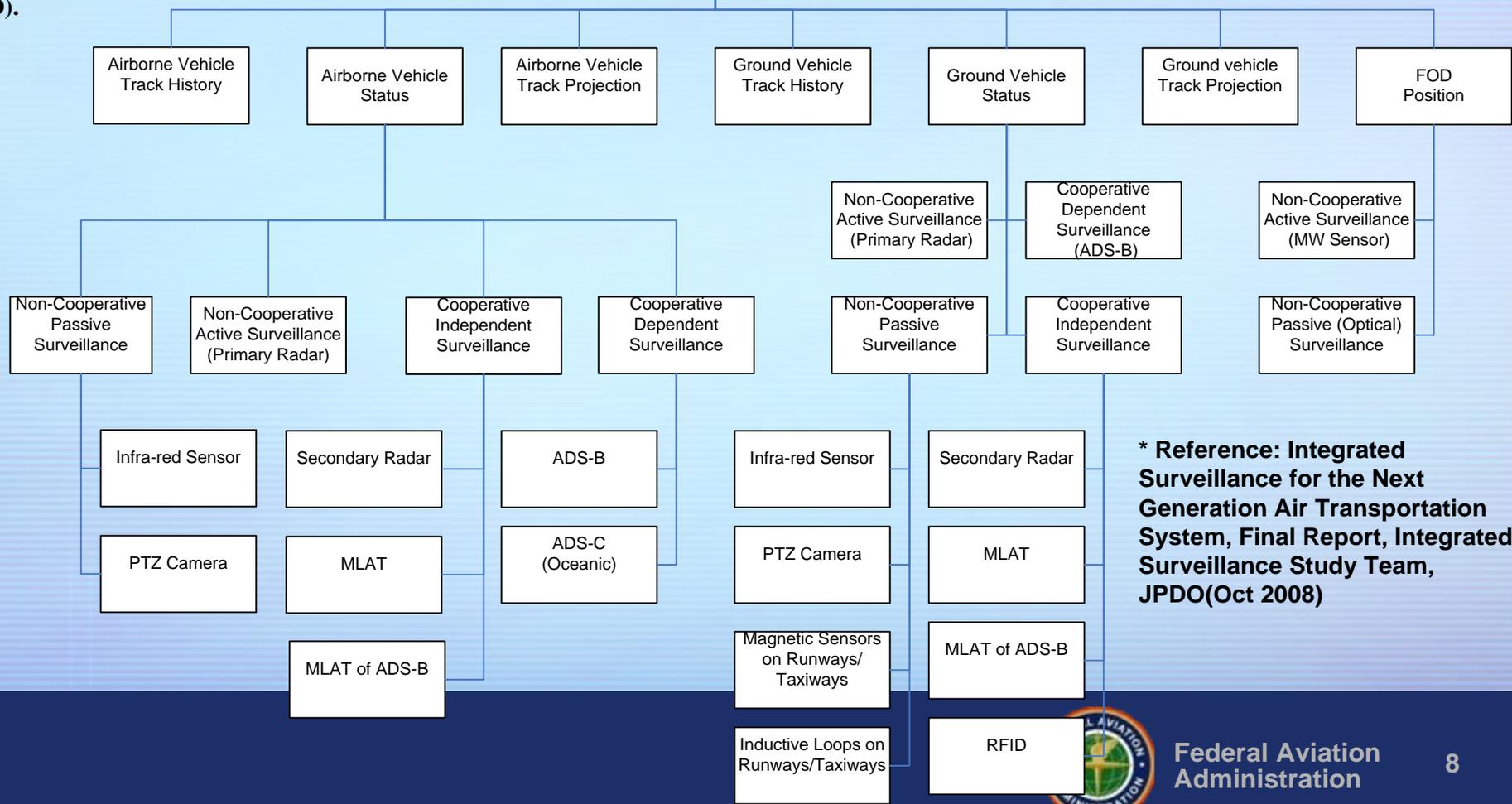
\* Reference: NAS Flight Data Model Subject Areas (MITRE MTR 98W0000120, NAS Flight Data Model, 1998)



# Surveillance Data: Hierarchy Diagram\*

## Definition

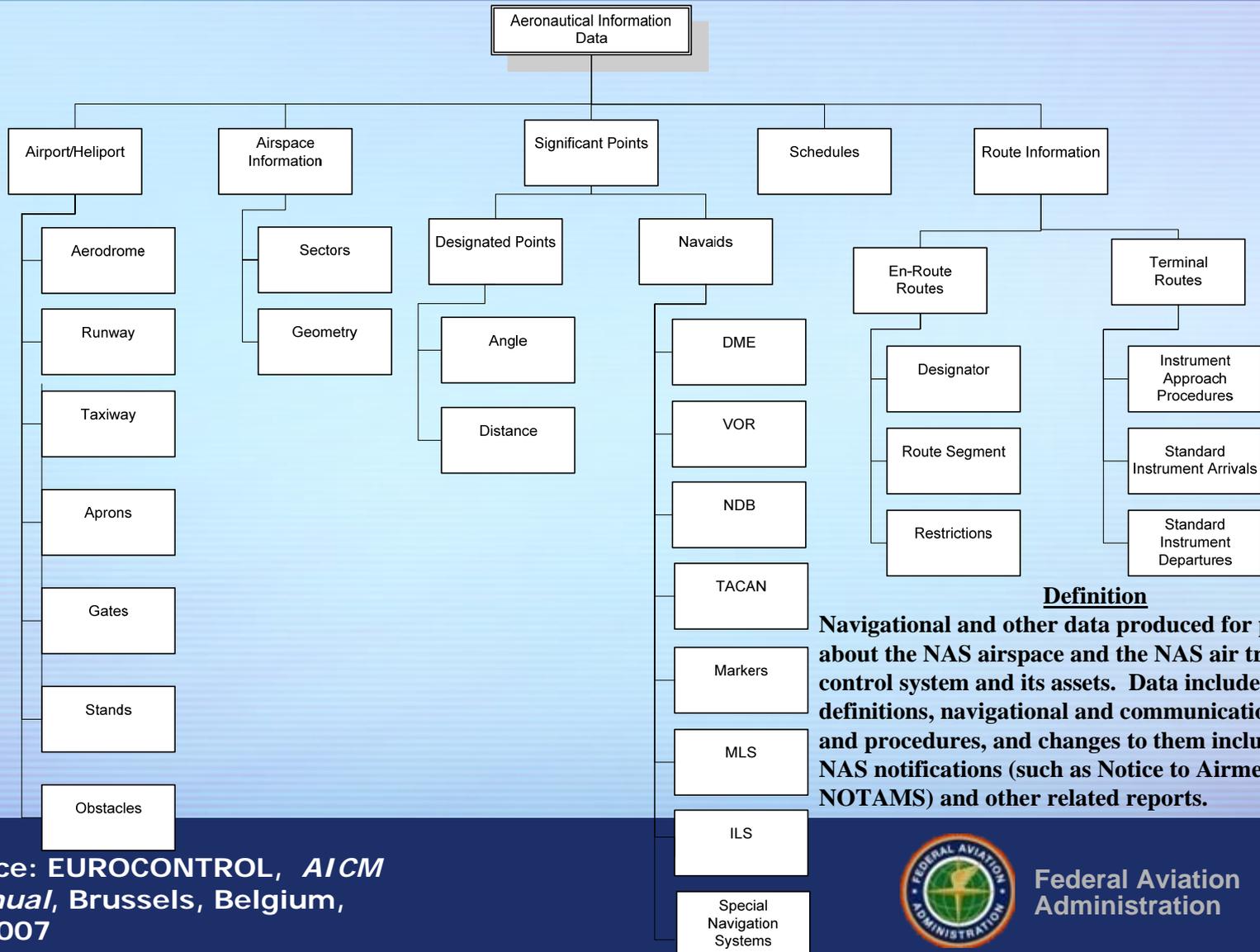
Data about flights' position, vector, identify, and flight path intent as reported by sensors. This data also includes location and related data on ground vehicles and foreign object debris (FOD).



\* Reference: Integrated Surveillance for the Next Generation Air Transportation System, Final Report, Integrated Surveillance Study Team, JPDO(Oct 2008)



# Aeronautical Data: Hierarchy Diagram\*



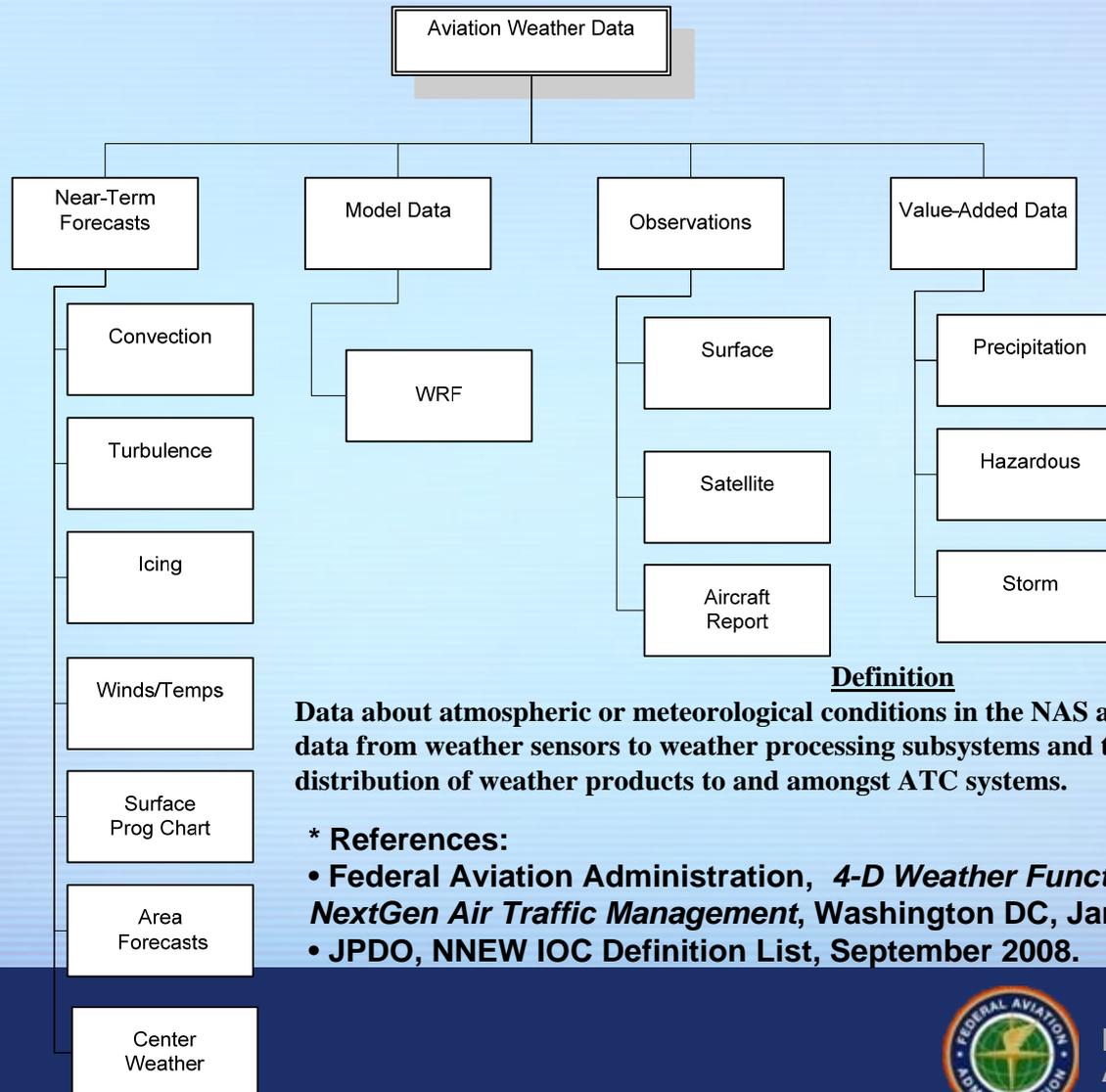
**Definition**

Navigation and other data produced for pilots about the NAS airspace and the NAS air traffic control system and its assets. Data includes airspace definitions, navigational and communication aids and procedures, and changes to them including all NAS notifications (such as Notice to Airmen, NOTAMS) and other related reports.

\* Reference: EUROCONTROL, *AICM Users Manual*, Brussels, Belgium, October 2007



# Weather Data: Hierarchy Diagram\*



## Definition

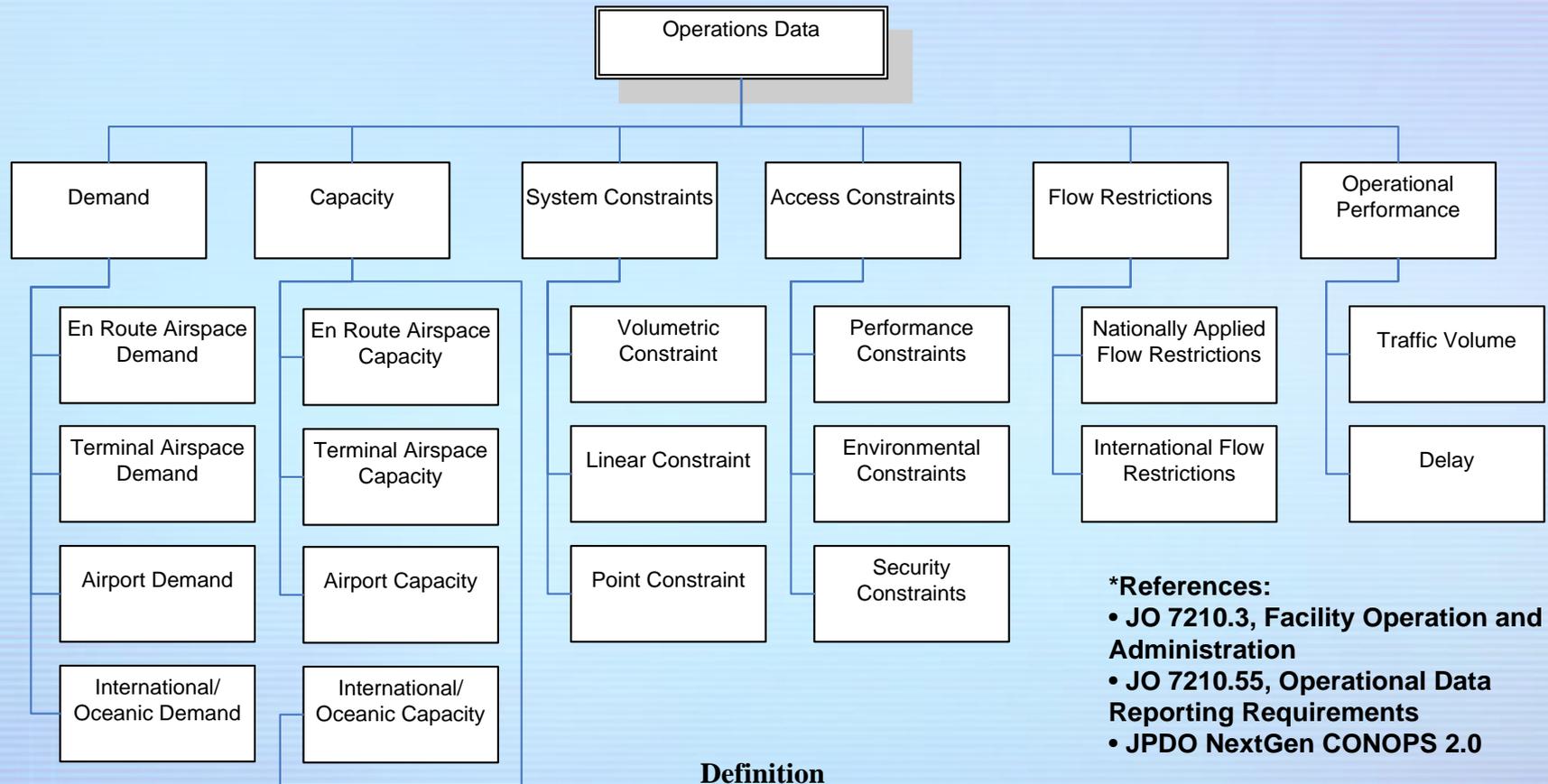
**Data about atmospheric or meteorological conditions in the NAS airspace; including collection of data from weather sensors to weather processing subsystems and the dissemination and distribution of weather products to and amongst ATC systems.**

## **\* References:**

- **Federal Aviation Administration, *4-D Weather Functional Requirements for NextGen Air Traffic Management*, Washington DC, January 18, 2008**
- **JPDO, NNEW IOC Definition List, September 2008.**



# Operations Data: Hierarchy Diagram\*

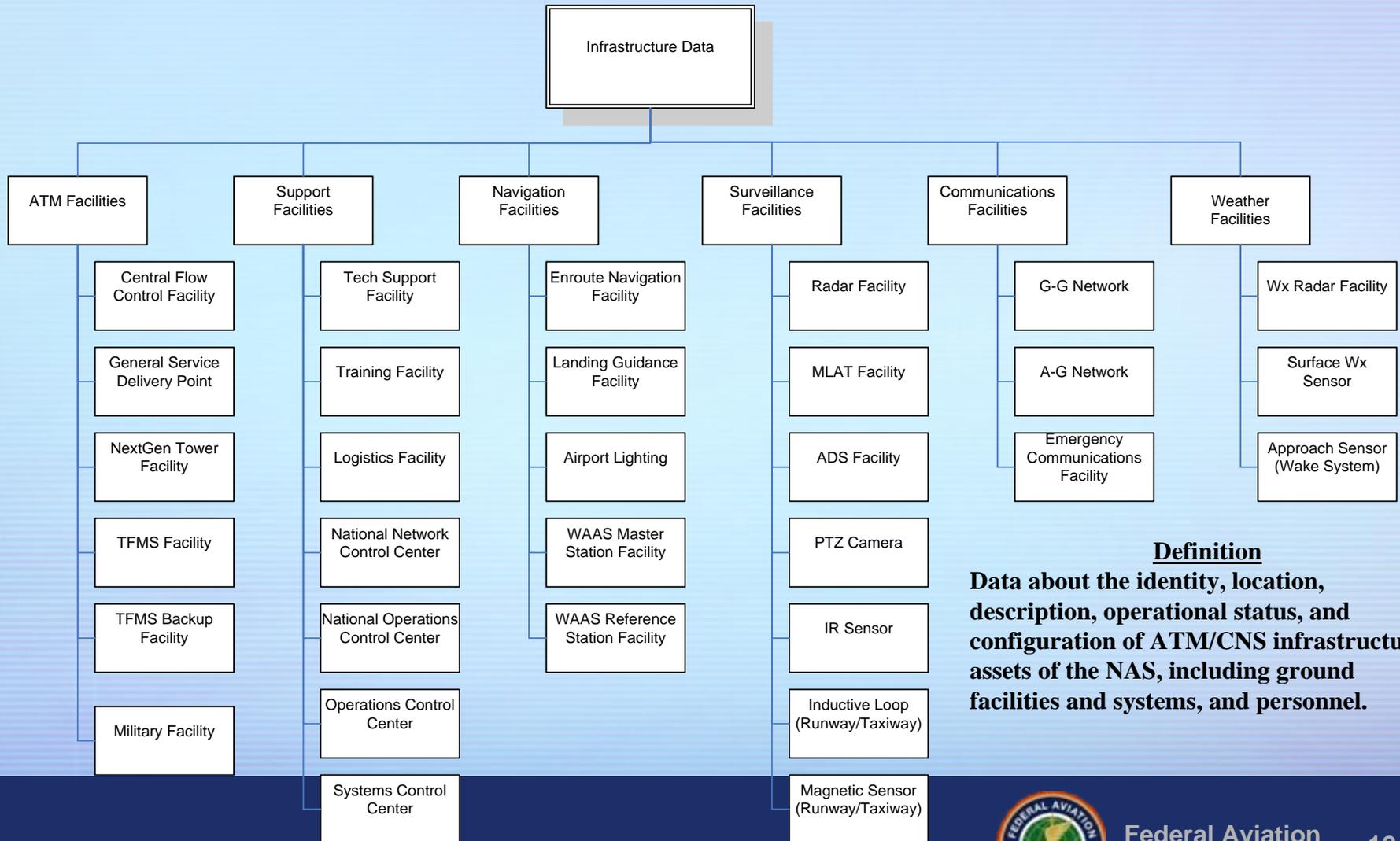


## Definition

Data supporting capacity management and flow contingency management activities, including aggregated demand data, capacity of resources including airspace and terminal areas, operational constraints imposed to adjust demand, flow restrictions, and operational performance data.



# Infrastructure Data: Hierarchy Diagram



## Definition

**Data about the identity, location, description, operational status, and configuration of ATM/CNS infrastructure assets of the NAS, including ground facilities and systems, and personnel.**



# **OV-7 Sample Diagrams: Operations Data**

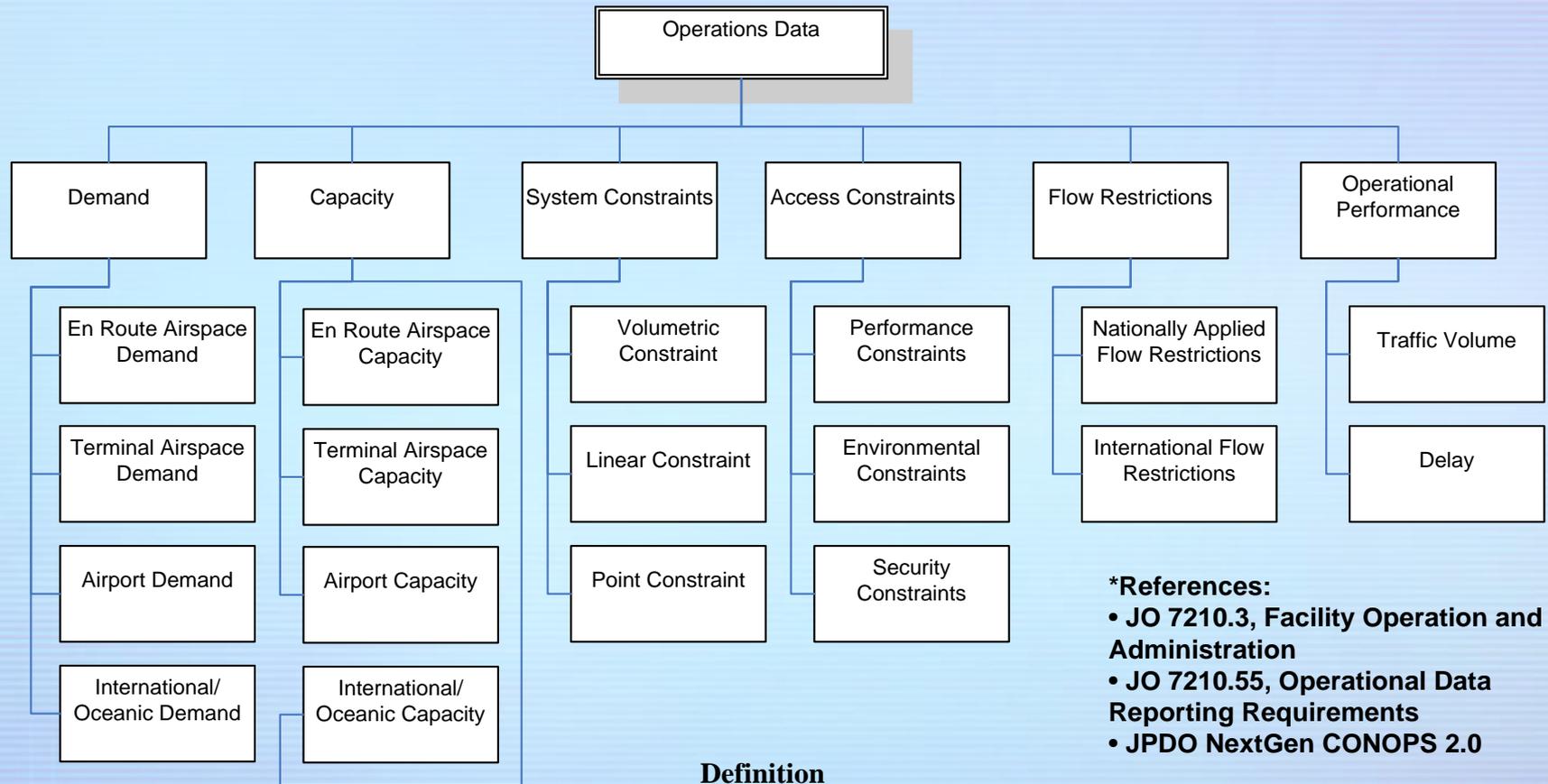


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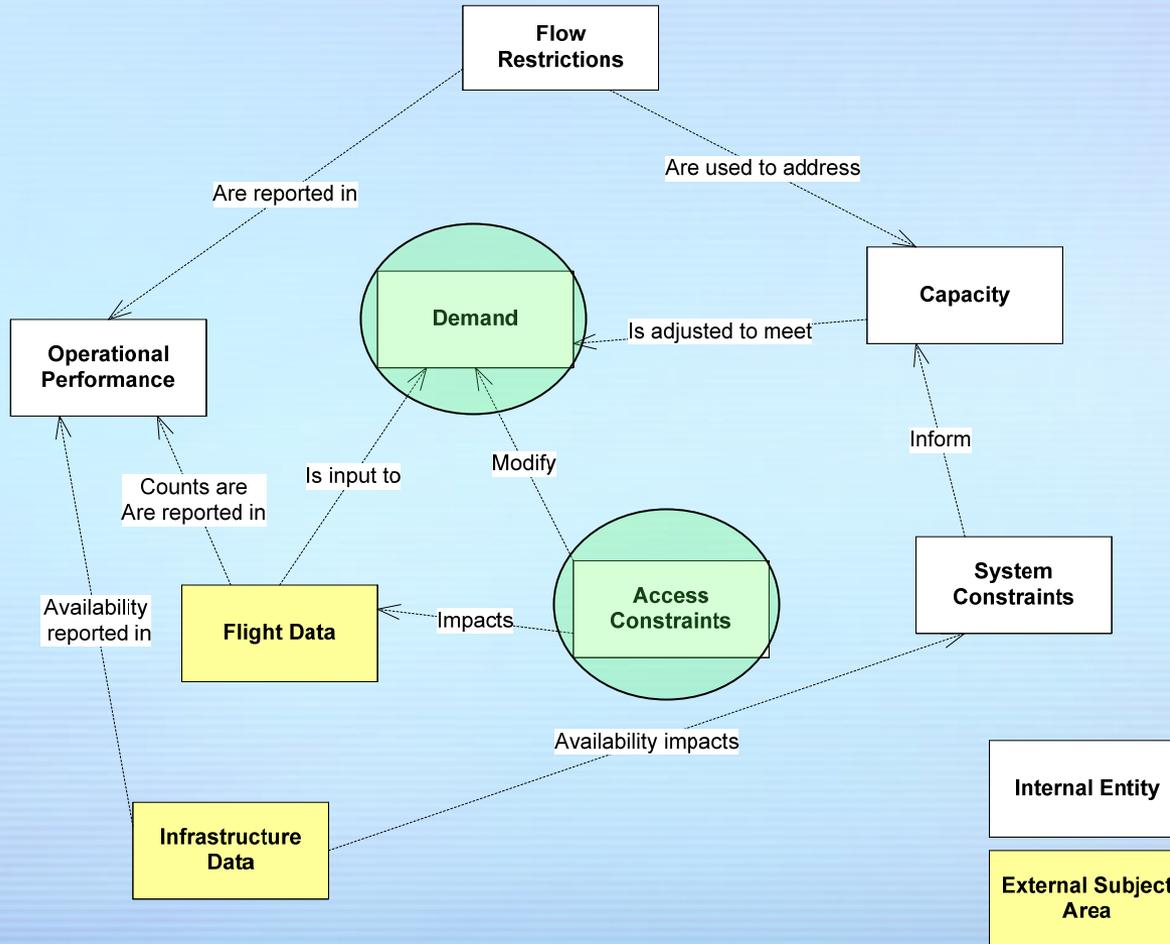


## Definition

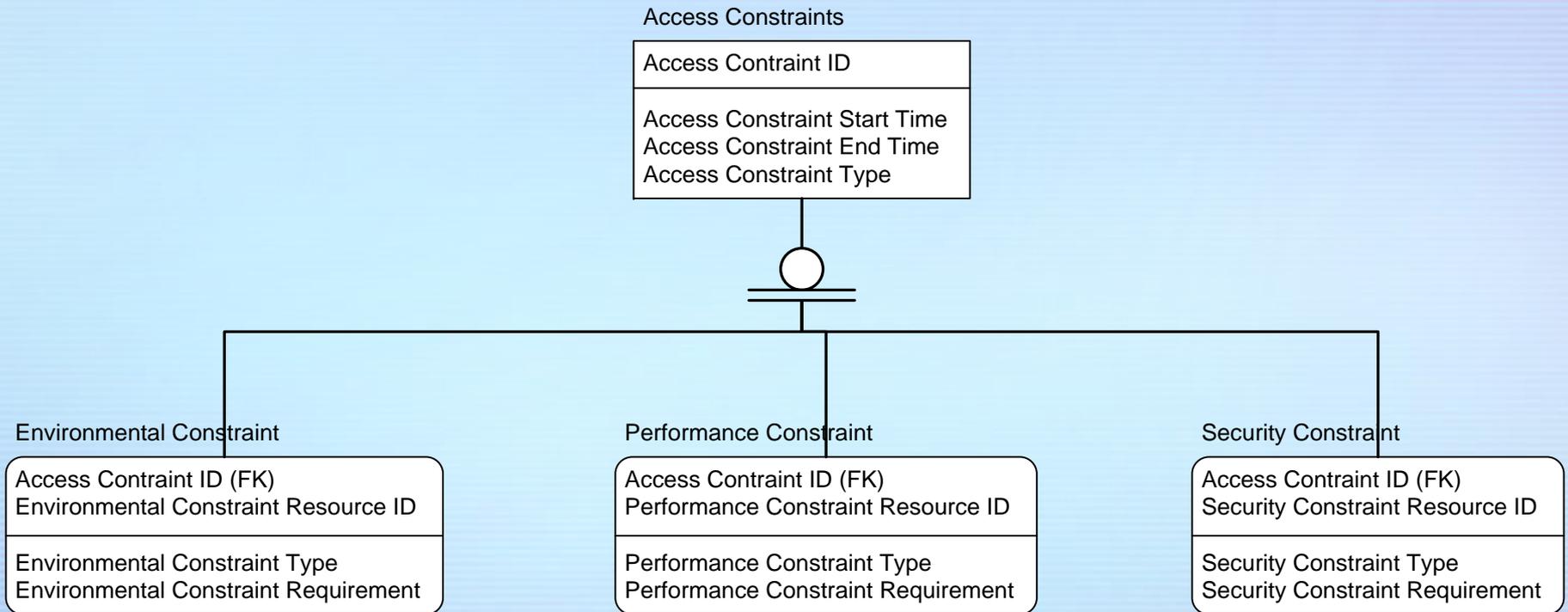
Data supporting capacity management and flow contingency management activities, including aggregated demand data, capacity of resources including airspace and terminal areas, operational constraints imposed to adjust demand, flow restrictions, and operational performance data.



# Sample High-Level ER Diagram: Operations Data



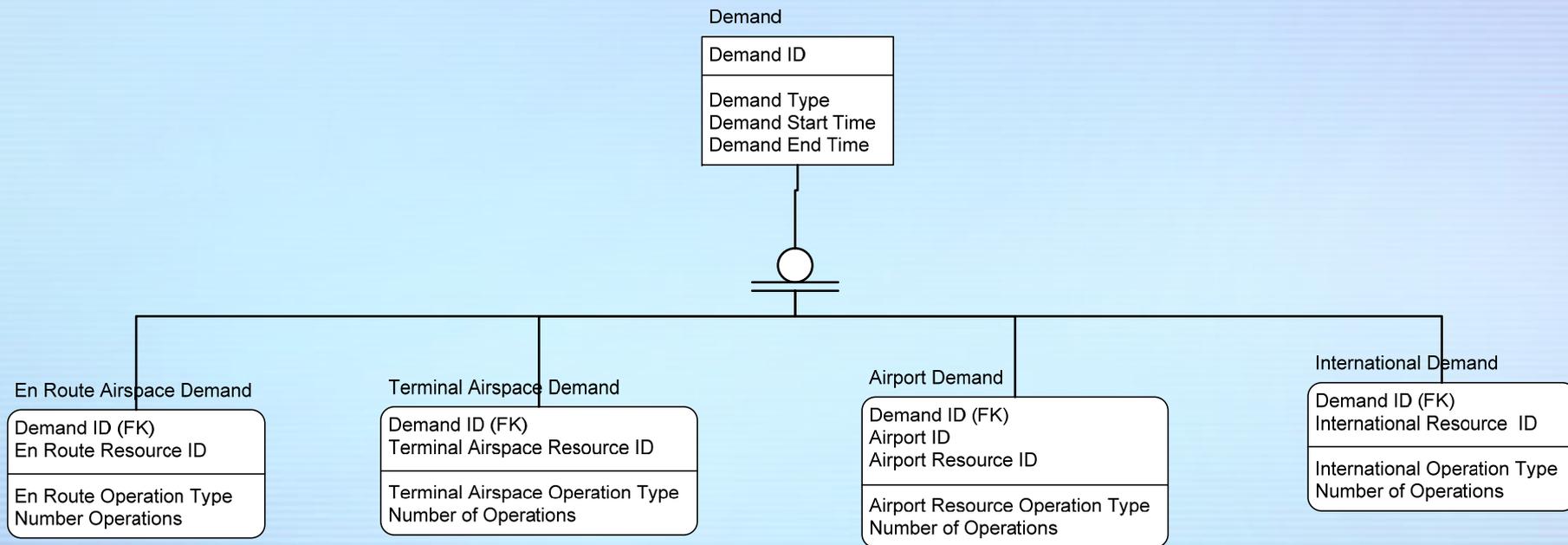
# Sample Detailed Operations Data ER Diagrams: Access Constraints



**Access Constraints ER Diagram with Attributes**



# Sample Detailed Operations Data ER Diagrams: Demand Data



**Demand ER Diagram with Attributes**



# Next Steps

- Develop initial 2018 OV-7 data models
- Revise 2025 and 2018 OV-7 data models to align with ongoing 2018 OV-6c and OV-5 activity models
- Explore implementation in data architect tool

