

The Future ATM System

MET and OGC

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The Future ATM System

MET and OGC

- The Air Traffic Management (ATM) System in Europe
- The Challenges
- Single European Sky (SES)
- MET and ATM
- OGC and MET
- Some examples (OWS-6, OWS-7)

EU Single Aviation Market – some key figures

- A €140bn business in 2006
- Carrying over 730 million passengers in 2006 (of which 480 million within EU)
- ~11 million tons of cargo in 2005
- ~35% of world air passenger traffic (2006)
- +150 airlines (scheduled passenger carriers)
- +400 airports (scheduled services)
- ~5,300 aircrafts in service (2006)
- 2.8 million indirect jobs (3% of EU workforce), Europe's 30 largest airlines alone employ 360,000 staff

EU Single Aviation Market - based on high common EU standards

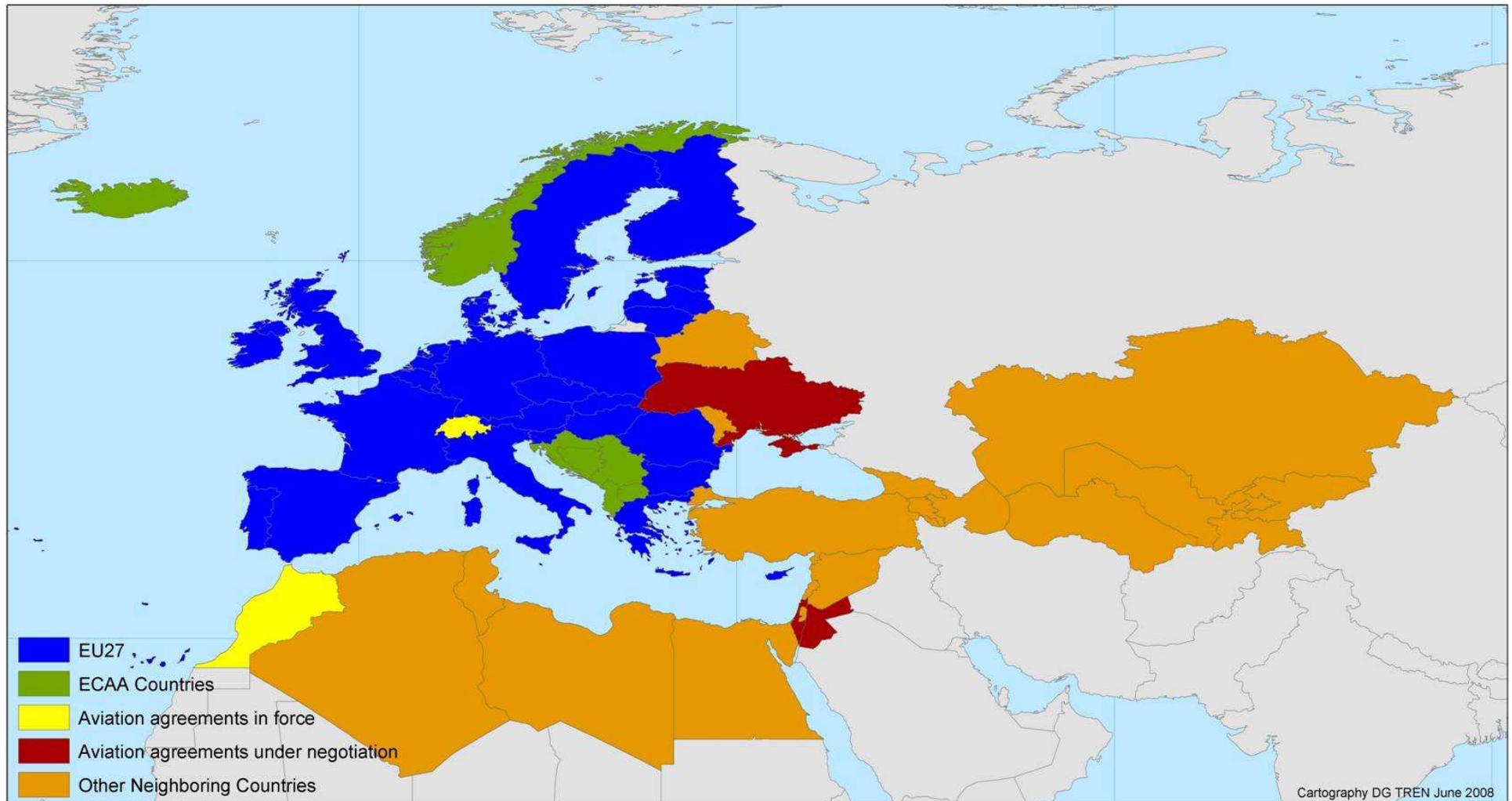
- European Union has worked towards:
 - establishing a single aviation market,
 - adopting common rules in most relevant areas of the air transport system,
 - enhancing competition and efficiency throughout the whole value chain of aviation,

... but there is still no Single European Sky (SES) with a single regulatory framework and subsequent performance standards

Single European Sky



Towards a Common Aviation Area



Single European Sky

What are challenges in the future?

- **Environment**
 - Aviation's share of EU greenhouse gas emissions (currently 3%) is predicted to increase.
 - Network improvements could save up to 4.8 mio tons of CO₂ per year
- **Fragmentation**
 - Significant additional costs for airspace users (€2 bn per year could be saved by reducing fragmentation)
- **Economics**
 - Current European route network is an amalgamation of national routes that makes intra-European flights 15% less efficient than domestic flights, resulting in additional costs of €1.4 bn per year
- **Safety**
 - Cannot be compromised and must be enhanced with increased traffic levels
- **Capacity**
 - Further increase of traffic (250% increase within the next 25 years) with enlargement and Open Skies

Single European Sky Fragmentation example

The 100 main airports are:

- connected by approx. 600 airspace segments
- controlled by 66 Air Traffic Control Centre's with many systems
- operated by 38 Air Traffic Service Providers with different cultures

Sectors and routes are designed according to national borders rather than traffic flows

Air Traffic Control Centre's below optimal economic size, duplication of systems & piecemeal procurement, high contingency costs, support costs on research, training & admin too high

Single European Sky 2nd package

The themes

- PERFORMANCE
- SAFETY
- CAPACITY
- TECHNOLOGY

- SESAR the **technological / industrial component** of the Single European Sky
- **Improvements** to be delivered by SESAR from **2013** onwards
- **SESAR program** in 3 phases
 - Definition phase – 60 M€
 - Development phase – 2,1 BN€
 - Deployment phase – 25 BN€

Technology SESAR phases

Definition phase

Resulted in the
European Master Plan

2006-2008

Development phase

Managed by the
SESAR Joint Undertaking

Based on the Master Plan,
results in **Standards,**
new operational procedures,
new technologies and
pre-industrial
components,

2008-2014

Deployment phase

Implements the results of the
development phase, delivers
service performance

in the **phase** foreseen
in the ATM
Master Plan
From 2015

2025



SESAR Joint Undertaking

A public private partnership

founding members



Aena



FREQUENTIS

Honeywell



NATS

NORACON

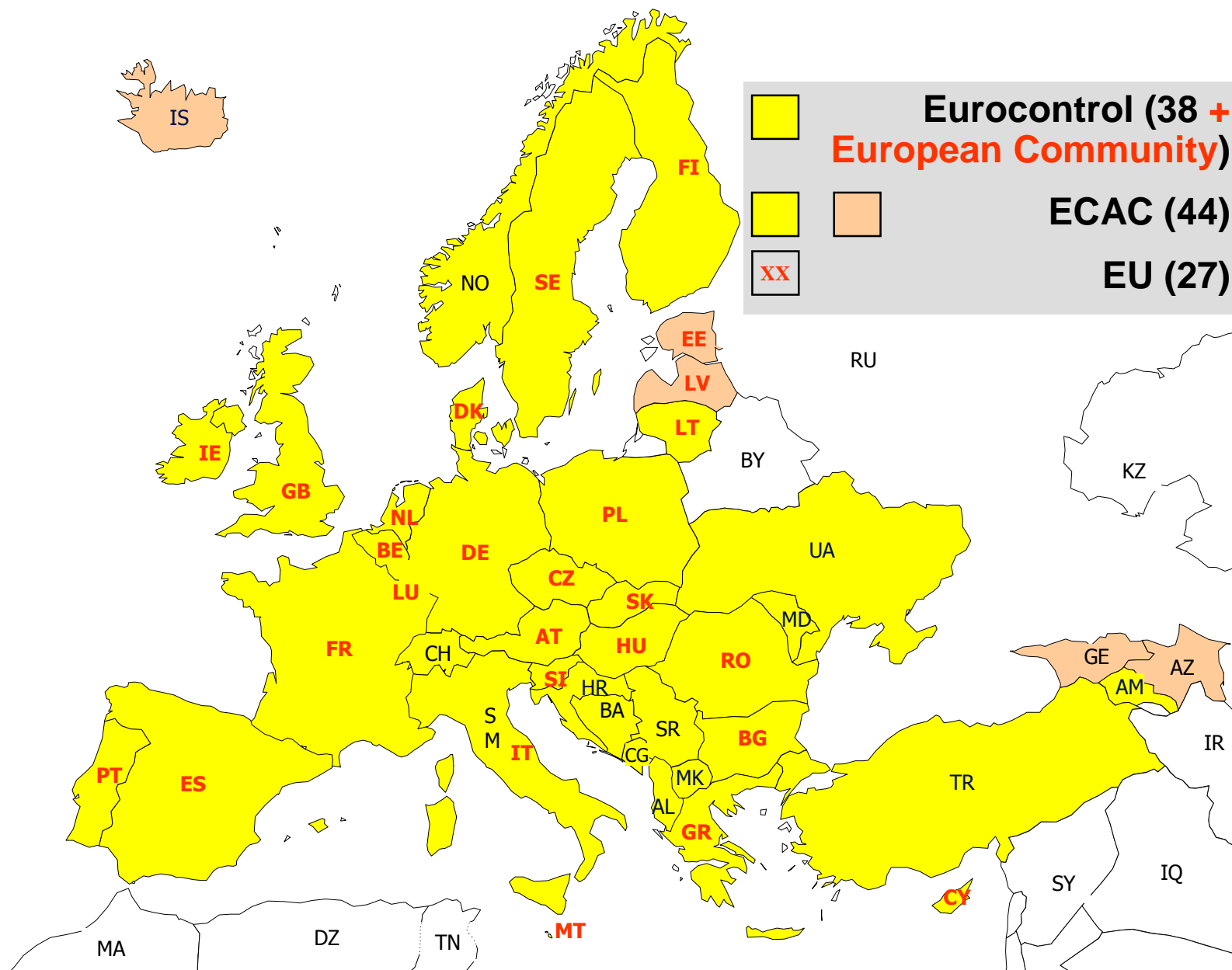


THALES

- Is not ...
 - A for-profit organisation
 - A competitor in providing Air Navigation Services or Meteorological Services
- Is ...
 - The European Organisation for the Safety of Air Navigation

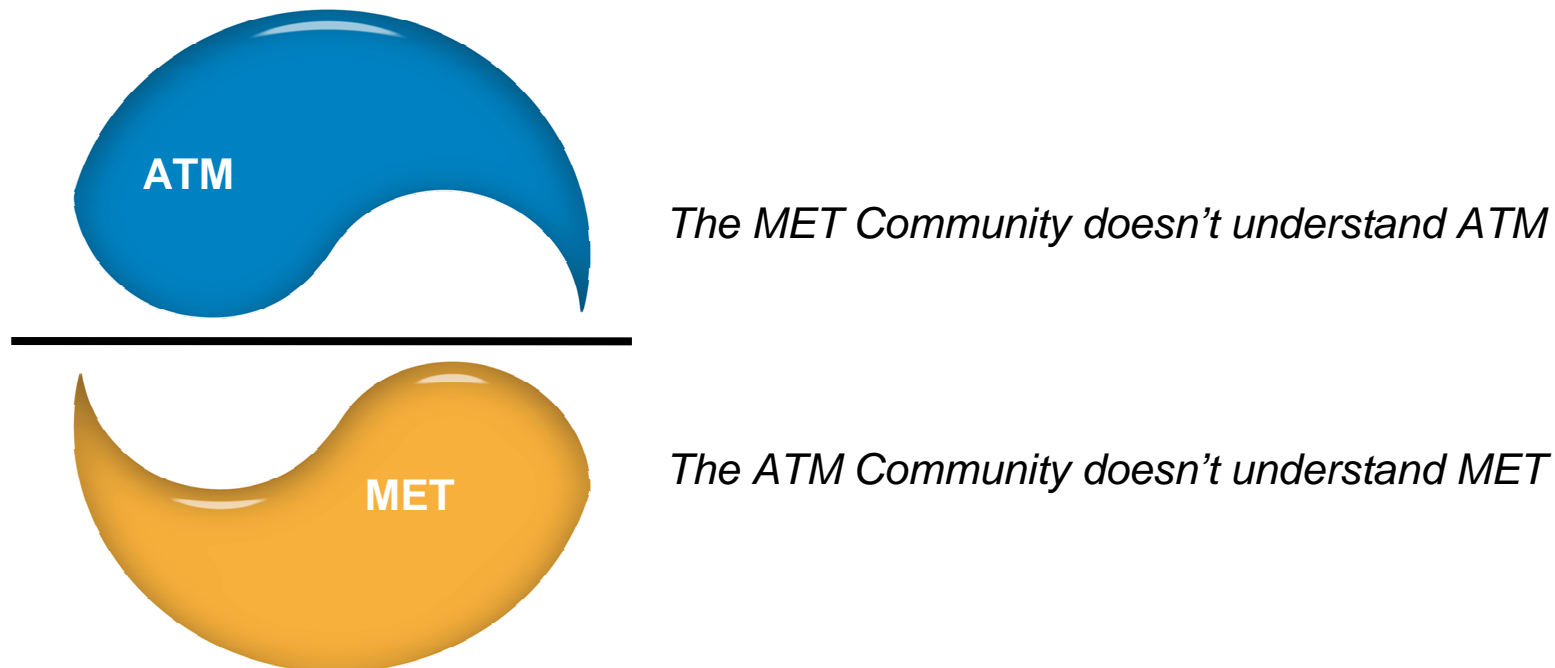


EUROCONTROL Member States



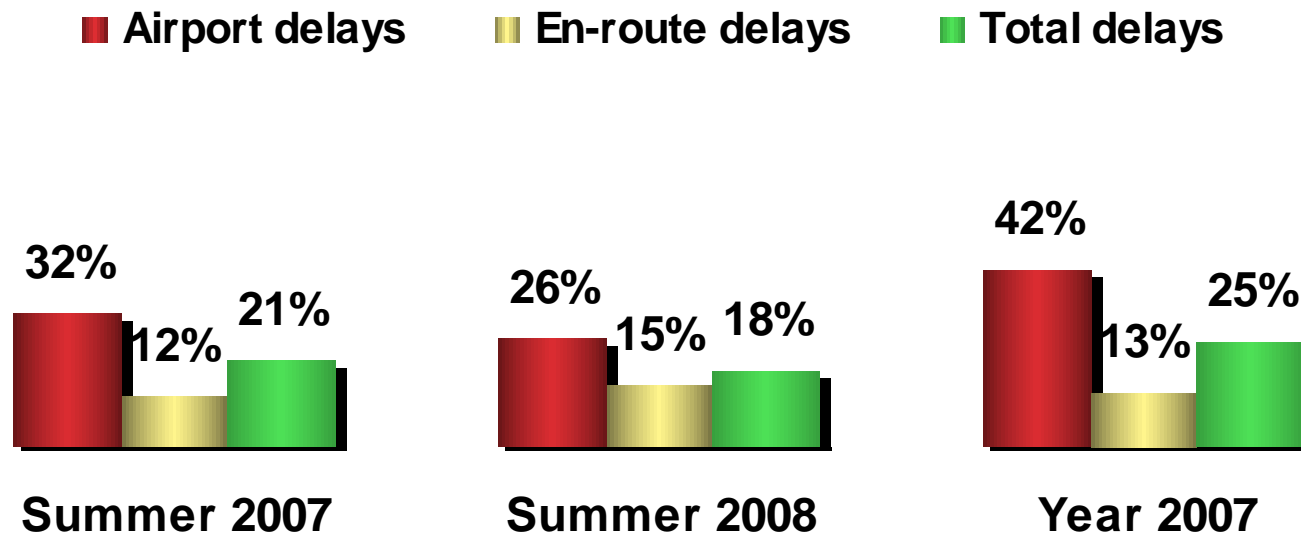
Today's ATM system and Meteorology

- Weather is seen as a nuisance
- Capabilities currently not well understood
- Mismatch between current and foreseen requirements and capabilities of Meteorology (MET) and ATM



Today's ATM system and MET

- Wait and see' approach
- Used primarily for hazard prevention and mitigation
- MET products predominantly available for traditional flight crew briefing only and no real support for concepts such as dynamic routings

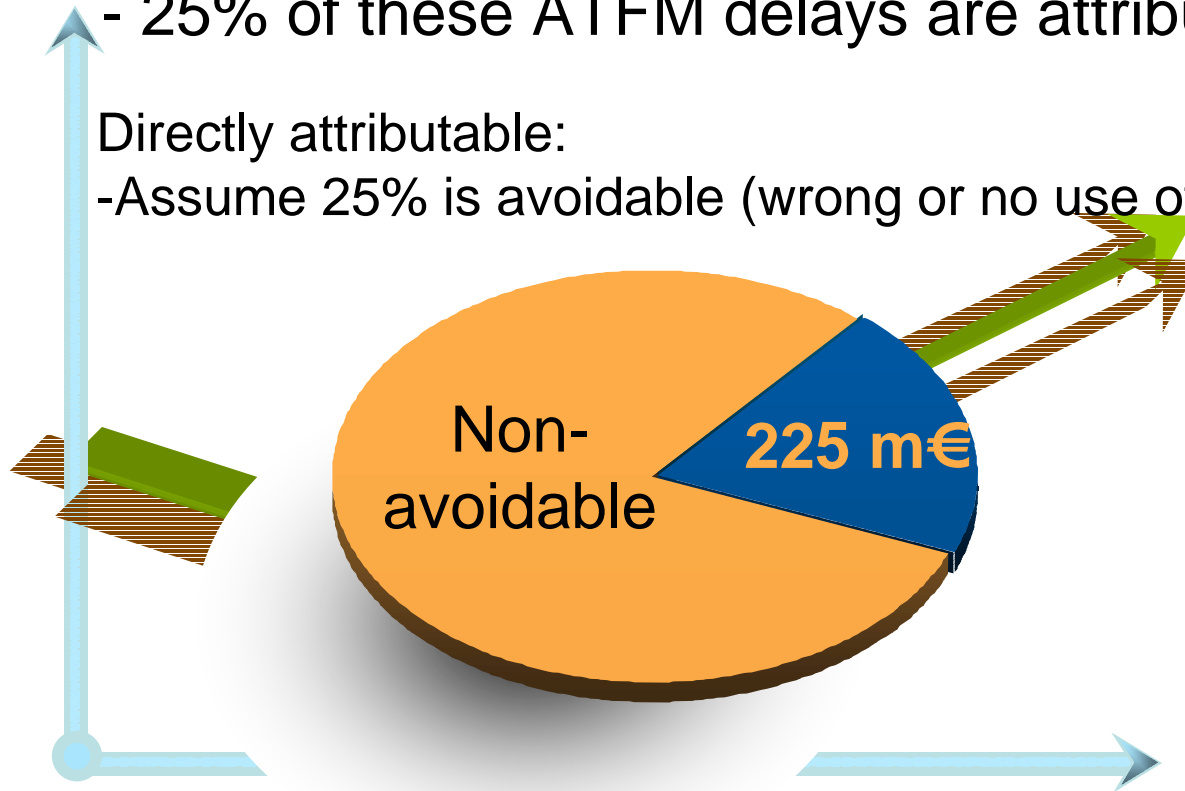


Meteorology and delays: today

- Performance Review Report 2008 (EU footprint):
- 3.6 b€ loss in ATFM delays and route extensions
 - 25% of these ATFM delays are attributed to WX

Directly attributable:

- Assume 25% is avoidable (wrong or no use of MET)



What to achieve

- Weather assimilated decision making in ATM
 - *Making the ATM System more robust and more predictable by integrating weather information in all phases of ATM decision making and making this information available to all stakeholders*
- By means of fit for purpose services, applications and underpinning systems whilst ensuring:
 - 1) A clear separation of concern between provision, exchange and use of meteorological information
 - 2) Truly interoperable solutions
 - Connectivity
 - Meteorological capability
 - 3) A level playing field for implementation and service provision

‘Move away from weather being the ultimate excuse why a carefully planned business trajectory was not achieved in the real world’

Technology – SESAR Goals

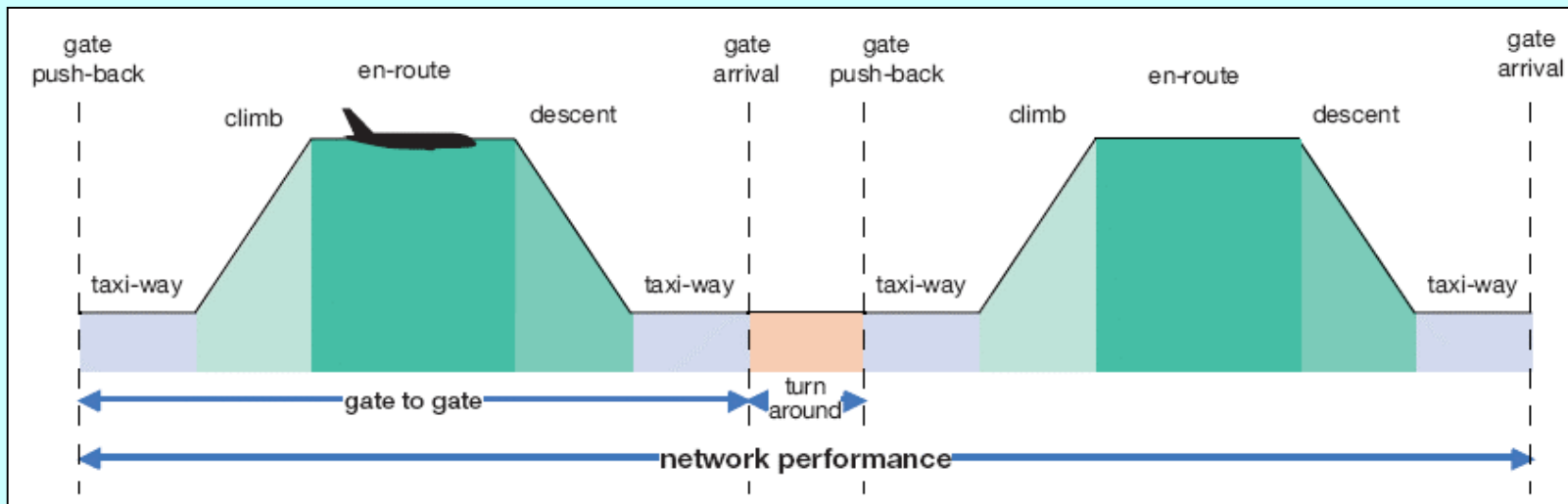
Enabling handling
3 times the traffic

Improving safety
by a factor of 10

Reducing by 10%
the **environmental**
impact
per flight

Cutting
Air Traffic
Management
(ATM) costs by 50%

Technology – SESAR ATM concept



The driver: Performance Based Approach

ATM intranet

Collaborative Decision Making

Airports as Integrated Partners

Network Management

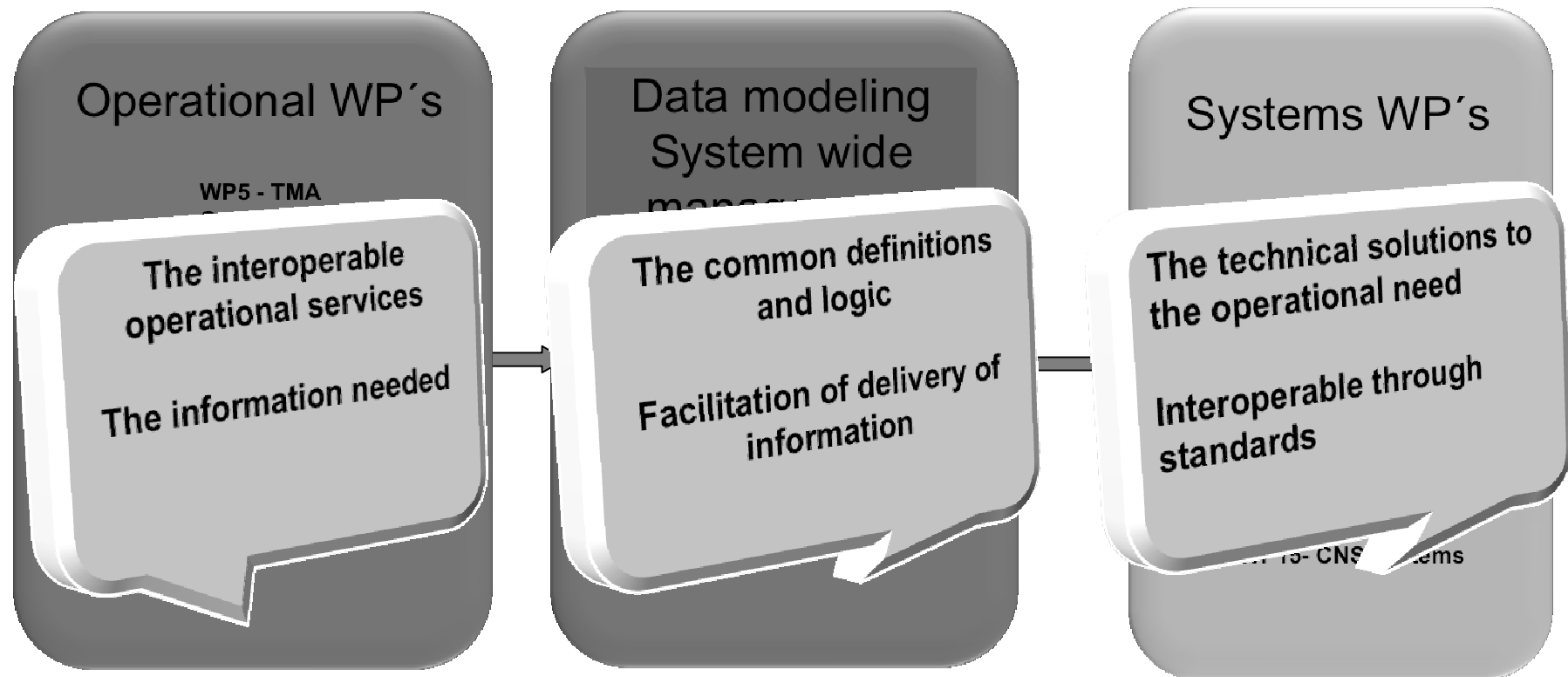
The foundation: Trajectory Based Operations

Source: SESAR JU

Technology – SESAR WBS

WPB - Target concept & Architecture

WPC – Master Plan maintenance



WP3 – Validation Infrastructure

WP16 – Transversal areas

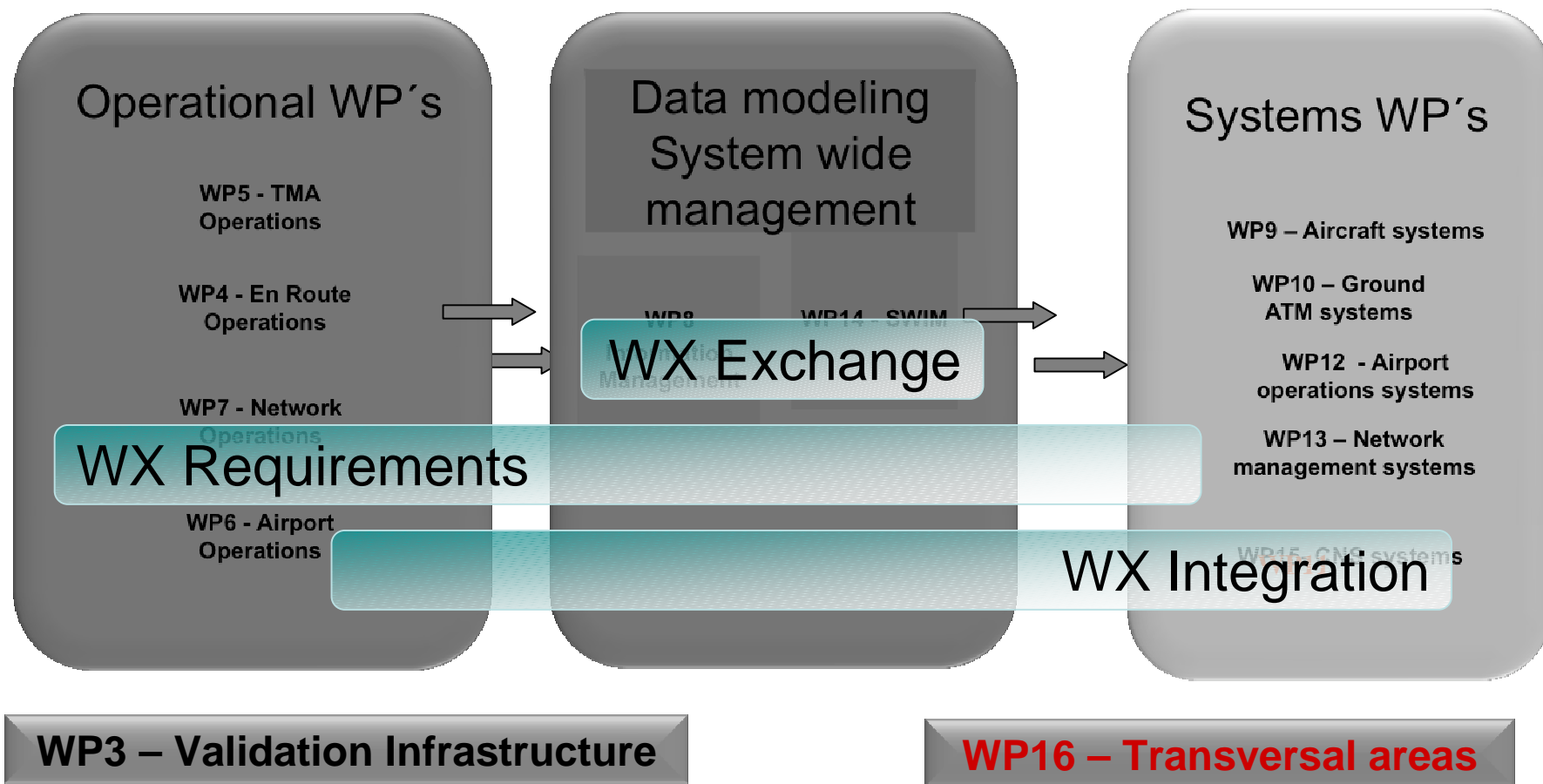
The Weather View of SESAR



Technology – SESAR WBS

WPB - Target concept & Architecture

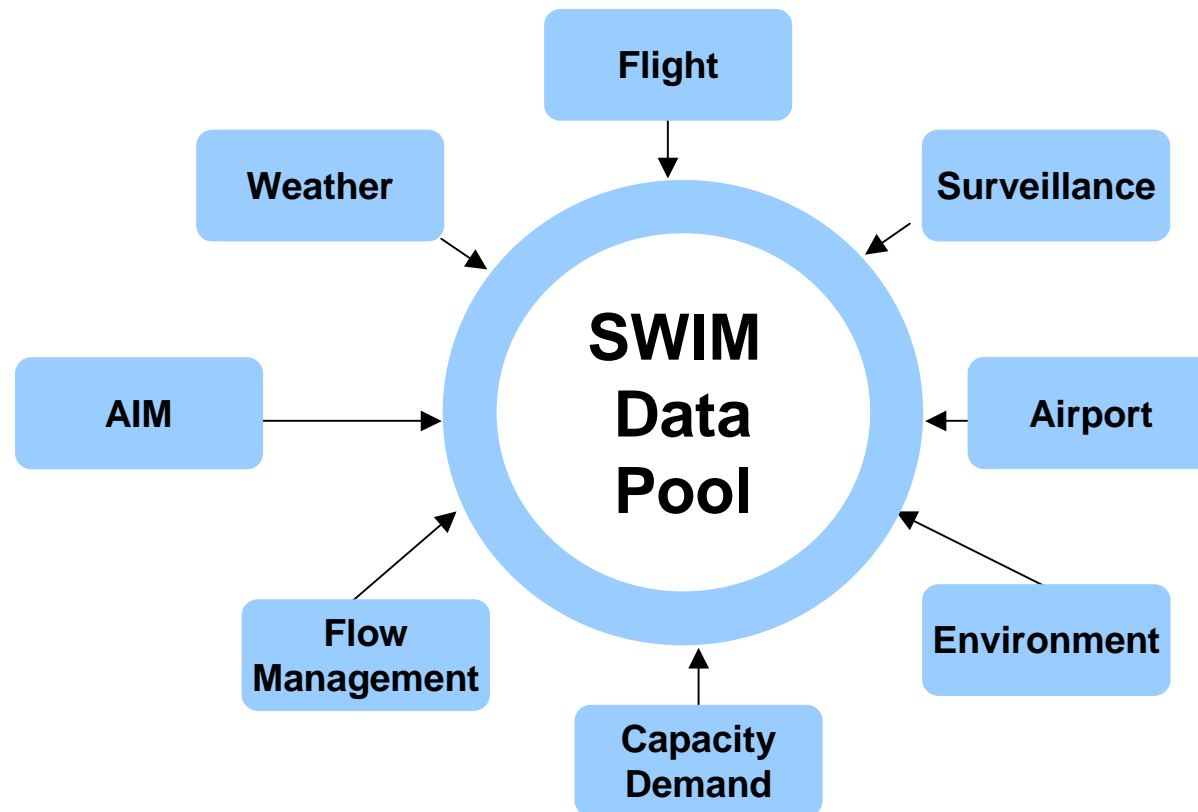
WPC – Master Plan maintenance



The Weather View of SESAR

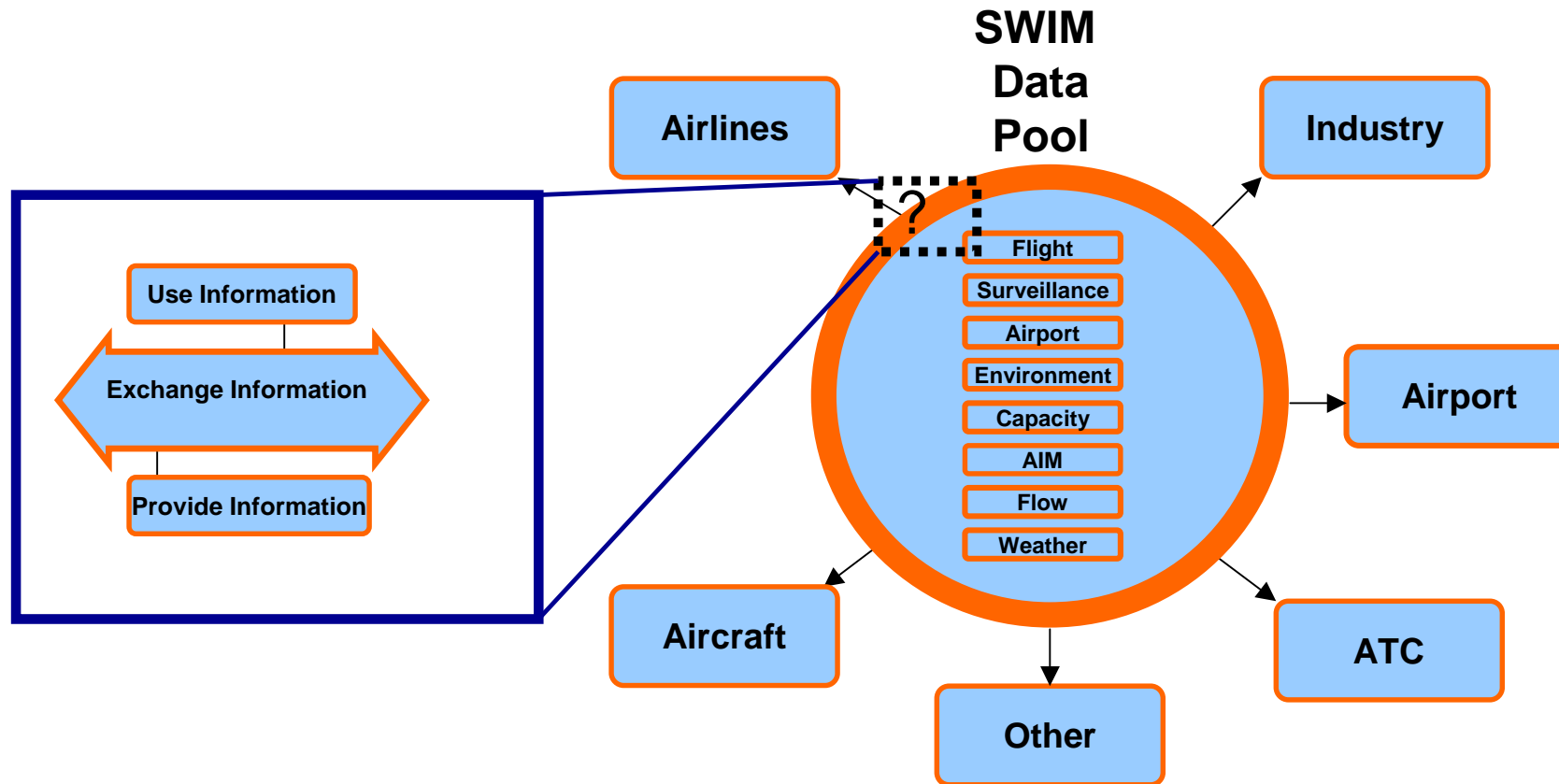


Transition to SWIM



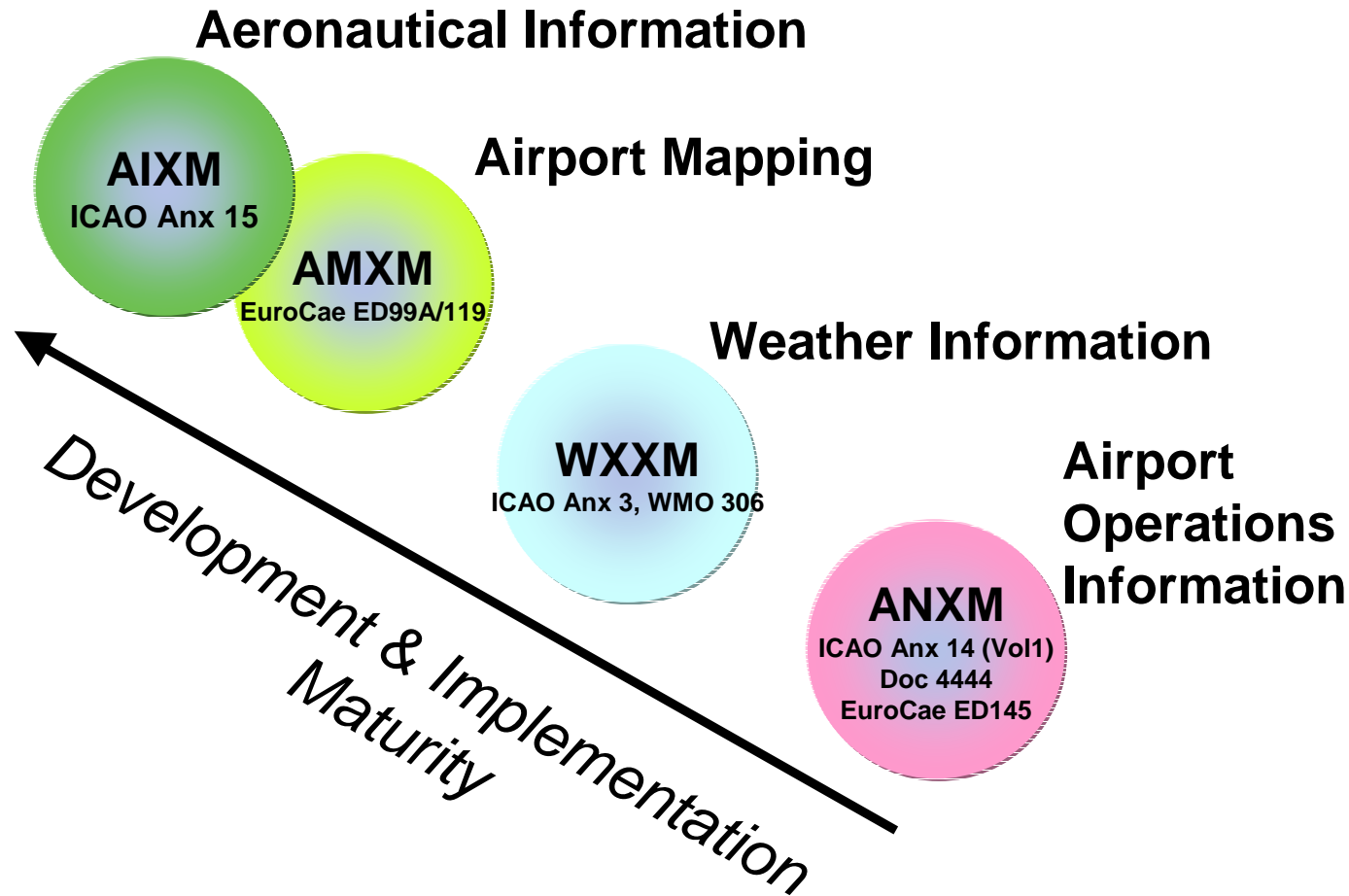
- ATM Data Domains share data into SWIM

Transition to SWIM



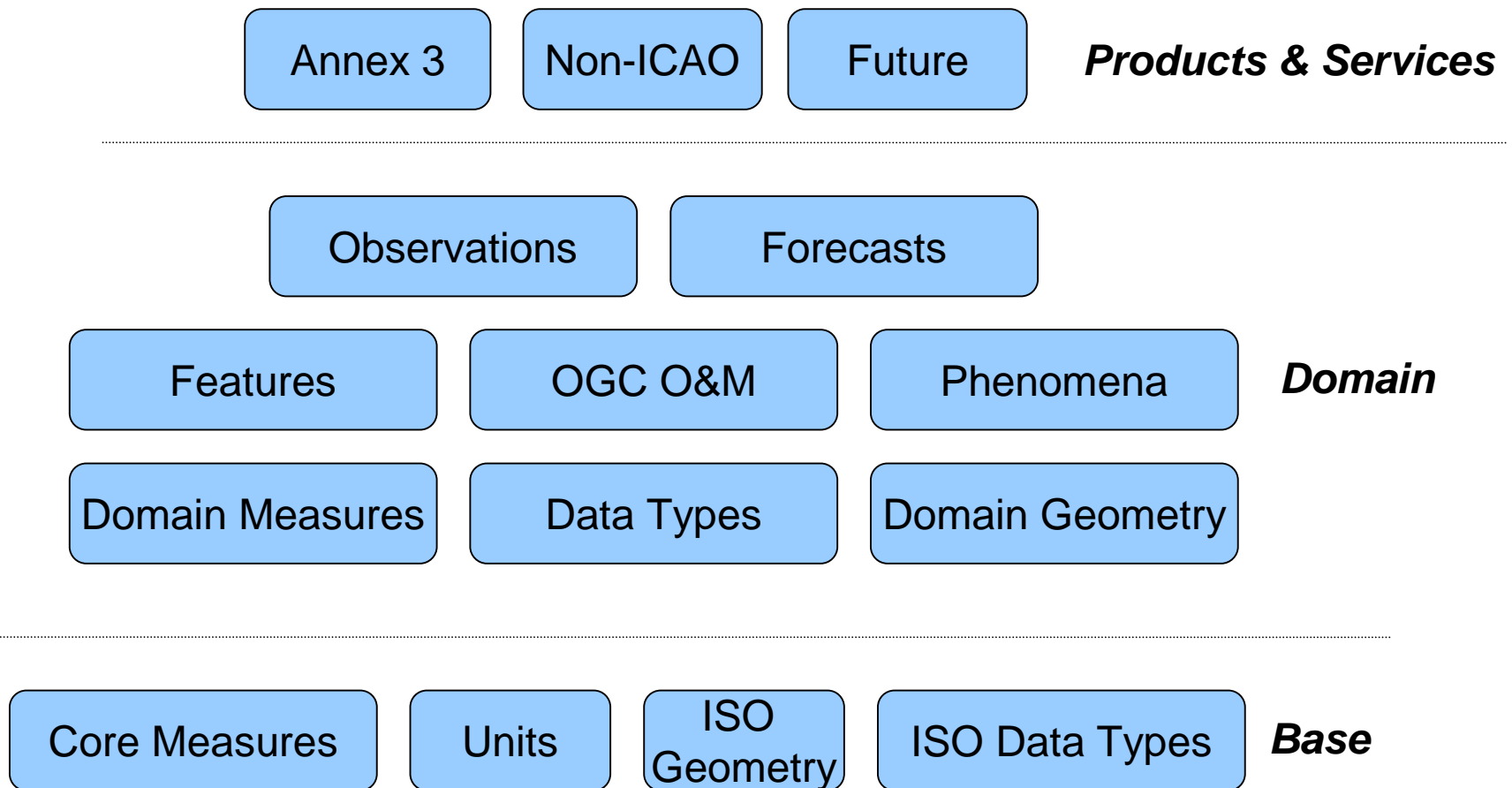
- Connecting information users and providers
- Towards seamless information sharing

Interoperable Information Exchange



WX##

Design principle; separation of concerns



Cooperation & Harmonisation is a MUST

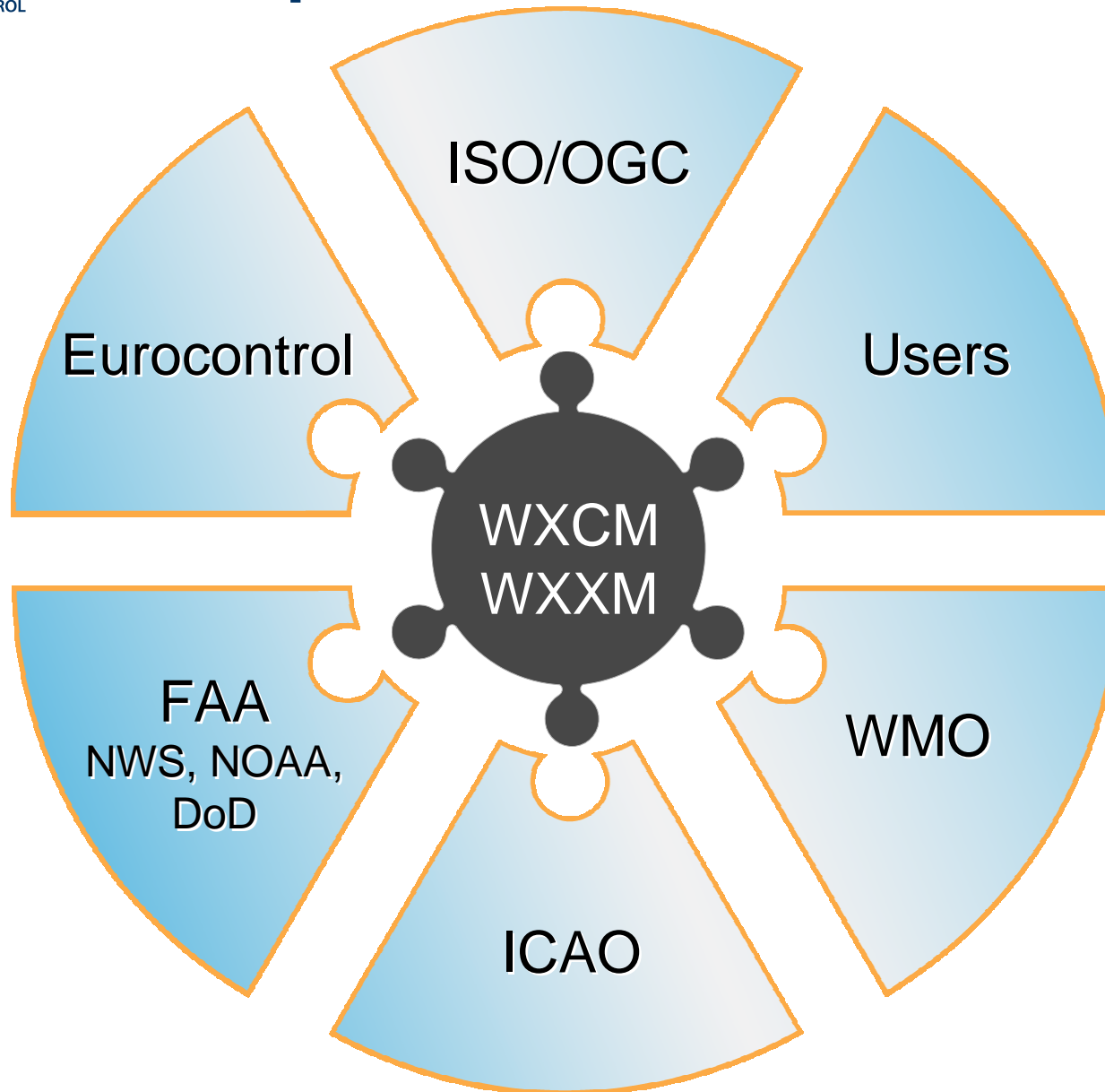
Air transport is a 'business' on a global scale

Modernisation is therefore a world-wide issue

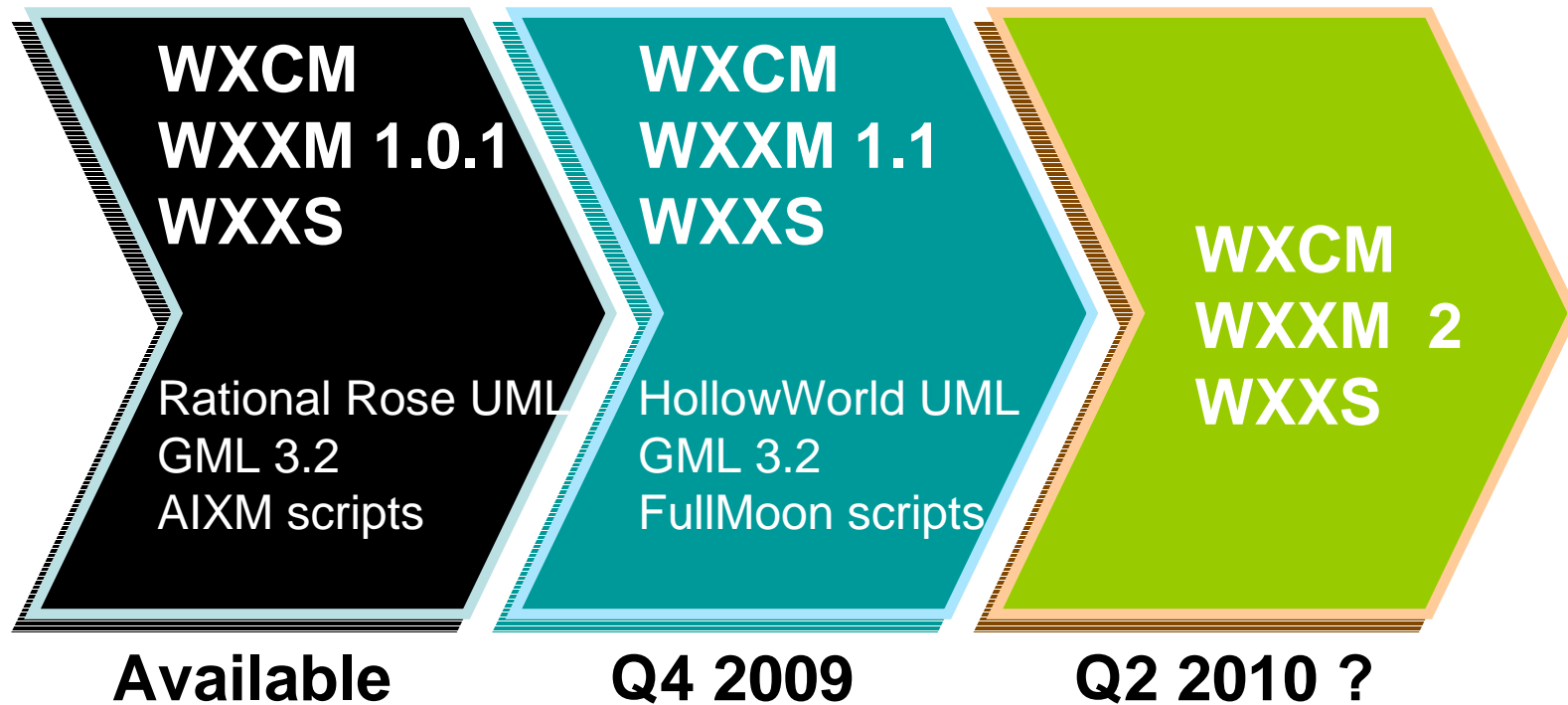
Today's Regional problems become tomorrow's global issues and must be solved only once

Use existing developments, programs, etc. to the maximum extent

Cooperation & Harmonisation



Model development status



Next steps; Proofing the Concept

- MET Data Fusion Demonstrator
- Aeronautical Information Thread OWS-6
- Aeronautical Information Thread OWS-7

MET Data Fusion Demonstrator

MET Data Fusion Demonstrator

SWIMming in WXXM river


- Home
- MET Data Fusion Configuration
- Conversions
- Maps by sources
- Maps by information
- Download
- Geoserver
- Viewer

Latest News

04/08/09
New design for the website.

04/02/09
Conversion of METAR forecast now available.

THALES




EUROCONTROL, the European Organisation
for the Safety of Air Navigation

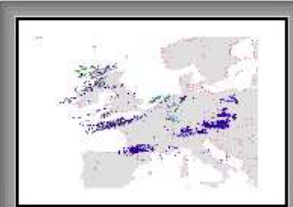
MET Data Fusion Converter

MET Data Fusion Demonstrator is a converter of meteorological information. It convert information from different file formats (as BUFR, GRIB, METAR, ...) to a new format the WXXM. This extension of the GML format allow the storage of information about temperatures, airports, clouds, volcanoes (and volcano ash clouds) (...) in a XML format and can be use as GIS data sources.

Features news



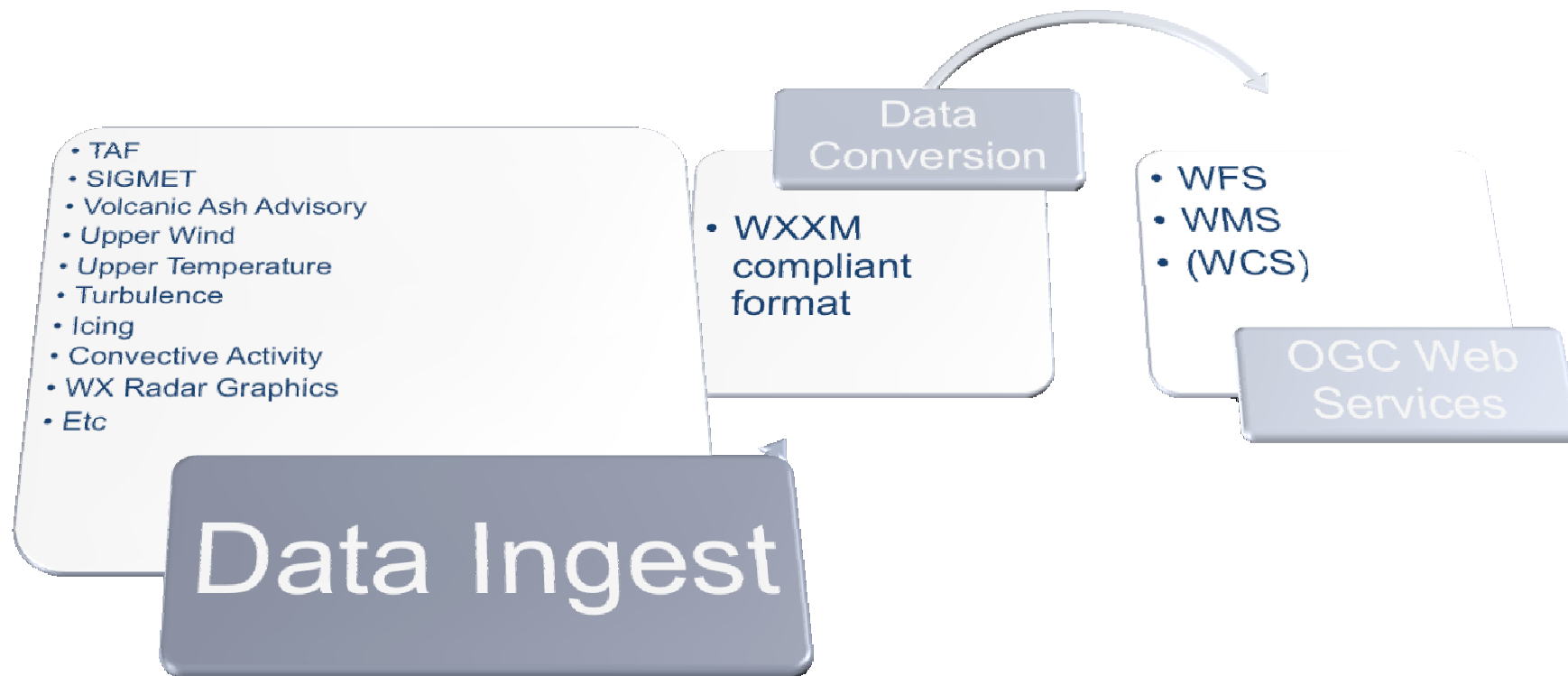
With the conversion of the volcano ash advisories, it's now possible to display ash clouds and their forecasts for the next 6, 12 or 18 hours.



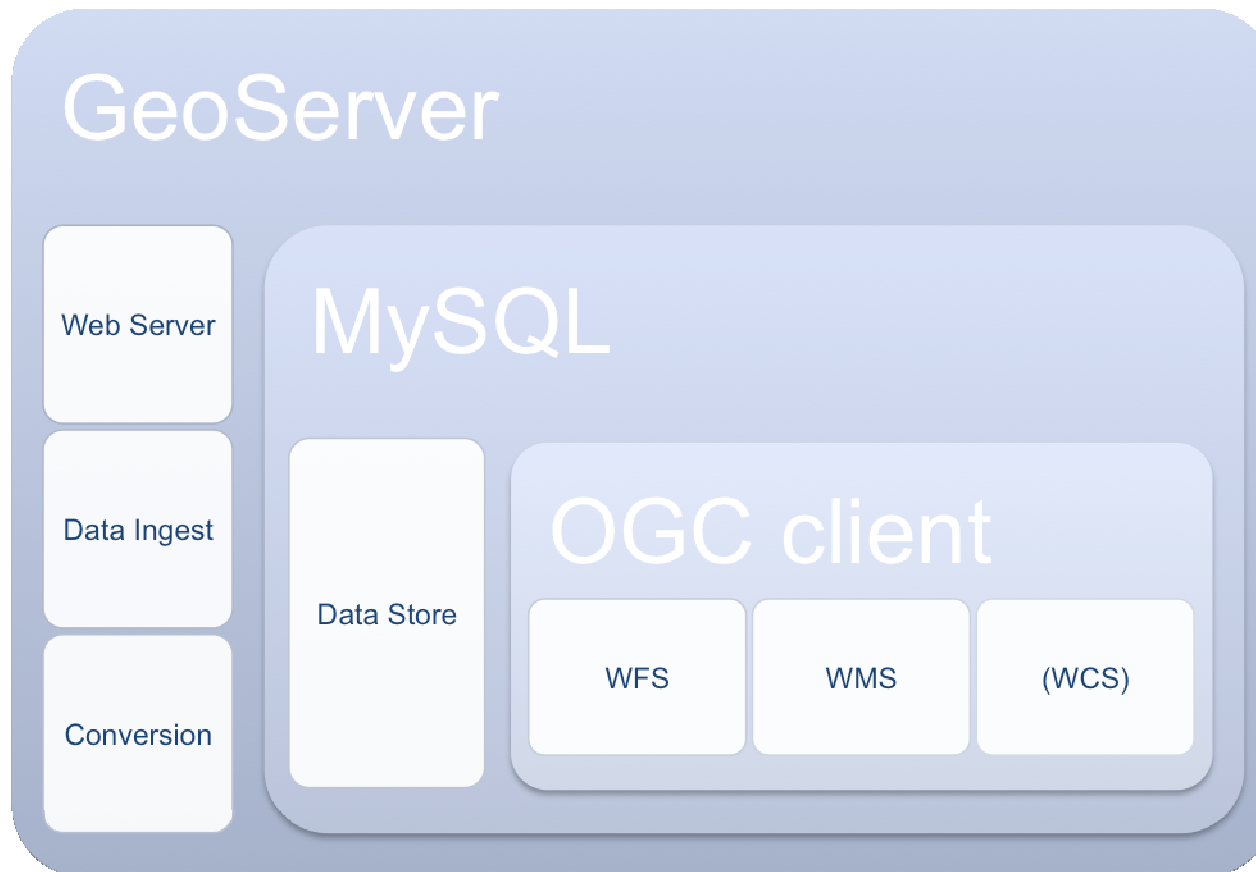
During the conversion of the HDF5 file format, picture data are extracted and converted in GeoTIFF. These GeoTIFF are used as coverages and can be accessed through WMS.

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MET Data Fusion Demonstrator

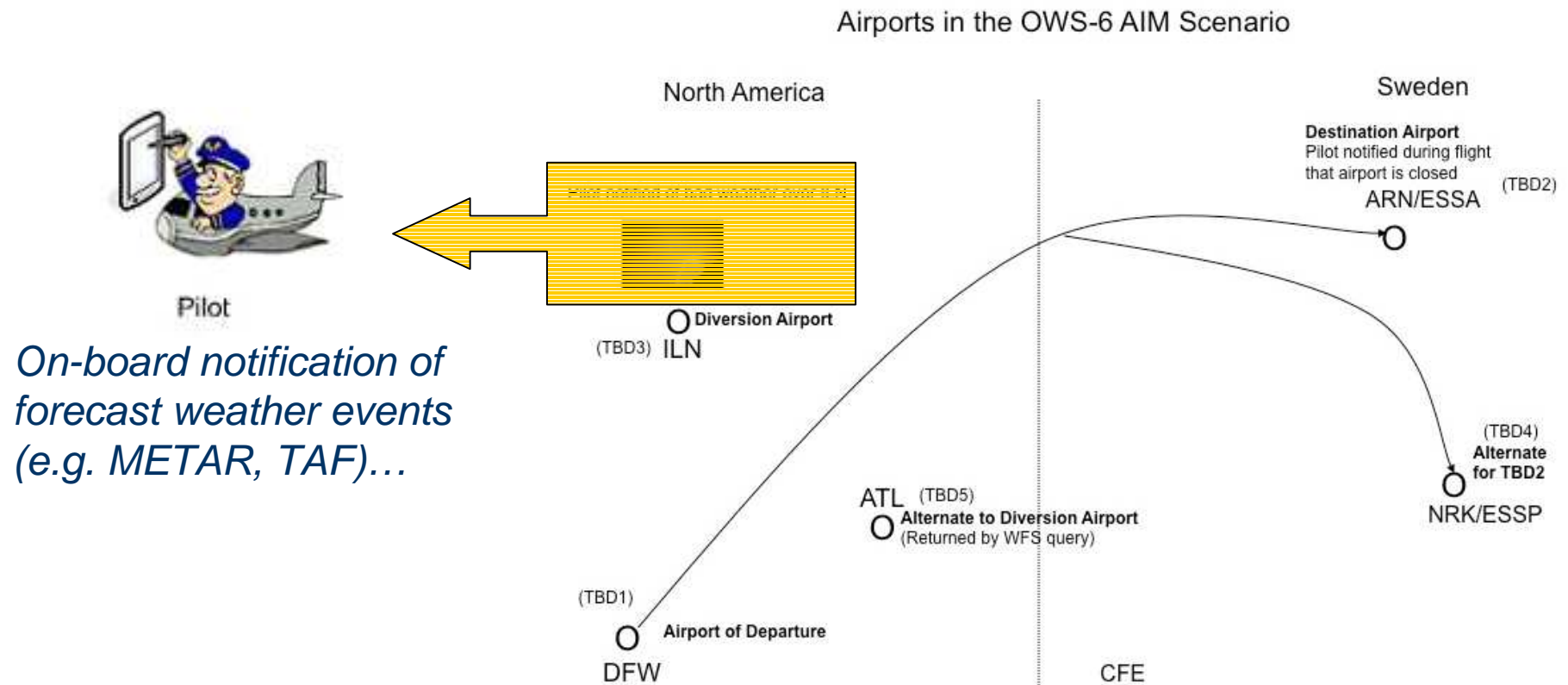


MET Data Fusion Demonstrator

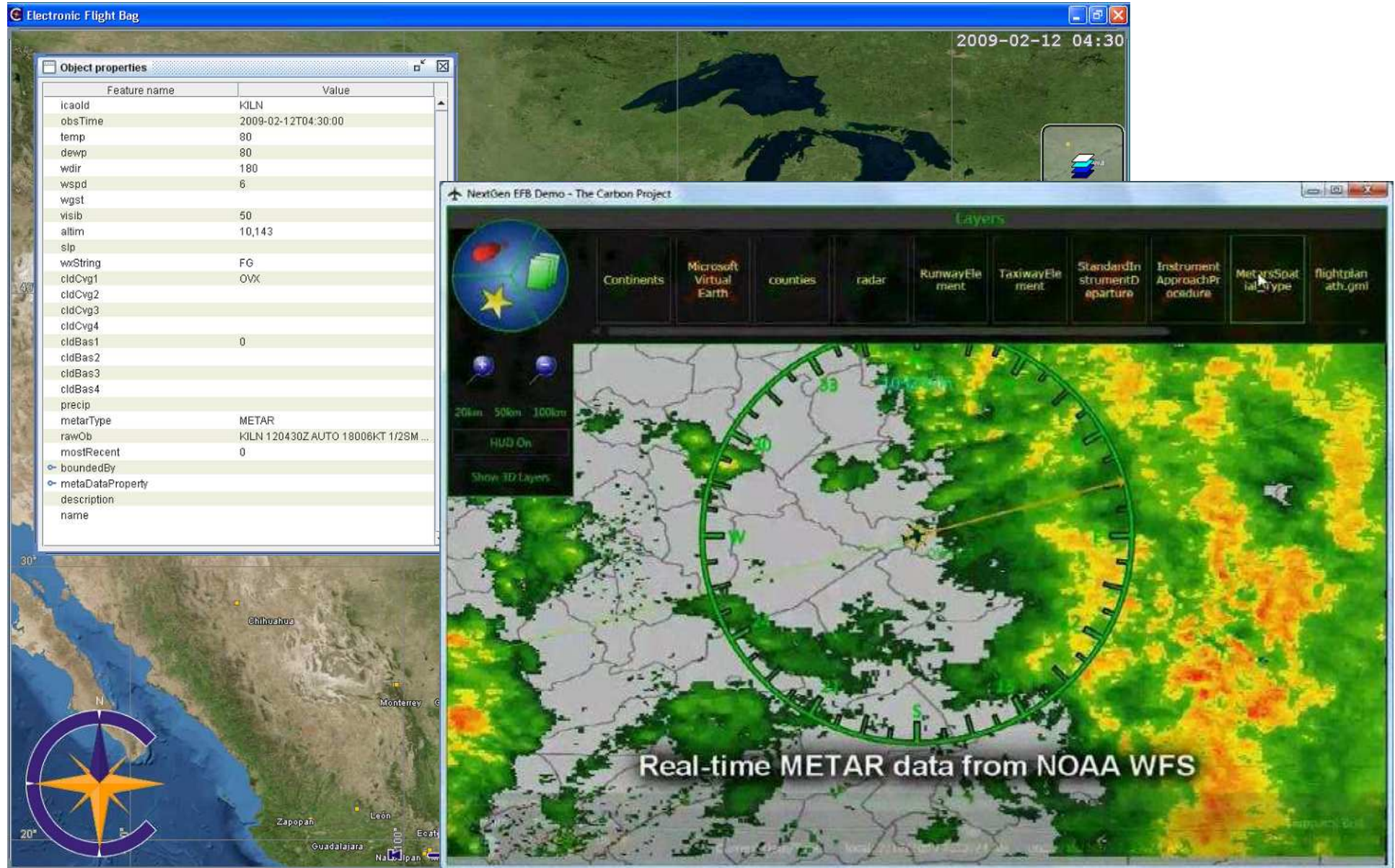


WXXM in OGC OWS-6 Aviation Thread

- How weather data affecting a flight can be published e.g. on EFB ?
- How collected weather data can be merged with other aeronautical data ?



WXXM in OGC OWS-6 Aviation Thread



WXXM in OGC OWS-6 Aviation Thread

- OWS 6 demonstrated **successful access** and **retrieval** of **WXXM** data
- It is **possible to combine Aeronautical** and **Weather** information using formats such as AIXM & WXXM, with similar WFS technologies.
- **WXXM** lowers the implementation barrier for **EFB** clients.
- *Check online video on OGC Web site*

<http://www.opengeospatial.org/pub/www/ows6/index.html>



Next step: OWS-7 Aviation Thread

- OWS-7 will use WXXM version 1.1
- Objectives
 - Investigate the time model used in WXXM
 - Check if WXXM can support the dispatch of probabilistic weather events
 - Advance and evolve the Event Notification Architecture (parse and disseminate changes to weather data)



2010



Objectives & scope

- Proposed mapping btn DoW / BAFO \leftrightarrow NAF v3 deliverables

