Building the SAS, Policy and Governance Challenges

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Friends and Partners in Aviation Weather
July 14, 2011

Purpose

- Provide JPDO Weather Working Group policy progress on the Single Authoritative Source

- Convey several known issues with the SAS

- Open the floor for other questions or SAS "elephants in the room"

JPDO Weather Policy Team
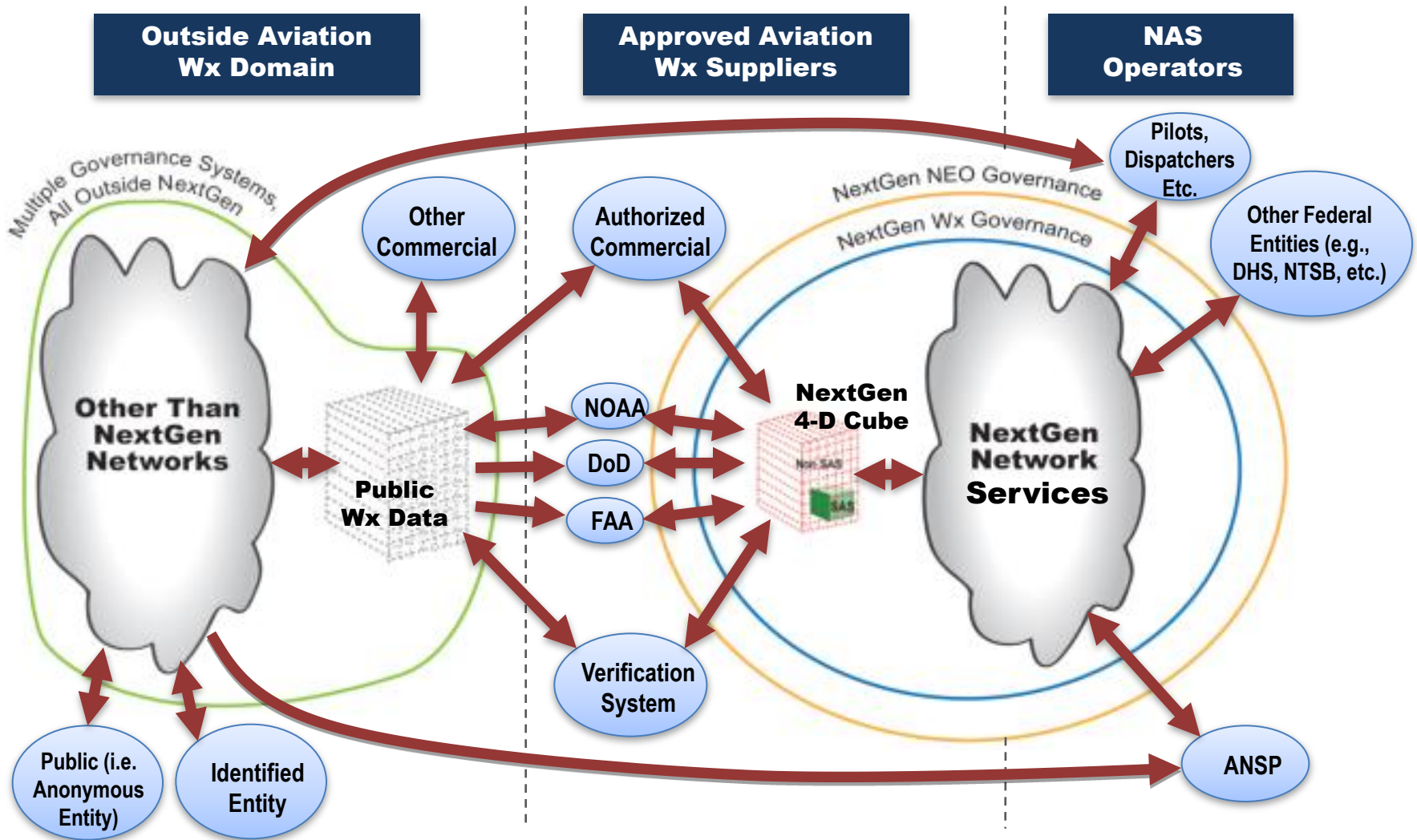
Information Briefing

Presented to: **Friends and Partners in Aviation Weather**

Presented by: Rick Heuwinkel, FAA

Ed Johnson, NOAA

July 14, 2011

Policy Context Diagram* (Updated 2/3/11)

Outside Aviation Wx Domain

Approved Aviation Wx Suppliers

NAS Operators

Multiple Governance Systems, All Outside NextGen

NextGen NEO Governance

NextGen Wx Governance

Other Commercial

Authorized Commercial

Pilots, Dispatchers Etc.

Other Federal Entities (e.g., DHS, NTSB, etc.)

Other Than NextGen Networks

Public Wx Data

NOAA

DoD

FAA

NextGen 4-D Cube

Non SAS

SAS

NextGen Network Services

Verification System

Public (i.e. Anonymous Entity)

Identified Entity

ANSP

* This diagram is for the purpose of developing policy and does not represent the system design or architecture of the NextGen 4-D Wx Data Cube. The NextGen 4-D Wx Data Cube is based on transactions between entities and represents information flows only. From a policy perspective, sub-setting data, changing map projections, changing units, and changing formats are considered functions of the NextGen Network and are necessary for transactions through the NextGen 4-D Wx Data Cube.
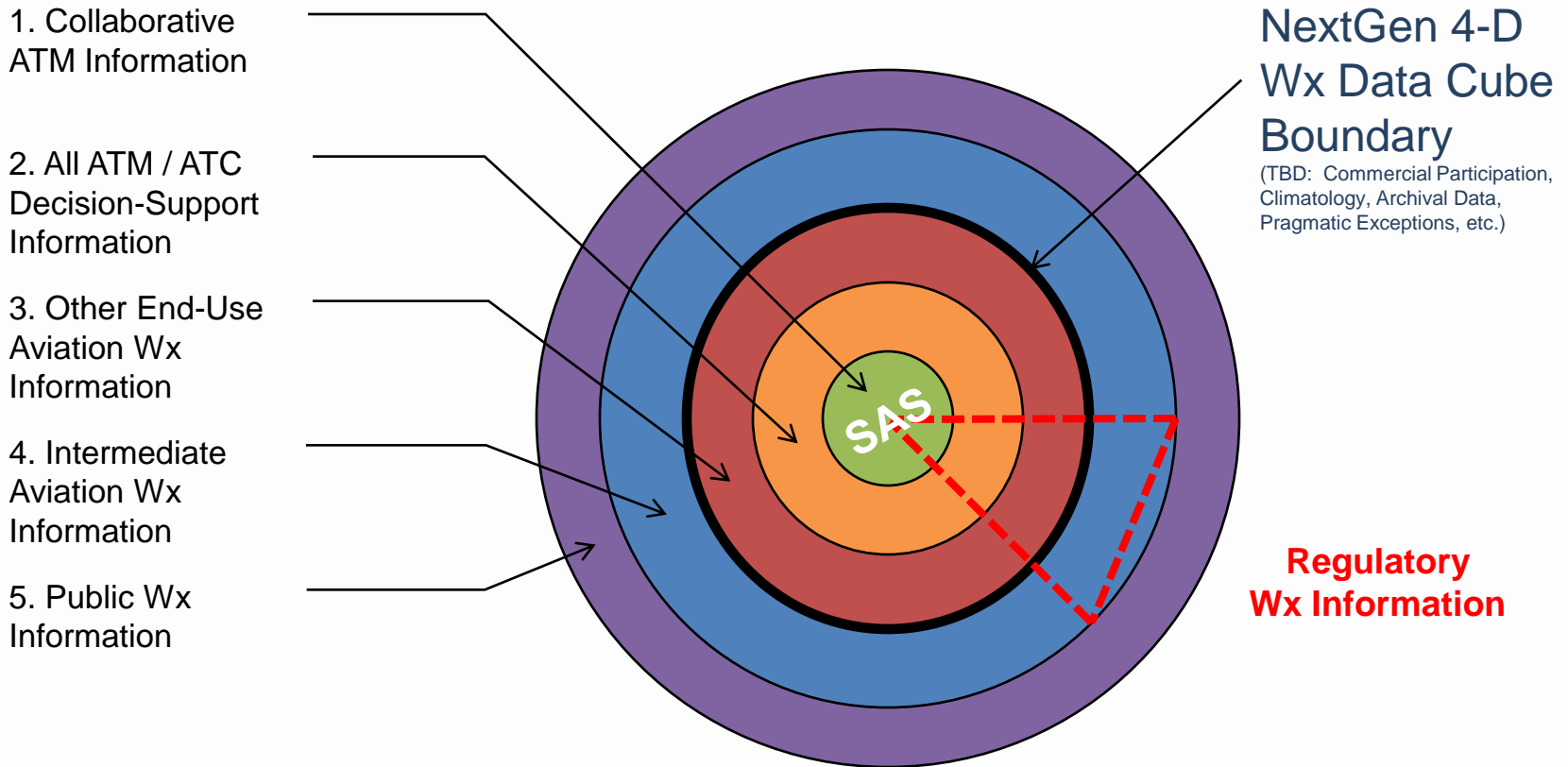
Current Definitions of the Cube and SAS

- NextGen 4-D Wx Data Cube: A net-centric, virtual repository of weather state information for authorized aviation users.

- NextGen 4-D Wx SAS: The primary source of weather information for the ANSP's Collaborative Air Traffic Management (ATM) decisions, supported by the same network services as the NextGen 4-D Wx Data Cube.
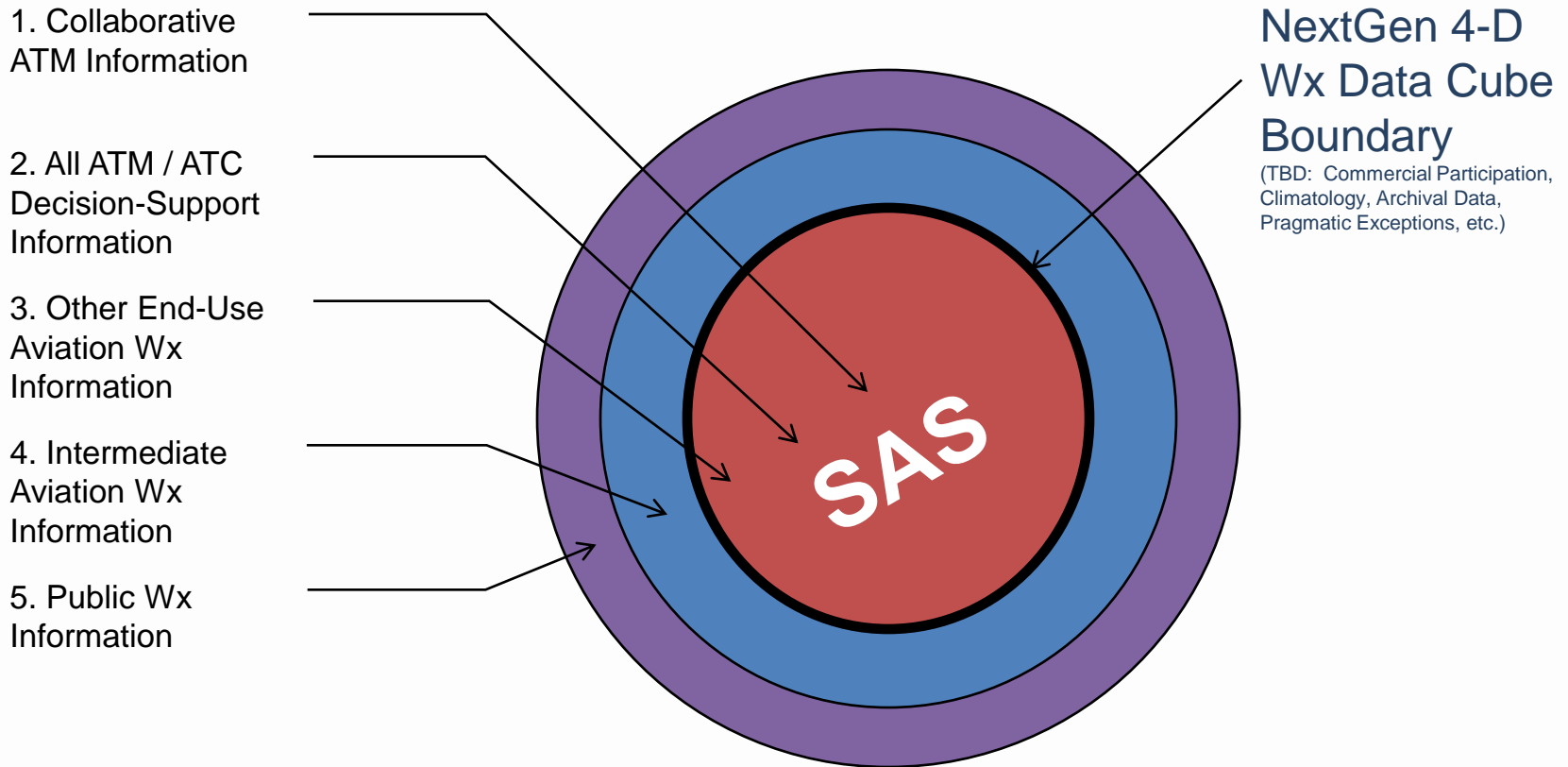
* Formal definitions of the NextGen 4-D Wx Data Cube and 4-D Wx Data SAS can be provided by the JPDO Weather Working Group Policy Team.
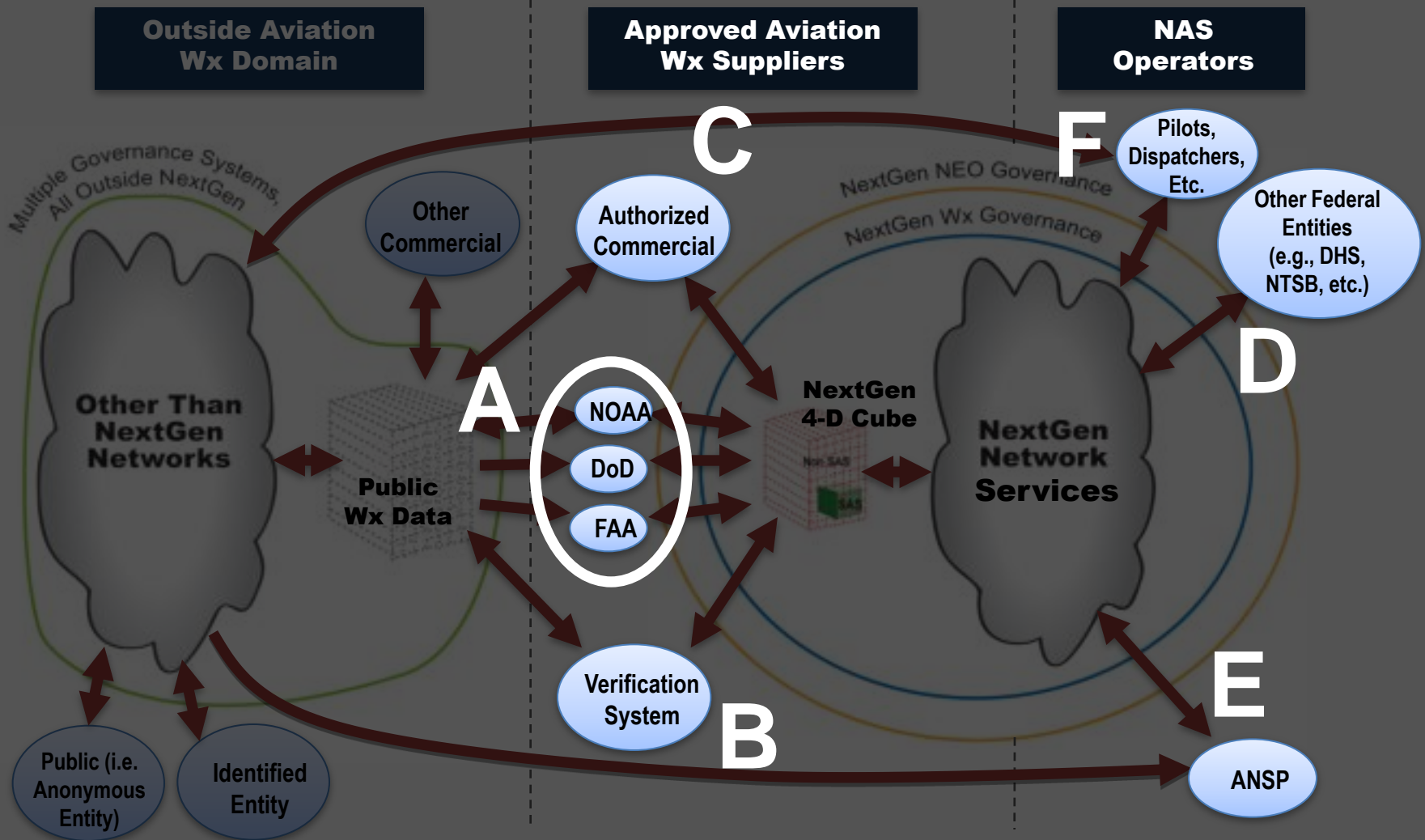
Near-Term NextGen 4-D Wx SAS Concept

1. Collaborative ATM Information

2. All ATM / ATC Decision-Support Information

3. Other End-Use Aviation Wx Information

4. Intermediate Aviation Wx Information

5. Public Wx Information

NextGen 4-D Wx Data Cube Boundary
(TBD: Commercial Participation, Climatology, Archival Data, Pragmatic Exceptions, etc.)

SAS

Regulatory Wx Information

Far-Term NextGen 4-D Wx SAS Concept

1. Collaborative ATM Information

2. All ATM / ATC Decision-Support Information

3. Other End-Use Aviation Wx Information

4. Intermediate Aviation Wx Information

5. Public Wx Information

SAS

NextGen 4-D Wx Data Cube Boundary

(TBD: Commercial Participation, Climatology, Archival Data, Pragmatic Exceptions, etc.)

Publishers & Subscribers of the NextGen 4-D Wx Data Cube

Outside Aviation Wx Domain

Approved Aviation Wx Suppliers

NAS Operators

Multiple Governance Systems, All Outside NextGen

NextGen NEO Governance

NextGen Wx Governance

Other Than NextGen Networks

Public Wx Data

Other Commercial

C Authorized Commercial

A NOAA | DoD | FAA

NextGen 4-D Cube
Non-SAS | SAS

NextGen Network Services

F Pilots, Dispatchers, Etc.

D Other Federal Entities (e.g., DHS, NTSB, etc.)

Verification System **B**

Public (i.e. Anonymous Entity) | Identified Entity

E ANSP

*This diagram is for the purpose of developing policy and does not represent the system design or architecture of the NextGen 4-D Wx Data Cube. The NextGen 4-D Wx Data Cube is based on transactions between entities and represents information flows only. From a policy perspective, sub-setting data, changing map projections, changing units, and changing formats are considered functions of the NextGen Network and are necessary for transactions through the NextGen 4-D Wx Data Cube.

Criteria for Publishing & Subscribing

• The JPDO Policy Team has identified 4 categories of publishers. Governance of these will be handled by the appropriate governance bodies at initial standup in 2013.

• Additionally, 6 categories of subscribers have been identified. Governance of these will be handled by the appropriate governance bodies at initial standup in 2013.
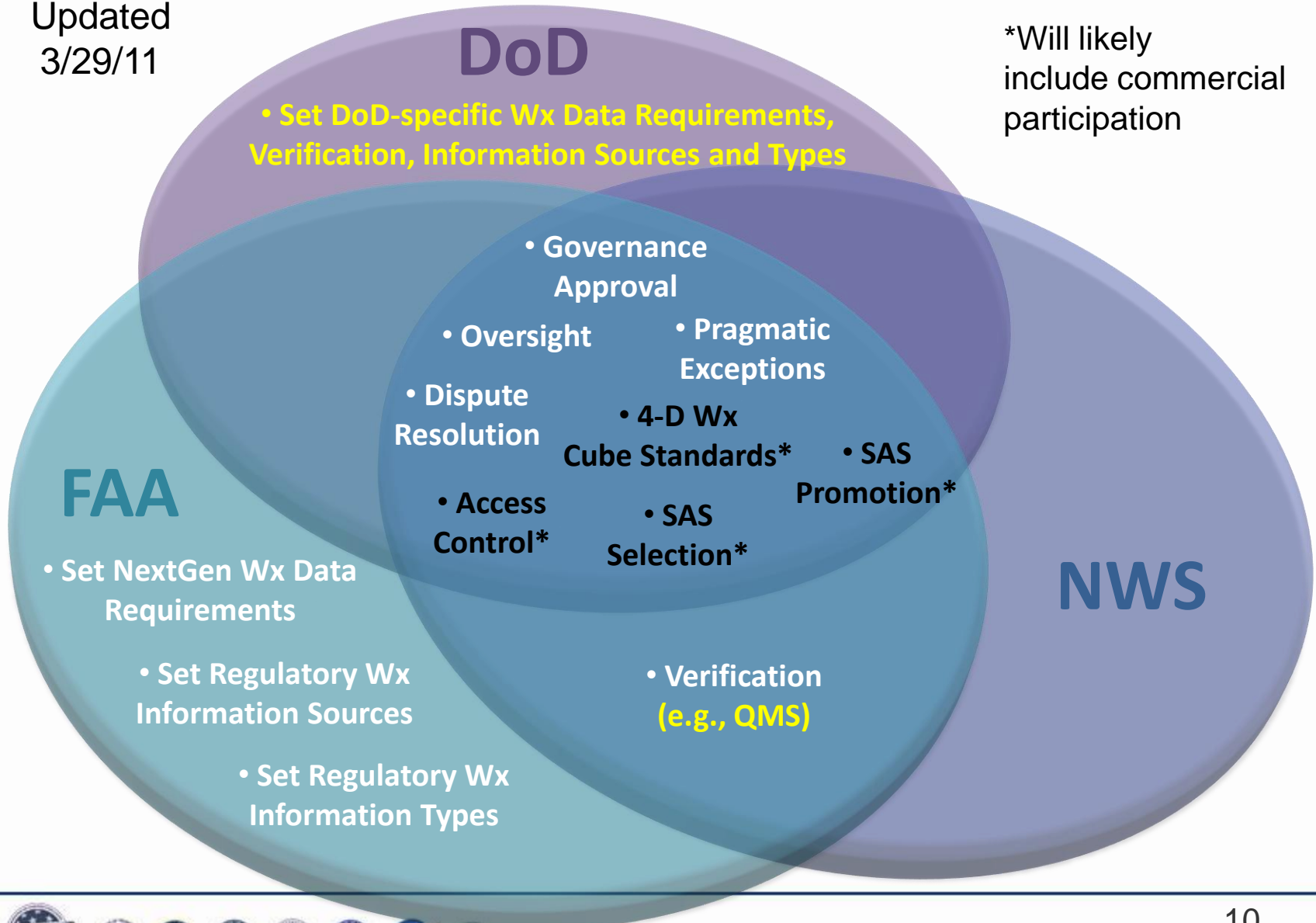
*Additional publisher-specific criteria are detailed in the background slides of this presentation and have been developed with IOC and NCOD guidance.
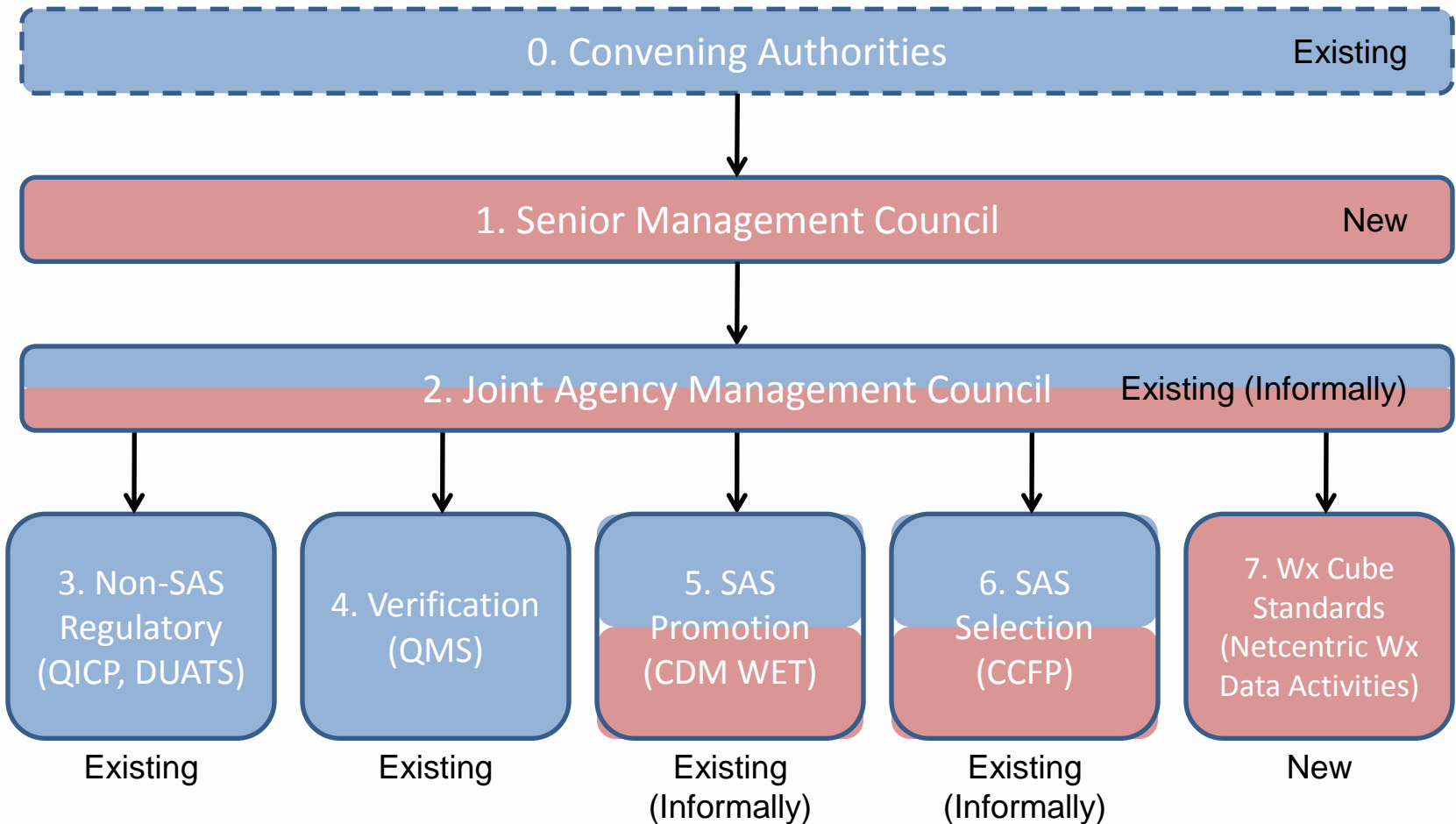
Next Generation Air Transportation System
Joint Planning and Development Office

Updated
3/29/11

*Will likely
include commercial
participation

DoD

• **Set DoD-specific Wx Data Requirements, Verification, Information Sources and Types**

FAA

NWS

• **Governance Approval**

• **Oversight**

• **Pragmatic Exceptions**

• **Dispute Resolution**

• **4-D Wx Cube Standards***

• **SAS Promotion***

• **Access Control***

• **SAS Selection***

• **Set NextGen Wx Data Requirements**

• **Set Regulatory Wx Information Sources**

• **Verification (e.g., QMS)**

• **Set Regulatory Wx Information Types**

Proposed Governance Structure

0. Convening Authorities	Existing

↓

1. Senior Management Council	New

↓

2. Joint Agency Management Council	Existing (Informally)

3. Non-SAS Regulatory (QICP, DUATS)	4. Verification (QMS)	5. SAS Promotion (CDM WET)	6. SAS Selection (CCFP)	7. Wx Cube Standards (Netcentric Wx Data Activities)
Existing	Existing	Existing (Informally)	Existing (Informally)	New

Questions

"Known" Issues with SAS

- Handling ensemble / probabilistic information

- Handling commercial weather providers

- Handling impact information vs weather (same impact information needed?)

- Controller restrictions in using SAS

"Unknown" Issues with SAS

- Open Discussion
  - (Dangerous, I know! But, it needs to happen.)

Backup Slides

NextGen Weather Integration Concept

Met Community

State of the Atmosphere

Observations
Reports
Sensors

Collect data

Analyze data

Forecast data

NextGen 4-D Wx Cube / SAS

Direct External Users

Research Community & Components

ATM Community

State of the NAS

Thresholds/Behavior

ATM Aviation Standards

ATM Efficiency Demand/Capacity

Weather Translation*
Translation to Aviation Constraints

ATM Impact Conversion**
Conversion to Operational NAS Impact

ATM Decision Support***
Impact Mitigation Options

Direct FAA Users

* Translation of weather data & other components into characterization of potential NAS constraints

** Conversion of potential NAS constraint into specific NAS impact(s).

*** DSTs use specific NAS impact to develop strategic/ tactical TFM strategies.

Primary: *NWS*

Secondary: *FAA, DOD, Private*

FAA-MET

NWS, DOD-MET

FAA-ATM

DOD-ATM, Private

Cube Content

Approved by the NEWP 12/7/10

governance

Petitioner

**NextGen
4-D Wx
Data Cube**

1. **4-D Wx Single Authoritative Source (SAS)**

    a.   Candidate

    governance (e.g. RT, OSIP)

    b.   Alternative

    **governance
    (e.g. CDM, CCFP)**

    c.   Single Authoritative Source (from multiple sources)

2. **Public Domain, to meet regulatory requirements**

    a.   Candidate

    governance (e.g. RT)

    b.   Approved

3. **Proprietary, Commercial Information**

    **Requirements &
    policy need further
    development**

    a.   To meet regulatory requirements

    •   Candidate

    governance (e.g. EWINS)

    •   Approved

    b.   Other (e.g. alternate wind model)

4. **Other**

    a.   Aviation Climatology

    b.   Archives

    c.   Data for non-aviation purposes included for pragmatic reasons

5. **Wx Production Systems Information** ("Intermediate" weather data required to produce end-use information)

    a.   FAA weather production systems

    b.   Commercial weather production systems

6. **Outside NextGen 4-D Wx Data Cube**

    a.   All other weather information (e.g., supporting weather analysis, verification, and forecasting but not needed for aviation use)
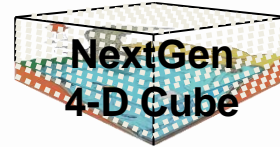
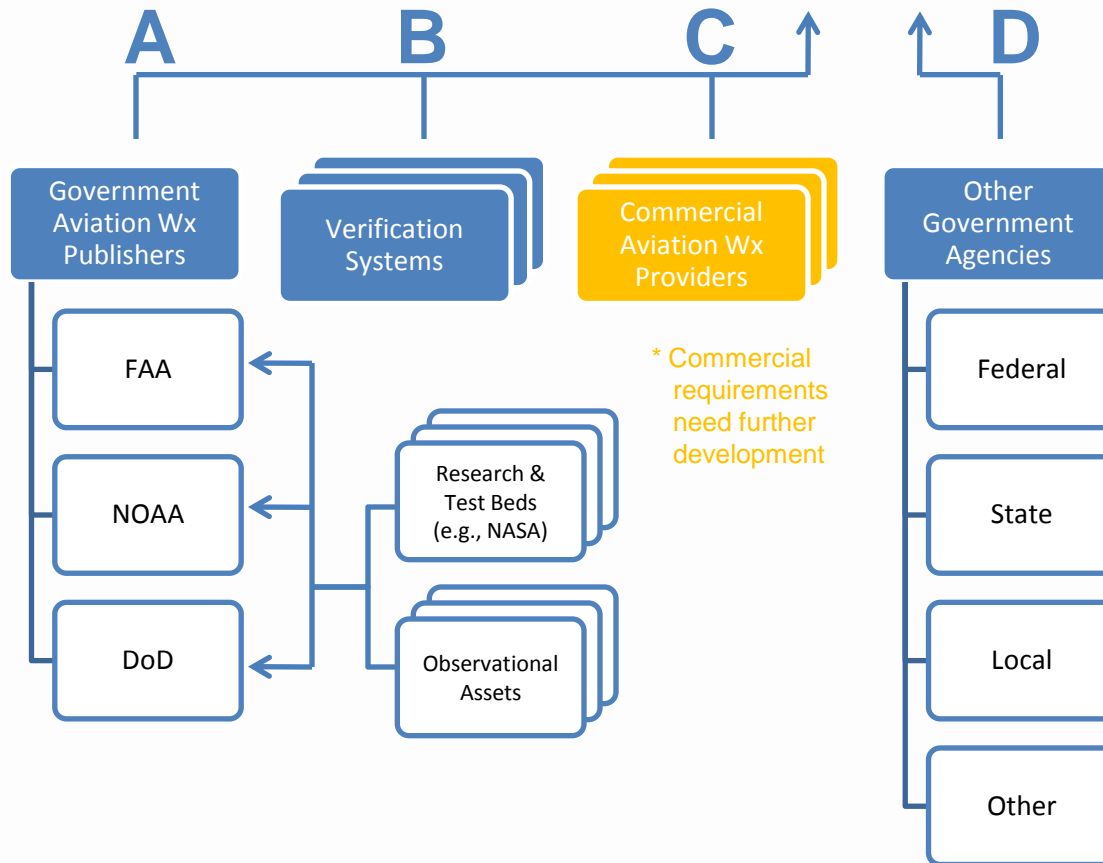# NEWP-Approved (6/30) Definition of NextGen 4-D Wx SAS

- The 4-D Wx SAS is an optimal representation of all Air Navigation Service Provider (ANSP) weather state information used directly or translated into operational impact by the ANSP, and is consistent in time, space, and among weather elements. The 4-D Wx SAS is specified by the ANSP and is accessible to all users of the NAS. The 4-D Wx SAS is the source of weather information for ANSP's Air Traffic Management (ATM) decisions and is supported by the same network services as the 4-D Wx Data Cube.

- The ANSP will specify characteristics of weather state information needed to support its ATM decision-making and the corresponding decision support tools. As NextGen capabilities mature, the ANSP requirements will evolve. National Weather Service (NWS) will, in coordination with AF/Navy weather services, determine what weather state information best meets the 4-D Wx SAS requirements specified by the ANSP; information from any source, including commercial sources, can be used to meet SAS requirements as long as it can be freely distributed to all.

- With rare exceptions, the 4-D Wx SAS will be the only source of weather information for the ANSP's ATM decisions; however, it will not necessarily be the only source for other decision makers, such as pilots, dispatchers, and military operators. Making the 4-D Wx SAS both a support tool for the ANSP's ATM decisions and a NextGen resource provides both transparency and predictability in these decisions and shared situational awareness (SSA) for all NextGen participants.

Categories of Publishers to the NextGen 4-D Wx Data Cube

Approved Aviation Wx Suppliers

NextGen 4-D Cube
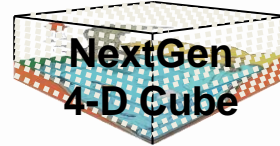
NAS Operators

A **B** **C** **D**

Government Aviation Wx Publishers

Verification Systems

Commercial Aviation Wx Providers

Other Government Agencies

FAA

NOAA

DoD

Research & Test Beds (e.g., NASA)

Observational Assets

* Commercial requirements need further development

Federal

State

Local

Other

Criteria for Publishing

• All publishers of weather state data to the NextGen 4-D Wx Data Cube must belong to one of four approved categories, subject to applicable NextGen governance and standards.

• All published weather state data must be intended for use by NAS Operators, unless approved as a pragmatic exception.

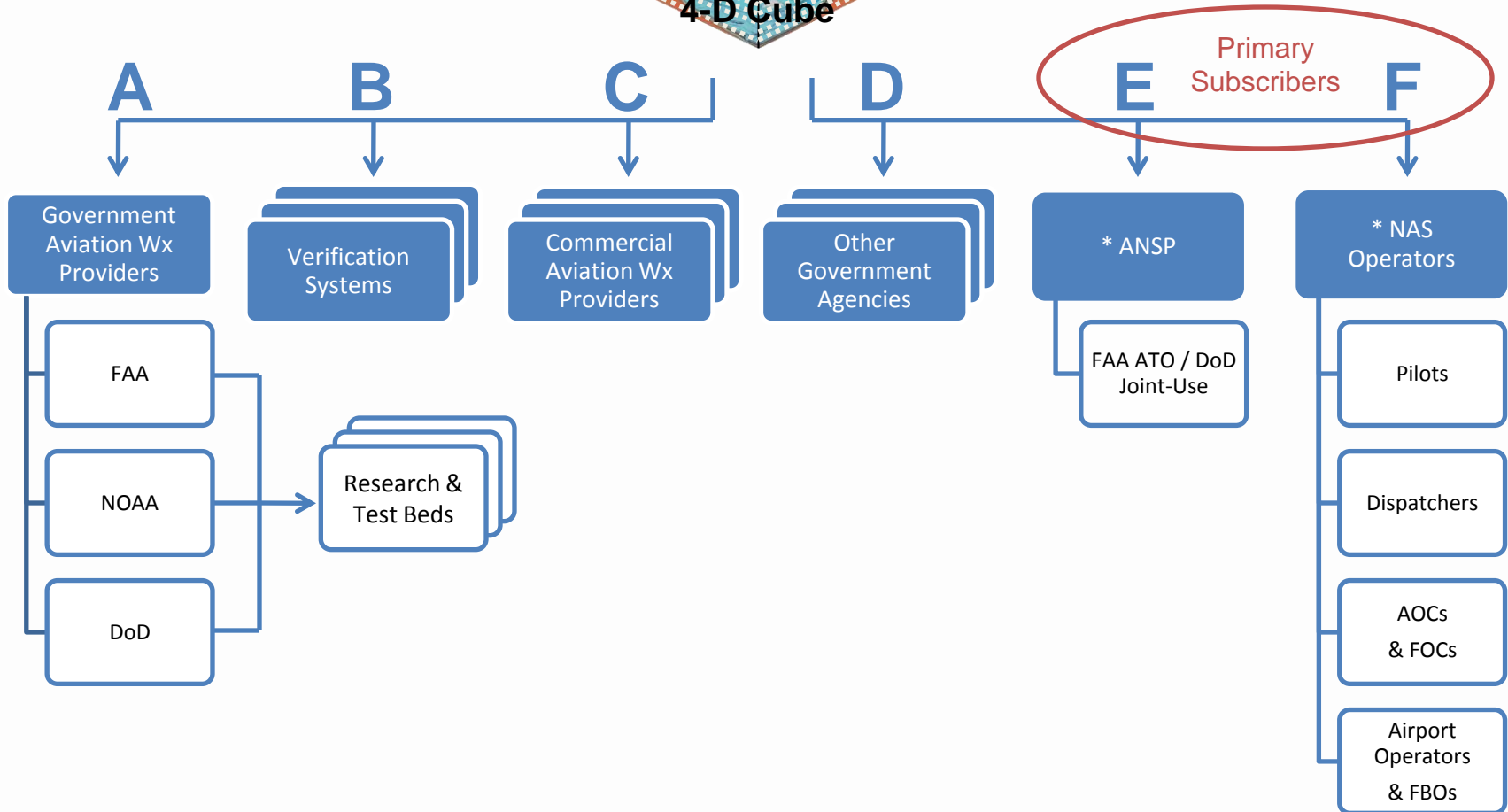• All publishers must be uniquely-identifiable and authenticated in a manner defined by NextGen Governance.

*Additional publisher-specific criteria are detailed in the background slides of this presentation and have been developed with IOC and NCOD guidance.

Categories of Subscribers of the NextGen 4-D Wx Data Cube

Approved Aviation Wx Suppliers

NextGen 4-D Cube

NAS Operators

A B C D E F

Primary Subscribers

Government Aviation Wx Providers

FAA

NOAA

DoD

Research & Test Beds

Verification Systems

Commercial Aviation Wx Providers

Other Government Agencies

* ANSP

FAA ATO / DoD Joint-Use

* NAS Operators

Pilots

Dispatchers

AOCs & FOCs

Airport Operators & FBOs

Criteria for Subscribing

• All Subscribers must belong to one of six approved categories, subject to applicable NextGen governance and standards.

• All Subscribers must be uniquely-identifiable and authenticated in a manner defined by NextGen Governance.

• All identified Subscribers have rights to SAS (by definition).

Eleven SAS Myths

1. Myth: The SAS is all aviation weather information

   Fact: SAS is a subset of all aviation weather information "contained" in the 4-D Wx Data Cube

2. Myth: The SAS is a single big server

   Fact: SAS is hosted on many servers around the US that is specified by metadata tag as SAS data

3. Myth: To the SAS user it is as if there is a single source

   Fact: **Not a myth!** The decision on the best source is left to the whether service provider consistent with the users requirements; the SAS user will automatically be directed to that single best source

Eleven SAS Myths (cont'd)

4.   Myth: The SAS is all the aviation weather information necessary to meet regulatory requirements

   Fact: Regulatory requirements are distinct from the SAS – some, but not all, SAS content may be regulatory and vice versa

5.   Myth: The SAS will have the highest performance requirements for weather information

   Fact: Different data elements specified as SAS will have different performance requirements based on the criticality of the information for operational decisions. Some information may be accessed independent of the SAS due to stringent performance requirements (e.g., micro burst reports), and some high performance data may not be included in the SAS at IOC

Eleven SAS Myths (cont'd)

6.   Myth: FAA air traffic controllers and managers will use the SAS as their only weather information source to support decision making

   Fact: The FAA expects to use SAS, and all others must have access to SAS (consistent with contractual agreements). At IOC, there may be weather information needed for FAA's ATM decisions that is outside the SAS, but by FOC these exceptions will be rare. The SAS will be the weather basis upon which the ANSP-provided translation from weather to ATM impacts will rest.

7.   Myth: The FAA will require operators to use the SAS

   Fact: The civil ANSP will use the SAS for its weather information and translate it into operational decisions. Operators are free to use multiple sources of weather information, including the SAS, based on individual business models and as consistent with regulations.

Eleven SAS Myths (cont'd)

8. Myth: Commercial vendors are excluded from providing SAS content

    Fact: The SAS definition does not restrict sources, although it does require open distribution to all, consistent with contractual agreements.

9. Myth: Commercial vendors are excluded from using SAS content

    Fact: Commercial vendors can repackage SAS content as part of value-added end-to-end services.

Eleven SAS Myths (cont'd)

10. Myth: The SAS will signal the end of human-in-the-loop development of weather information.

    Fact: Methods used to create SAS content are independent of the SAS definition. Many expect continuation of human-in-the-loop approach (e.g., today's Collaborative Convective Forecast Product (CCFP)), but this is ultimately a science question.

11. Myth: SAS is a static set of preferred sources

    Fact: SAS is a dynamic set of sources which are determined based on best judgment today with continuing research into how to determine the preferred source for the day. This is a "weather" question, not a translation question.