Global Harmonization Through Collaboration

Emerging Concepts: FAA Common Support Services

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EUROCONTROL

Federal Aviation Administration

AIR TRANSPORTATION INFORMATION EXCHANGE CONFERENCE - (FEATURING AIXM, WXXM AND FIXM)

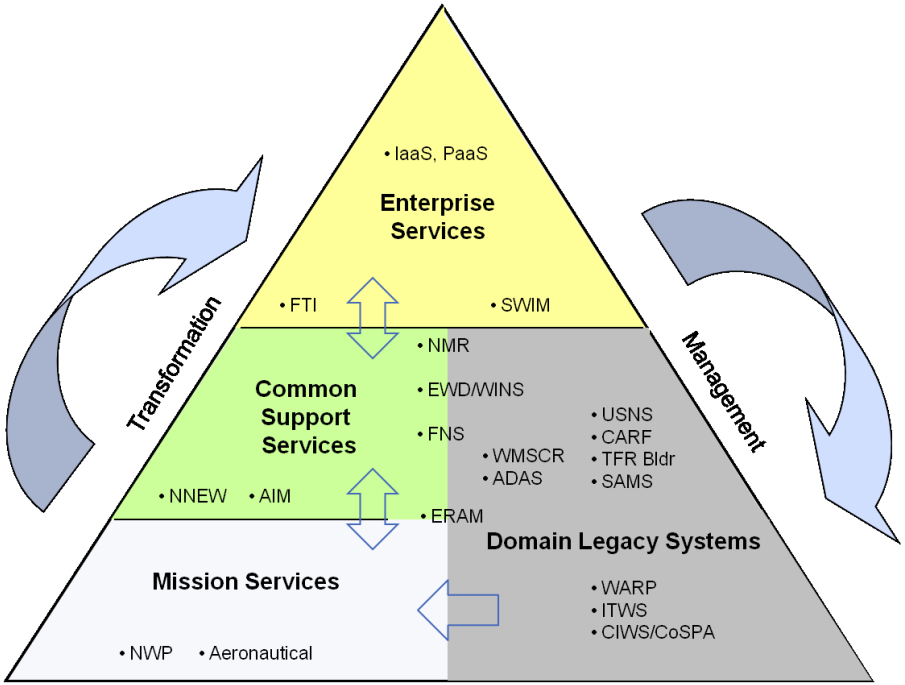
August 28, 2012 - August 31, 2012
NOAA Auditorium and Science Center
Silver Spring, Maryland

FAA
Common Support Services

Led by FAA - AJM 33, 31

Goals:

- Identify commonalities between aviation weather, aeronautical systems and potentially others
- Identify & recommend common infrastructure and services requirements
  - Define common support and mission services
  - Define common high level functions and interfaces
  - Recommend a common infrastructure and services
  - Establish portfolio management and governance guidelines



Outline

- Overview

- Dimensions of Commonality
  - Data Model
  - Message Exchange
  - Metadata
  - Services & Architecture

- Summary

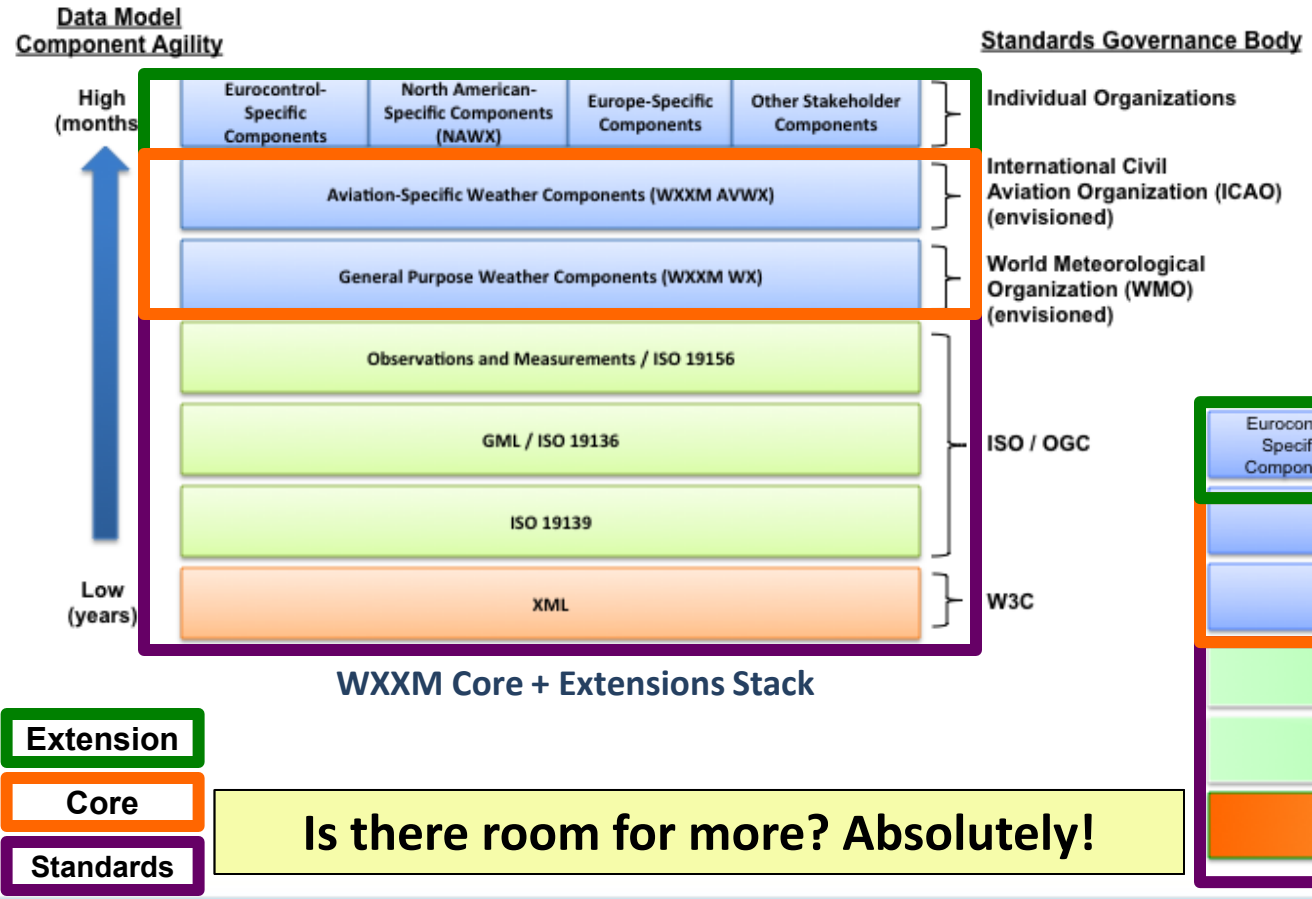
Air Transportation Exchange Models

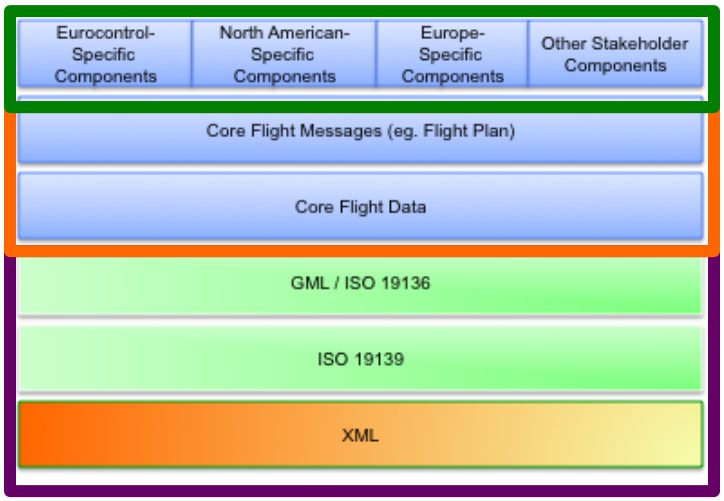
- International data models: AIXM, WXXM, FIXM
  - Initiated with partnerships between FAA and Eurocontrol
  - Includes many other participants
  - At various stages of maturity

- Design goals:
  - Represent respective domains and air transportation products
    - Example: FIXM represents Flight information from filing to enroute to termination
  - Build on existing international (USIGS/ISO/OGC) standards
    - Models build on top of relevant ISO models
      - Examples: ISO 19103,19107, 19108
    - Provide increased interoperability and information exchange across the three models (AIXM, WXXM, FIXM)
  - Modular, extensible, adaptable

So where are the commonalities?

- Design Philosophy: Models follow a “core + extensions” model
- Based on same standards





Is there room for more? Absolutely!

Case for Unification: Common Reference Model & Common Core

- All three models – AIXM, WXXM, and FIXM define the notion of an **AERODROME**. But:

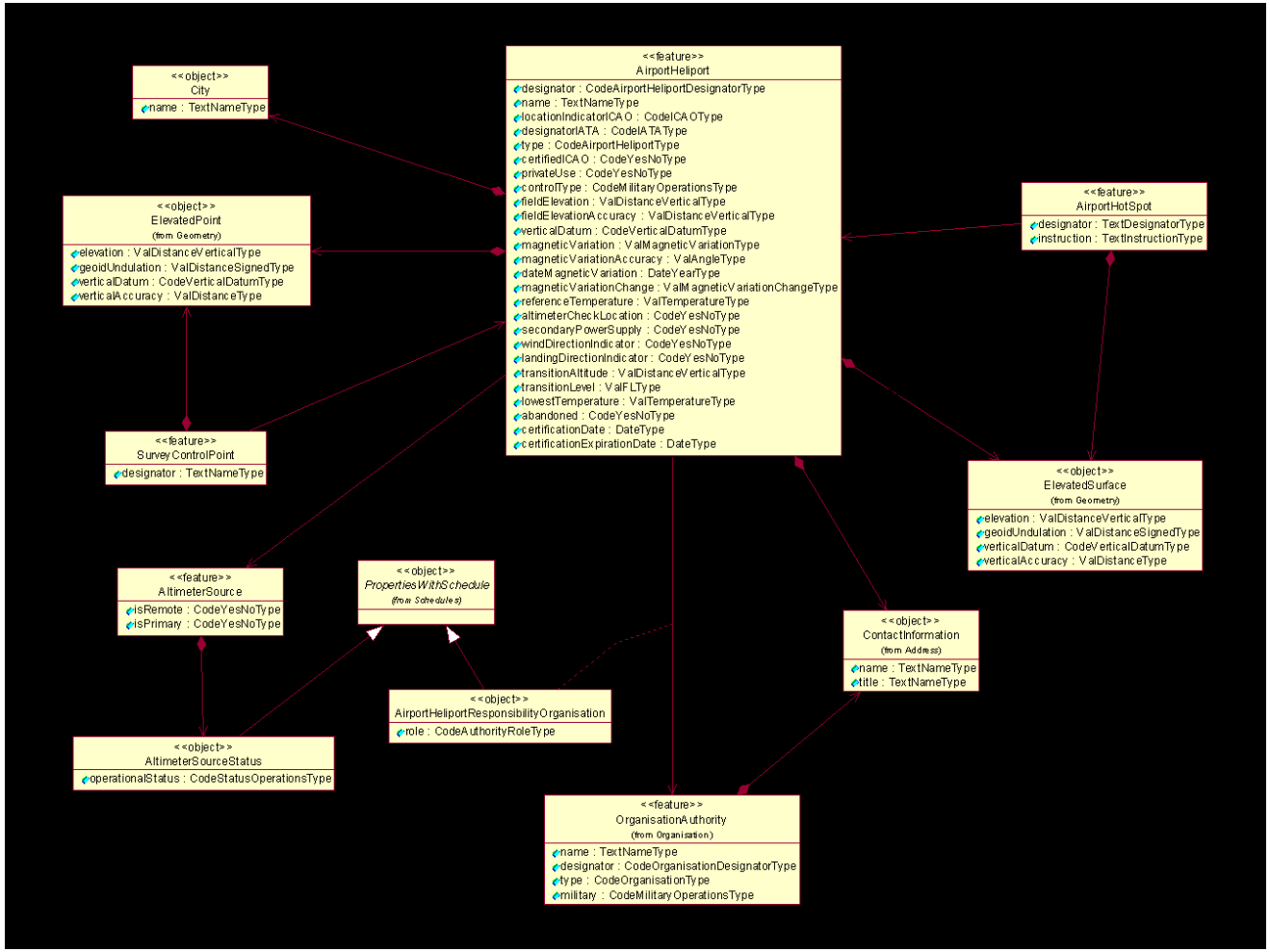
  1. Definitions are not consistent
  2. Structures and Information content are specific to and in context of the needs of each domain
  3. Terminology is not consistent

- (2) is necessary, but (1) and (3) must be unified
- When possible common core should be established for (2)

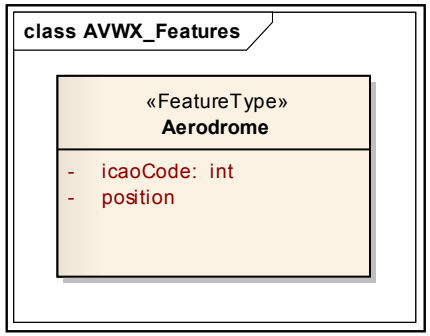
AIXM: Aerodrome/Heliport

A coded designator for an Aerodrome/Heliport.
The rules according to which this identifier should be formed are as follows:
If the AD/HP has an ICAO four letter location indicator, then this one will become the CODE_ID for the Aerodrome/Heliport;

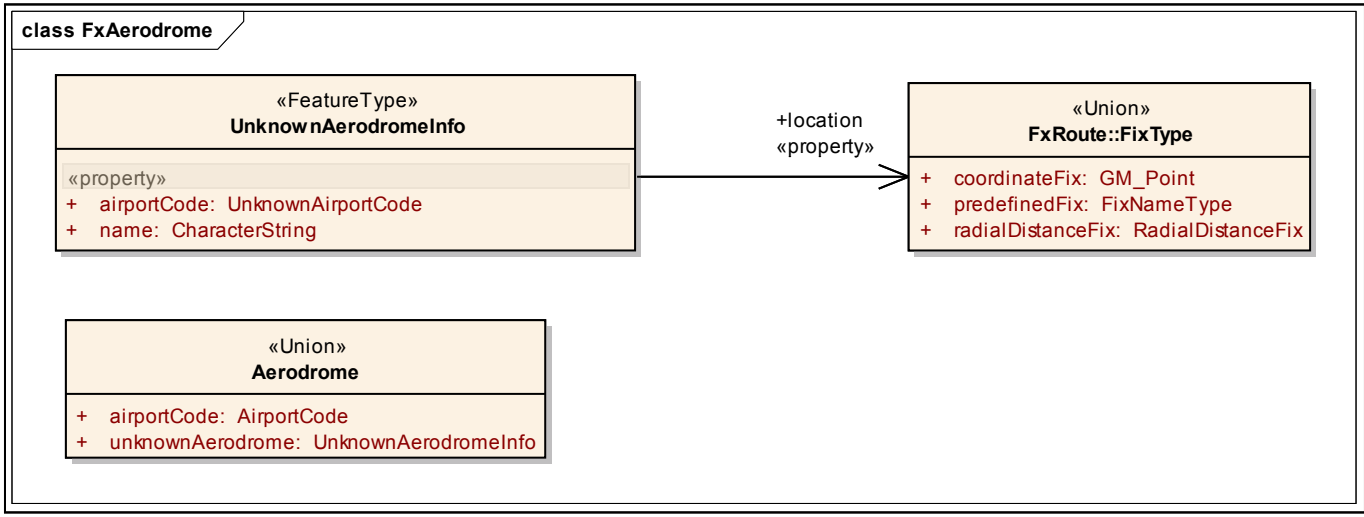
https://extranet.eurocontrol.int/http://prisme-oas.hq.corp.eurocontrol.int/aixmwiki_public/bin/view/AIXM/Diagram_AirportHeliport



WXXM & FIXM: Aerodrome



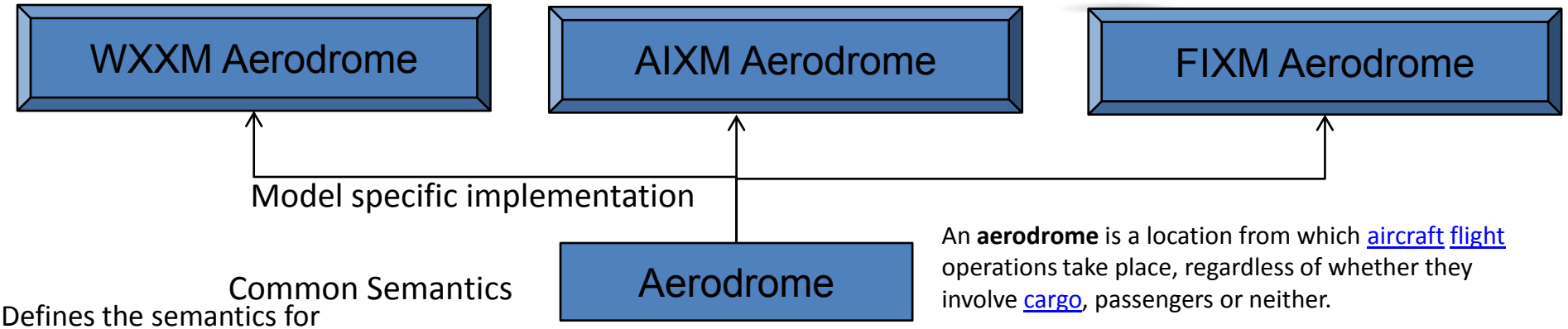
WXXM Aerodrome: Utility class to define weather in the aerodrome region



FIXM Aerodrome: To identify the departure and arrival aerodromes.

WXXM **FIXM**

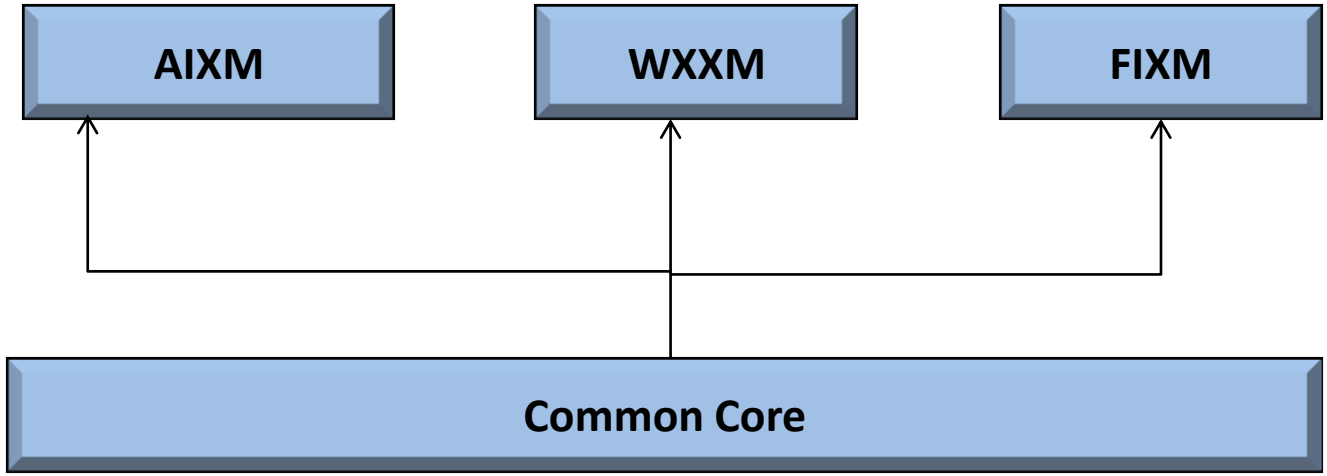
Common Reference Model & Common Core



Common Semantics

Defines the semantics for across the models providing common knowledge base

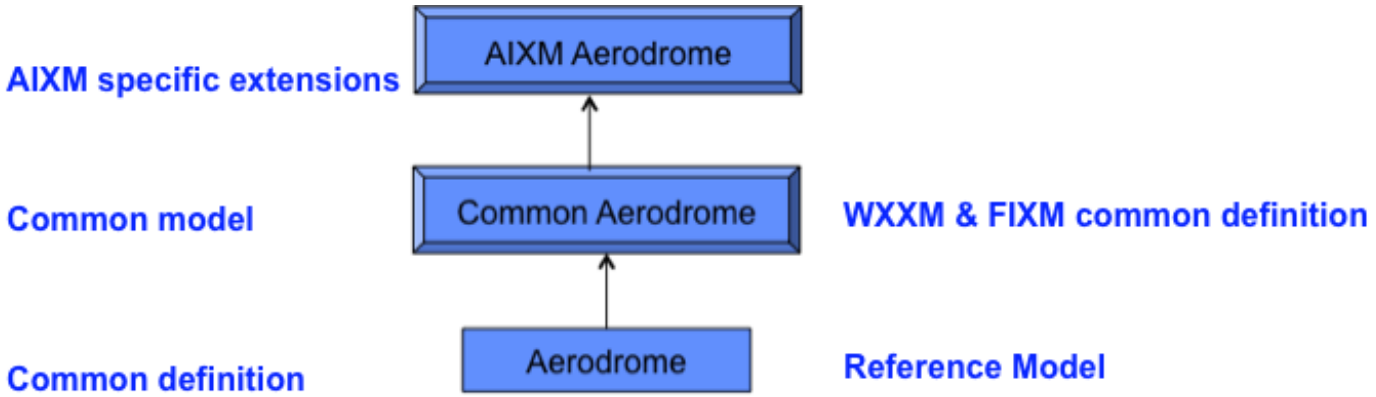
An **aerodrome** is a location from which aircraft flight operations take place, regardless of whether they involve cargo, passengers or neither.



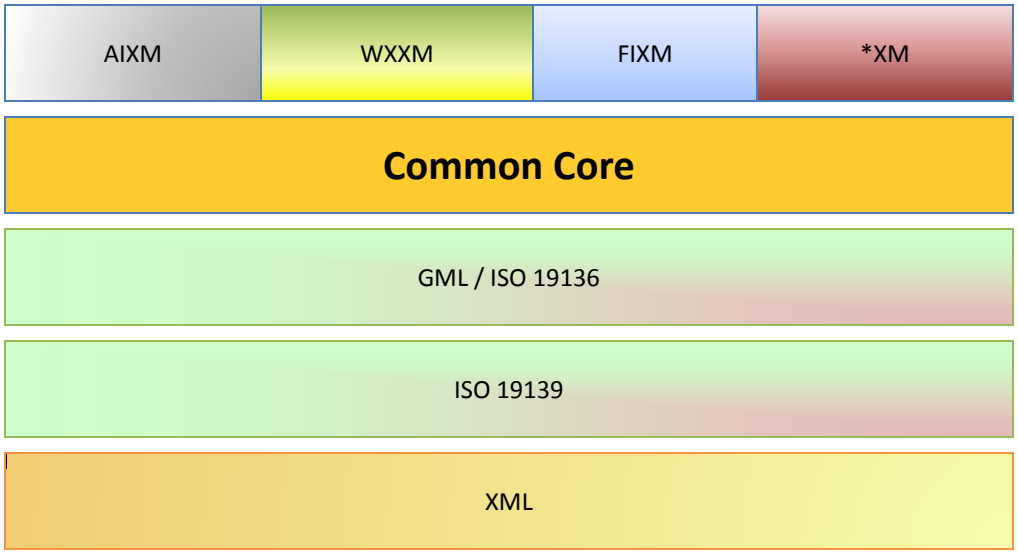
Defines the structure and information content that must be captured in each domain

Case for a Common Core

- Common Reference Model provides semantic unification
- Common Logical Model provides structural unification
- For interoperability – critical to also establish structural compatibility where possible
  - WXXM and FIXM definitions of Aerodrome are close, while AIXM needs to capture more detailed information
    - Use model extension to achieve the common structural compatibility



Common Core: Food for Thought?



Universal data components that are universally shared and understood among all (or almost all) domains. Relatively *small* and *stable* core

Core
Message Framework

Core
Aeronautical Features

Core
Measures

Core
Data Types

Core
Units of Measure

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Core Message Framework: A Proposal

- Represents proposed messaging standard for FIXM
  - Applicable for AIXM and WXXM

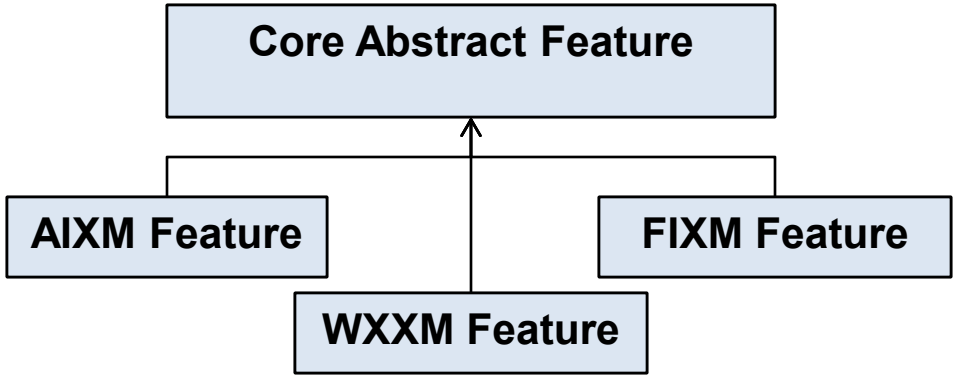
- History
  - General consensus in FIXM community
    - FIXM defines the flight data and not messages exchanged between systems!
    - But…. Messages must be exchanged and for interoperability should be standardized

- Goals for Messaging Framework
  - Independent of any data exchange model
  - Lightweight and Efficient
  - Standards Compliant
  - Independent of Delivery Mechanism
  - Self Describing
  - Adaptable and Extensible
  - Database Friendly (including GIS databases)

Core Abstract Message

Core Abstract Message

- Message Wrapper
- Message Metadata
- **Payload: Core Abstract Feature**

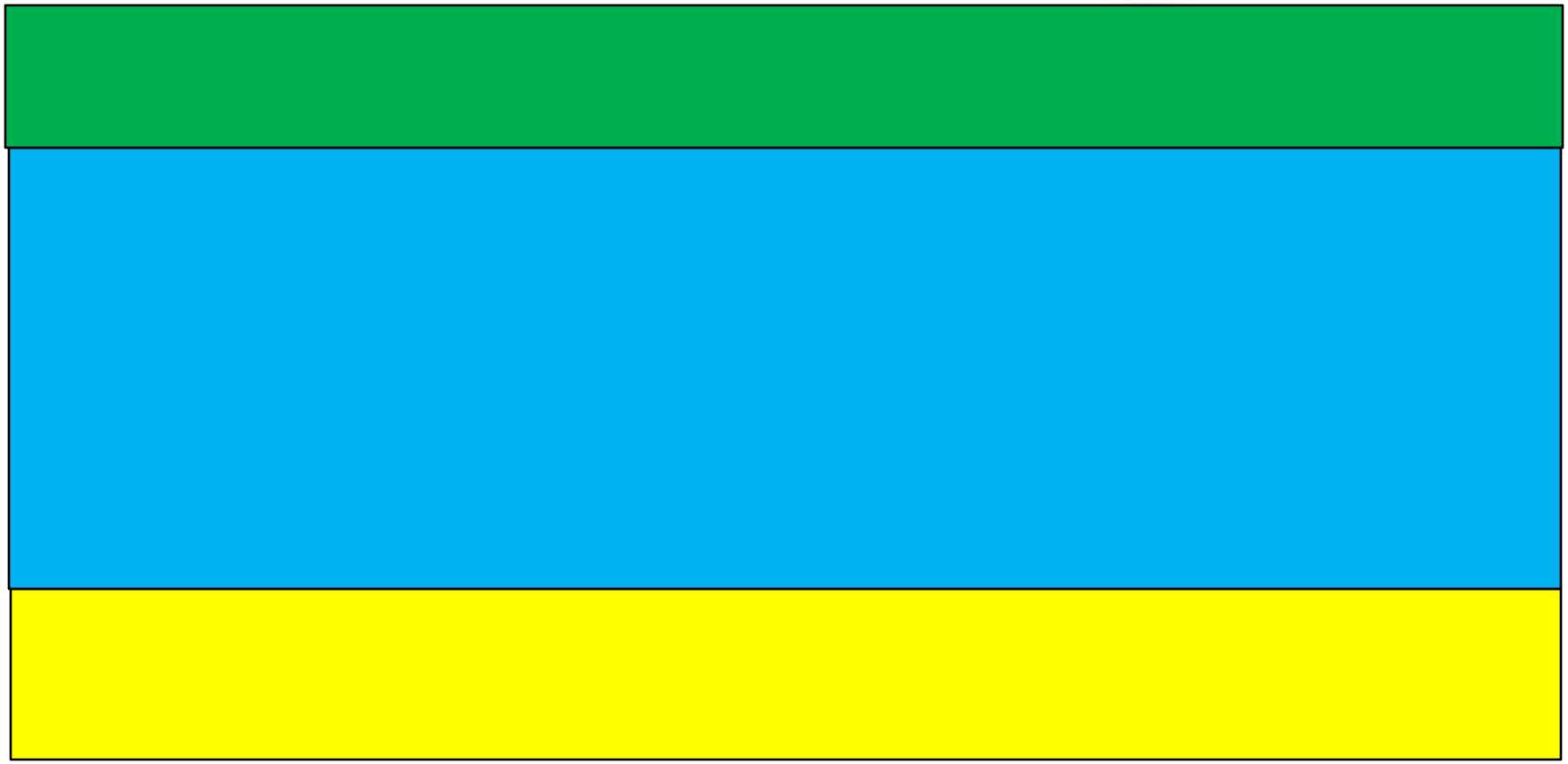


- Message Framework defines a single, most basic, abstract message type
  - All messages share common wrapper and metadata structure
  - Payload is specific to the individual models (AIXM, WXXM, FIXM)

Proposed Metadata

- **Global Unique Message Identifier (GUMI)**
  - Generated locally
  - Uniquely identifies the message
  - Primary key for message databases
- **Time Stamp**
  - Time (local + GMT offset) at which message was created
- **Valid time span**
  - Time during which the message's payload is valid
  - Reserved values for "beginning of time" and "end of time"
- **Source System**
  - Unique URI of system that generated the message
  - Includes location, system, subsystem, version number
- **Source Location**
  - Lat/long of system that generated the message
  - Used in queries in geographic database systems

An Example



Concerns: Message Bloat! Metadata adds overhead, but it may be needed

Other Key Features

- **Message Collections**
  - Useful when per-message fixed transmission & parsing cost is high & messages can be batched!
  - Collection of messages that share metadata
    - Multiple messages, one set of metadata

- **Delta Messages:**
  - Most flight messages are minor updates from previous version
    - Expected arrival at fix
    - EDCT change
  - Delta messages contain GUMI of preceding message and a list of "deltas" for every element that changed
  - Delta contains:
    - Xpath of the element that changed
    - New value of element as string
    - Data type of element
  - Open question: can deltas be extended to finer granularity?

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Summary

- Common Support Services critical for establishing commonalities at all levels between emerging programs
  - Cost and effort savings
  - Increased interoperability
  - Ongoing efforts at the infrastructure and services level
- Common Reference Model and Common Core
  - Eurocontrol charting the effort with AIRM (reference model)
  - Now is the time to begin establishing the Common Core
    - Needs to be community effort
    - Goes beyond a single program/domain effort
    - At FAA CSS investigating the effort
- Messaging Framework
  - Proposal compatible with AIXM message structure and to some degree WXXM messages/reports
  - Uses identical ISO primitive data types
  - Abstract Message ↔ (no equivalent)
  - Individual Message ↔ AIXM Snapshot Message
  - Delta Message ↔ AIXM Update Message
  - Message Collection ↔ (no equivalent)

Questions ?

Contact Information

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