

Aeronautical Information Service A DIGITAL PRESENT

ICAO EUR/NAT and MID interregional SWIM Seminar
Tbilisi, Georgia
JUNE 24TH 2026



*Everyone embarks on their own transformation journey.
Today, I would like to share ours at ENAIRE.*

*How we started by automating AIS processes
and ended up swimming.*

We would be proud to support and share this journey with you.



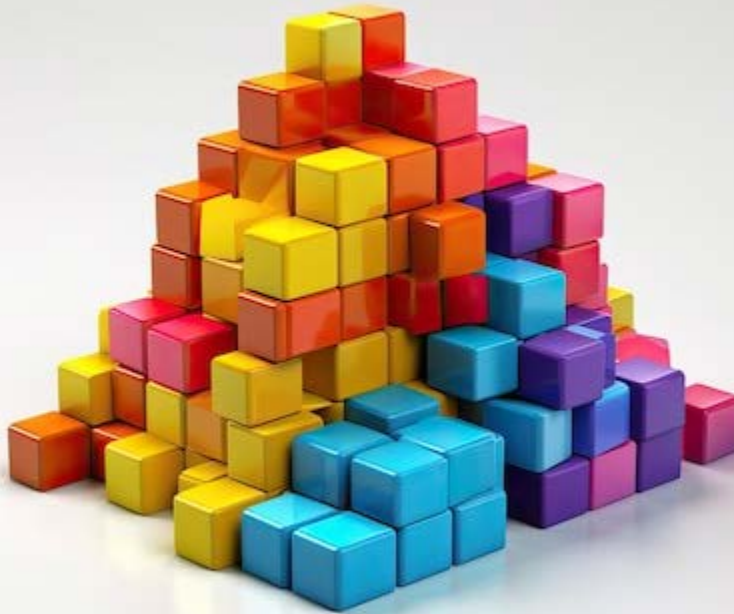


The object of the aeronautical information service (AIS) is to ensure the flow of aeronautical data and aeronautical information necessary for global air traffic management (ATM) system safety, regularity, economy and efficiency in an environmentally sustainable manner

Anex 15

DATA
SAFETY
EFFICIENCY

How? Processes



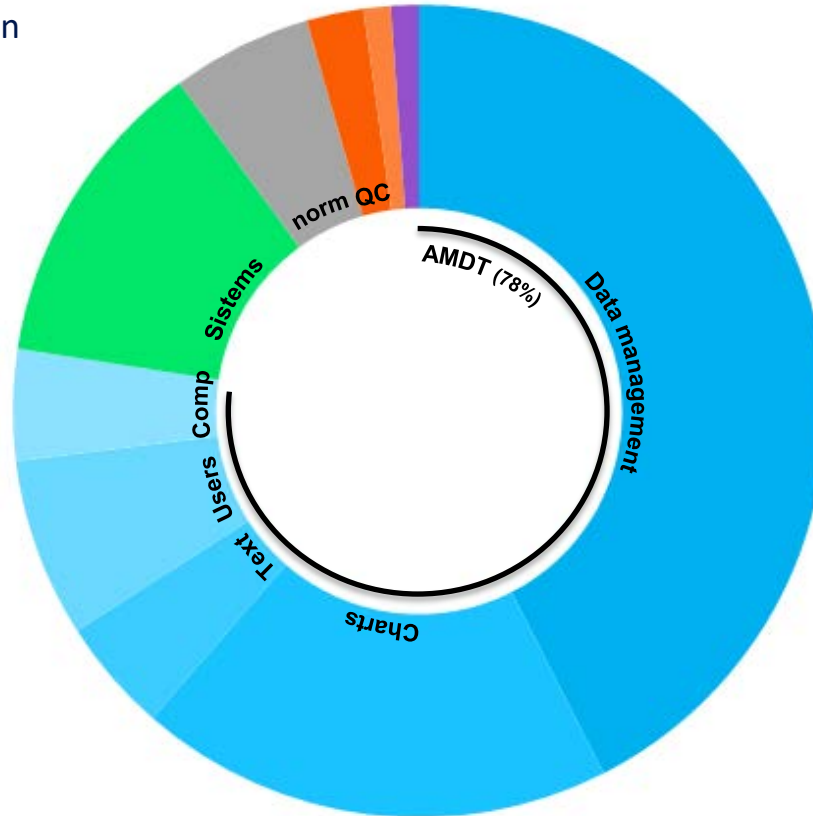
Receive,
Plan,
Process (validate, verify, assemble)
Store,

Specify,
Process (validate, verify, assemble)
Edit (including formating),
Publish,
Distribute

How? Processes



Workload distribution





No database, the AIP is the reference

2010 and before – AIS Processes – focus on the product

1.- Data arrives in Excel, AutoCAD, PDF, etc..

2.- Impact assessment using the AIP (hand made annotations)

3.- AIP charts and text pages are manually edited with CAD and text editors. Drafts are sent for review and approval

4.- Once all products are approved, the AMDT is compiled and sent to the printshop.



AIS DO



GESIS



Editing
MicroStation,
QuarkXpress, etc.



AIP
PDF or paper

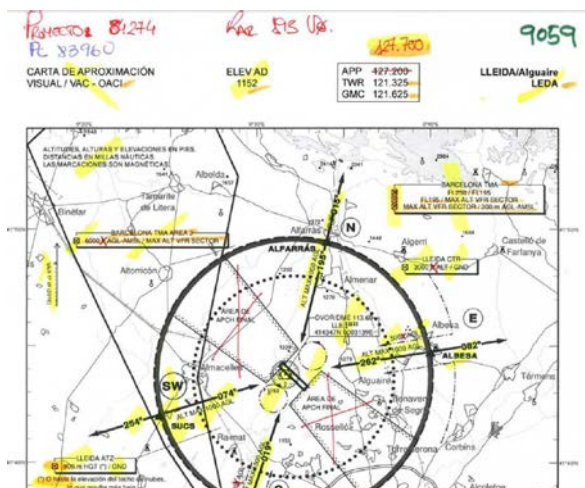


Users

No data base, the AIP is the reference

2010 and before – AIS Processes – focus on the product

Impact assessment on a chart



Tools we worked with

MicroStation

MGE

iPLOT

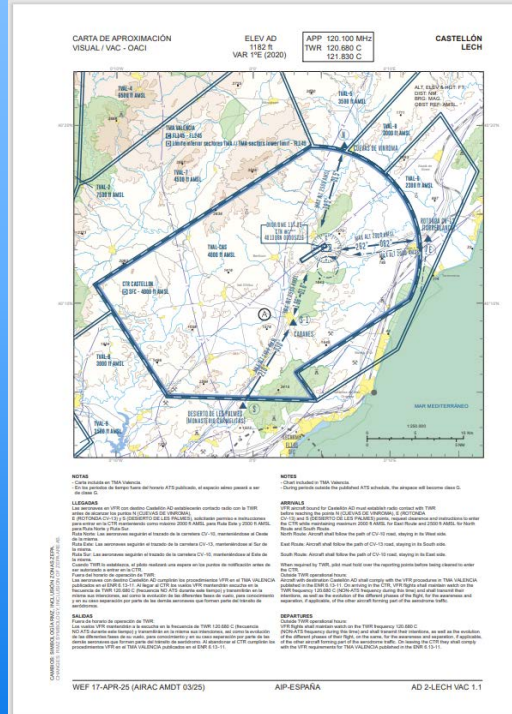
Map Publisher

IRASB / IRASC

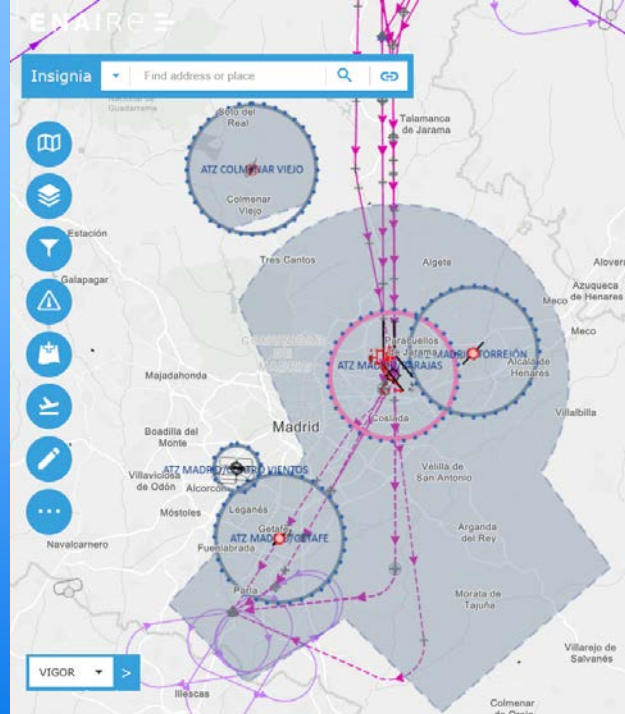


Our road to AIM and SWIM

2010 – Productivity
Automated charts.



2012- The database is the asset.
Apps



2015 - Beyond AIS. API.
2025 - SWIM



Stage 1 - Automation



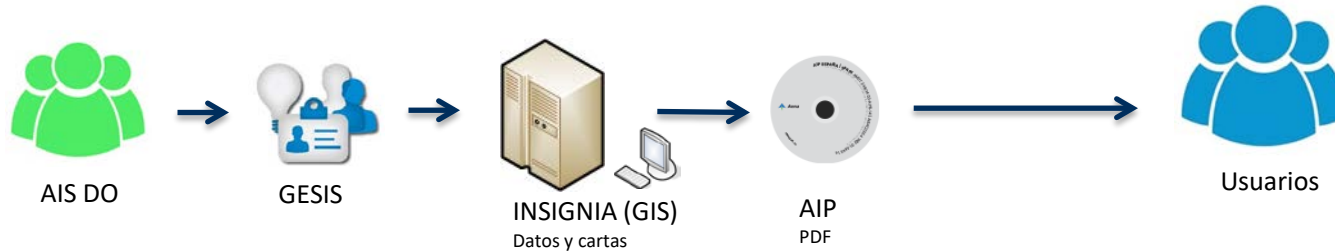
We have a database, but the PDF AIP is still the reference.
2010 we introduced GIS in our processes

1.- Data arrives in Excel, AutoCAD, PDF,
etc. **Data base is updated**

2.- Impact assessment using the AIP (hand
made annotations)

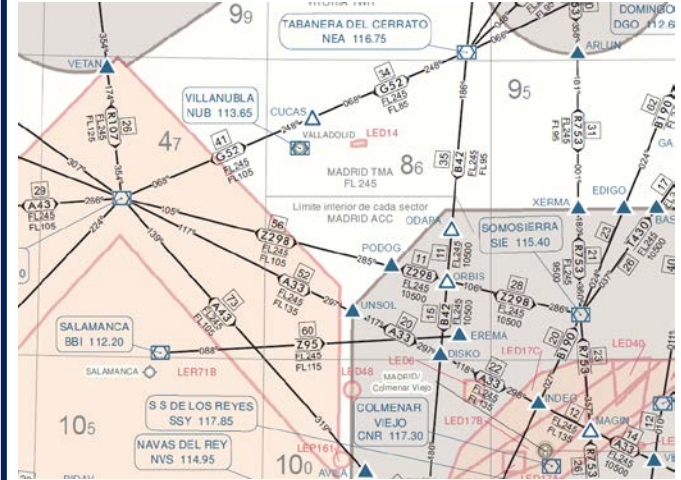
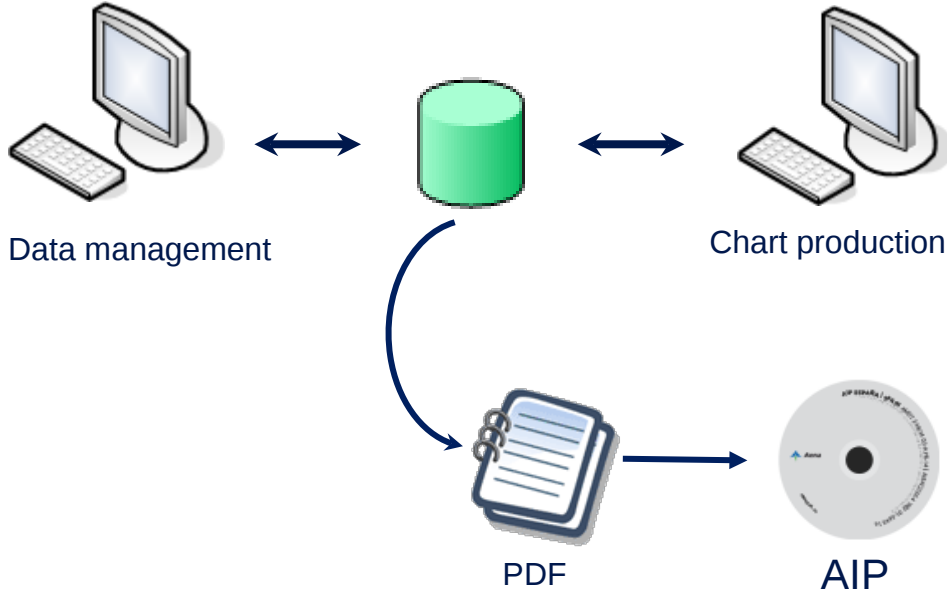
3.- **Automated processes are executed to
update the charts. These proposals are
compared with the impact drafts generated in
step 2. No data in the products is edited; only
the format is modified.**

4.- Once all products are approved, the AMDT is
compiled and sent to the printshop **and published
online**



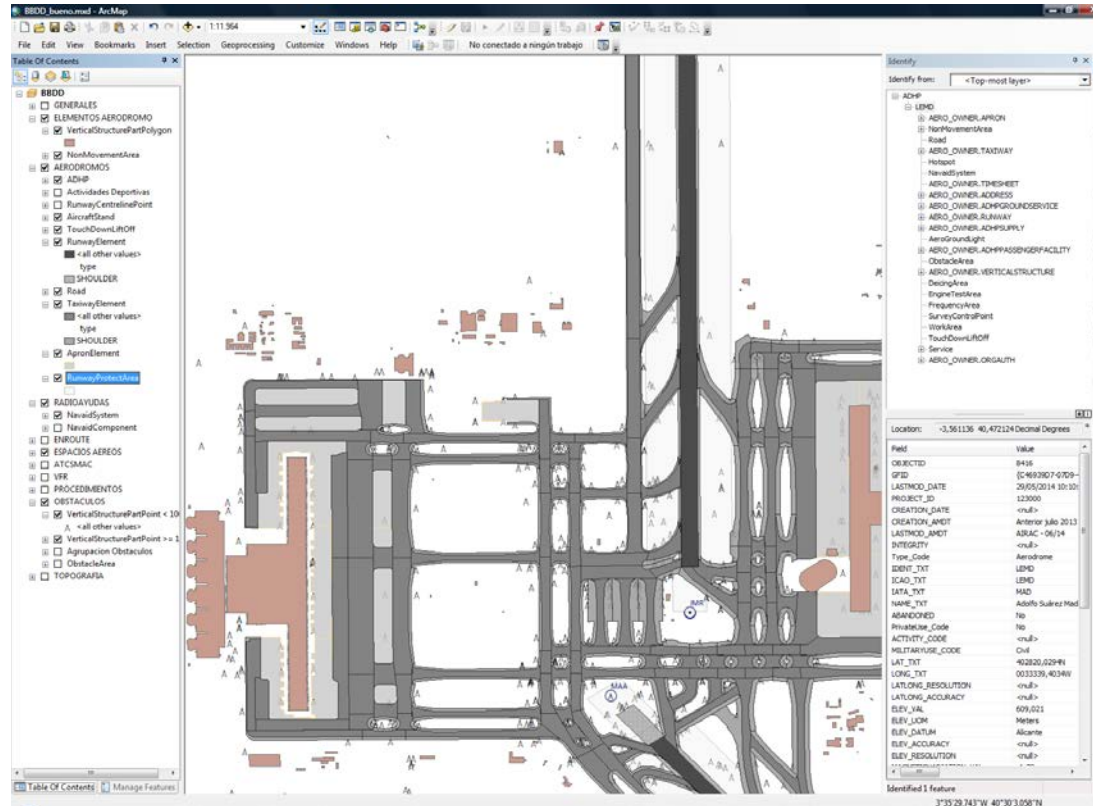
Stage 1 - Automation

INSIGNIA. The project main driver is AIS automation, we deploy a GIS system, geospatial AIS.



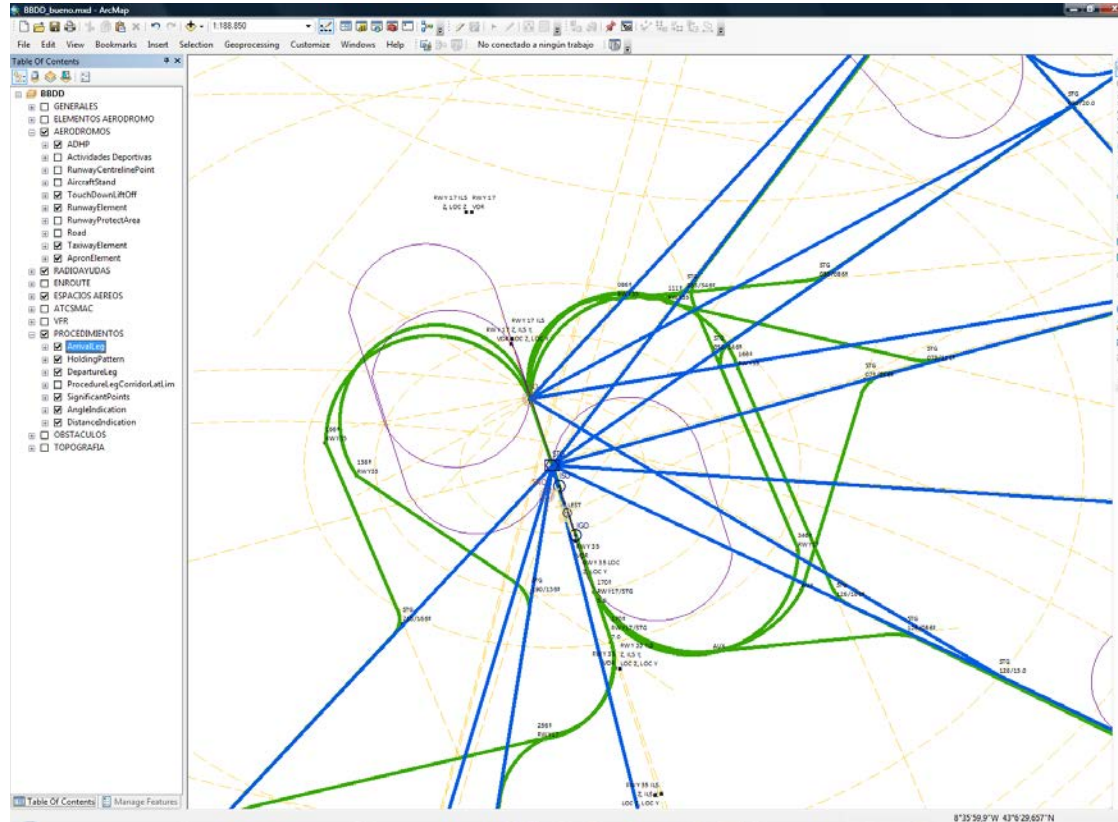
Stage 1 - Automation

INSIGNIA. We deployed a GIS system. Geospatial AIS.



Stage 1 - Automation

INSIGNIA. We deployed a GIS system. Geospatial AIS.

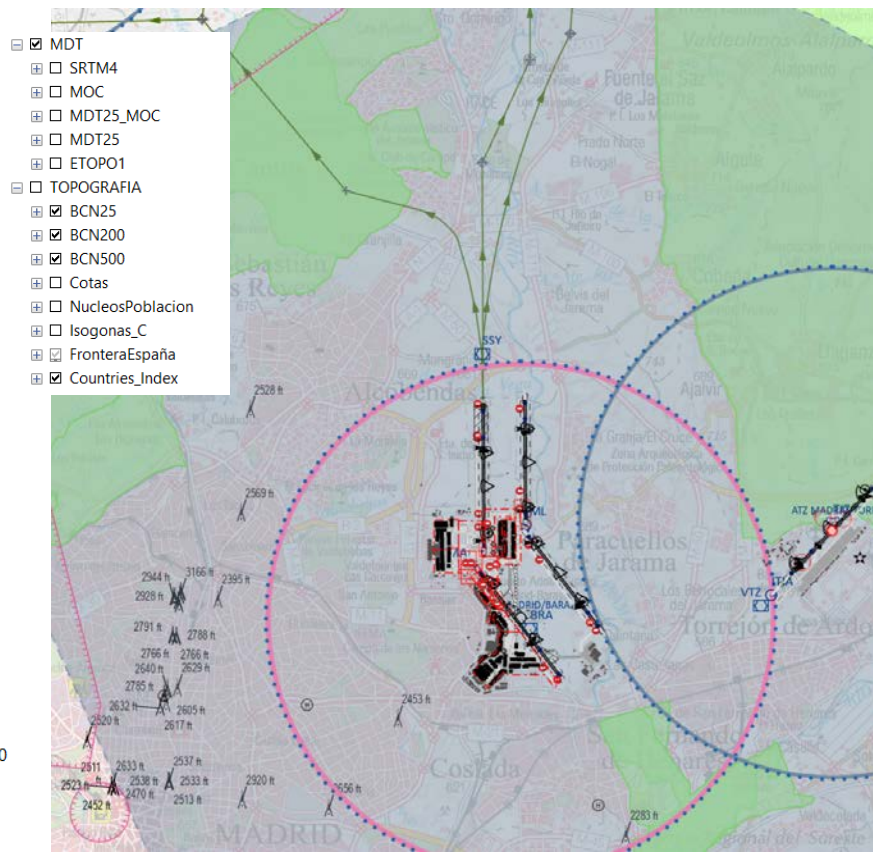


Stage 1 - Automation



INSIGNIA. We deployed a GIS system. Geospatial AIS

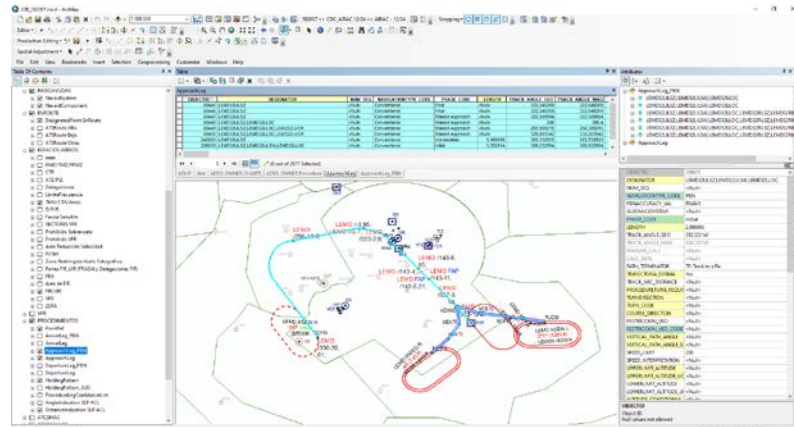
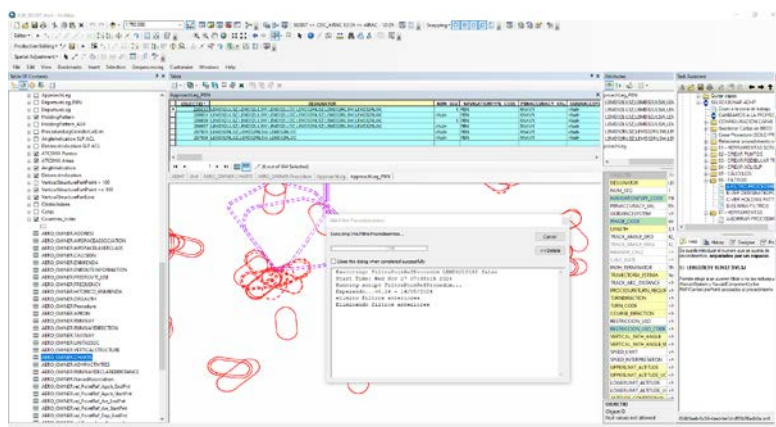
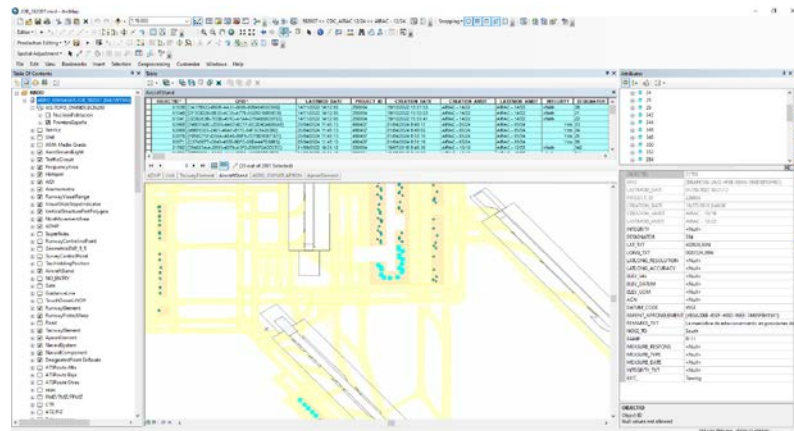
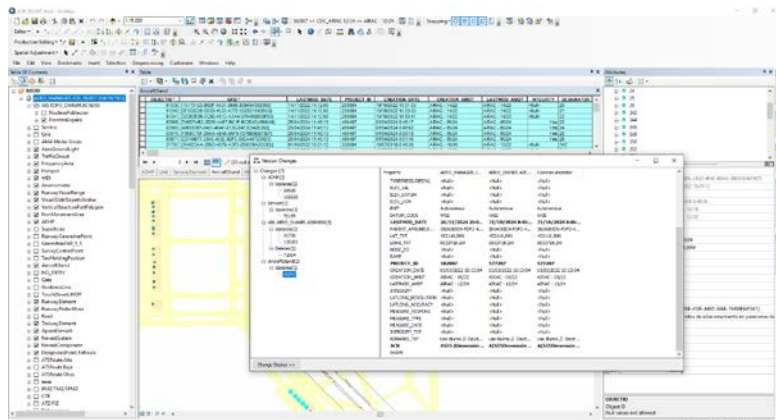
- ☐ GENERALES
 - ☒ Service
 - ☐ Unit
 - ☒ AMA Medio Grado
- ☐ ELEMENTOS AERODROMO
 - ☒ AeroGroundLight
 - ☐ TrafficCircuit
 - ☒ FrequencyArea
 - ☐ Hotspot
 - ☐ WDI
 - ☐ Anemometre
 - ☒ RunwayVisualRange
 - ☐ VisualGlideSlopeIndicator
 - ☒ VerticalStructurePartPolygon
 - ☐ NonMovementArea
- ☐ AERODROMOS
 - ☒ ADHP
 - ☐ Superficies
 - ☐ RunwayCentrelinePoint
 - ☐ Drones_AreaSeguridad
 - ☐ GeometriaENR_5_5
 - ☐ SurveyControlPoint
 - ☐ TaxiHoldingPosition
 - ☐ AircraftStand
 - ☐ NO_ENTRY
 - ☐ Gate
 - ☐ TouchDownLiftOff
 - ☐ RunwayElement
 - ☐ RunwayProtectArea
 - ☐ Road
 - ☐ TaxiwayElement
 - ☐ ApronElement
- ☐ RADIOAYUDAS
 - ☒ NavaidSystem
 - ☐ NavaidComponent
- ☐ ENROUTE
 - ☒ DesignatedPoint EnRoute
 - ☐ ATSRute Alta
 - ☐ ATSRute Baja
 - ☐ ATSRute Otras
- ☐ ESPACIOS AEREOS
 - ☐ eaaa
 - ☐ RMZ/TMZ/FPMZ
 - ☐ CTR
 - ☐ ATZ/FIZ
 - ☐ Delegaciones
 - ☐ LimiteFrecuencia
 - ☒ TMA/CTA/Areas
 - ☐ D/P/R
 - ☐ Fauna Sensible
 - ☐ SECTORES VFR
 - ☐ Prohibido Sobrevuelo
 - ☐ Prohibido VFR
 - ☐ Area Reducción Velocidad
 - ☐ RVSM
 - ☐ Zona Restringida Vuelo Fotografico
 - ☐ Partes FIR_UIR (FRASAI y Delegaciones)
 - ☐ FRA
 - ☐ Area de FIR
 - ☒ FIR/UIR
 - ☐ SRR
- ☐ VFR
 - ☐ DesignatedPoint VFR
 - ☒ Rutas VFR
 - ☒ AngleIndication VFR
 - ☒ DistanceIndication VFR
 - ☐ RunwayAproxFinalArea
- ☒ PROCEDIMIENTOS
 - ☒ PointRef
 - ☐ ArrivalLeg_PBN
 - ☐ ArrivalLeg
 - ☐ ApproachLeg_PBN
 - ☐ ApproachLeg
 - ☐ ApproachLeg_Aux
 - ☐ DepartureLeg_PBN
 - ☐ DepartureLeg
 - ☐ HoldingPattern
 - ☐ HoldingPattern_AUX
 - ☐ ProcedureLegCorridorLatLim
 - ☐ AngleIndication SLP ACL
 - ☐ DistanceIndication SLP ACL
- ☐ ATCSMAC
 - ☒ ATCSMA Puntos
 - ☒ ATCSMA Areas
 - ☐ AngleIndication
 - ☐ DistanceIndication
- ☐ OBSTACULOS
 - ☒ VerticalStructurePartPoint < 100
 - ☒ VerticalStructurePartPoint >= 100
 - ☐ ObstacleArea



Stage 1 - Automation



Data Quality Assurance and Management

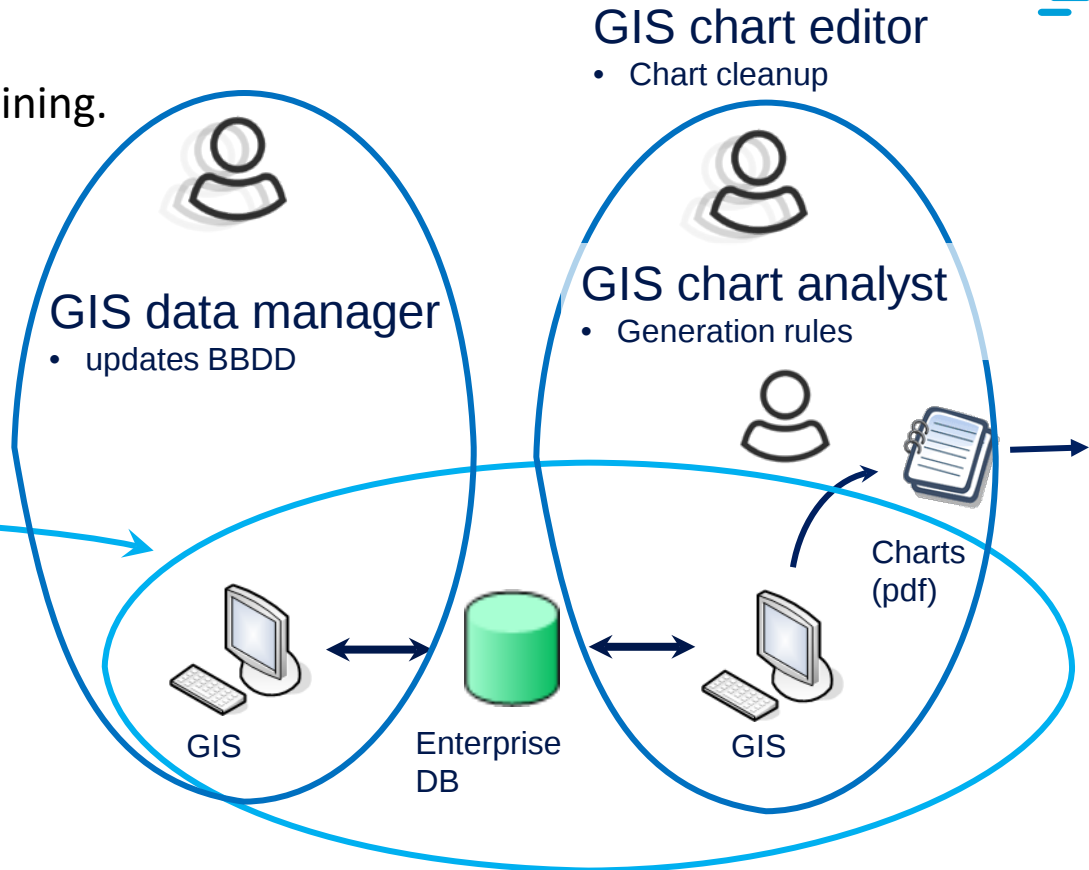


Stage 1 - Automation

People can do amazing things
when they have the right tools and training.

 **Functional Analyst**
• Plans

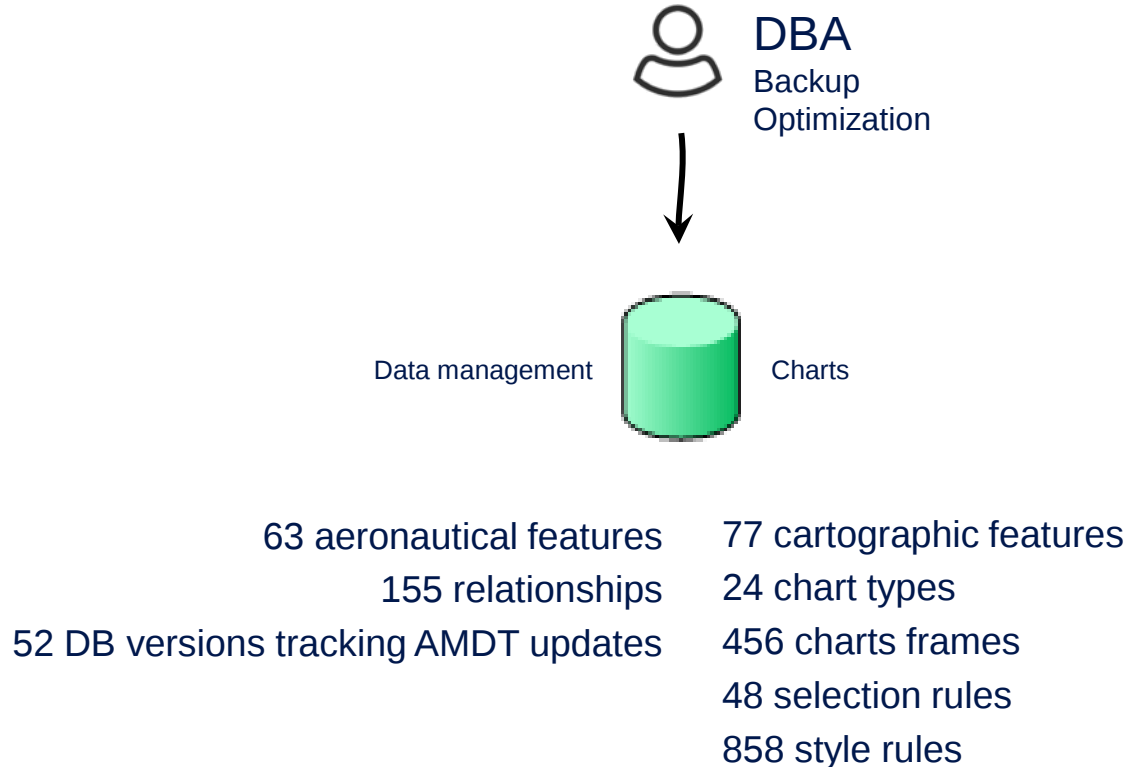
 **GIS Analyst**
• DB set up
• Editing workflows



Stage 1 - Automation



The database started to grow.



Stage 2 – Digital products



We have a database, but the PDF AIP is still the reference.

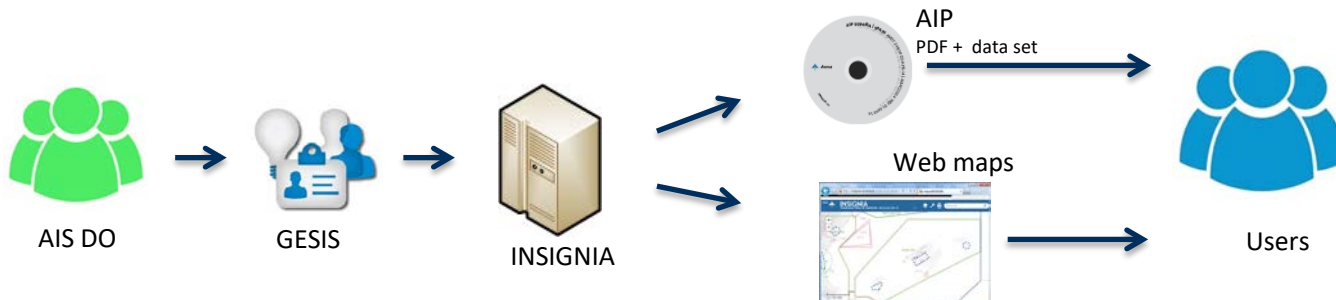
2012 we introduced GIS web maps and initial data sets

1.- Data arrives in Excel, AutoCAD, PDF, etc. Data base is updated. **Data sets are generated.**

2.- Impact assessment using the AIP (hand made annotations) **and cross checked against DB**

3.- Automated processes are executed to update the charts. These proposals are compared with the impact drafts generated in step 2. No data in the products is edited; only the format is modified.

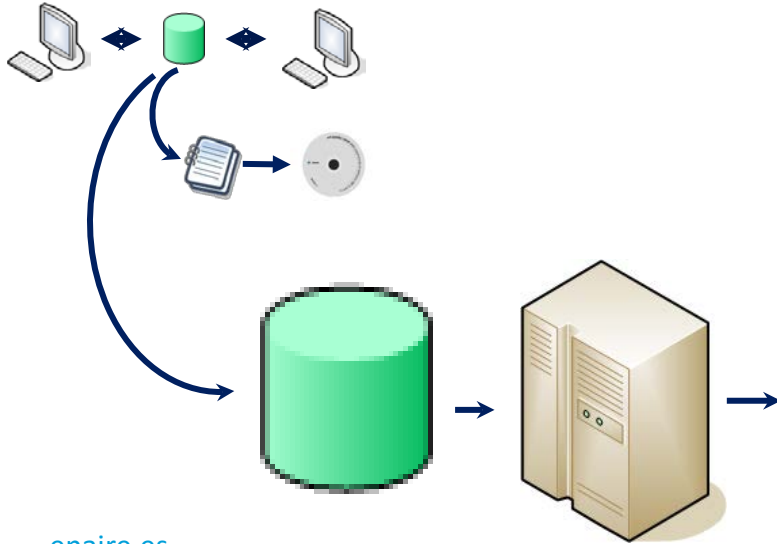
4.- Once all products are approved, the AMDT is compiled **and sent to the printshop, published online and on Apps**



Stage 2 – Digital products

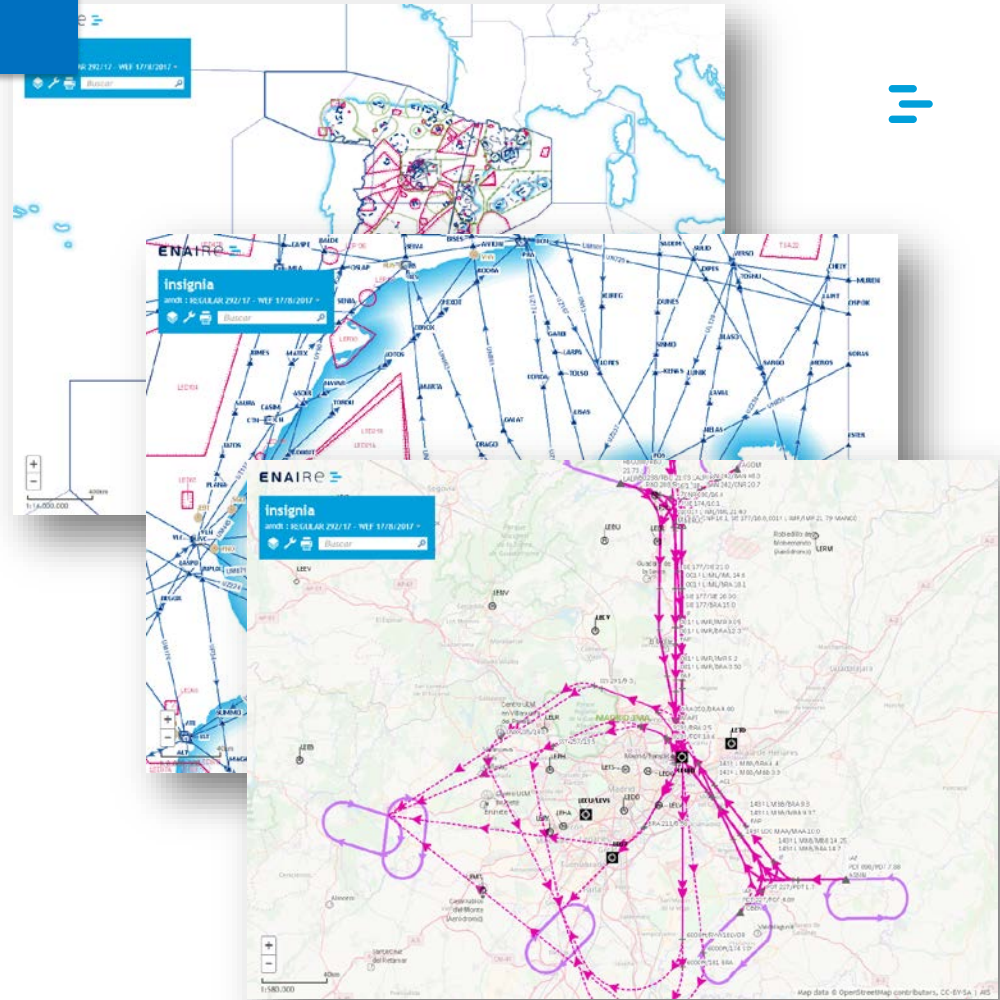
INSIGNIA, a new AIS experience

We realized DB is our assets



enaire.es

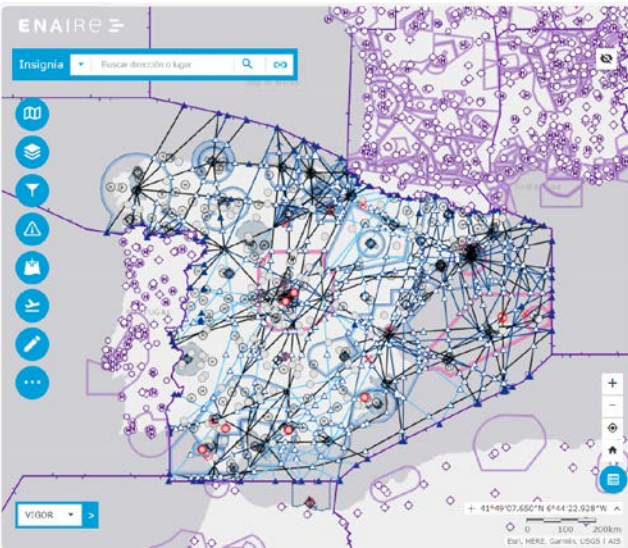
Public INSIGNIA : BBDD and server



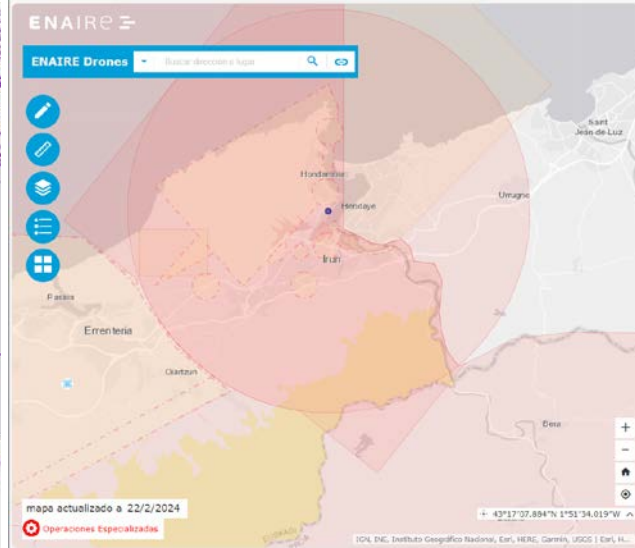
Stage 2 – Digital products



AIS user-centric applications. Purpose-built applications for defined user profiles



2012 - Insignia



2018 - ENAIRE Drones

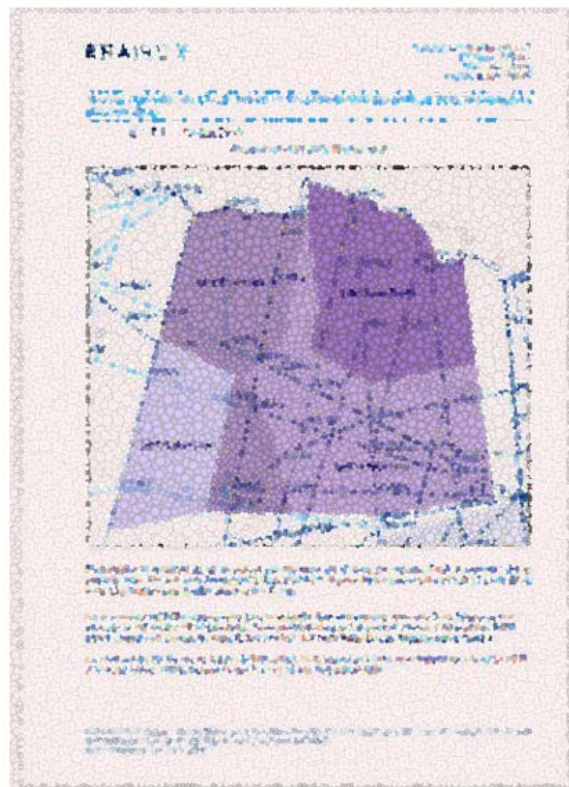
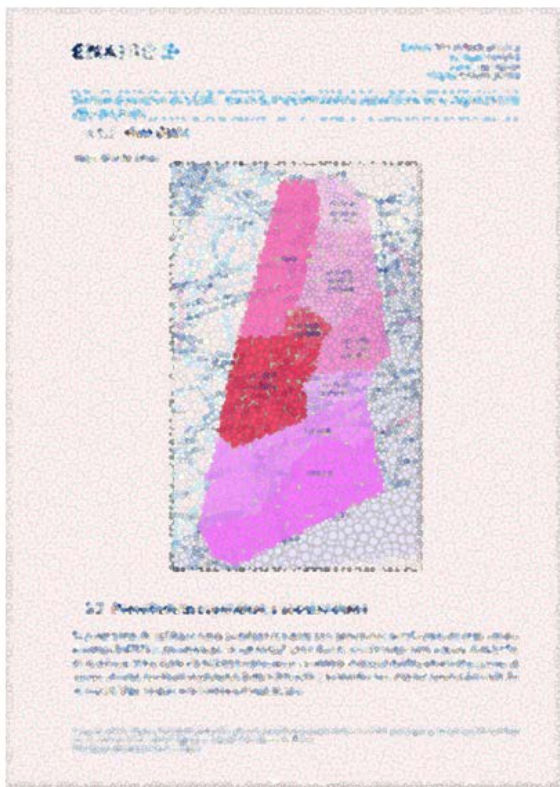


2018 - Insignia VFR

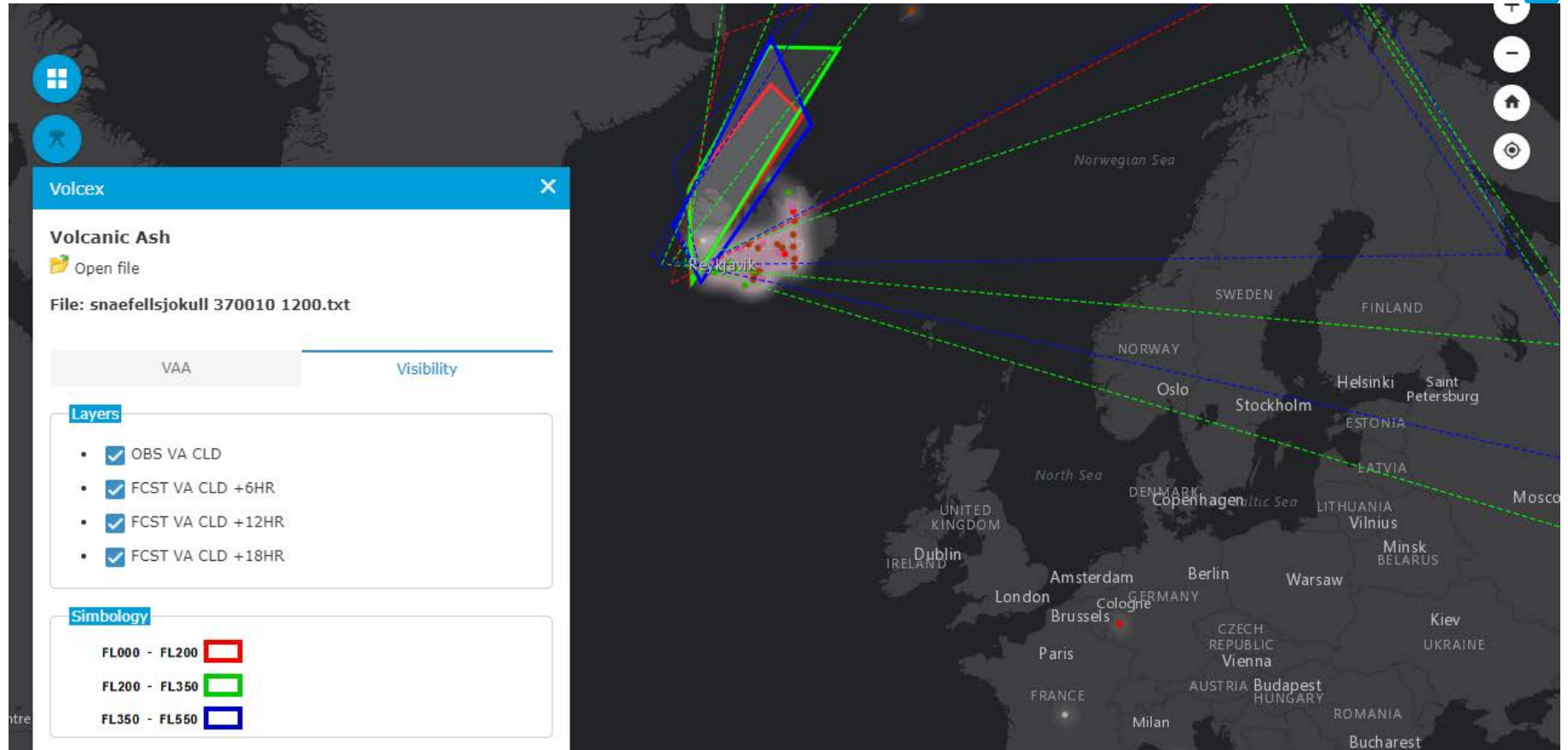
Stage 2 – Digital products



Public INSIGNIA reached beyond our expectations.

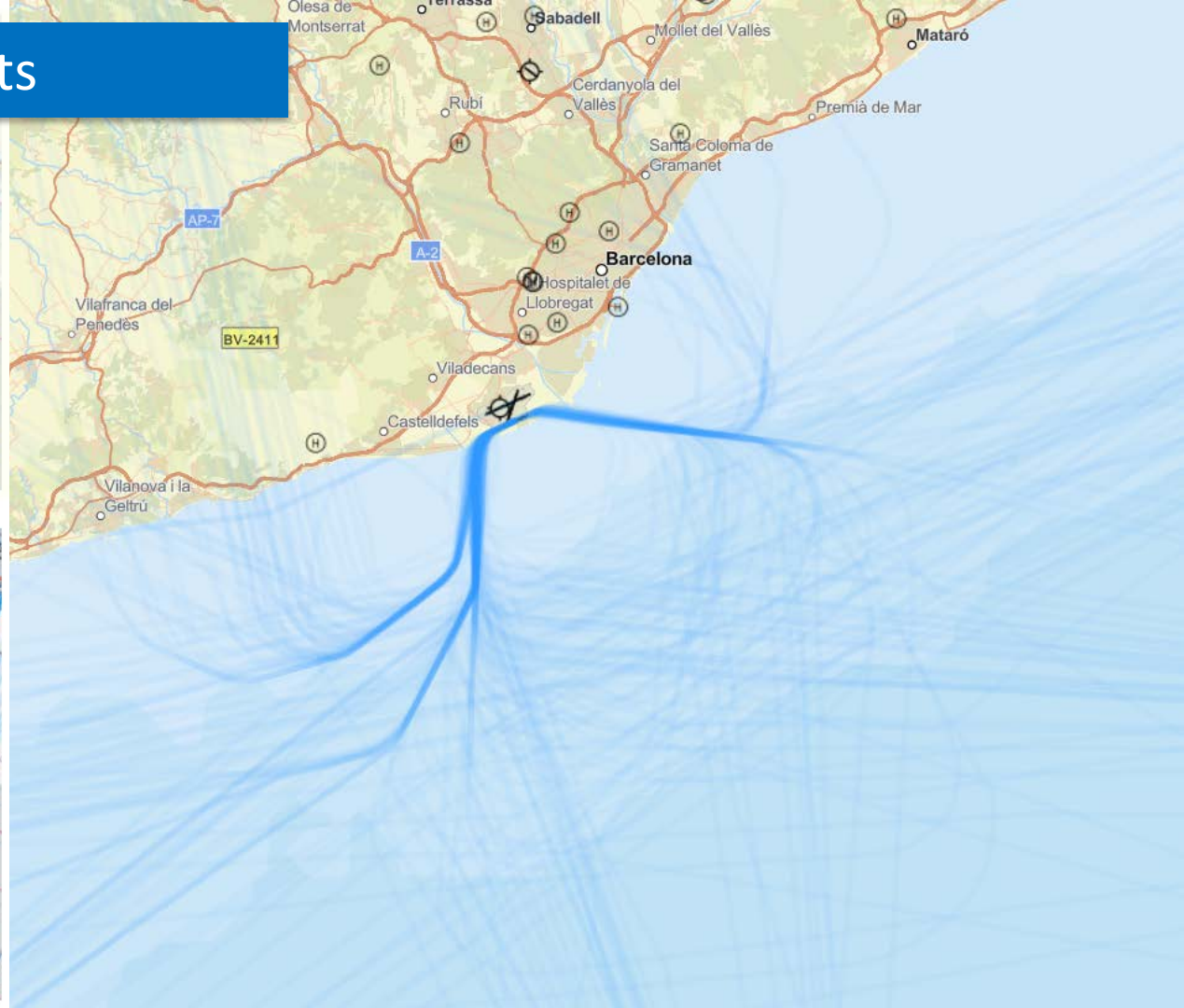


Stage 2 – Digital products

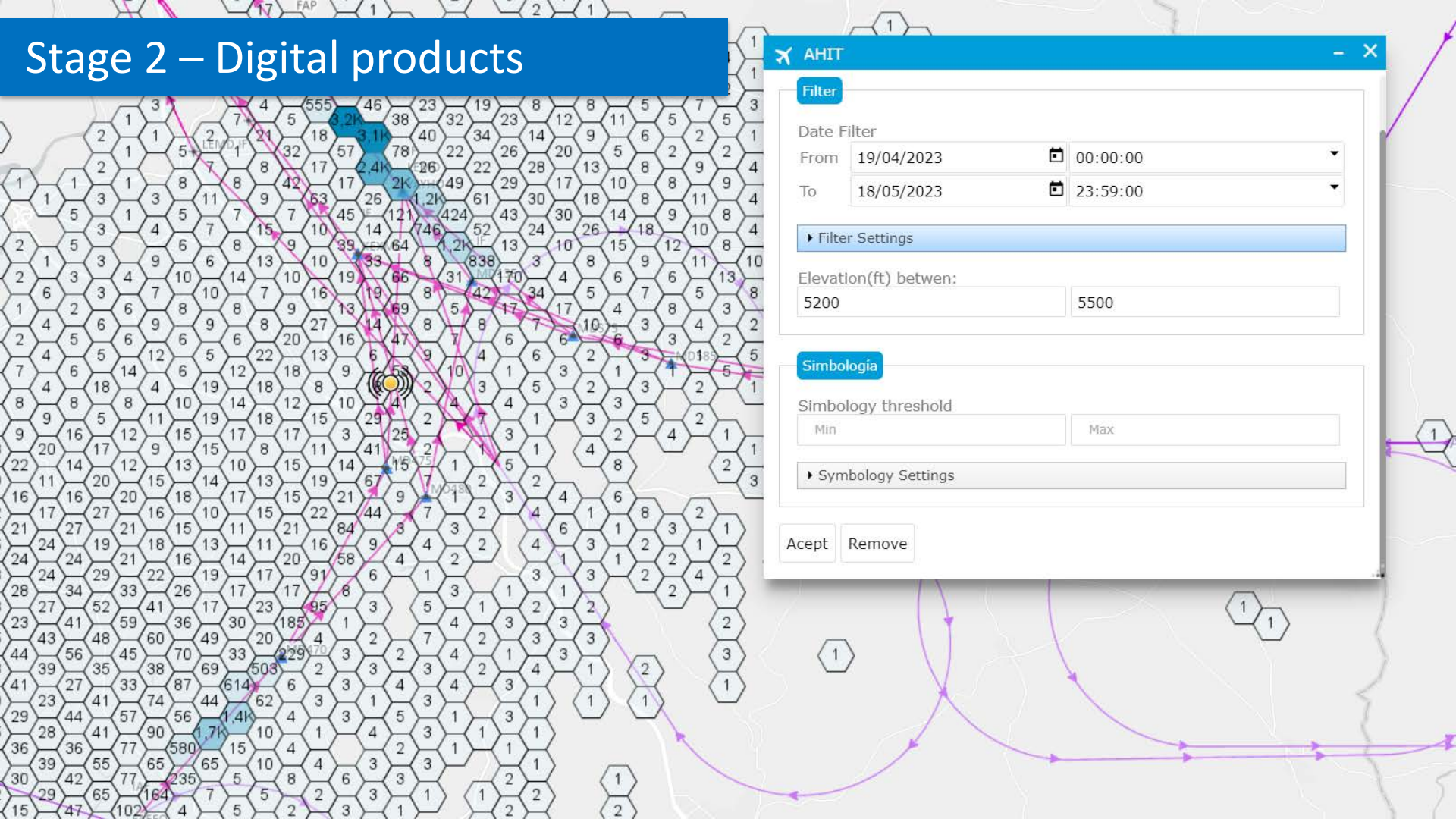




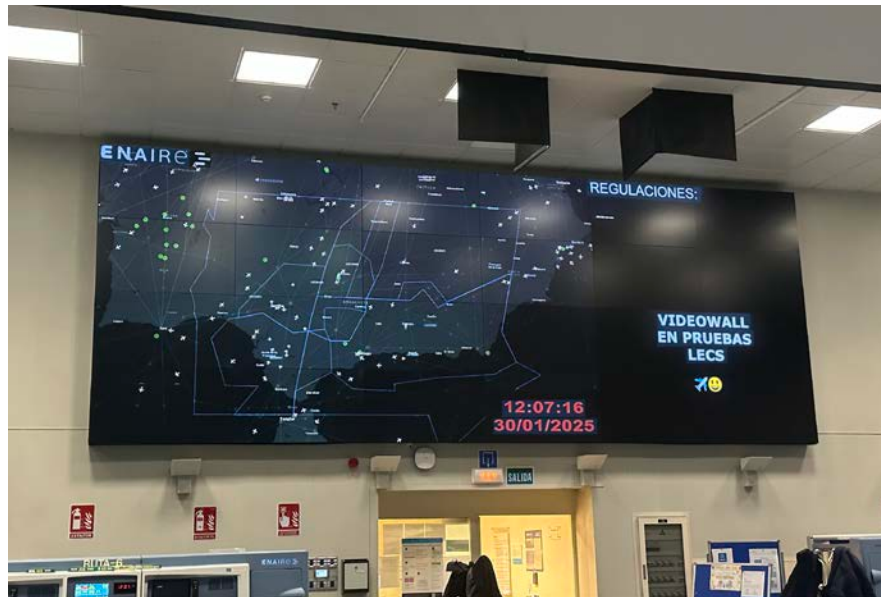
Stage 2 – Digital products



Stage 2 – Digital products



Stage 2 – Digital products

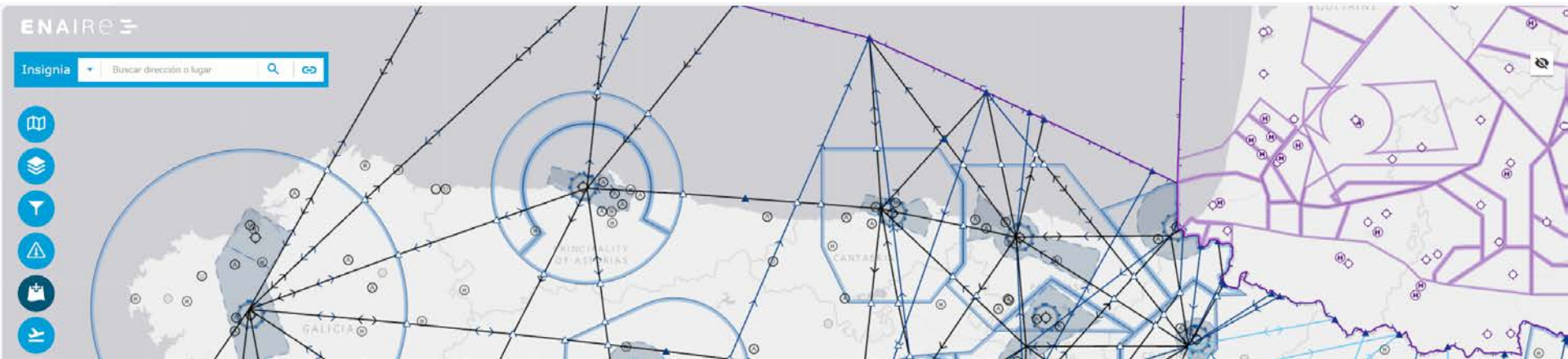
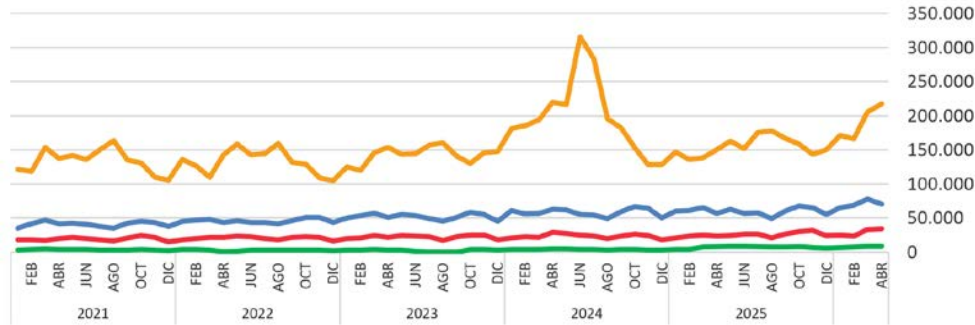


Stage 2 – Digital products



Users grow out of our control

AIS over GIS grows in relevance even over AIP



Stage 2 – Digital products

New profiles



IT

- Keeps server working
- IT 24/7
- High availability
- Cybersecurity
- QoS



GIS developers

- Build GIS apps



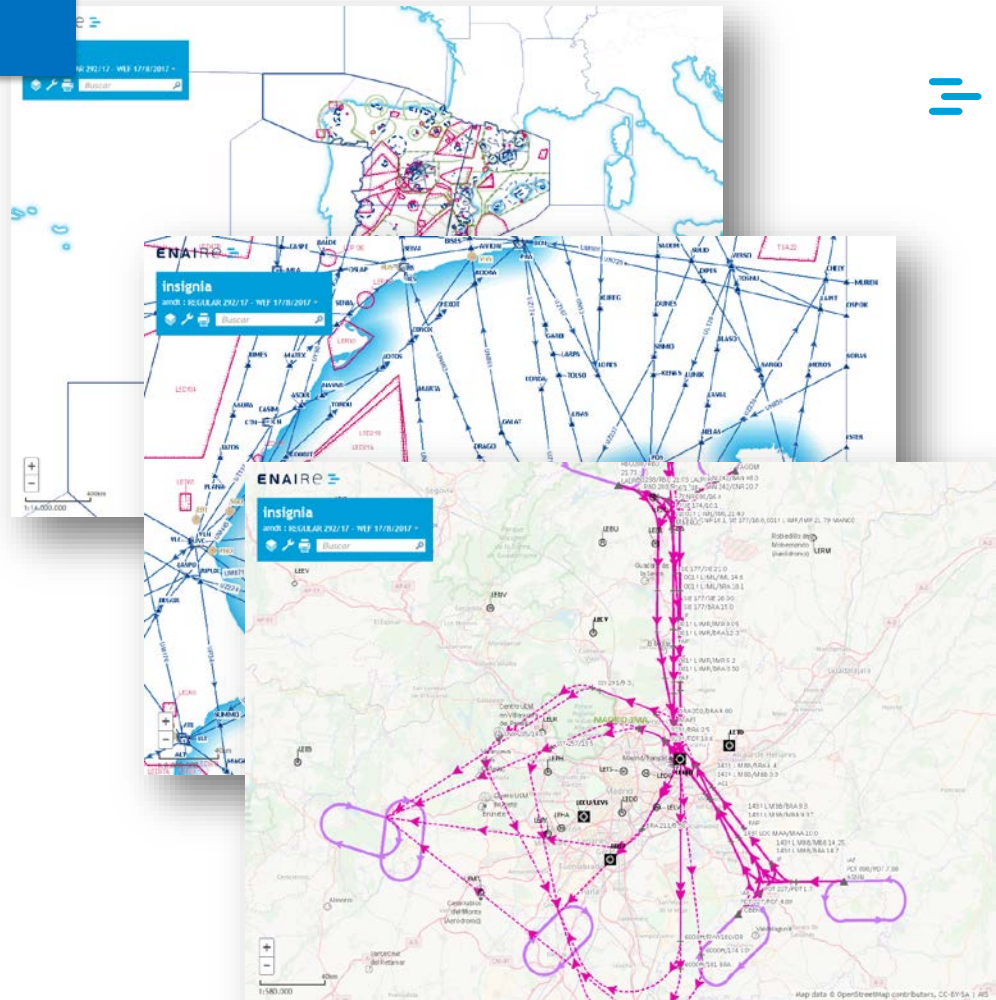
Enterprise



Public



GIS Server



we needed something more
We where unable to create apps for everyone

A framework to share data



We were lucky, INSIGNIA (our GIS Implementation for AIS) uses industry best practices (SOA architecture) it was immediate to share data over REST.

<https://servais.enaire.es/insigniads/rest/services>



Stage 3 – servAIS SWIM registered



Aeronautical Information Geospatial Service 01.00.00



Abstract

The service provides access to aeronautical geospatial entities and aerodrome mapping data through multiple interfaces, including REST-based Feature Service and OGC-compliant Web Map and Web Feature Services (WMS/WFS).

It enables system-to-system exchange of structured feature-level data and map representations, supporting interoperable integration in SWIM-compliant environments.

Users can:

- Query and retrieve vector features representing aeronautical and infrastructure information from the underlying spatial database.
- Request on-demand aerodrome maps generated from current or next AIRAC cycle aerodrome mapping data.

The service supports spatial and attribute-based filtering for features, and provides map visualizations according to operational requirements.

Interaction follows standard request-response patterns:

1. Clients send HTTP requests to the appropriate service endpoint (REST, WMS, or WFS).
2. The service processes the request and retrieves or generates the requested features or maps.
3. Responses are returned as structured feature data (e.g., JSON, GeoJSON, GML) or map graphics, ensuring efficient and reliable access.

The service facilitates accurate, up-to-date, and interoperable access to aeronautical geospatial information and aerodrome maps, in line with the EUROCONTROL SWIM Technical Infrastructure (TI) Yellow Profile principles.

NOTAM Geospatial Service 01.00.00



Abstract

This service provides access to NOTAM geospatial entities through multiple interfaces, including REST-based Feature Service.

It enables system-to-system exchange of structured feature-level data and map representations, supporting interoperable integration in SWIM-compliant environments.

Users can:

- Query and retrieve vector features representing NOTAM information from the underlying spatial database.
- Request on-demand NOTAM maps generated from the underlying spatial database.

The service supports spatial and attribute-based filtering for features and provides map visualizations according to operational requirements.

Interaction follows standard request-response patterns:

1. Clients send HTTP requests to the appropriate service endpoint (REST).
2. The service processes the request and retrieves or generates the requested features or maps.
3. Responses are returned as structured feature data (e.g., JSON, GeoJSON) or map graphics, ensuring efficient and reliable access.

The service facilitates accurate, up-to-date, and interoperable access to NOTAM geospatial information, in line with the EUROCONTROL SWIM Technical Infrastructure (TI) Yellow Profile principles.

Full new digital AIS Team

AIS and GIS layers

-  Functional analyst.
-  GIS main analyst.
-  User experience

AIS service provision

-  GIS charting analyst
-  GIS data analyst
-  GIS data manager
-  GIS chart editor

Maintenance

-  AIS GIS ATSEPs

Apps

-  GIS developers

beyond AIS

-  GIS business analyst

IT

-  DBA
-  IT Support (24/7)
-  19 servers
-  2 DB servers
15 databases
-  ~70 working GIS positions

Sharing data requires connectivity

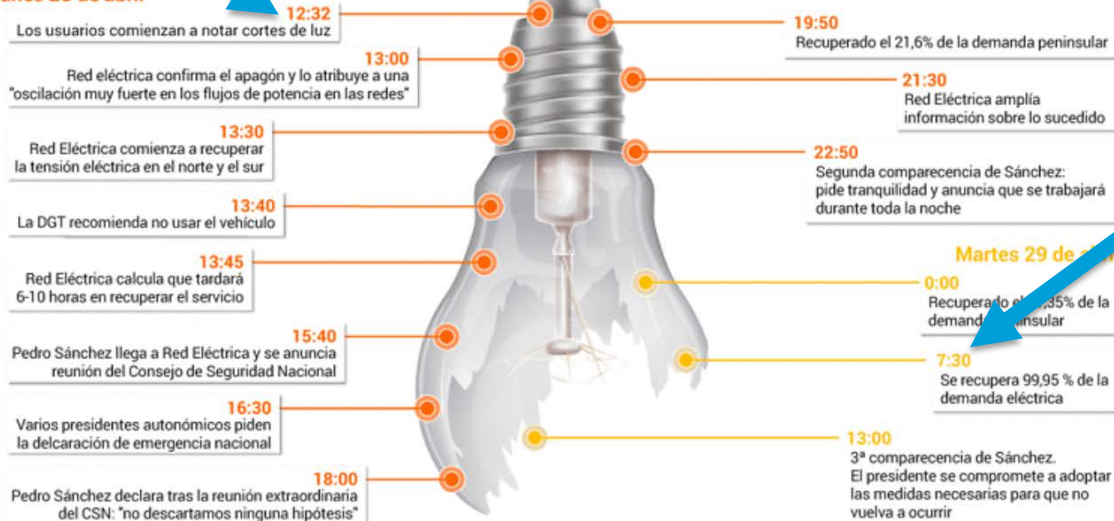


IP connectivity is a must.

We learned it badly on April 28th

Principales acontecimientos del apagón

Lunes 28 de abril



Martes 29 de abril

- 0:00**: Recuperado el 35% de la demanda peninsular
- 7:30**: Se recupera 99,95 % de la demanda eléctrica
- 13:00**: 3ª comparecencia de Sánchez. El presidente se compromete a adoptar las medidas necesarias para que no vuelva a ocurrir

Fuente: elEconomista.es

eE

Sharing data requires connectivity

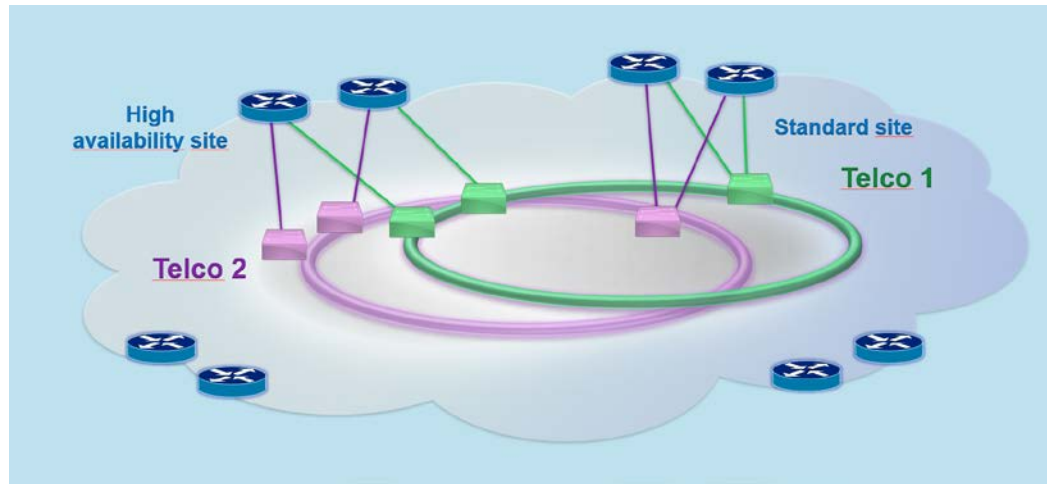


Internet is OK, but for critical systems we need something more, best effort is not enough.

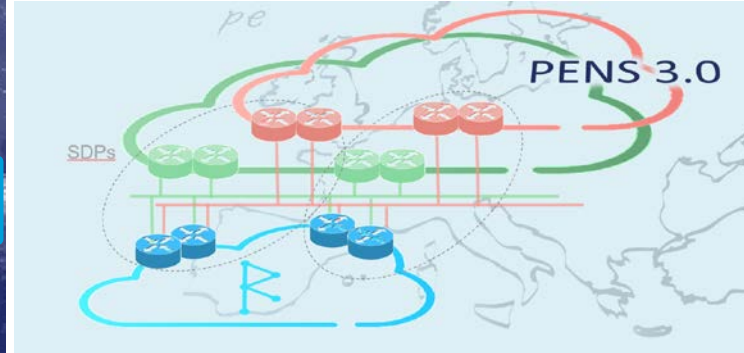
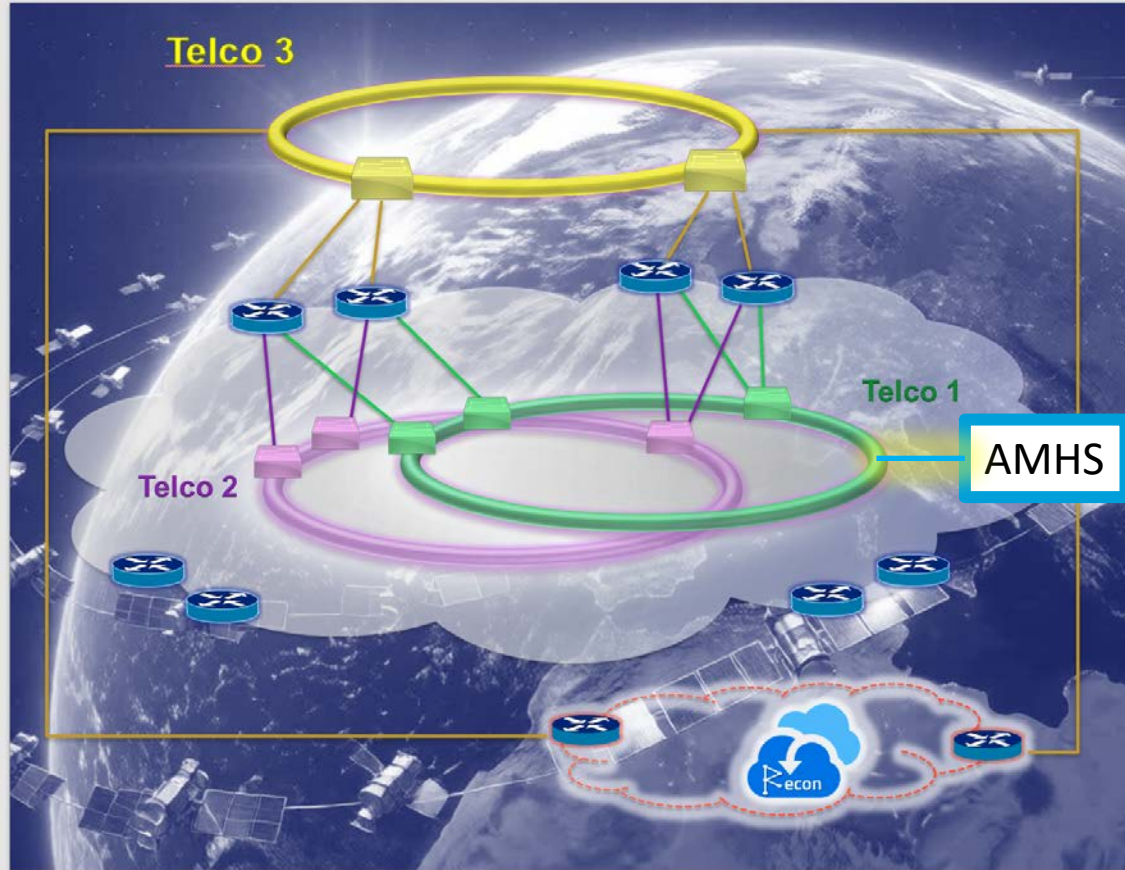
We were preparing for this for years, REDAN has a dual network core. Support is integrated at ENAIRE COM center.

Enabled ENAIRE to operate at around 70–75% of nominal capacity.

While other transport modes were completely shut down



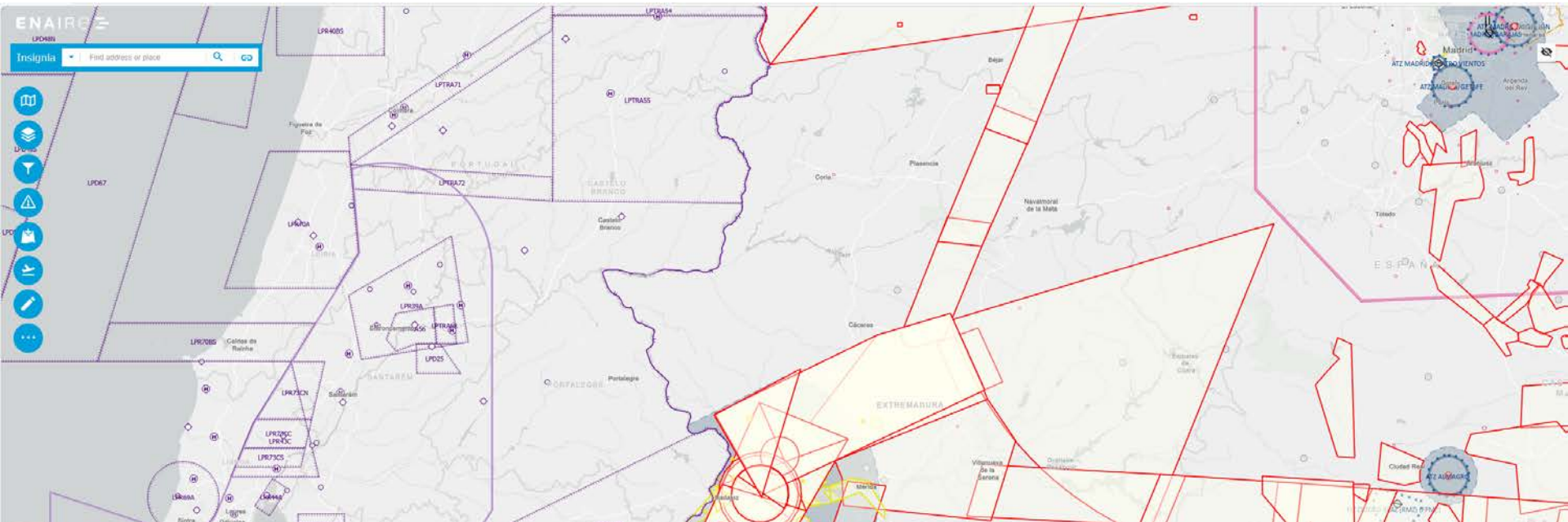
Sharing data requires connectivity



Do we need any more?



For true GIS interoperability we need a recognised standard



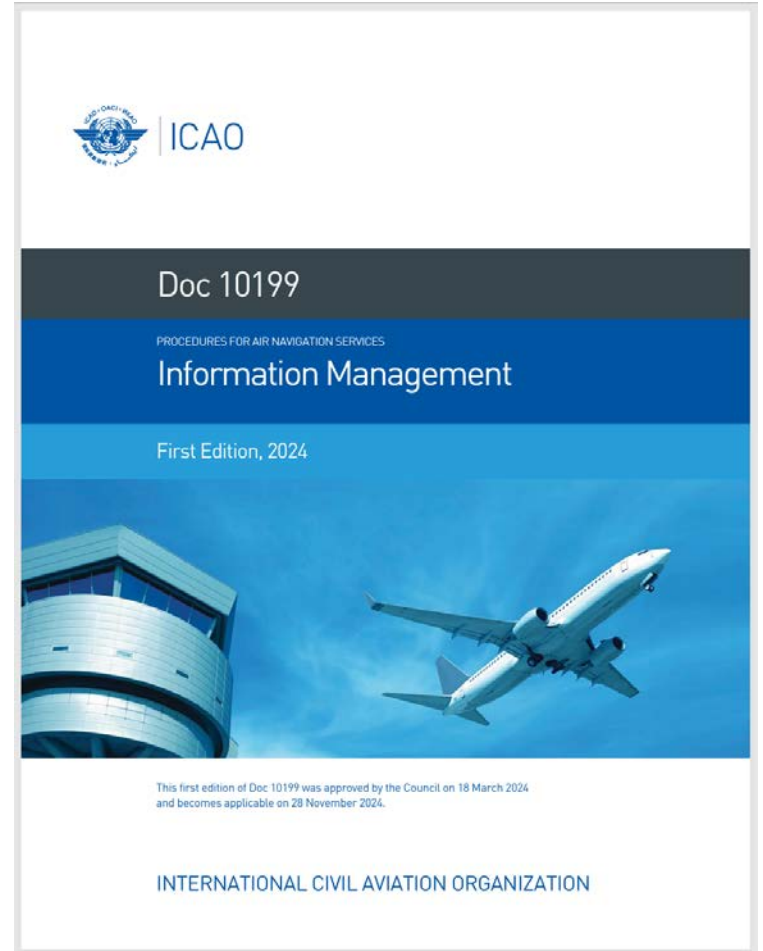
Stage 4 –SWIM

We found out there where a number of colleagues on the same GIS journey.

GIS Community of interest

PANS-IM

Information exchange model – AIRM
Information service overview
Information service definition
Technical Infrastructure





Aeronautical Geospatial Feature Service - AGFS

WORKING

<https://swim-eurocontrol.atlassian.net/wiki/spaces/ASW/pages/327548976/Aeronautical+Geospatial+Feature+Service>

Aeronautical SWIM Services

Content

Search by title

- > Aeronautical Data Set Request Service
- > Digital NOTAM Subscription and Request Service
- > Aeronautical Data Set Subscription Service
- > Aeronautical Aerodrome Map Request Service
- > Aeronautical Information Request Service
- ✓ Aeronautical Geospatial Feature Service
 - Aeronautical Geospatial Feature Service - Service Definition
 - Use Cases
 - Working Items
- > Aeronautical SWIM Services Ecosystem
- > Service Architecture Team
- > Aeronautical Data Set Management Service

+ Create

Teams

More

Aeronautical Geospatial Feature Service - Service Definition

By MARRAZZO Gianluca (EXT) 8 min Listen 20 Add a reaction

Task Status

This page is part of the ongoing discussion within [A3SG](#). The content is **working material**. It should not be treated as final as it is still subject to review, comment and change.

Service Definition Identification

Trace

SWIM-DEFN-030

WORKING

service definitions

[Service Definition Identification] [Service Identification] [Service Abstract] [Service Definition Provider] [Geographical Extent of Information] [Service Categories] [Service Standard Reference] [Operational Environment] [Service Functions] [Service Access and Use Conditions] [Security Constraints] [Quality of Service] [Quality of Data] [Source of Information] [Service Validation Information] [Application Message Exchange Pattern] [Service Behaviour] [Service Monitoring] [Service Interfaces] [SWIM Profile and Interface Bindings] [Aeronautical Geospatial Feature Service Request Interface] [Service Interface Protocols and Data Format] [Service Operations] [Service Messages] [Information Definition (Minimum) and (Extended)] [Filter Encoding] [Machine-Readable Service]

Stage 4 –SWIM AGFS



Bottom-up approach. Listen to user's operational needs.

“I need data that I can directly use in my system”.

We want them all to use our curated data



adjective

(of online content, merchandise, information, etc.) selected, organized, and presented using professional or expert knowledge.

"Individuals still desire curated news content"





GIS as an industry paradigm is a well probed and successful way to exchange geospatial data.

Disseminating AIS data over GIS makes a lot of sense and it is already being implemented by many stakeholders.

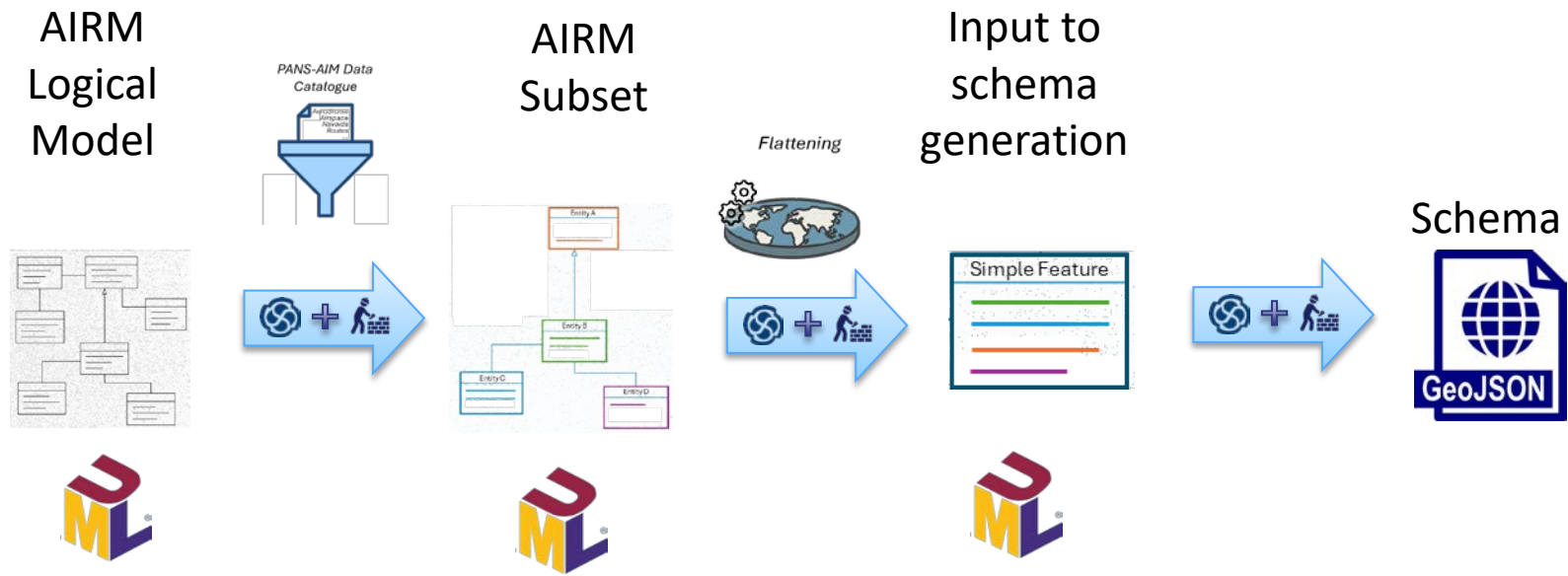
- OGC API - Features
- geoJSON payload
- OpenAPI

Objective Retrieve temporality integrated layered geospatial aeronautical data for **'out-of-the-box' interoperable use** within scope of the data domains managed in their spatial data infrastructure using GIS technology

Stage 4 –SWIM AGFS



AIRM Derivation as a design-time choice for SWIM compliance
Developing **simple features** using the AIRM vocabulary



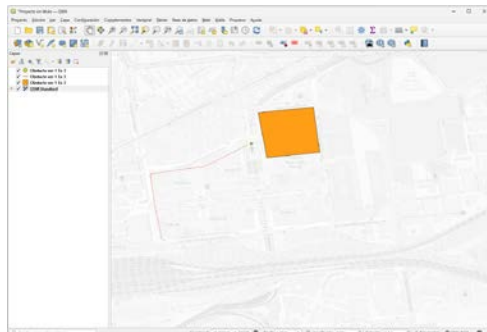
Stage 4 –SWIM AGFS

Hands on with the GML files

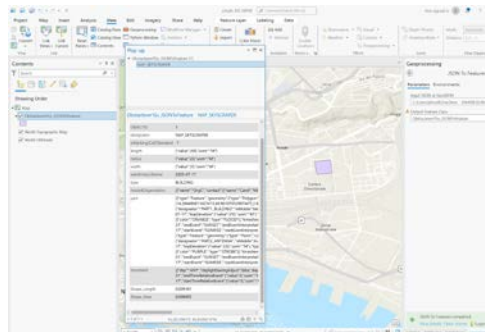
All of them read and render the file with very similar behaviour



qGIS
(desktop)



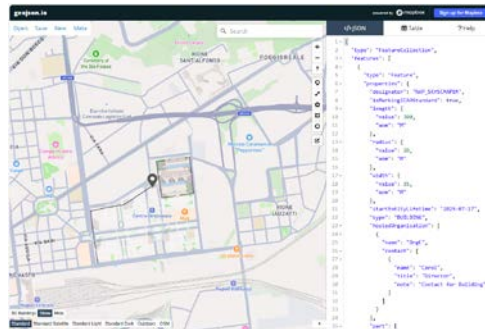
arcGIS
(desktop)



LFV web GIS
(openlayers)



geojson.io
(mapbox)



Having robust data management processes in place.

Possessing the necessary expertise to manage large volumes of constantly changing data.

Having the right tools and know how to use them effectively.

Having the ability to integrate additional data sources and analytical tools.



AIS/AIM units are in an optimal position to support ATM with data management, even beyond traditional AIS processes.

Aeronautical Information Service

A WORLD OF DATA

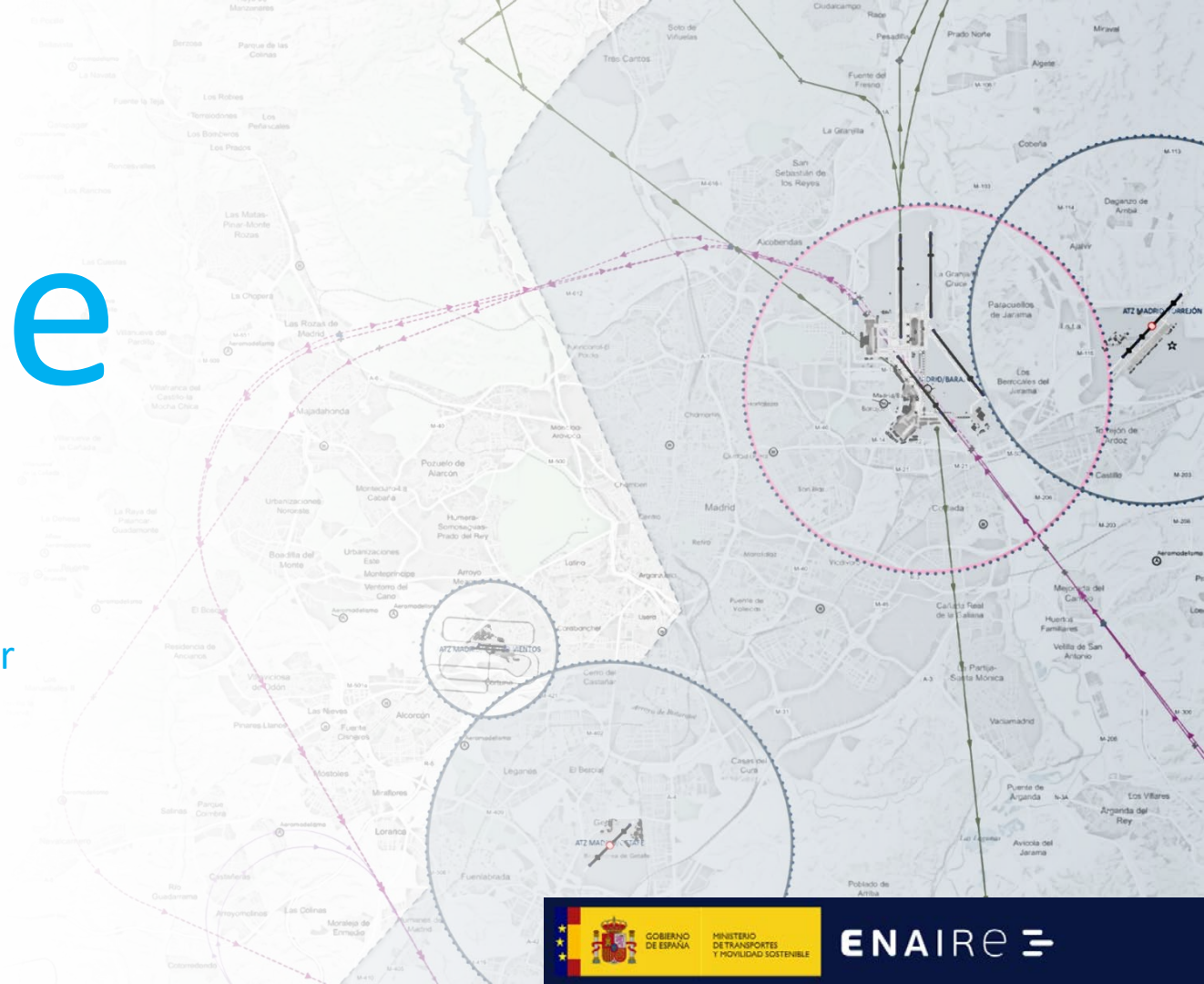
At your reach



- when data is available
- and with advanced tools

People

- do incredible things
- AIS, a fundamental enabler
- What do we build today



Thank you

I hope it was interesting and you see yourself reflected in part of this journey

We would be proud to support and share this journey with you.

ENAIRe 

EGS 

ENAIRe AVIATION SERVICES

jfenoll@enaire.es

ais@enaire.es

contact@egs-aviation.aero

enaire.es

