



# SWIM

Demonstrations and products

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SWIM and XML/GML messages Workshop  
Lima, Perú, 31 October 2017 to 03 November 2017



GRUPO EMBRAER

- Demonstrations
  - Mini Global II
  - SESAR SWIM Global Demonstration
- Information Services for Airspace Elements
- Remote Aerodrome Flight Information Service
- Medium-Term Conflict Detector
- Current Airspace Information Sharing Platform

# Mini Global II Demonstration



FTB / Daytona Beach  
April 25-29, 2016  
Demonstration led by FAA

Atech took part at the demonstration  
through representation by the Brazilian  
Department of Airspace Control (DECEA).





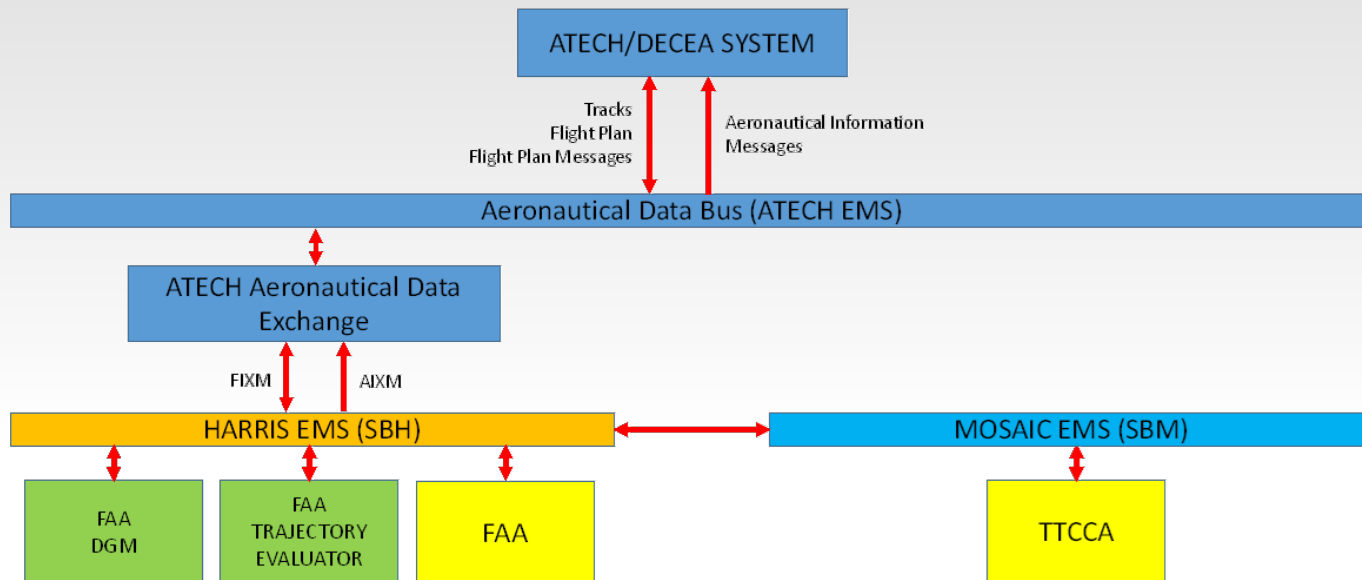
Flight **TAM8078**

9h 38min






Every weekday

3 boundary  
**coordinations**  
inside Brazilian  
airspace

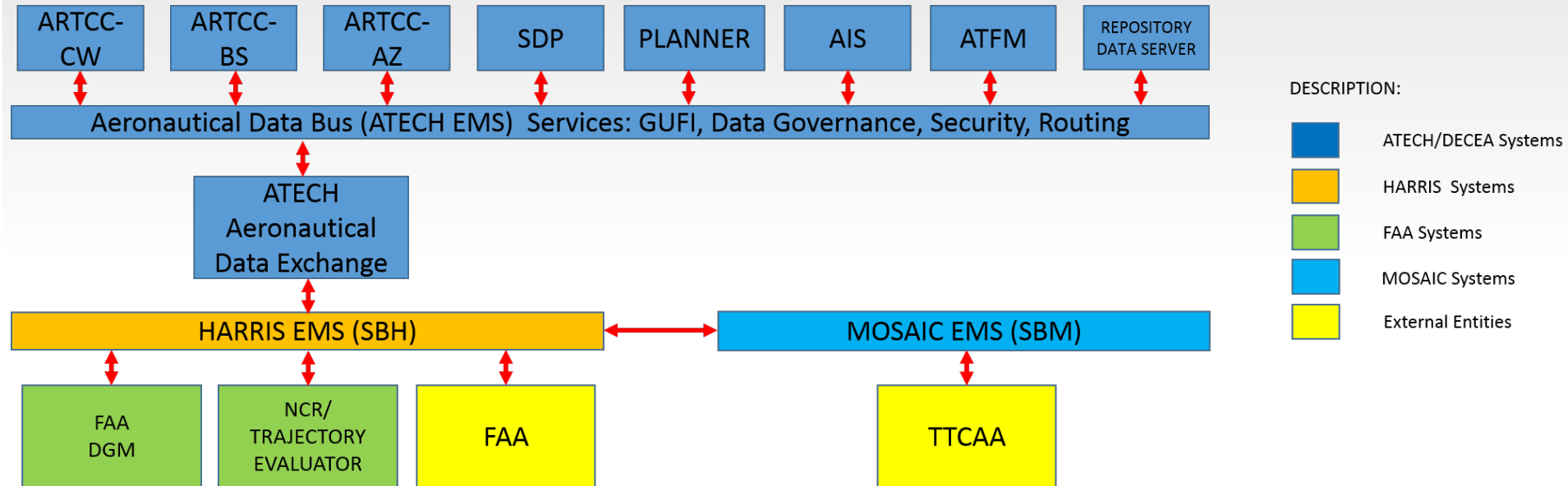
# System Context Diagram



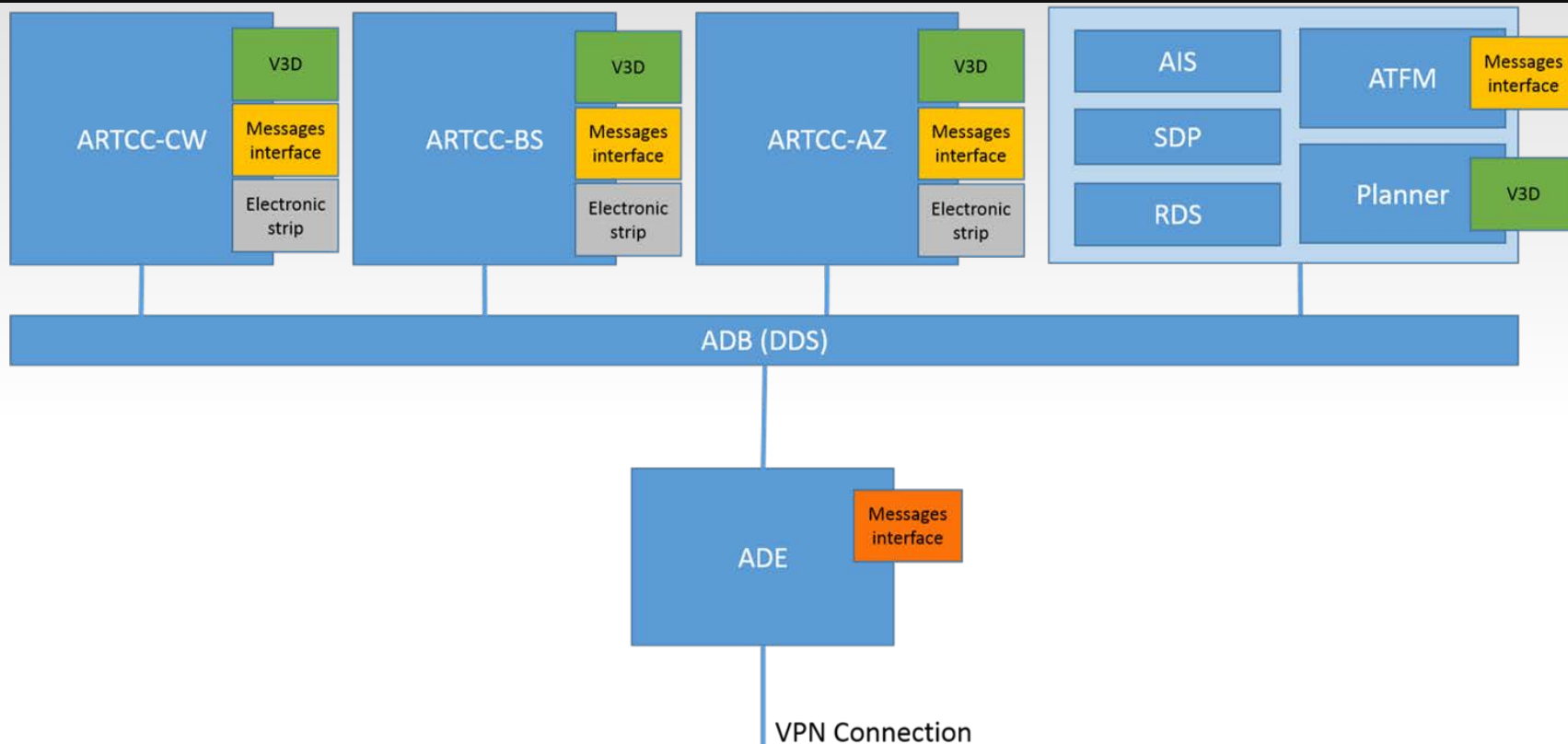
## DESCRIPTION:

-  ATECH/DECEA Systems
-  HARRIS Systems
-  FAA Systems
-  MOSAIC Systems
-  External Entities

# System Architecture



# System Implementation Diagram



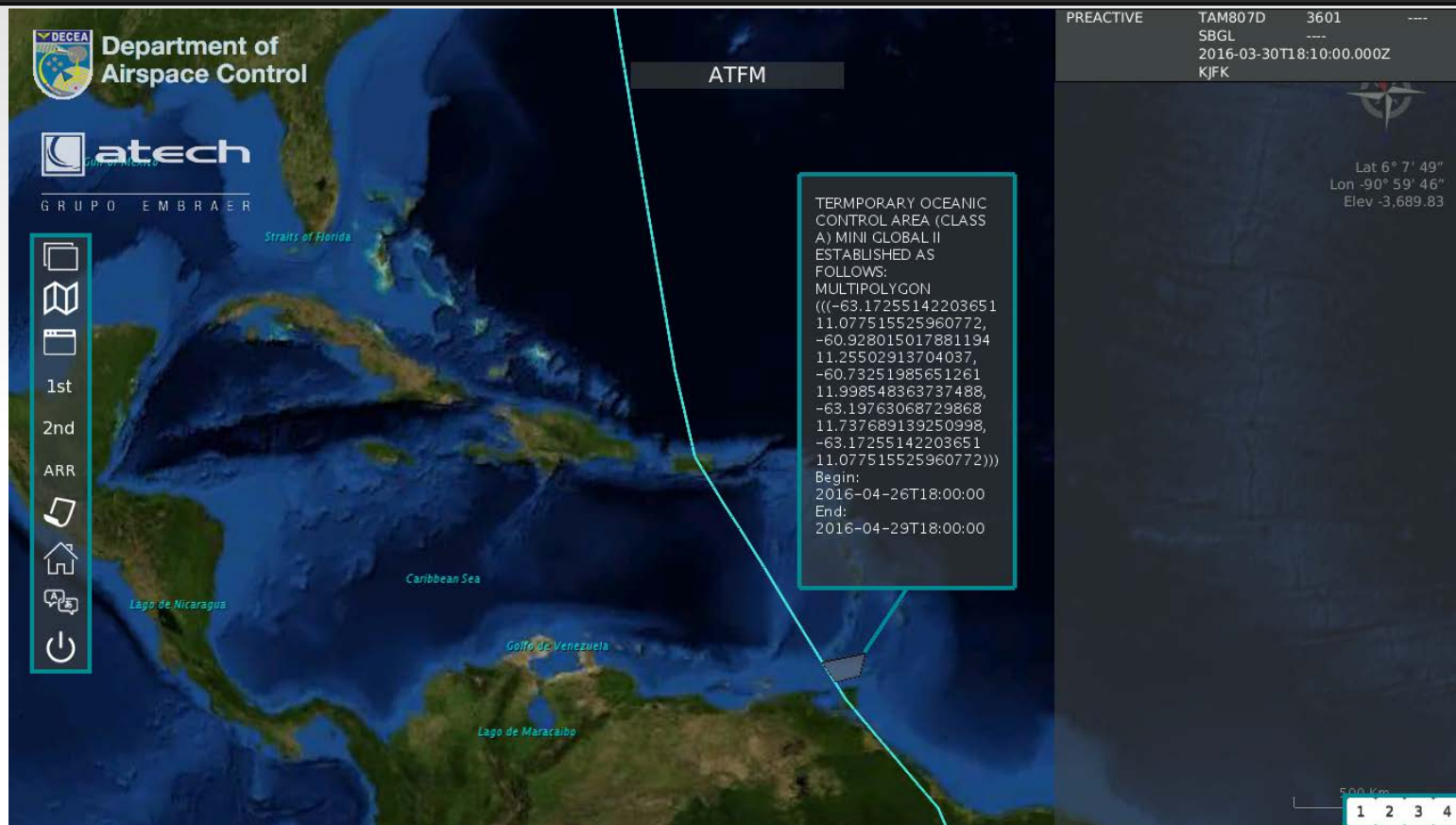


# Route specified on FPL

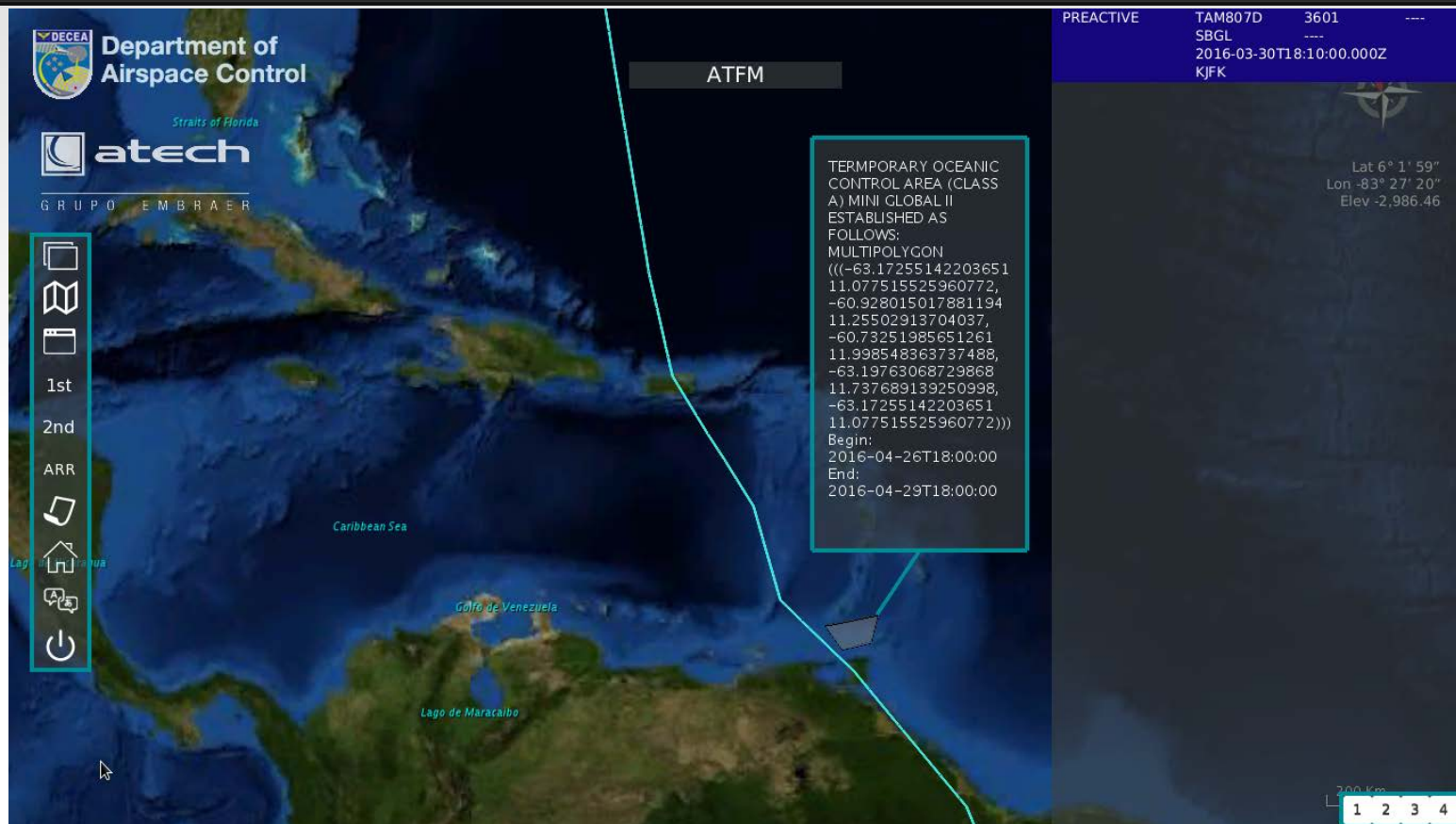




# Received NOTAM and affected area



# New Route specified on CHG

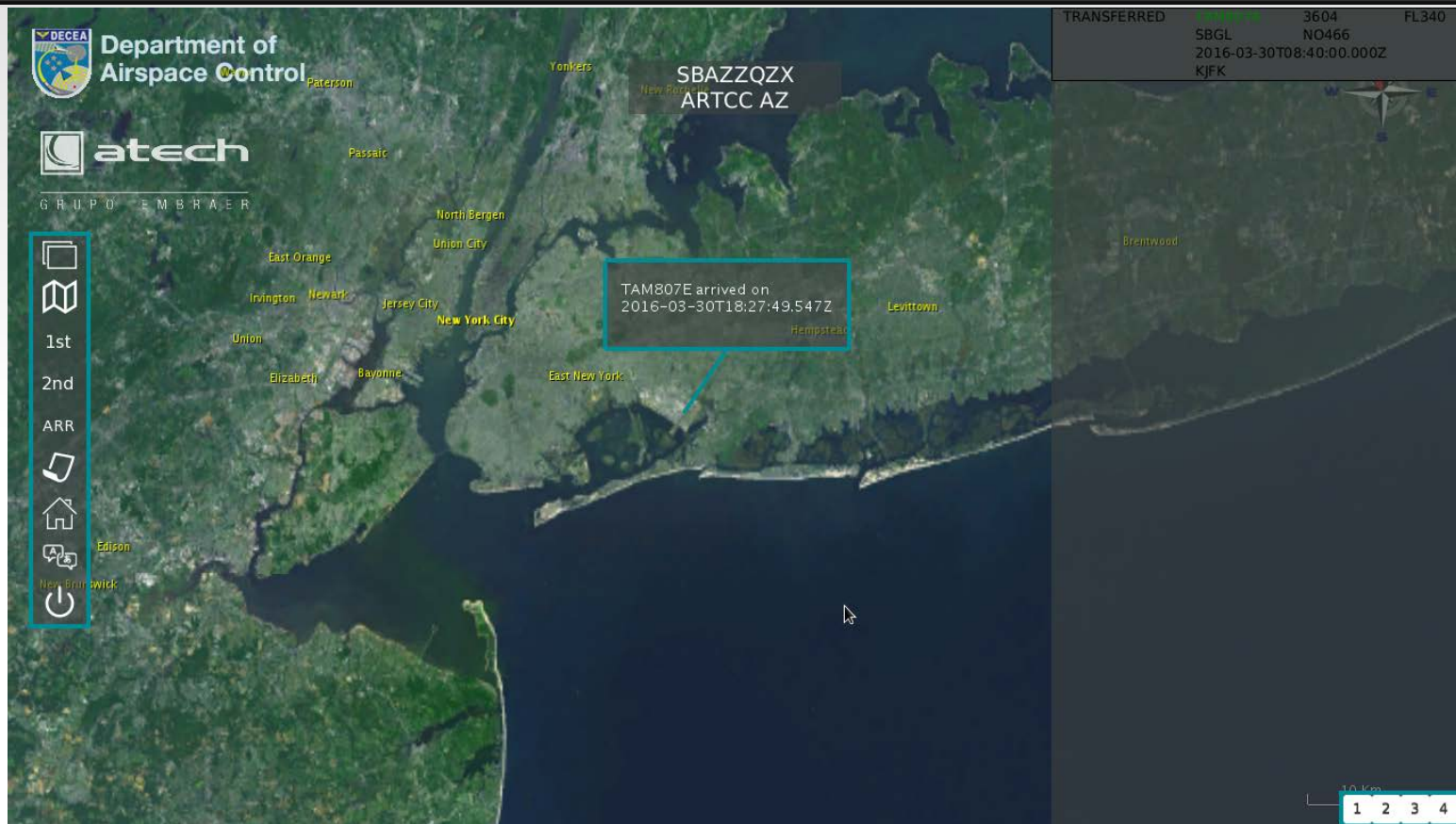


# Coordinations and track detections





# Arrival at JFK



# SESAR SWIM Global Demonstrations

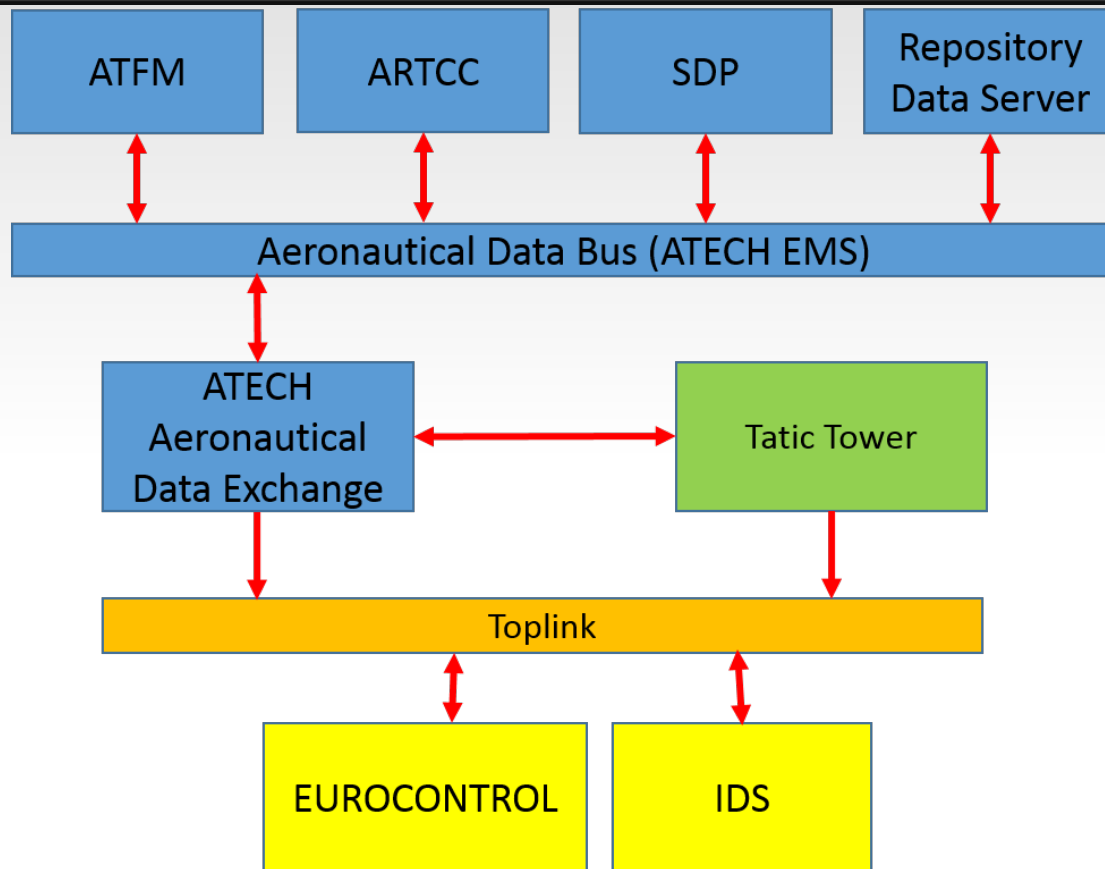


ENAV, Rome  
8th and 9th of June, 2016





DECEA/CISCEA,  
Atech and Saipher ATC partnership



# SESAR SGD: System Architecture



## DESCRIPTION:

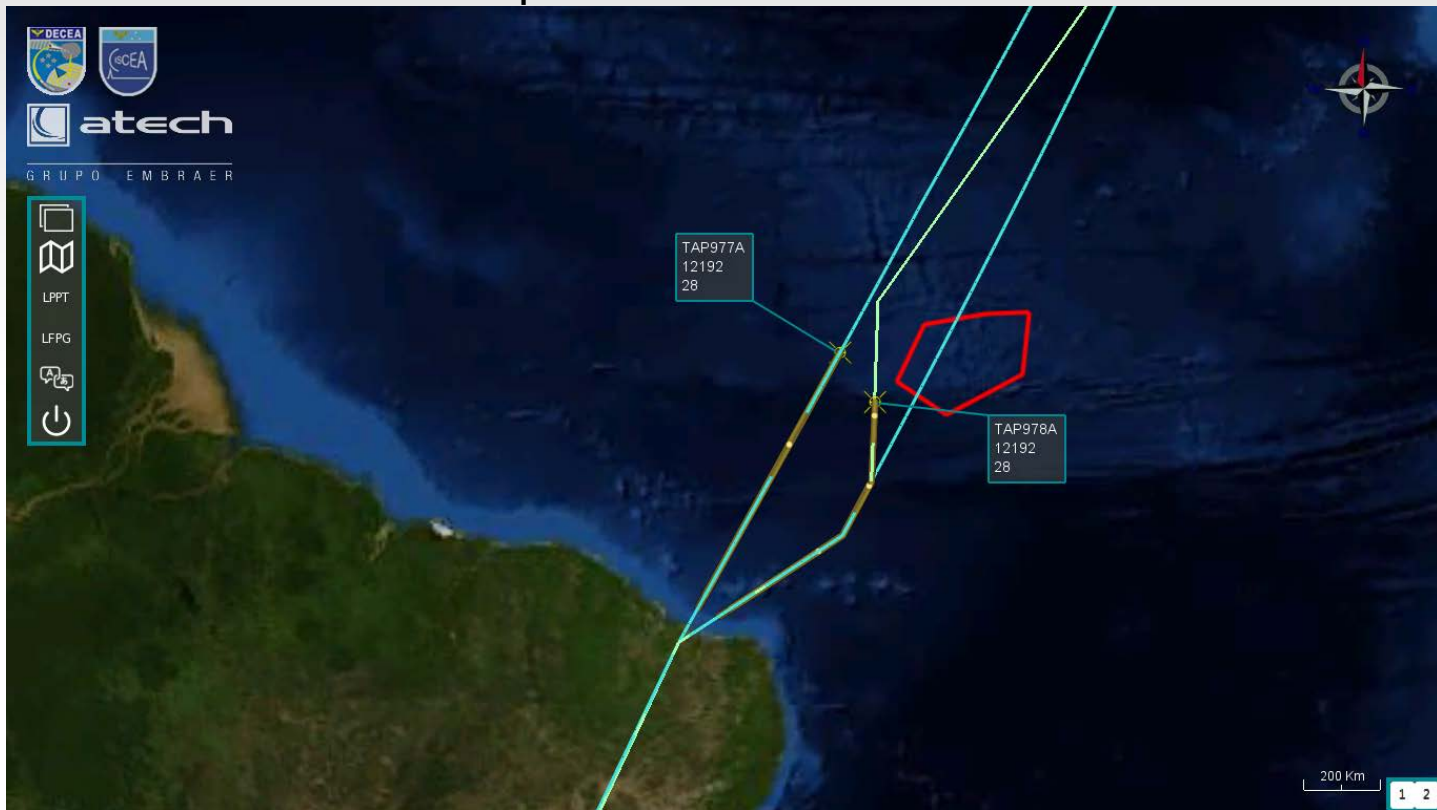
-  ATECH Systems
-  Saipher Systems
-  Thales Systems
-  External Entities

## SBGR - LFPG

- MET information and NOTAM evaluated and optimal FPL filled
- Flight status to while aircraft is moving inside the airport
- Departure message
- Track updates
- SIGMET/Met Hazard
- Rerouting requested
- Flight presented in the destination system, ETA updated.
- Arrival message



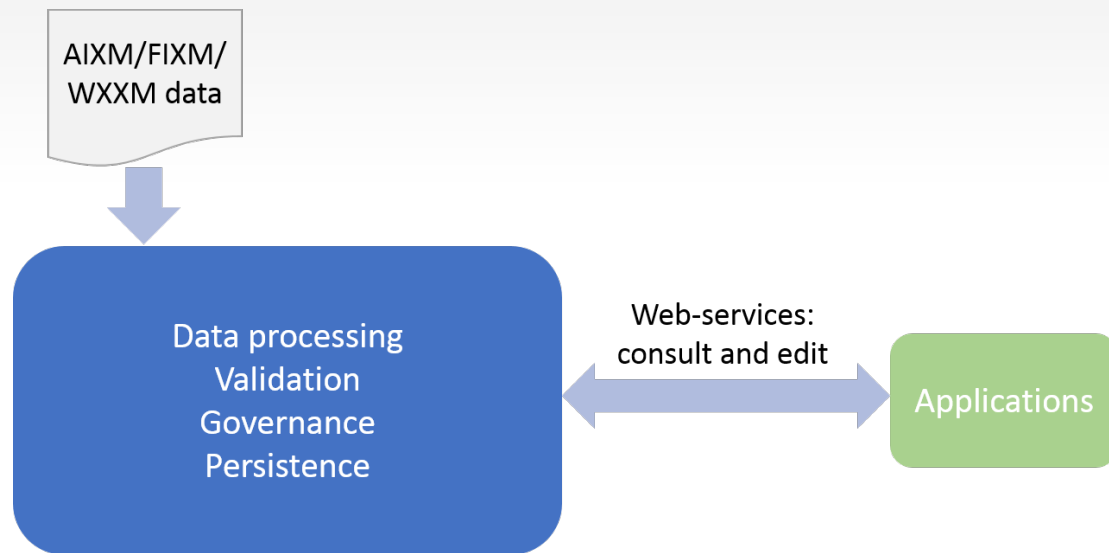
## Re-route after SIGMET reception



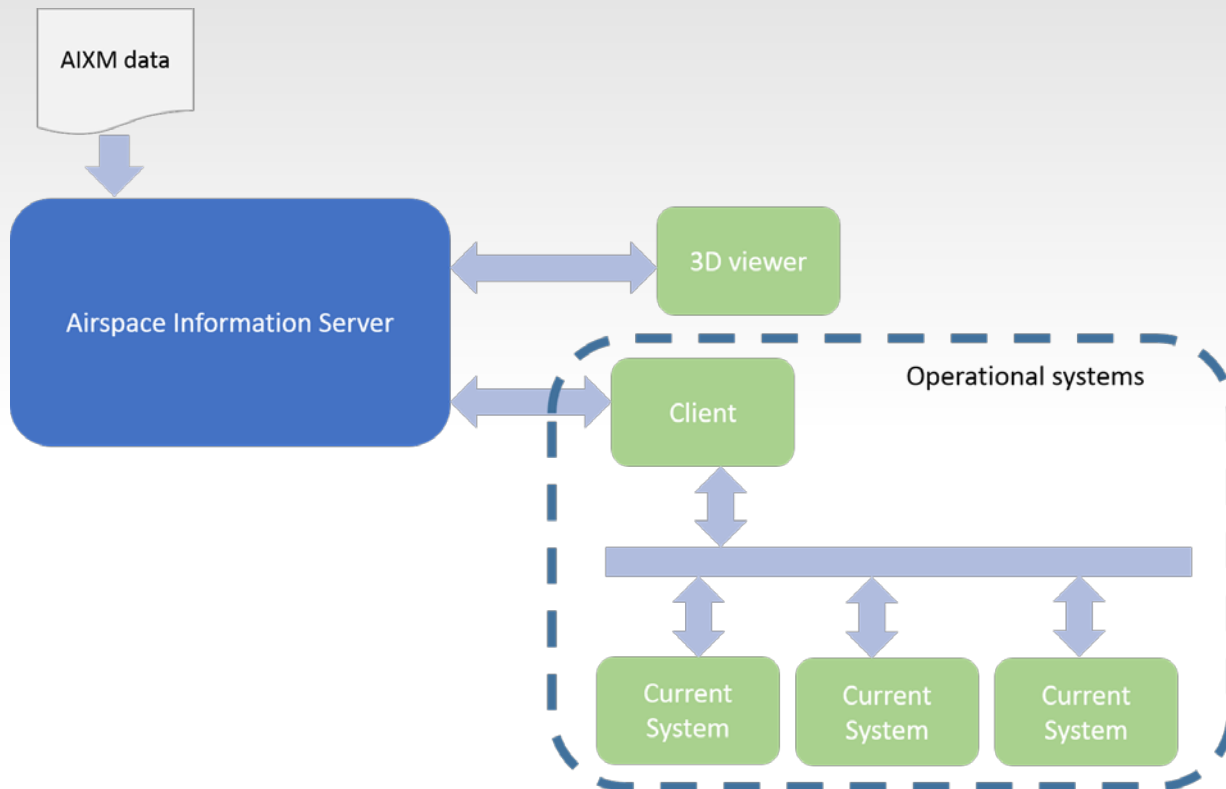
## SBGR - LPPT

- D-NOTAM is used to evaluate the flight plan before it is submitted. The initial route would be affected, the second route is chosen.
- Other D-NOTAMs received during the flight do not affect the route.

AIXM Data from ICA (Instituto de Cartografia da aeronáutica) will be used to improve the algorithms and solutions of Atech's ATC/ATM systems.



# System Implementation



- The Information Services must be able to allow the client to retrieve only the required **airspace elements**. Input **parameters**: temporal, geographical or any element's attribute.
- The server also gives a possibility to **insert** new information, **update** existing ones and turn an information from valid to invalid. This is done respecting some **rules**.
- **Governance**: API Manager
  - Authentication/authorization
  - Log/statistics

# Geometric representation at the 3D viewer



Airports and  
heliports at the  
Curitiba Flight  
Information  
Region (FIR)

# Geometric representation at the 3D viewer

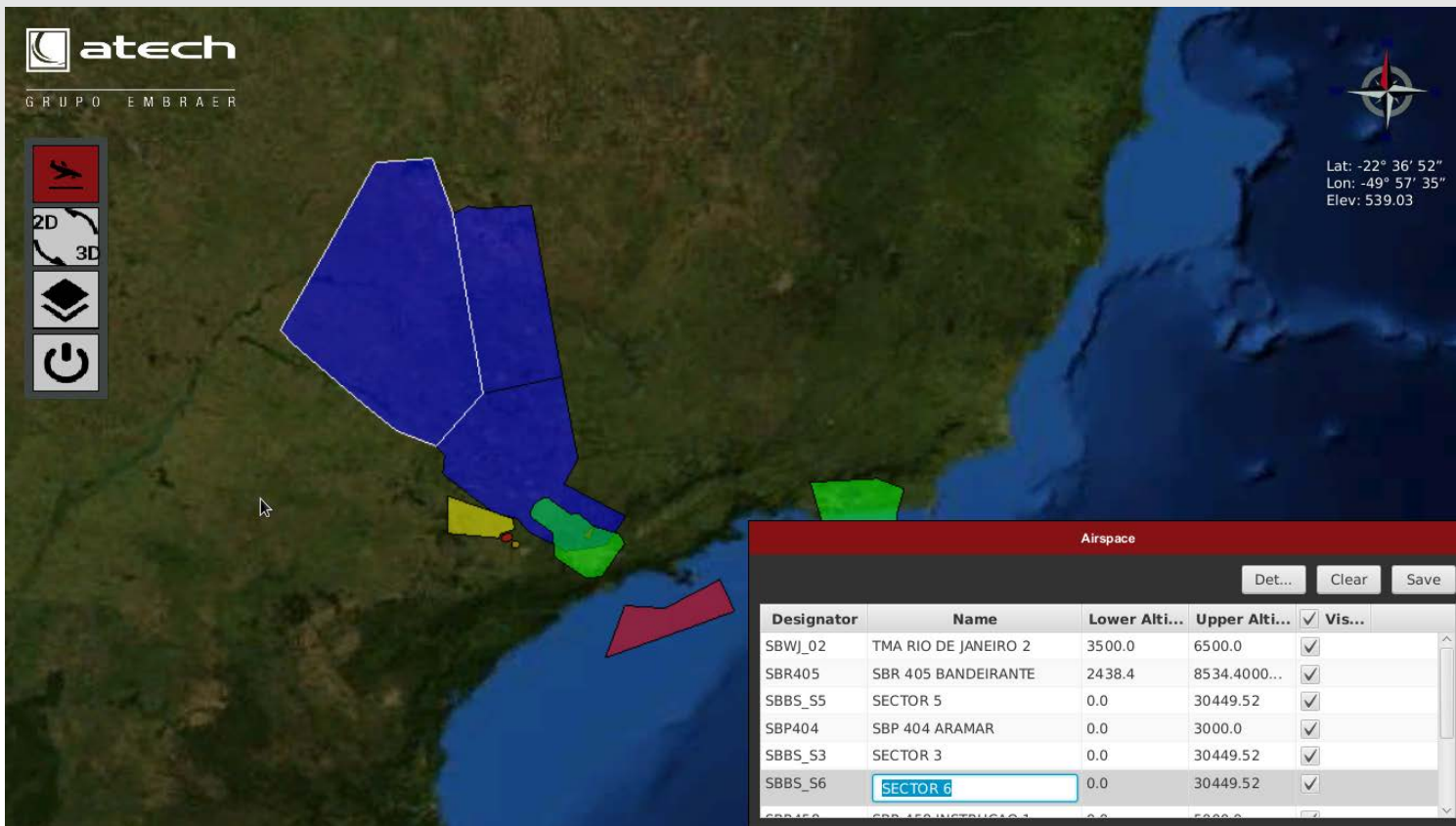


## Obstacles



# Edition of information at the 3D viewer

## Airspace edition



**atech**  
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2D 3D

Lat: -22° 36' 52"  
Lon: -49° 57' 35"  
Elev: 539.03

**Airspace**

Designator	Name	Lower Alti...	Upper Alti...	Vis...
SBWJ_02	TMA RIO DE JANEIRO 2	3500.0	6500.0	<input checked="" type="checkbox"/>
SBR405	SBR 405 BANDEIRANTE	2438.4	8534.4000...	<input checked="" type="checkbox"/>
SBB5_S5	SECTOR 5	0.0	30449.52	<input checked="" type="checkbox"/>
SBP404	SBP 404 ARAMAR	0.0	3000.0	<input checked="" type="checkbox"/>
SBB5_S3	SECTOR 3	0.0	30449.52	<input checked="" type="checkbox"/>
SBB5_S6	SECTOR 6	0.0	30449.52	<input checked="" type="checkbox"/>

Atech's operational systems have their own **representation** of the air space elements. It is necessary to convert the AIXM data in order to be used by the current systems.

A **mapping** has detected that the elements are not necessarily mapped one-to-one. The entities that are not modeled by the AIXM/FIXM/WXXM will be represented by **extensions** of them. The AIXM and its translated data is being used only for research purpose at the moment, being able to improve our systems later on.

Integration with systems - 3 cases:

- Remote Aerodrome Flight Information Service
- Medium-Term Conflict Detector
- Current Airspace Information Sharing Platform

The R-AFIS System assist aerodromes that do not have an ATC unit or it is closed, providing **Flight Information Service** and **Alerts**.

Tests were carried out with DECEA's data being provided to the RAFIS system. When the R-AFIS system makes a query, it receives only the information relevant to the aerodrome it is assisting.

Data (provided by the related ATC system):

- Meteorological information that affect landing and take-off,
- Runways' conditions,
- Airplanes' positions and procedures,
- Equipment,
- Other data for secure operations at the aerodrome

# Remote Aerodrome Flight Information Service



**Map Labels:**

- PTVISA CAB 21
- ANEMOMETRO
- BOQUEMATE
- AP-717 (INS-1)
- BIRUTA
- PLATAFORMA DO RADAR
- DVOR (PRE-SITE)
- VHF SIVAM
- AP-291 (ARP)
- PO DO PAPI (CAB-03) (LATERAL)
- CAB-03

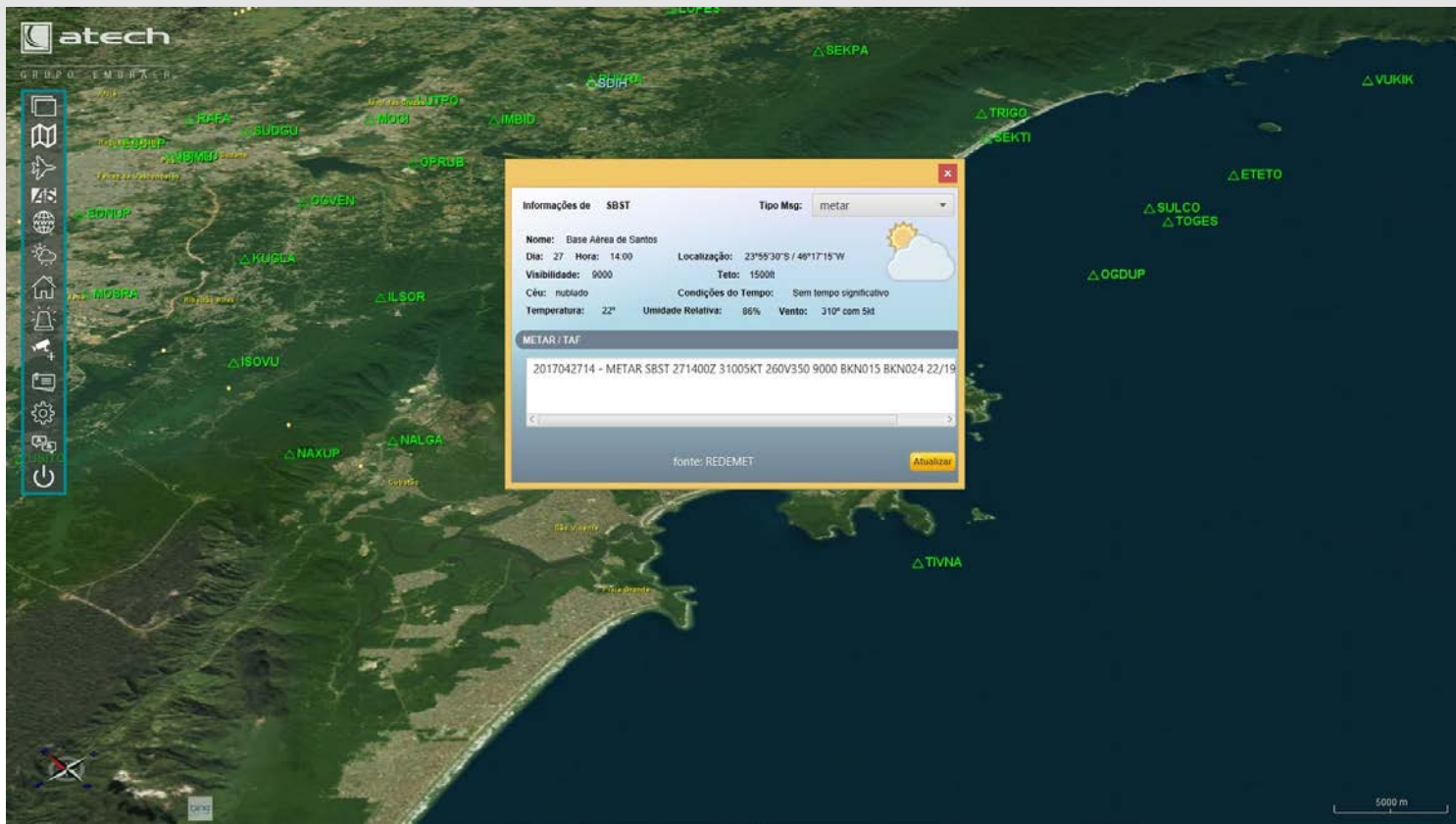
**Map Layer Selector:**

- ☒ I-cubed Landsat
- ☐ USGS NAIP Plus
- ☒ Bing Imagery
- ☐ USGS Topo Base Map
- ☐ USGS Topo Base Map Large Scale
- ☐ USGS Topo Scanned Maps 1:250K
- ☐ USGS Topo Scanned Maps 1:100K
- ☐ USGS Topo Scanned Maps 1:24K
- ☐ Political Boundaries
- ☐ Open Street Map
- ☐ Earth at Night
- ☒ Place Names
- ☒ Scale bar
- ☒ SBVH
- ☐ FIZ-VH

**Flight Information Panel:**

Aerodrome	AR	OMAA	SBGR	0515	DOF/151214
ETD191	AR	OMAA	SBGR	0515	DOF/151214
PTYNN	AR	SBJD	SBJD	1200	0
PRFBO	AR	SSQL	SBPR	1000	0
GLO7680	AR	SBGR	SABE	1120	0
CCA907	AR	LEMD	SBGR	0700	DOF/151213
PTVIY	AR	SWGJ	SB5R	0730	0

# Remote Aerodrome Flight Information Service



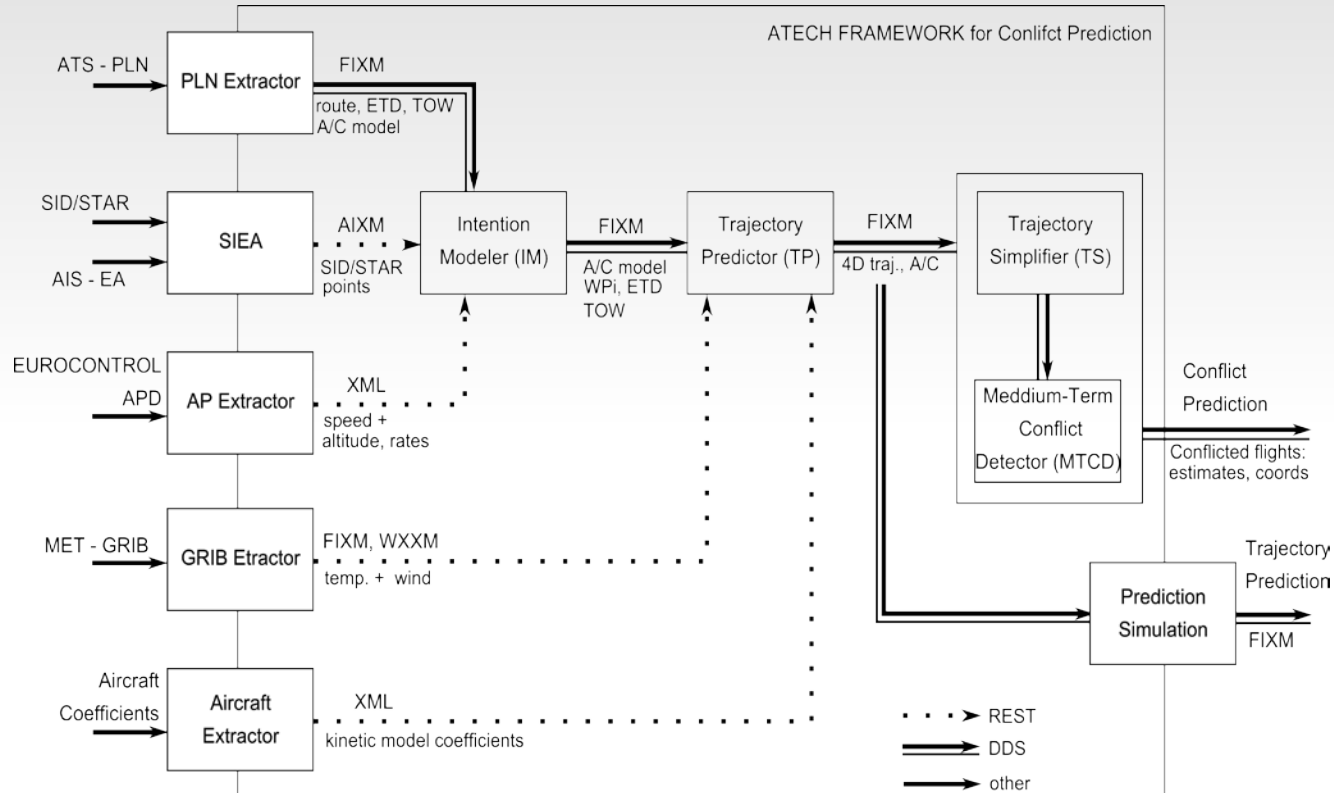
The Medium-Term Conflict Detector (MTCD) analyses two or more flights in order to detect if the **safety separation** is violated.

Trajectory prediction is an important step of conflict detection and it can also be enhanced by historical flight analysis. Later on, the Airspace Information Server will be able to provide this data in the FIXM format.

## Data:

- Departure and arrival procedures of the selected airports,
- Nav aids and designated points

# Medium-Term Conflict Detector





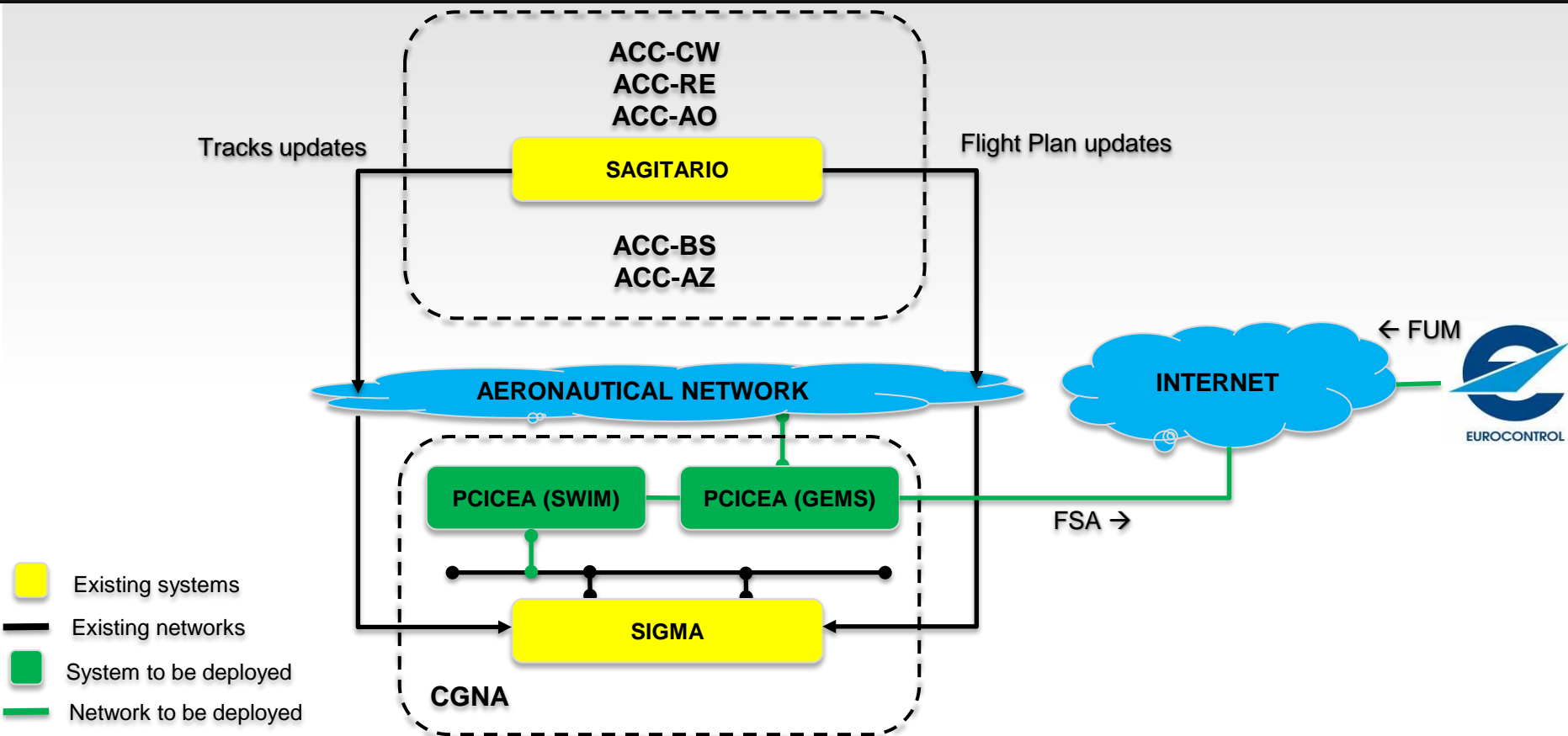
Cooperation agreement between Brazilian **DECEA** and **EUROCONTROL** to share information of international flights within the SWIM concept.

The project has 3 development phases.

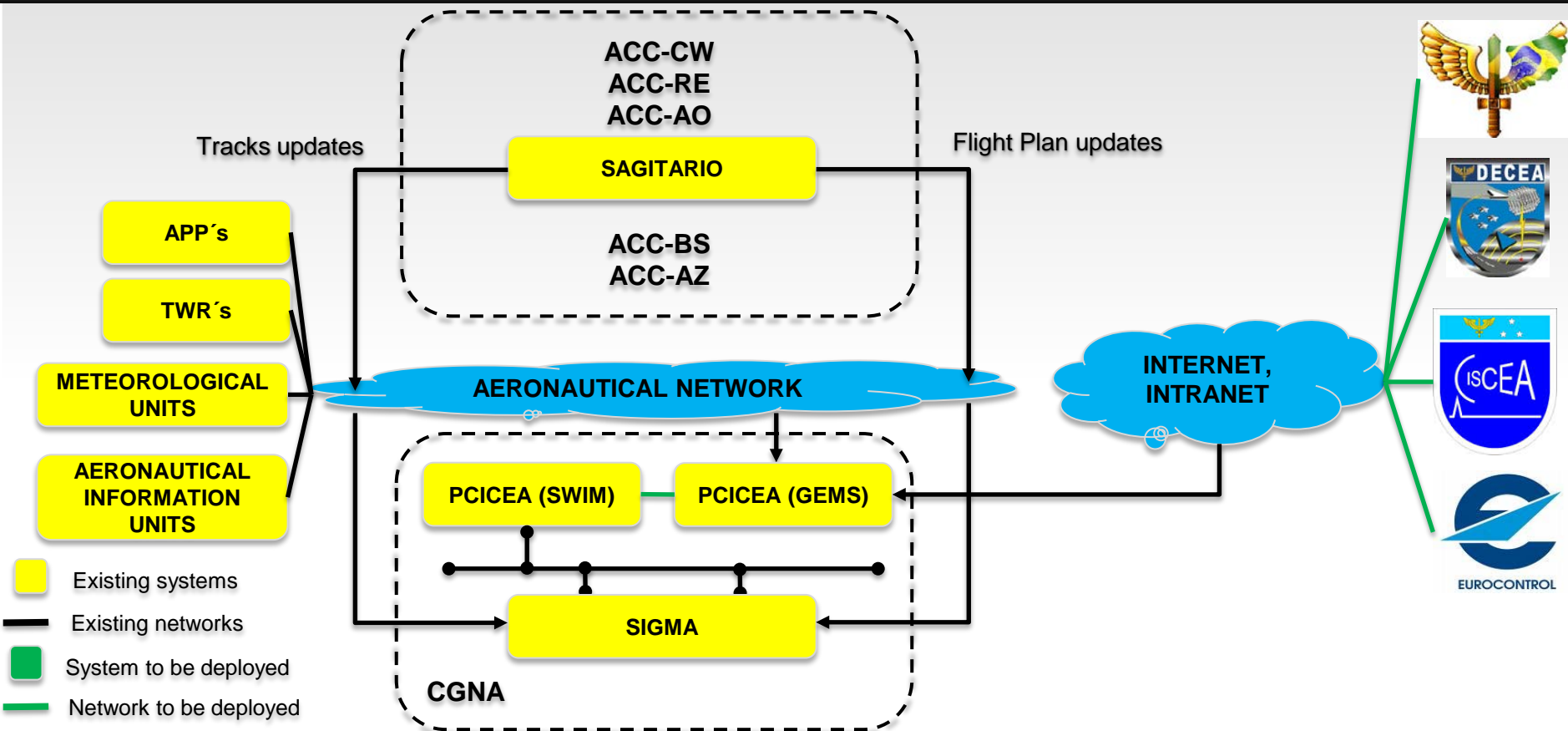
Test data from Information Service:

- Airports,
- Nav aids,
- Fixes,
- Flight Information Region (FIR),
- Terminal Maneuvering Area (TMA)

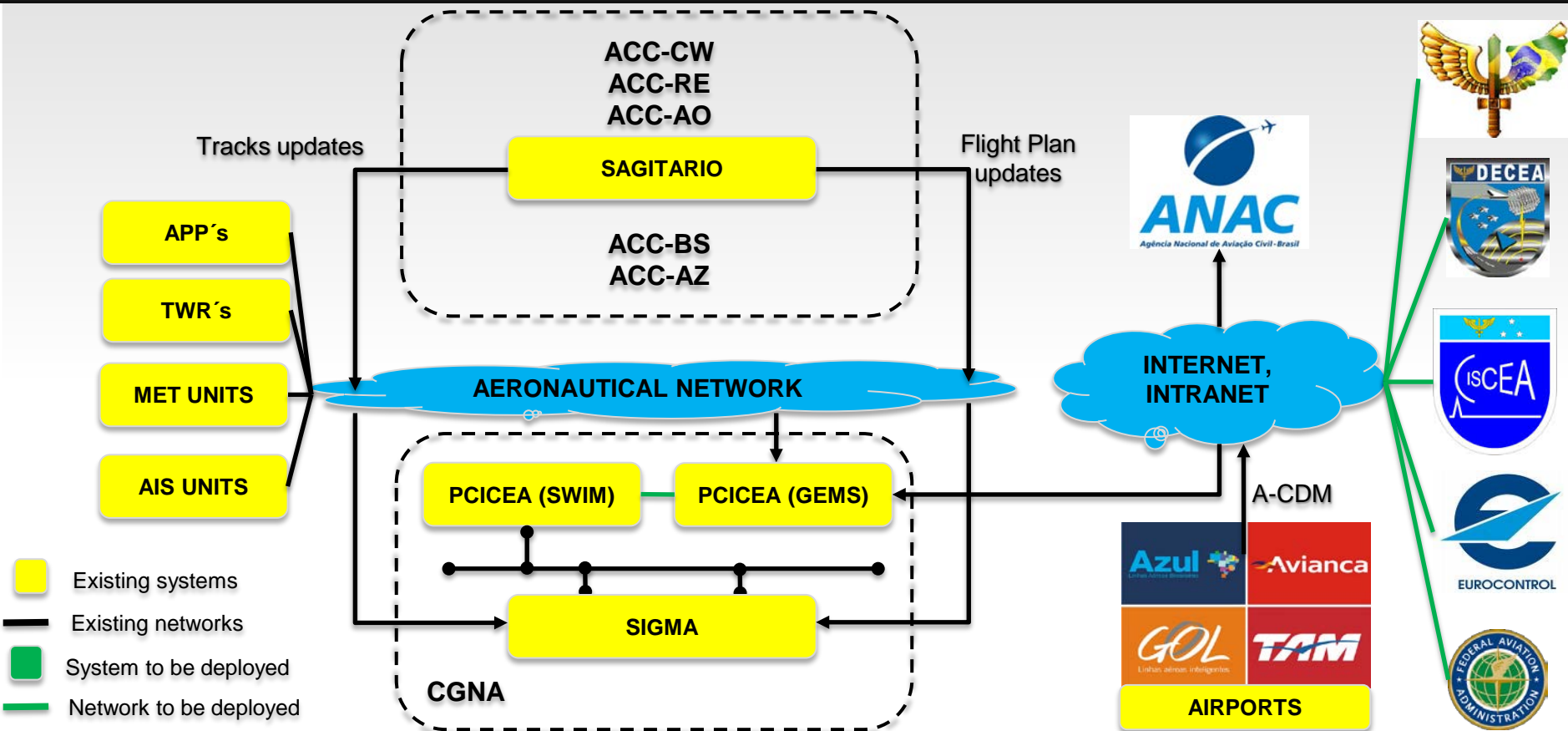
# PHASE 1: INTEGRATION WITH EUROCONTROL



# PHASE 2: INTEGRATION WITH OTHERS ATSU



# PHASE 3: INTEGRATION WITH OTHERS ENTITIES





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