



# IDS CRONOS

## Industry Experience

**Complete Reliable Operable NOTam System**

IDS Dynamic AIM Solution

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Corporate Sales & Marketing

## **1) Experience in Dynamic AIS**

- i. Reference Projects
- ii. Origins of CRONOS

## **2) xNOTAM Project**

- i. Overview
- ii. Capabilities
- iii. Architecture
- iv. Compliance to Event Specs

## **3) The System - CRONOS**

- 1) Overview
- 2) Logical Architecture
- 3) (x)NOTAM
- 4) MET

5) Flight Planning

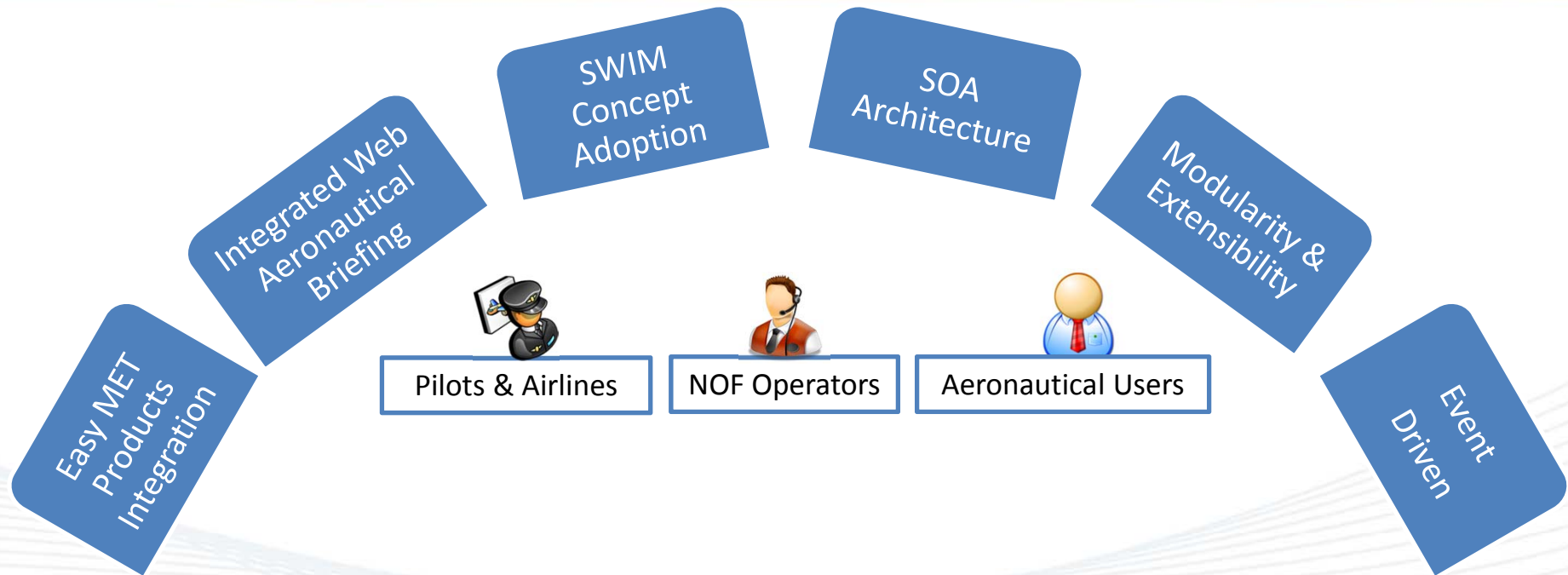
6) Briefing

## **4) ADQ / ADP**

## **5) Conclusions**

# **EXPERIENCE** in **DYNAMIC AIS**

CRONOS – IDS Dynamic AIS Management System



- ✈ ***Deeply Integrated within IDS AIS System (no duplicated data, PLX integrated)***
- ✈ ***Web Service oriented***
- ✈ ***Graphical interaction with data on WEB GIS***
- ✈ ***Static database integration***



→ OGC OWS-8/OWS-9:

Contribution to the implementation of the module for the « *dissemination of Digital NOTAM: IDS Broker* »



→ Eurocontrol Digital NOTAM Event Specification Focus Group:

presentation of Digital NOTAM (compliant Event Specification 1) support for the evolution of Event Specification 2

→ EUROCONTROL “Digital NOTAM and Digital Integrated Briefing Support” (WP 13.2.2):

support to the definition of validation plan & report relevant to the Digital NOTAM e *digital briefing*

SESAR – Support to ENAV on WP7 and WP13



→ SESAR SWIM Demo:

dissemination of Digital NOTAM via SWIM

→ SWIM Master Class:

implementation of communication interfaces with CFMU via B2B Services



**ENAV - Italian ANSP**  
Digital NOTAM Project



**NACL – Zambia ANSP**  
NOTAM, MET, FPL, & PIB



**TTCAA - Trinidad & Tobago ANSP**  
NOTAM, MET, FPL, & PIB



**NAATC – Curacao ANSP**  
NOTAM, MET, FPL, & PIB



**AEROTHAI - Thailand ANSP**  
NOTAM, MET, FPL, & PIB



**Oro Navigacija – Lithuania ANSP**  
NOTAM, MET, & PIB



AERONÁUTICA CIVIL  
Unidad Administrativa Especial

**Aerocivil – Colombia ANSP**  
NOTAM, MET, & PIB



**JCAA – Jamaica ANSP**  
NOTAM, MET, FPL, & PIB



**CAAB – Botswana ANSP**  
NOTAM, MET, FPL, & PIB



**Open Geospatial Consortium**  
OWS-8 (2011) & OWS-9 (2012)



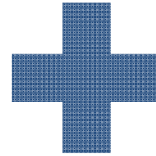
**IDAC – Dominican Republic ANSP**  
NOTAM, MET, FPL, & PIB



**EUROCONTROL**  
Digital NOTAM Event  
Specification Focus Group

## Traditional NOTAM Management System

- NOTAM, OPMET, FPL management & dissemination
- minSDO AIXM Database
- Briefing Functionality
- High Availability & Replication
- AMHS & AFTN Interoperability



## Digital NOTAM System

- Digital NOTAM management
- Full SDO AIXM5.1
- Wizard FPL Creation
- Advanced Briefing
- SWIM interfaces

**CRONOS**  
Aeronautical Information Management System



- Event driven Dynamic AIS data management
- Advanced Briefing Functionality
- Full SDO AIXM 5.1 Database
- SWIM services and AMHS & AFTN
- High Availability Architecture
- Dual Environment for NOTAM and D-NOTAMs

# **EXPERIENCE** in **DYNAMIC AIS**

CRONOS – IDS Dynamic AIS Management System

## **xNOTAM**





→ **ENAV** together with **IDS** has been cooperating on a three-year Project (divided in 3 phases) aimed at implementing a prototype for NOTAM messages digitalization according:

- AIXM 5.1 standards
- AIXM 5.1 temporality model
- GML standards



→ The aim of the **xNOTAM Project** is to provide a framework, resources and substantiated proof-of-concept of digital NOTAM concept, in order to support an accurate and always up-to-date common situational awareness of aeronautical operations environment

## → xNOTAM Phase 1:

- Implementing Dynamic Database linked to AeroDB
- Traditional NOTAM acquisition and digital translation

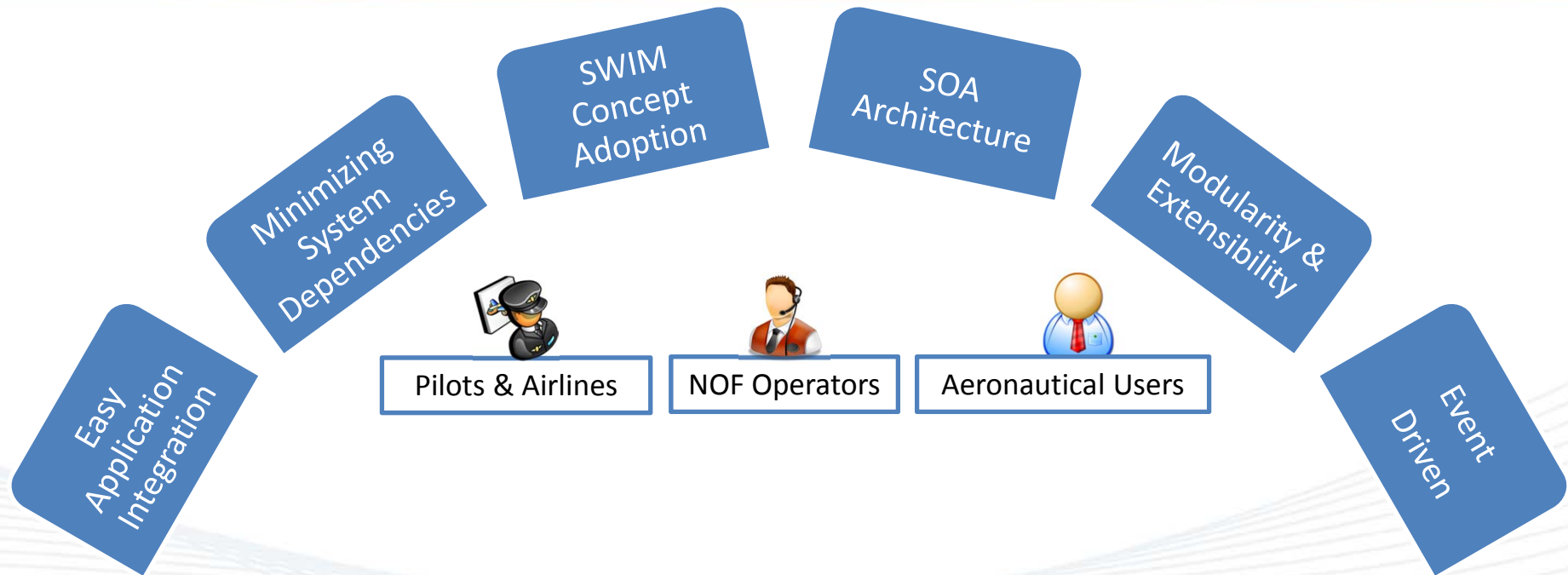
## → xNOTAM Phase 2:

- Flight Plans and Pre-Flight Information Bulletin
- Enquiry of NOTAM Messages (Digital Format)
- Map Widget Implementation for Web

## → xNOTAM Phase 3:

- Digital NOTAM Aeronautical Event Pro

```
A3322/06 NOTAMN
Q)LIXX/QXXXX/IV/M/E/000/999/400
7N01358E330
A)LIMM LIRR LIBB
B)0607092045 C)0607092115
E)SPECIAL NOTICE: GERMANY 2006
FIFA WORLD CUP -
WINNER : ITALY
CAMPIONI DEL MONDO
CHAMPIONS OF THE WORLD
MEISTER DER WELT
CHAMPIONS DU MONDE
CAMPEONES DEL MUNDO
CAMPE/ES DO MUNDO
MESTERE AV VERDENEN
KAMPIOENEN VAN DE WERELD
```



## ✈ Enav Project results

- ✈ has been tested with AIS & NOF Operators
- ✈ the results have been tracked – the success of the overall Project identifies other requirements to be implemented, such as management of Events even for static data
- ✈ Once more, this project has proved the constructive partnership between ENAV and IDS
- ✈ ENAV potentially could be among the first to go digital

➔ All **Events** included into ECTL – Digital NOTAM Event Specification, including the ones defined as “work in progress”

Published special activity area – Activation	Published ATS Airspace – Activation or Deactivation	Ad-Hoc special Activity area – creation
Ad-Hoc ATS airspace – Creation	Route Portion Closure	Route Portion Opening
Aerodrome Closure	Runway Closure	Navaid unserviceable
New Obstacle	Other Event	
<b>Withdrawn Obstacle</b>	<b>Taxiway Closure</b>	<b>Airport Surface Contamination</b>



- For any question regarding the result of the project you can contact :

**Giulio Melilli**

Air Navigation Service Department

Aeronautical Information Service

Head of Aeronautical Data Management/Quality  
and Production Unit

[giulio.melilli@enav.it](mailto:giulio.melilli@enav.it)

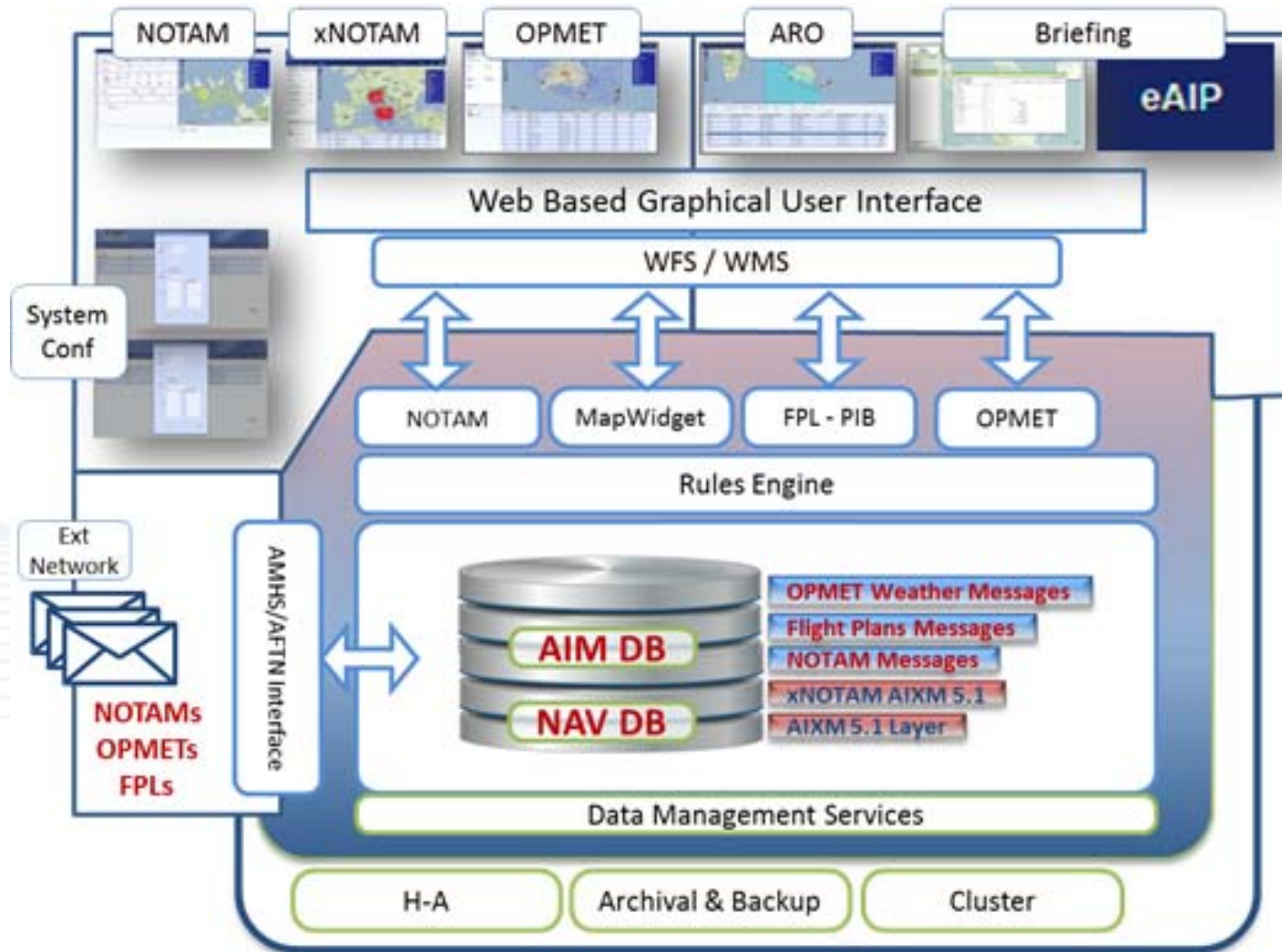
# **IDS CRONOS SYSTEM**

CRONOS – IDS Dynamic AIS Management System

# **CRONOS**

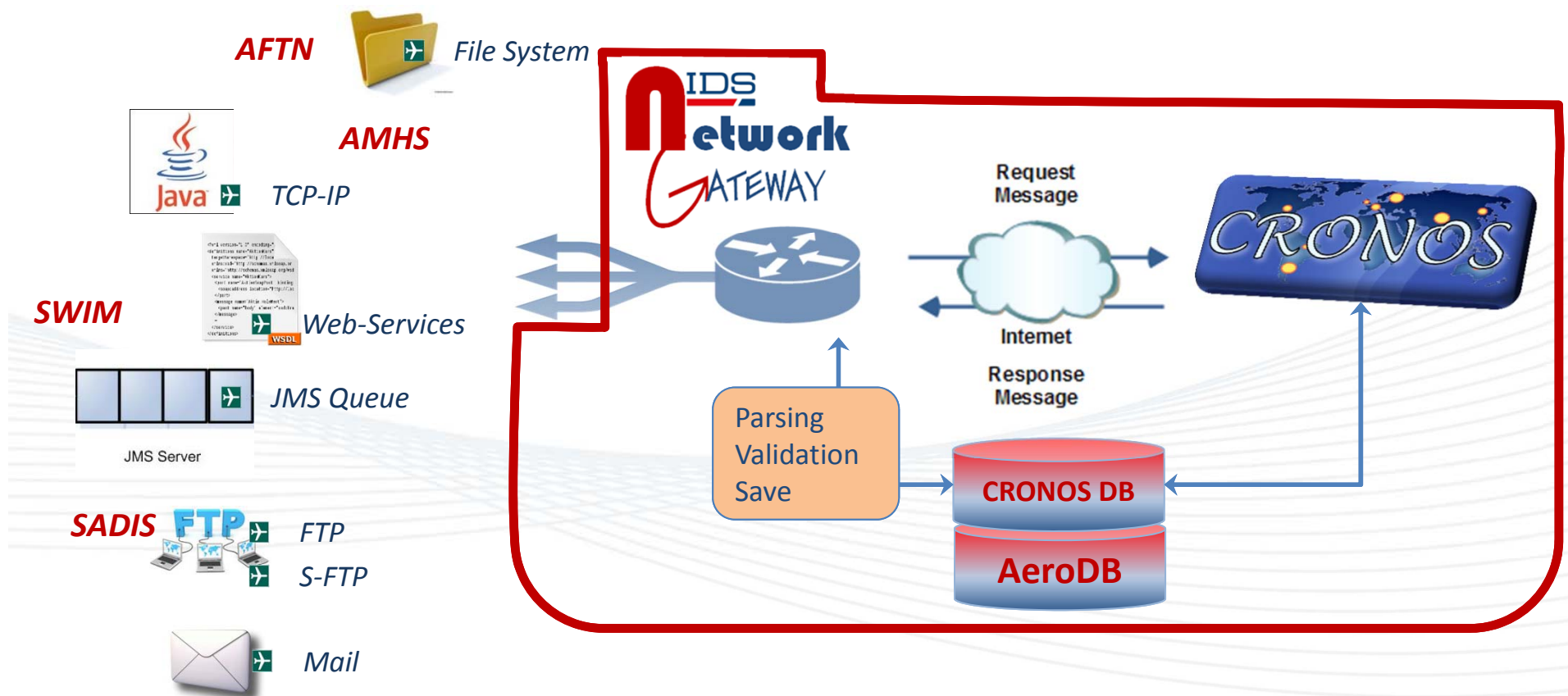
## → **Single Product**

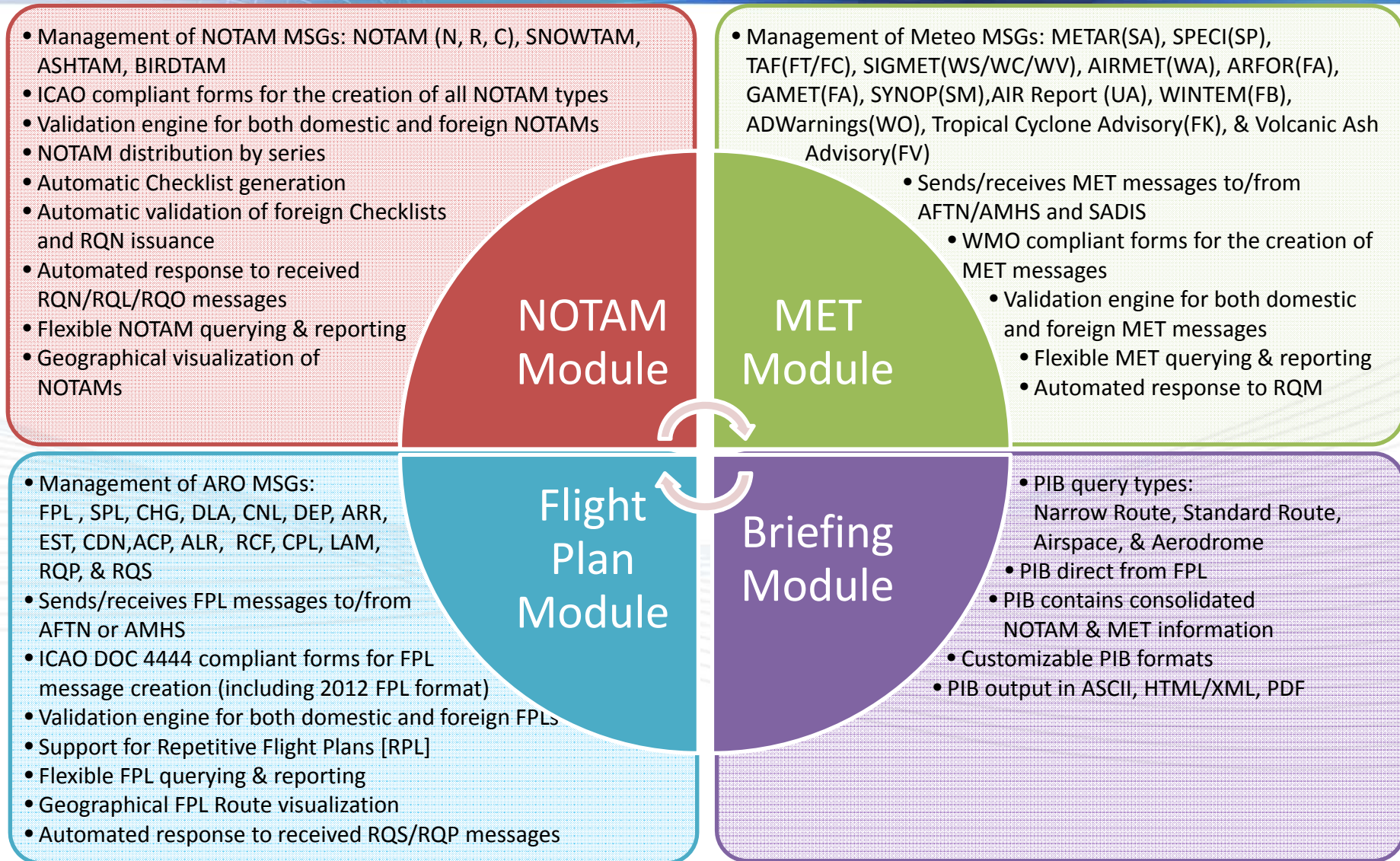
- *Inherits core capabilities of each product*
- *Repositions these capabilities to reflect the future paradigm of AIM*
- **Event Driven data management of NOTAM, D-NOTAM, MET, and FPL information**
- **Advanced briefing capabilities**
- **Fully Integrated with AIXM 5.1 database**
- **Interoperable with AMHS, AFTN & SWIM and b2b Svcs**
- **Interoperable with other IDS's Tools**
- **High-availability deployment configuration**





## ✈ Integration and Communication Patterns





## Aerodrome (Runway and Taxiway)

- Closure
- Limitation
- Other Event
- Trigger
- Airport Surface Contamination

## ATS Airspace

- Activation / De-Activation
- Creation
- Other Event
- Trigger

## NavAIDS (Waypoints)

- Creation
- Unserviceable
- Other Event
- Trigger

## Airways (Routes)

- Route Portion Closure
- Route Portion Opening

## Airways (Routes)

- Closure
- Opening
- Other Event
- Trigger

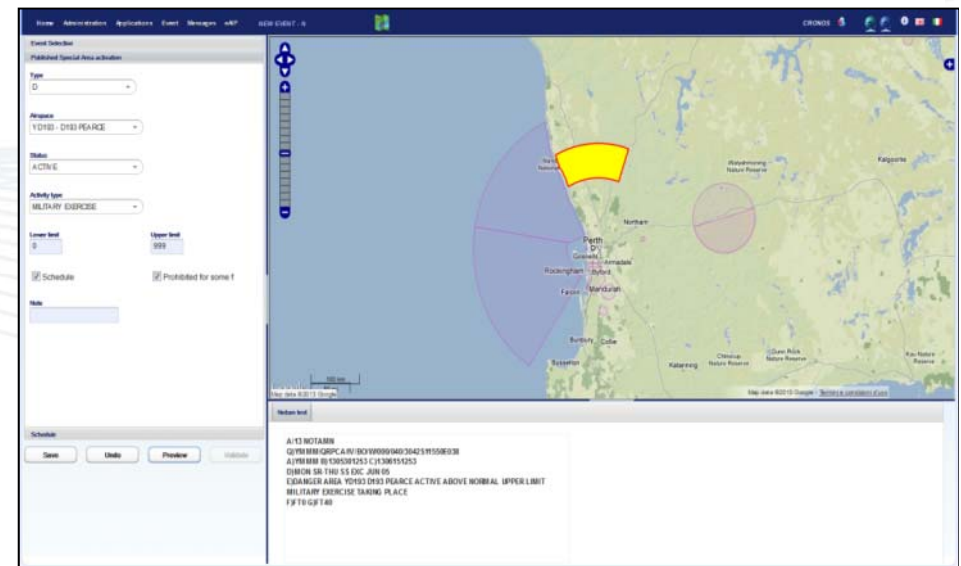
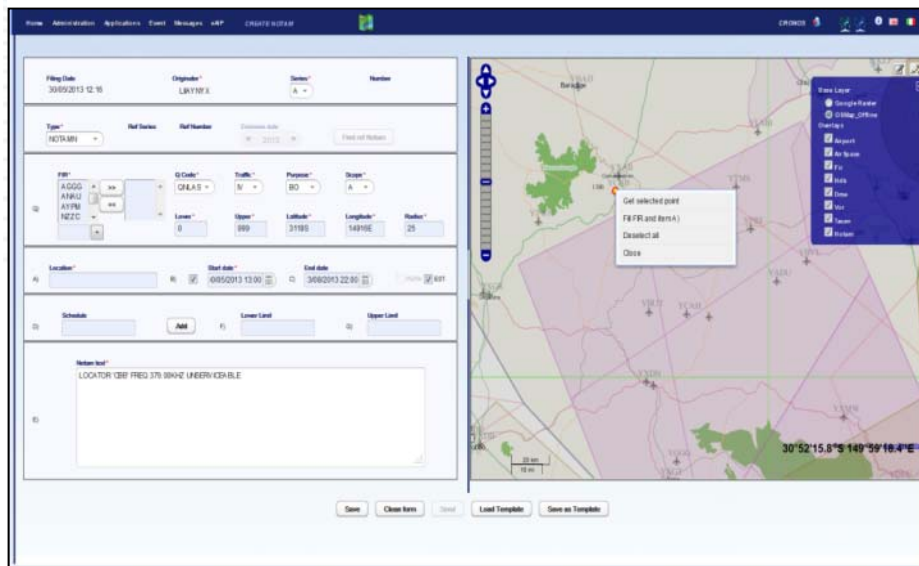
## SAA Airspace

- Activation / De-Activation
- Creation
- Other Event
- Trigger

## Obstacle

- Obstacle Creation
- Obstacle Withdrawn
- Obstacle Other Event
- Obstacle Trigger

- ✈ *NOTAM proposal creation/update*
- ✈ *NOTAM dissemination*
- ✈ *NOTAM Replacement*
- ✈ *NOTAM Cancelation*
- ✈ *x-TAM Lists*
- ✈ *Traditional ICAO Templates*
- ✈ *Message Templates*
- ✈ *Aeronautical Event creation/update*
- ✈ *Digital NOTAM dissemination*
- ✈ *Digital NOTAM Replacement*
- ✈ *Digital NOTAM Cancelation*
- ✈ *Events' List*
- ✈ *Wizard-driven creation process*
- ✈ *Enhanced interaction with Web GIS components and aeronautical data*



# IDS Aeronautical Digital Message Publishing



Administration Applications Event eAIP **NEW EVENT - N** Welcome User2 User2 Logout

**Event Selection**

Special Area creation

Designator: ASIG12 Name: ASIG12

Type\*: TRA Activity type: AEROBATICS

Lower limit\*: 0 Uom lower limit: FL

Upper limit\*: 150 Uom upper limit: FL

Status: ACTIVE

Location Note: Controlling Unit Note:

Excluded Airspace

GAMMA - Gamm: LIT SA74B - LI TSA  
LICTRBA1 - Ame  
LICTRBA2 - Ame  
LIR51D - LI R51D

Note: REF AIP 5.1.2-15  Schedule

Schedule

Geometry detail

Save Undo Preview Validate

**Notam text**

```

/NOTAMN
Q)LIBB/QRRCA/IV/BO/W/000/150/4159N01546E012
A)LIBB B)1207271111 C)1207311111
E)TEMPORARY RESERVED AREA ( ASIG12 ) ASIG12 ESTABLISHED FOR AEROBATICS
AS FOLLOWS: 4156N 01531E - 4149N 01540E - 4150N 01553E - 4159N 01557E -
4205N 01547E - 4204N 01535E - 4204N 01535E - 4201N 01534E - 4201N 01535E -
4200N 01536E - 4157N 01536E - 4156N 01531E ; EXCLUDING LICTRBA1 CTR_P AND
LICTRBA2 CTR_P AND LIR51D R AND LITSA74B TSA REF AIP 5.1.2-15
F)0FL G)150FL
    
```

# IDS Aeronautical Digital Message Publishing

INGEGNERIA DEI SISTEMI

Administration Applications Event eAIP NEW EVENT - N Welcome Luca Giallombardo Logout

Event Selection  
Airport Surface Contamination

Runway Info

Runway: 18/36  
Runway lights:  R  L  
Cleared runway length (M):   
Cleared runway width (M):   
Deposit: 4/9/6  
Cont. (%): 100/49/26  
Mean depth Deposit:   
Friction: 2/3/5  
Further clearance:   
Further clearance Date: hh:mm  
Critical snowbanks:   
Taxiway snowbanks:   
Taxiway: J  
Taxiway Status:    
Runway: RUNWAY

Save Undo Preview Validate

SNOWTAM  
A) LIML  
B) 07311224  
C) 18 F) 4/9/6 H) 2/3/5 I)  
100/49/26 N) J  
R) 1  
S) 07311224

Base Layer  
Google Raster  
OSMap\_Offline  
Overlays  
 Airport  
 Runway  
 Runway Direction  
 Taxiway  
 Snowtam

Map data ©2012 Google Terms of Use

Validation mask Configuration

NAME	DESCRIPTION
FAA	FAA NOTAMs Message Validation Rules
DEFAULT	DEFAULT MASK (TO BE C...

table\_mask

Update Validation Mask

Name:  Description:

FIELD	VALIDATION LEVEL
Item B	No error Allowed
Item C	No error Allowed
Fir	No error Allowed
Q Code	No Data on Db Allowed
Traffic	No error Allowed
Purpose	No value Allowed Value Malformed Allowed
Scope	No Data on Db Allowed

Check coherence

Q Code, Scope, Traffic, Purpose

Item A, FIR, Scope

Originators

AGGH	KASE
ANAU	KATL
AYPM	KAUS
BGSF	KBHM
BIRK	KBUF
DGAA	KCRP
DNLL	KDAL
KDCA	KDTW
EUEC	KZWY
FAJN	KEFD

Update Remove Undo

Add

→ **High-Configurable NOTAM Message Validation Engine**

→ **Validation Levels per each of the NOTAM fields**

✈ *x-TAM Lists per status*

- ✈ *Saved/Updated*
- ✈ *In sending*
- ✈ *Submitted*
- ✈ *Received*
- ✈ *Invalid Received*

✈ *Event List per status:*

- ✈ *Saved/Updated*
- ✈ *In Sending*
- ✈ *Submitted*
- ✈ *Received*
- ✈ *Invalid Received*

✈ *NOTAM History*

✈ *Message Auditing*

The screenshot displays the x-TAM software interface. The main window shows a table of events with columns for Event name, Series, Number, Year, ICAO Code, Type, Status, User, Application, Emission date, Start date, and End date. A pop-up window titled 'NotamDetail' is open, showing the history of a specific NOTAM (NA-13-2013 NZCC). The history includes three entries:

- Version 0: status: Event inserted, rec date: 18-01-2013 16:12, user: CRONOS
- Version 1: status: (S)NOTAM sent to Quires, rec date: 18-01-2013 16:14, user: CRONOS
- Version Last: status: (N)NOTAM sent, rec date: 18-01-2013 16:14, user: CRONOS

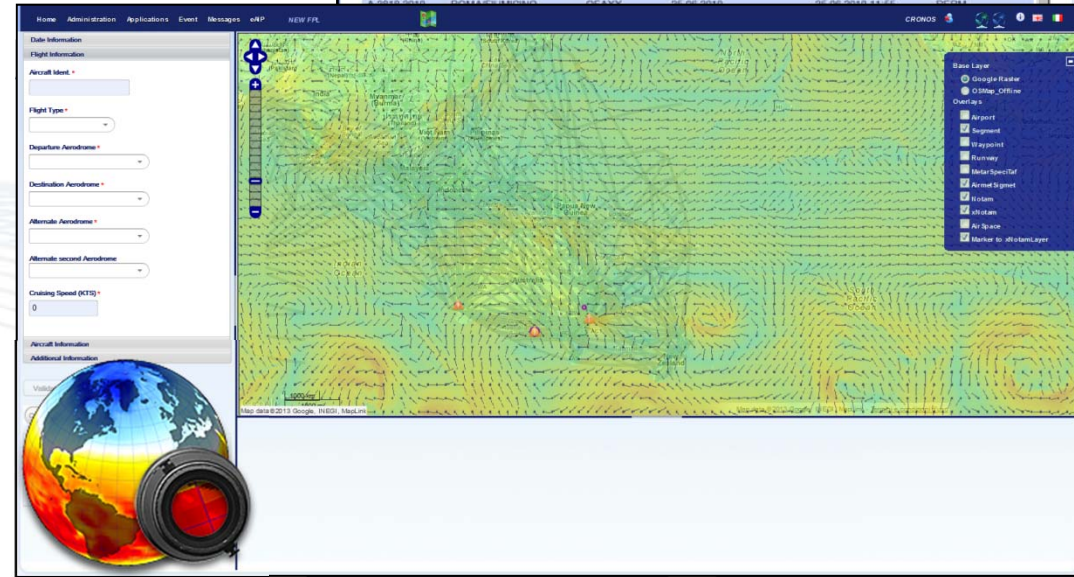
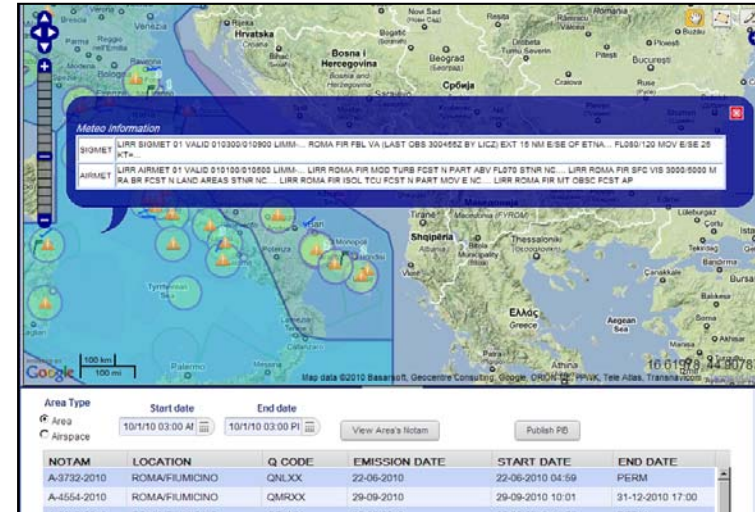


 **Collection of OPMET messages and data from External Systems**

 **Fully compliant MET bulletin collection and distribution**

 **Storage of graphical products**

 **WebGIS visualization of information**



✈ *FPL as a Digital Object to which linking updates*

✈ *Flight Plan Registration*

✈ *Wizard based tool*

✈ *Automatic Routing*

✈ *FPL Route Assistance using web-GIS interaction and visualization*

✈ *Flight Plan 3D Visualization*

✈ *FPL approval process*

✈ *PIB from FPL production*

The screenshot shows a flight planning application with a 2D map view. The map displays a network of flight routes over a geographical area. A specific route is highlighted in red. Below the map is a data table with the following columns: POS, ID, START, END, WIDTH, LENGTH, LEVEL, and AIRWAY.

POS	ID	START	END	WIDTH	LENGTH	LEVEL	AIRWAY
1	69190	VOR_BSI	Waypoint_MILX	null null	54 NM	UPPER	UA317
2	54439	Waypoint_MLX	Waypoint_PAPES	null null	84 NM	UPPER	UA317
3	47054	Waypoint_PAPES	Waypoint_OPRUX	null null	45 NM	UPPER	UA317
4	53542	Waypoint_OPRUX	Waypoint_EOOLA	null null	92 NM	UPPER	UA317
5	46346	Waypoint_EOOLA	Waypoint_MALMI	null null	89 NM	UPPER	UA317
6	53545	Waypoint_MALMI	Waypoint_XNQU	null null	72 NM	UPPER	UA317
7	46336	Waypoint_XNQU	Waypoint_OERTU	null null	30 NM	UPPER	UA317
8	46054	Waypoint_OERTU	VOR_ATF	null null	124 NM	UPPER	UA317
9	51244	VOR_ATF	Waypoint_NASAL	null null	123 NM	UPPER	UA317
10	46005	Waypoint_NASAL	Waypoint_DEMIT	null null	139 NM	UPPER	UA317
11	46097	Waypoint_DEMIT	Waypoint_AROPI	null null	91 NM	UPPER	UA317
12	46063	Waypoint_AROPI	Waypoint_IGAPO	null null	70 NM	UPPER	UA317
13	45582	Waypoint_IGAPO	Waypoint_STONE	null null	47 NM	UPPER	UA317

The screenshot shows a 3D visualization of a flight route over a globe. The route is highlighted in orange. Below the 3D view is a data table with the following columns: POS, ID, START, END, WIDTH, LENGTH, LEVEL, and AIRWAY.

POS	ID	START	END	WIDTH	LENGTH	LEVEL	AIRWAY
1	69190	VOR_BSI	Waypoint_MILX	null null	54 NM	UPPER	UA317
2	54439	Waypoint_MLX	Waypoint_PAPES	null null	84 NM	UPPER	UA317
3	47054	Waypoint_PAPES	Waypoint_OPRUX	null null	45 NM	UPPER	UA317
4	53542	Waypoint_OPRUX	Waypoint_EOOLA	null null	92 NM	UPPER	UA317
5	46346	Waypoint_EOOLA	Waypoint_MALMI	null null	89 NM	UPPER	UA317
6	53545	Waypoint_MALMI	Waypoint_XNQU	null null	72 NM	UPPER	UA317
7	46336	Waypoint_XNQU	Waypoint_OERTU	null null	30 NM	UPPER	UA317
8	46054	Waypoint_OERTU	VOR_ATF	null null	124 NM	UPPER	UA317
9	51244	VOR_ATF	Waypoint_NASAL	null null	123 NM	UPPER	UA317

## ✈️ *SWIM Standard – CFMU IFPS interoperability*

- ✈️ *Compose Flight Plans by using published aeronautical valid data*
- ✈️ *Propose Route for approval*
- ✈️ *Validate Route*
- ✈️ *Send FPL and Store Flight Object*
- ✈️ *Get Response messages (ATS) from CFMU*
  - ✈️ *ACK*
  - ✈️ *REJ*
  - ✈️ *DLN*
  - ✈️ *CHG...*

Administration Applications Event eAIP

Date Information

Flight Information

Aircraft Information

Additional Information

CFMU Interaction

Response message from CFMU:

OFF  Automatic route

## ✈️ *SWIM Standard* – CFMU IFPS Interoperability

The screenshot displays a flight planning application interface. On the left, a sidebar contains navigation tabs (Administration, Applications, Event, eAIP) and a 'NEW FPL' section. Under 'NEW FPL', there are sections for 'Date Information', 'Flight Information', 'Aircraft Information', 'Additional Information', and 'CFMU Interaction'. The 'CFMU Interaction' section includes buttons for 'Propose route', 'Validate route', and 'Send and save'. A callout box labeled '1' points to the 'Send and save' button. Below these buttons, a yellow message box labeled '2' displays a 'Response message from CFMU: Creation FPL succeeded, it's saved into DB with status VALID. The Id is: BT01487727'. At the bottom of the sidebar, there is a 'Validate' button and a toggle for 'Automatic route' (currently OFF).

The main area features a map of Italy and surrounding regions (Bosnia and Herzegovina, Albania) with a network of flight routes. A red line highlights a specific route starting from Genoa and ending at Pisa. A large red circular area is overlaid on the map, centered around the Pisa area. A legend on the right side of the map lists various map layers and overlays, including 'Airport', 'Segment', 'Waypoint', 'Runway', 'Metar Spec/Taf', 'Airmet Sigmet', 'Notam', 'AirSpace', 'xNotam', and 'Marker to xNotamLayer'.

At the bottom of the interface, a table displays the flight plan details:

POS	ID	START	END	WIDTH	LENGTH	LEVEL	AIRWAY
1	698	VOR , GEN , LI	Waypoint , KALMO , LI	5 NM	22 NM	UPPER	UM730
2	2295	Waypoint , KALMO , LI	Waypoint , BEROK , LI	5 NM	34 NM	UPPER	UM730
3	699	Waypoint , BEROK , LI	Waypoint , RUXOL , LI	5 NM	10 NM	UPPER	UM730
4	700	Waypoint , RUXOL , LI	Waypoint , BALUK , LI	5 NM	3 NM	UPPER	UM730
5	2296	Waypoint , BALUK , LI	VOR , FRZ , LI	5 NM	15 NM	UPPER	UM730
6	701	VOR , FRZ , LI	Waypoint , VALEN , LI	5 NM	23 NM	UPPER	UM730
7	481	Waypoint , VALEN , LI	Waypoint , VERNA , LI	5 NM	17 NM	UPPER	UZ904
8	482	Waypoint , VERNA , LI	Waypoint , PREKI , LI	5 NM	76 NM	UPPER	UZ904
9	2037	Waypoint , PREKI , LI	VOR , PES , LI	5 NM	54 NM	UPPER	UQ920
10	2038	VOR , PES , LI	VOR , VIE , LI	5 NM	88 NM	UPPER	UQ920
11	1335	VOR , VIE , LI	Waypoint , PISIP , LI	5 NM	35 NM	LOWER	L612

## ✈ 5 Types of PIB:

- ✈ FPL
- ✈ Area (2)
- ✈ Airway
- ✈ Aerodrome

## ✈ PIB Outputs:

- ✈ Graphical
- ✈ Textual (ASCII)
- ✈ HTML, XML, PDF

## ✈ Incremental Notifications:

- ✈ Triggered Email

The screenshot displays the CRONOS system interface with several key components:

- Flight Data Table:**

FLIGHT: ANZ176 YPPH IFR NZAA			
Name:	ANZ176	Created by:	CRONOS
Departure date/time:	13/02/13 18:21	Arrival date/time:	14/02/13 00:06
Departure Aerodrome:	YPPH - PERTH	Destination Aerodrome:	NZAA - AUCKLAND
Alternate Aerodrome:	NZAR - AIRDRE		
- Weather Documentation:**
  - DOCUMENTAZIONE METEO DEL VOLO: DA LIML A LIRN** (Left panel)
  - METEO DOCUMENTATION OF FLIGHT: FROM YPPH TO NZAA** (Right panel)
- Wind Chart:**

WIND CHART  
FL 050 (0850 hPa) - Valid 13-FEB-2013 12:00 UTC  
UNITS: KNOTS Issued 13-feb-2013 12:00 utc

The chart shows wind vectors and speed over a geographic area, with a color scale on the right ranging from 4.5 to 49.5 knots.
- Map and PIB Output:**
  - A map of New Zealand with a PIB area highlighted in yellow and red.
  - A table of airway data at the bottom right:

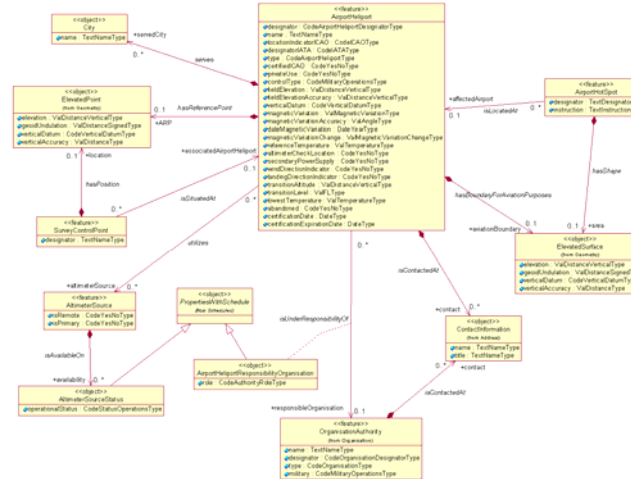
LENGTH	LEVEL	AIRWAY
47 NM	UPPER	UP92
37 NM	UPPER	UM872
58 NM	UPPER	UM872
64 NM	UPPER	UM872
18 NM	UPPER	UM872
16 NM	UPPER	UM872
26 NM	UPPER	UM872
6 NM	UPPER	UM130
18 NM	UPPER	UM872

# **ADQ ADP**

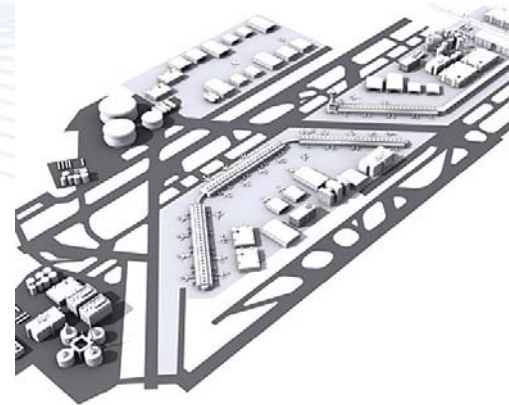
CRONOS – IDS Dynamic AIS Management System

## ✈️ What matters is the information, not how it is distributed or organized in DBs

✈️ User Assisted



✈️ Product Assisted



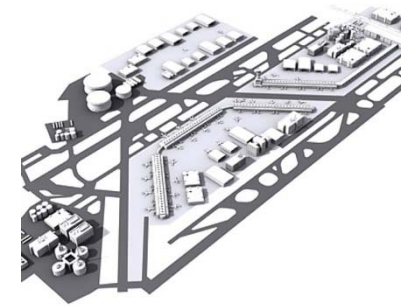
## Dynamic Data Integration Event Concept



✈ *Has a time of validity*

✈ *Represents Changes to:*

- ✈ *Aeronautical data*
- ✈ *Meteorological data*
- ✈ *FPL data*



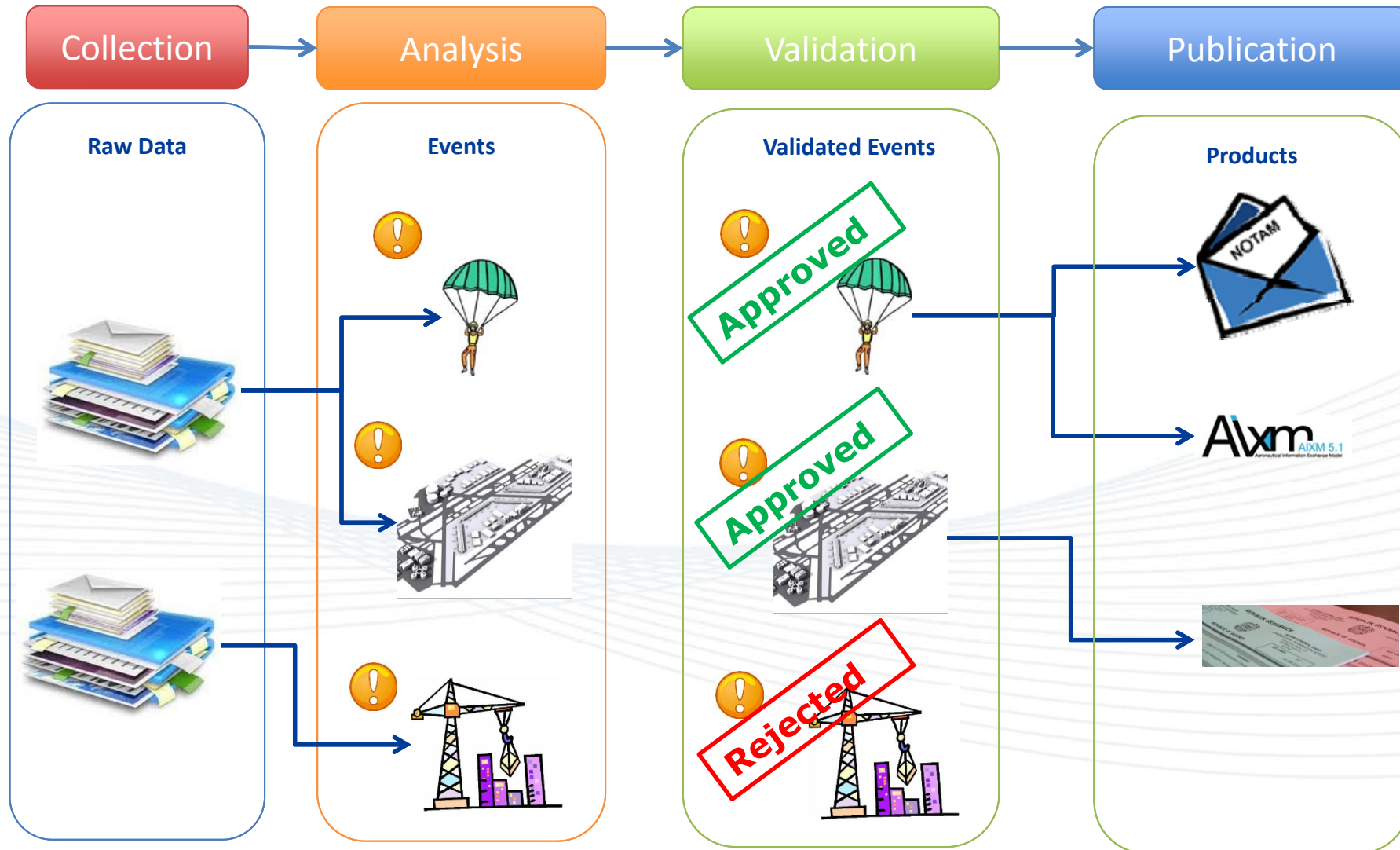
✈ *May be Notified via Aeronautical Networks:*

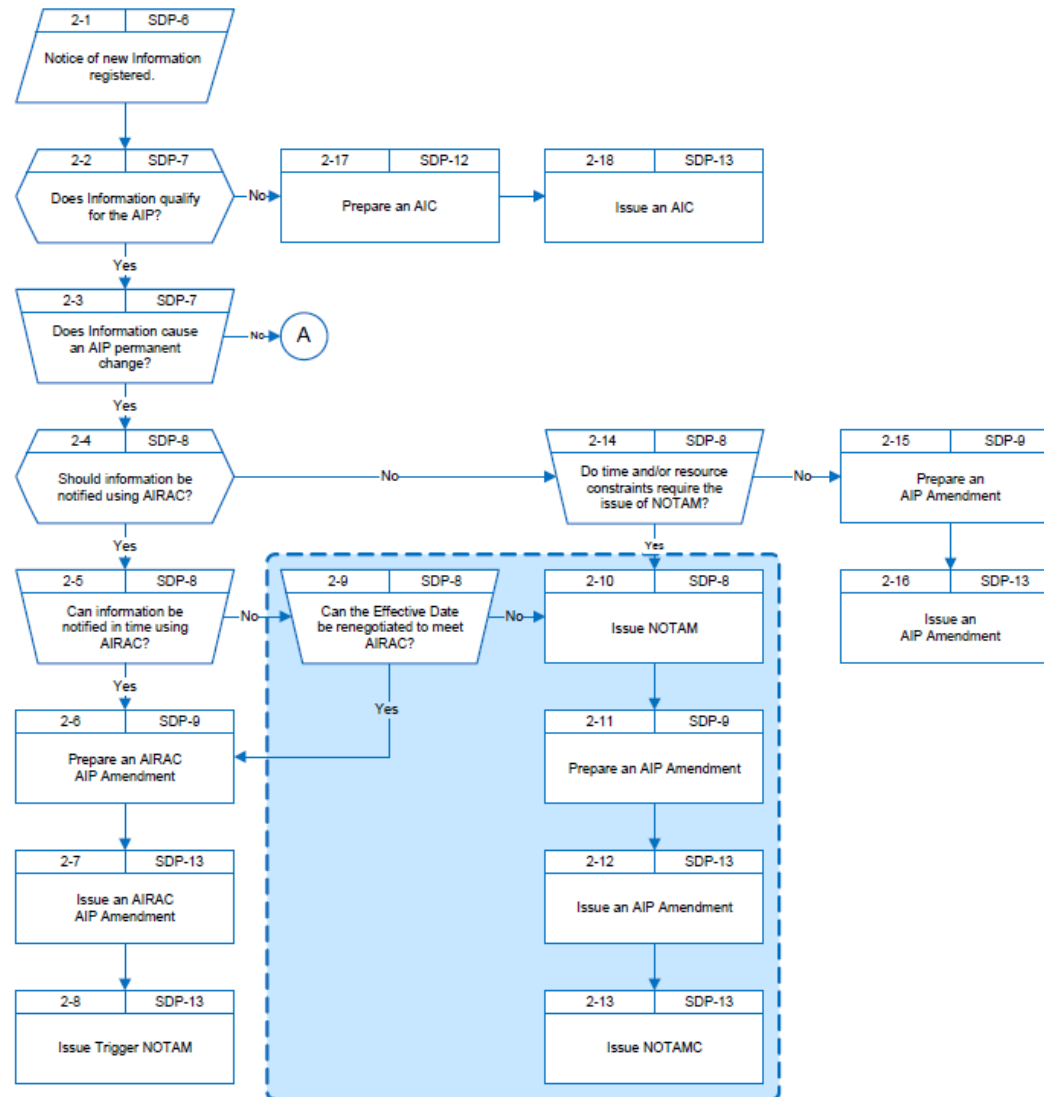
- ✈ *AMHS*
- ✈ *WS*
- ✈ *AFTN*

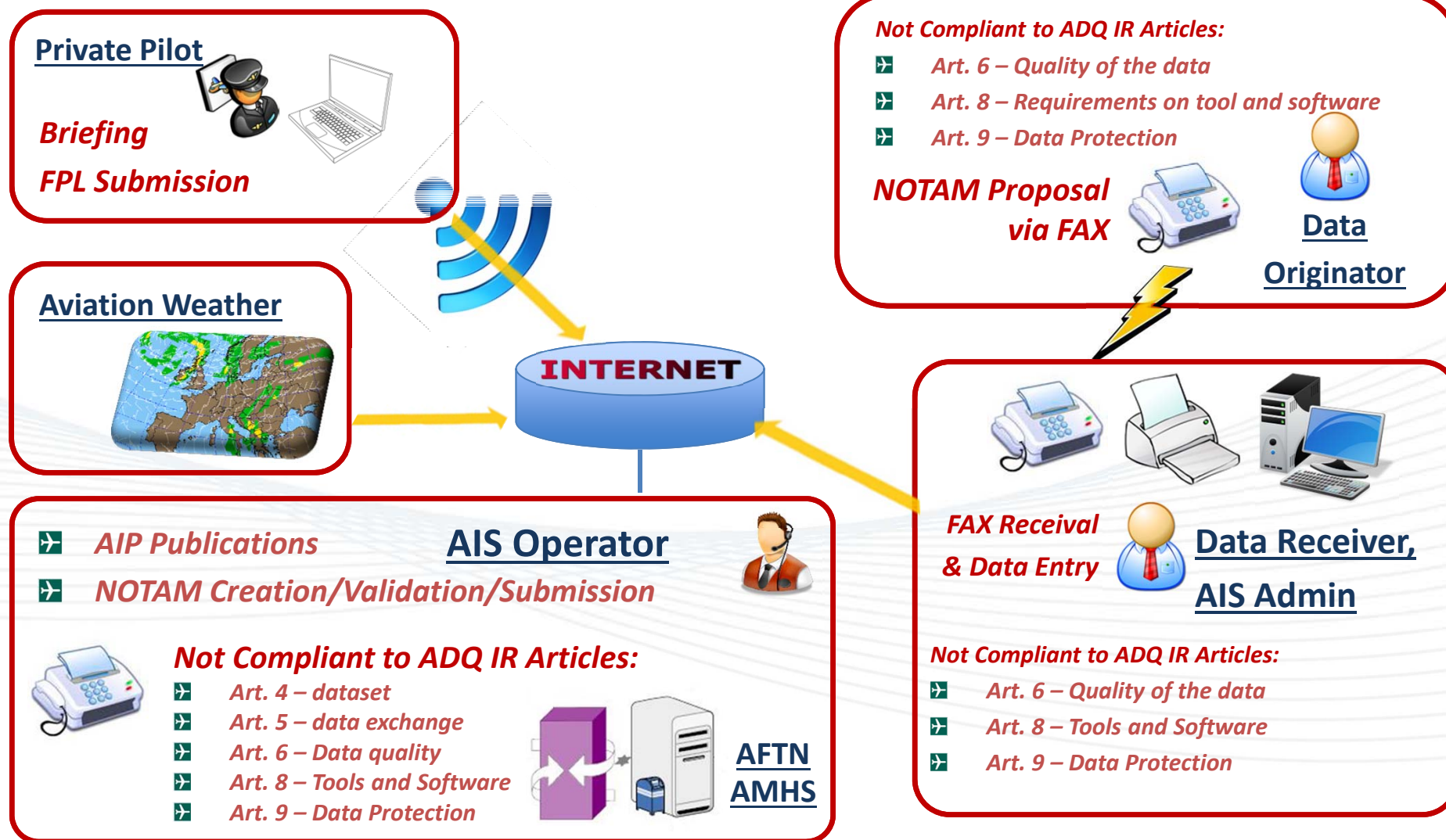
✈ *May be published via different communication paths:*

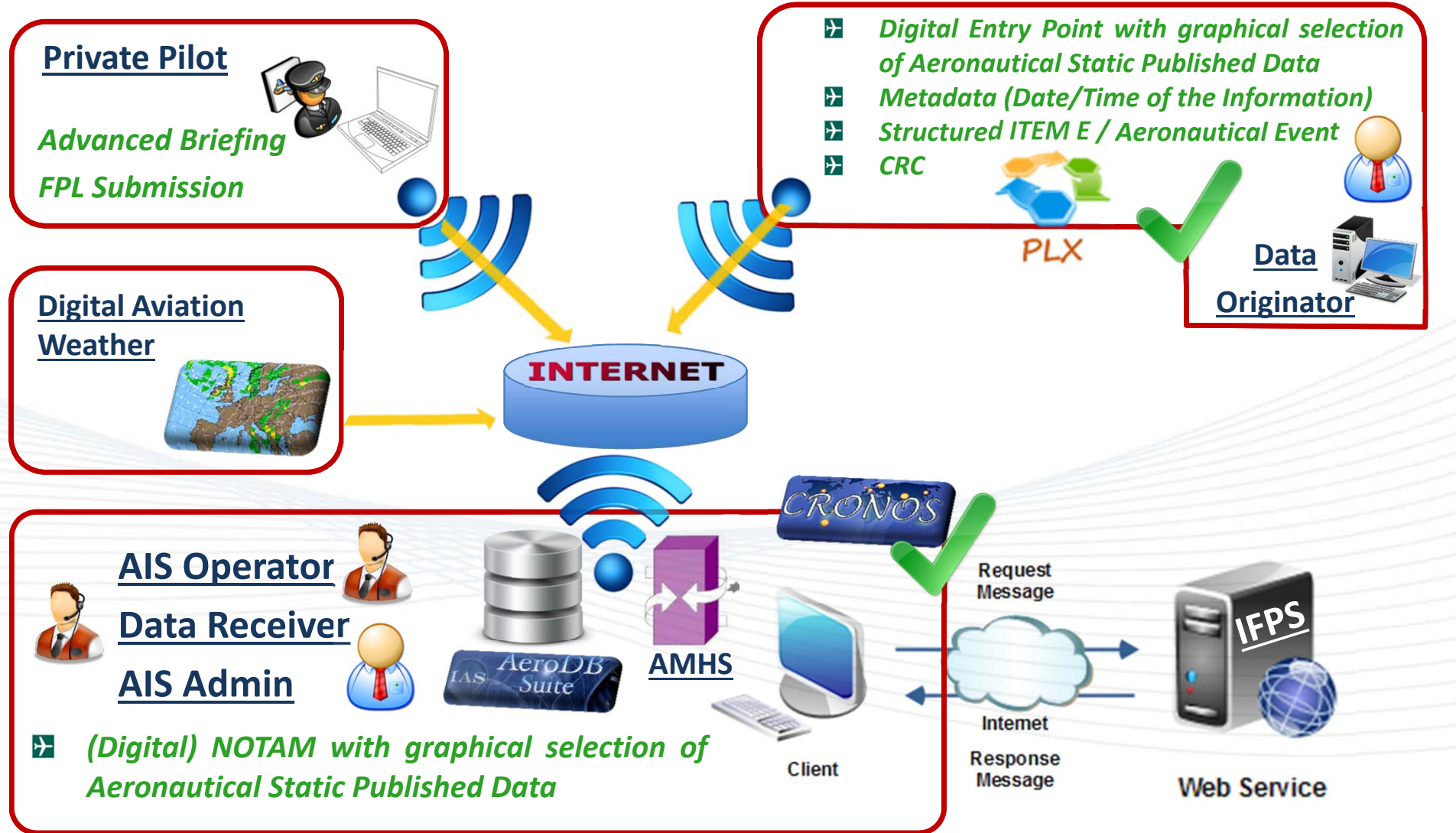
- ✈ *eAIP, AIP, Chart*
- ✈ *Web*











## **✈ Aeronautical Information Briefing**

- ✈ *Distributed Access to Static and Dynamic Aeronautical Information in a common and integrated environment*
- ✈ *eAIP connectivity*
- ✈ *Incremental Notification Updates for Pilots*



## **✈ Auditing**

- ✈ *Efficient Tracking of the main activities on aeronautical data (Who does what, and when)*

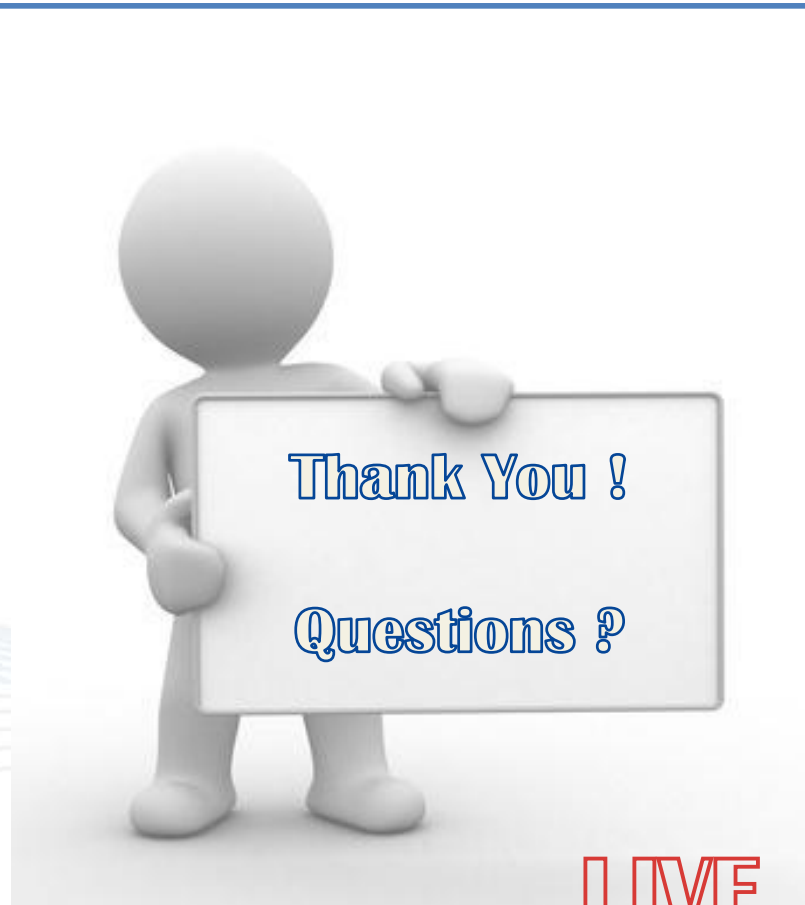
## **✈ Technology**

- ✈ *MET Interoperability*
- ✈ *SOA – Compliancy to SWIM standards ready to be used*
- ✈ *Interoperability system-to-systems and b2b services*

## **✈ Strategic – Leadership in implementing Digital NOTAM**

- ✈ *Leadership in improving data quality and integrity*

- ➔ *....Proven system for traditional message management*
- ➔ *....compliance to all “+” Digital NOTAM event specifications*
- ➔ *....event driven data management*
- ➔ *....SWIM Compliance*
- ➔ **Dedicated GUIs to CFMU interaction**



**LIVE  
DEMO**

