

Time flies at the digital library of historical aerial imagery of Spain

Ana Velasco Tirado

Eurogeographics webinar:
“Empowering an Interoperable Europe”
November 2023

Instituto Geográfico Nacional

ORGANISMO AUTÓNOMO CENTRO NACIONAL DE INFORMACIÓN GEOGRÁFICA



www.ign.es



- 
- 
- Introduction
 - The library of historical aerial imagery of the IGN
 - Preserving historical aerial photography
 - Digital data and metadata archiving
 - Disseminating aerial photography
 - Prospects



Introduction



National Geographic Institute of Spain (IGN)

- National Mapping Agency of Spain.
- Founded in 1870.
- In charged of make and disseminate geographical information of the country.
- Autonomous body National Centre for Geographic Information (CNIG) for commercialising and disseminating it.
- CNIG oversees, safekeeping, manage and disseminate the historical aerial photos of the IGN.





The library of historical aerial imagery of the IGN

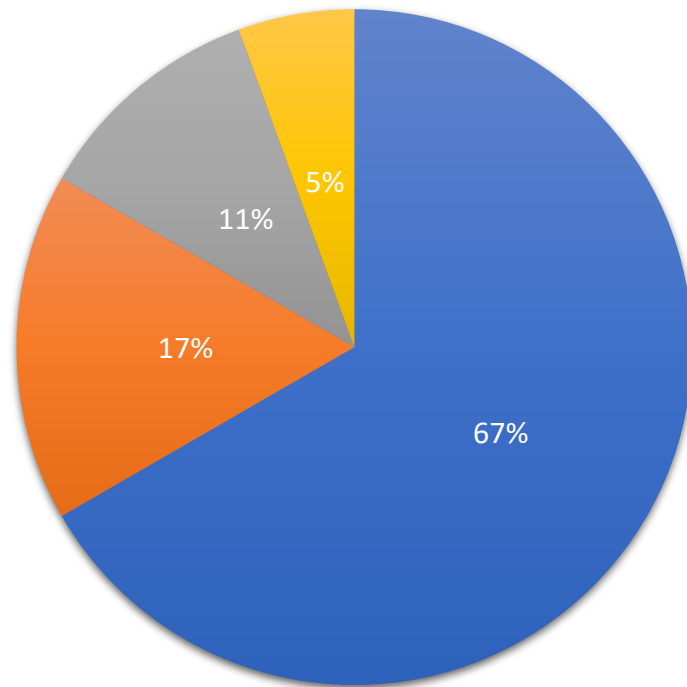


The library of historical aerial imagery of the IGN

- Collection of historical aerial imagery archived by IGN
- Aerial surveys from the 1930s up to now
- Covers all or a part of the national territory
- Commissioned by IGN, in cooperation with other levels of administration, or transferred from other organisations.



The library of historical aerial imagery of the IGN



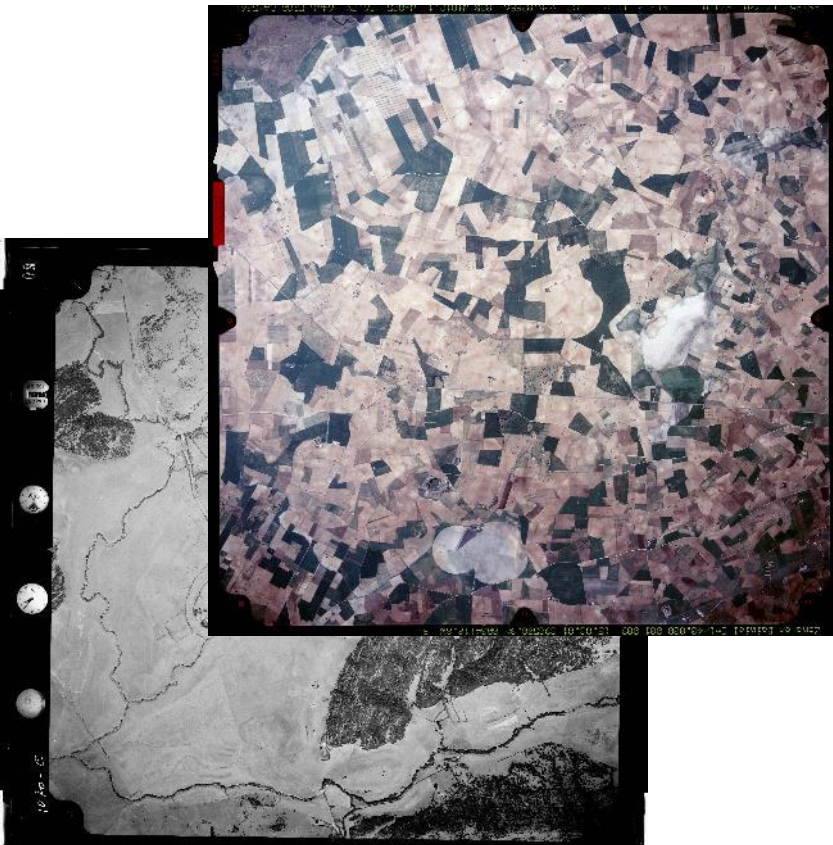
- Currently, over 1.8 million of analogue and digital nadir photographs with a photogrammetric approach are guarded by IGN.
 - 742 surveys: 544 analogue, 198 digital).

- Digital photos archived and served by IGN
- Analogue photos archived and served by IGN
- Analogue photos archived by IGN (not served)
- Analogue photos served by IGN (not archived)

Historical aerial surveys characteristics

Main characteristics:

- ◇ Photo mediums: film panchromatic, glass plates, film infrared, film natural colours, transparency.
- ◇ Scales goes from 5.000 to 70.000
- ◇ Formats: 23 x 23 cm, 18 x 18 cm, 23 x 30 cm or roll.
- ◇ Forward and side overlaps tend to be 60 and 30.
- ◇ Alternate photographs have been digitized in some historical aerial surveys.



National Aerial Orthophotography Plan (PNOA)



Objective

Aerial survey of Spanish territory, with an upgrading period of 3 years.



Spatial resolution

Started in 50 cm in 2004. Since 2017 it is better than 25 cm, reaching 15 cm in some areas.



Funding

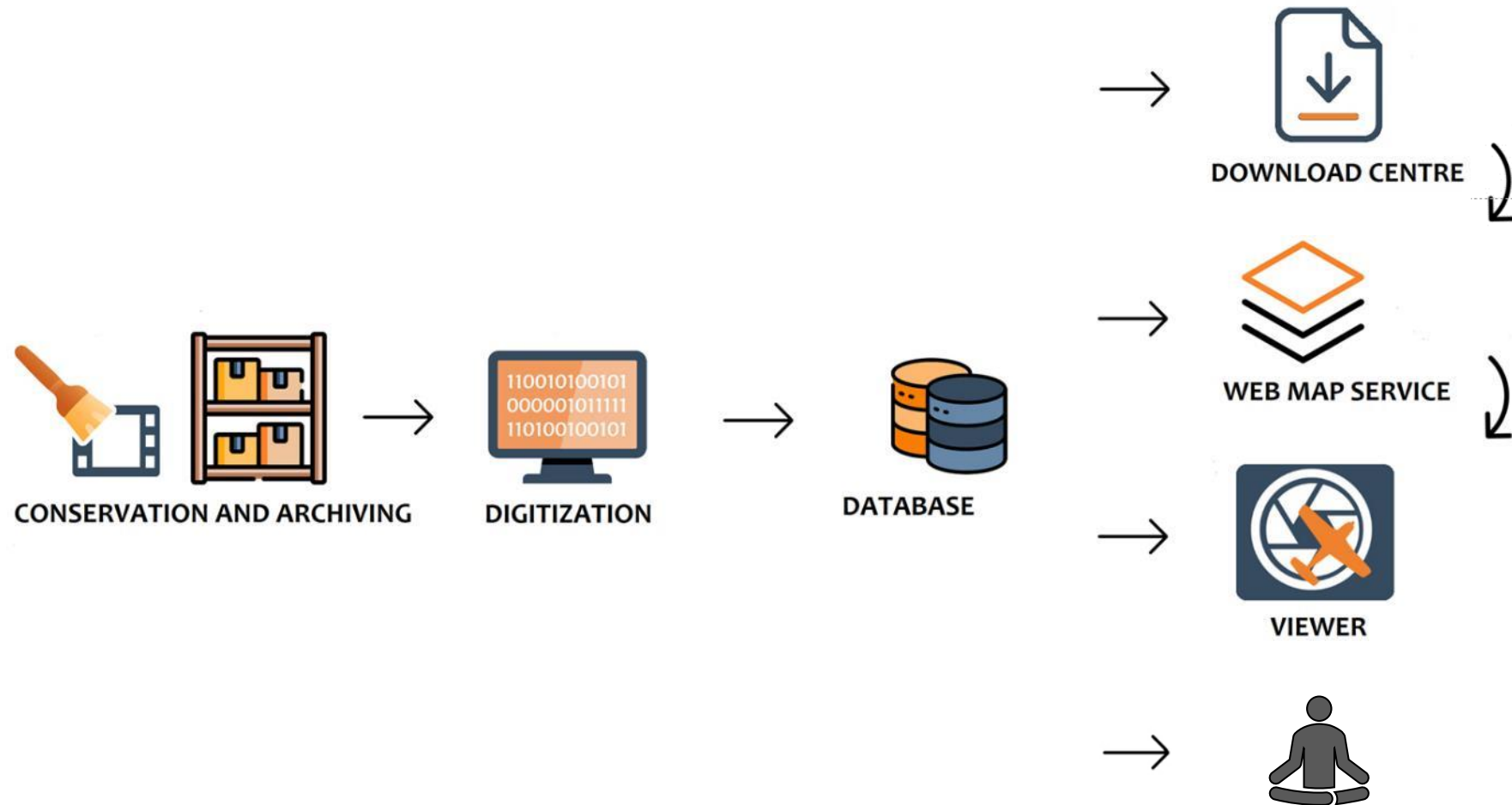
Collaborative production between different administrations in accordance with Inspire Directive spirit to establish a Spatial Data Infrastructure (SDI) in Europe.



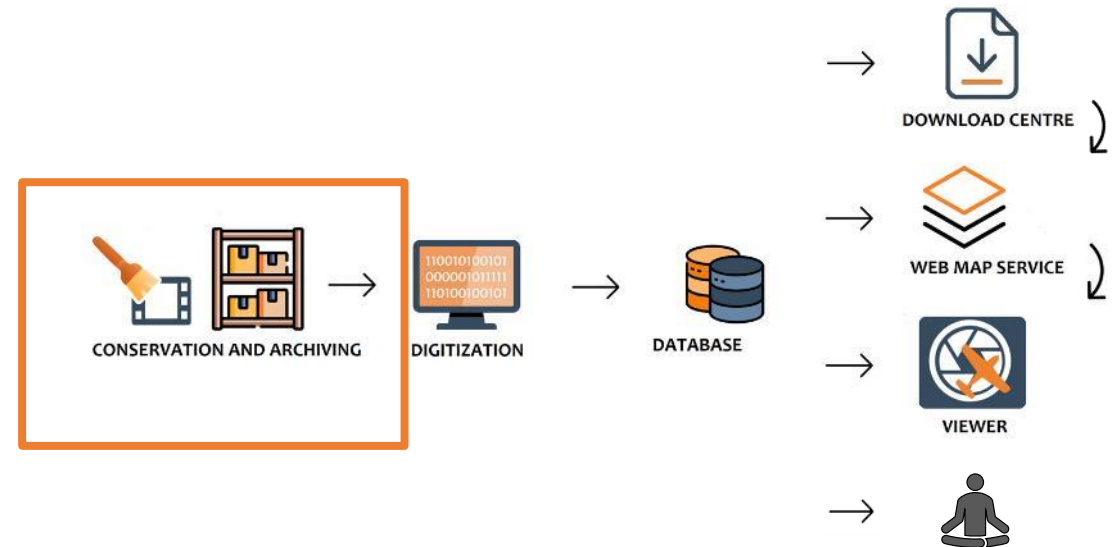
Digital imagery

Since 2006.

Aerial surveys photography workflow

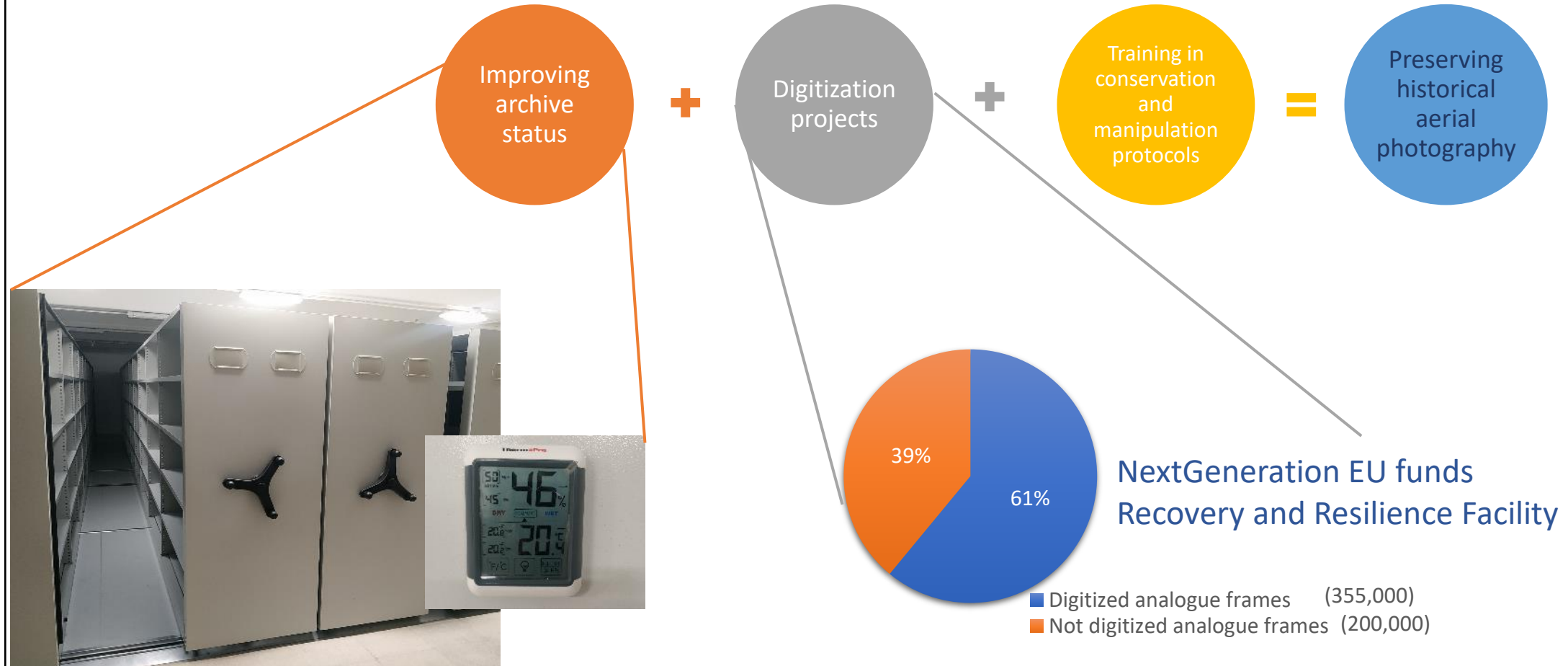


Preserving historical aerial photography

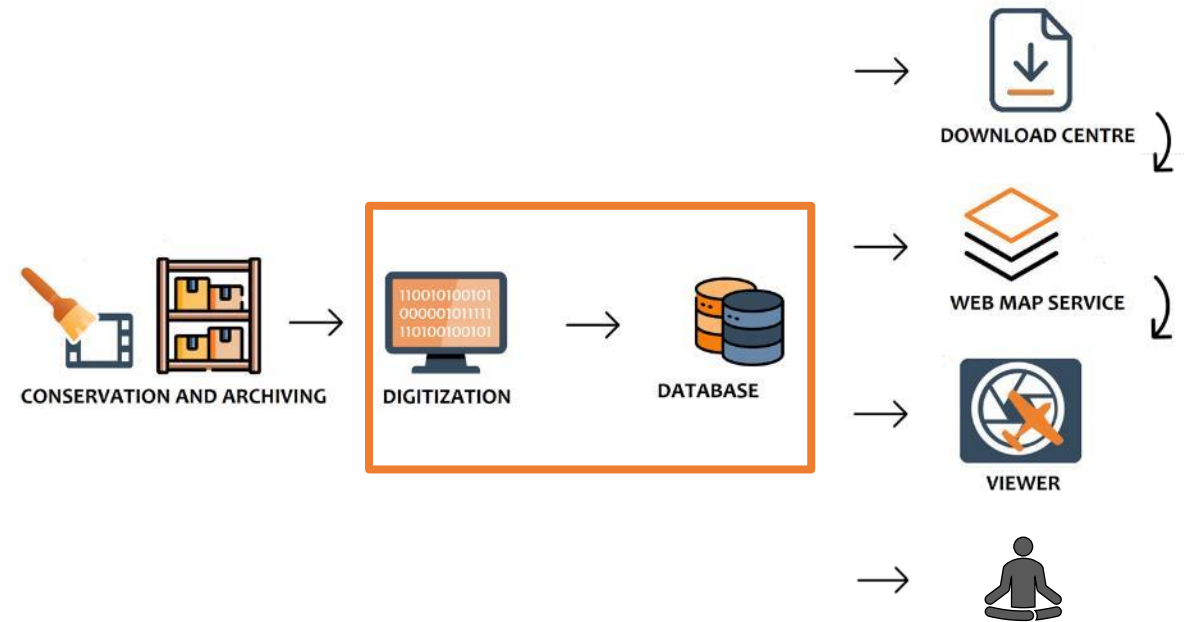


Preserving historical aerial photography

Preserving historical aerial photography and efficiently managing aerial surveys are the main reasons to digitize our funds and improve our archive status.



Digital data and metadata archiving



Digital data archiving : formats



◇ Digital photographs

◇ Raw

- ◇ GeoTIFF format.
- ◇ Archived in hard drive disks.
- ◇ 3 copies of each, stored in different places to ensure data safety.

◇ Compressed formats

- ◇ ECW, JP2 or COG.
- ◇ Stored in data servers. We are generating COG images to be published and downloaded since the benefits of this format have been proven.

Archiving metadata: Geographic Information Database

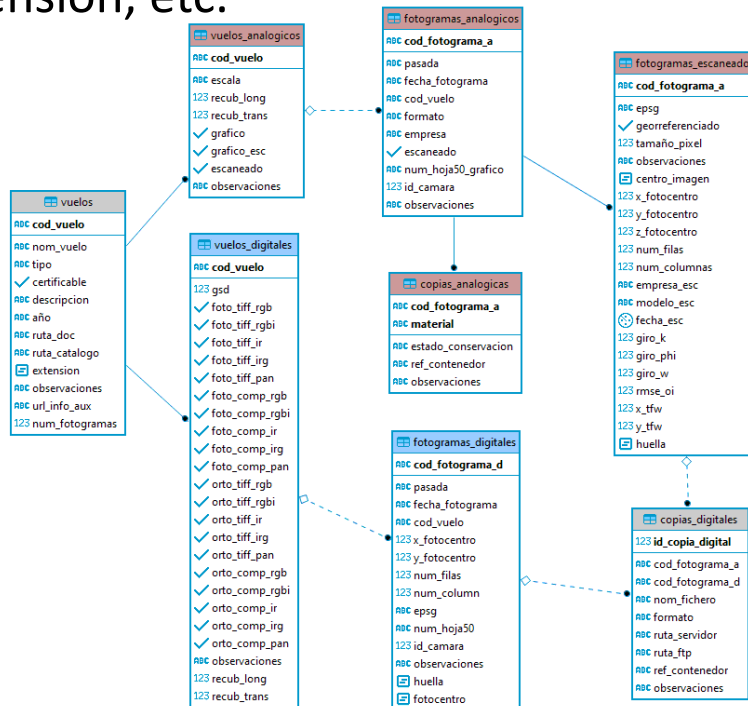
Metadata and geometries storage:

◇ Aerial survey information:

- ◇ Name
- ◇ Temporal dimension
- ◇ Spatial resolution
- ◇ Extension, etc.

◇ Photographs information:

- ◇ Conservation status (analogic surveys)
- ◇ Location in the archive (analogic surveys)
- ◇ Image orientation
- ◇ Date
- ◇ Coordinates system
- ◇ Format
- ◇ Centres and marks of photographs, etc.
- ◇ Link address



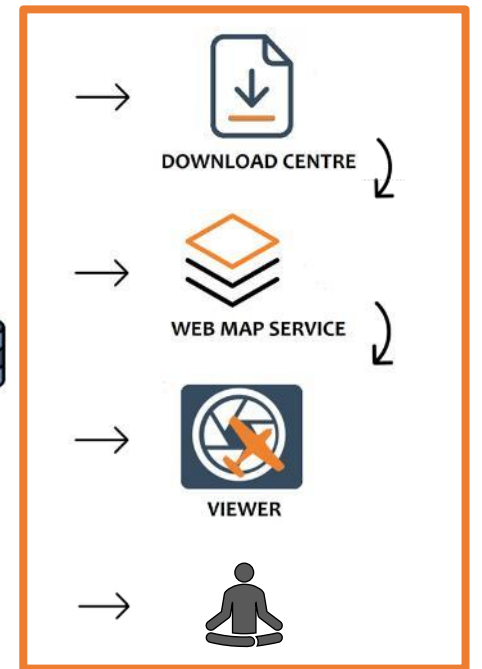
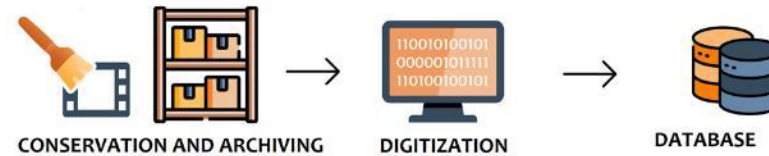
Historical orthoimage production

Historical Aerial Orthophotography National Plan was launched in 2008 for generating historical orthoimages. IGN in collaboration with various public bodies makes historical orthoimages accessible to citizens, public and private bodies.

Phases of orthoimage creation:

1. Quality analysis and control of baseline data.
2. Problems identification: lack of calibration data, bad quality of photographs and difficulties finding GCP and generating a DTM.
3. Working plan definition: methodology, quality assurance systems and a timeline.
4. Ground Control Points (GCP) collection and image orientation estimation.
5. Digital aerotriangulation.
6. Digital Terrain Model (DSM) generation.
7. Orthophotography generation and final mosaicking.
8. Internal procedures to ensure quality.
9. Products handover, report, record and metadata.

Disseminating aerial photography



Download Centre

A website for downloading digital files generated by IGN, aerial photographs and orthoimages among others, free of charge.



<http://centrodedescargas.cnig.es/>





**Interministerial flight
1973-1986**

Description:
Photograms from the 1973-1986 Interministerial photogrammetric flight.

GRS: ETRS89 for the Iberian Peninsula, Balearic Islands, Ceuta and Melilla, and REGCAN95 for the Canary Islands (both systems are compatible with WGS84). UTM projection in the corresponding zone.

Download Units:
Photogram

Format: ECW

[See + Metadata](#)



**Orthophotos
Interministerial**

Description: Mosaic of orthophotos from the Interministerial flight.

GRS: ETRS89 for the Iberian Peninsula, Balearic Islands, Ceuta and Melilla. UTM projection in the corresponding zone.

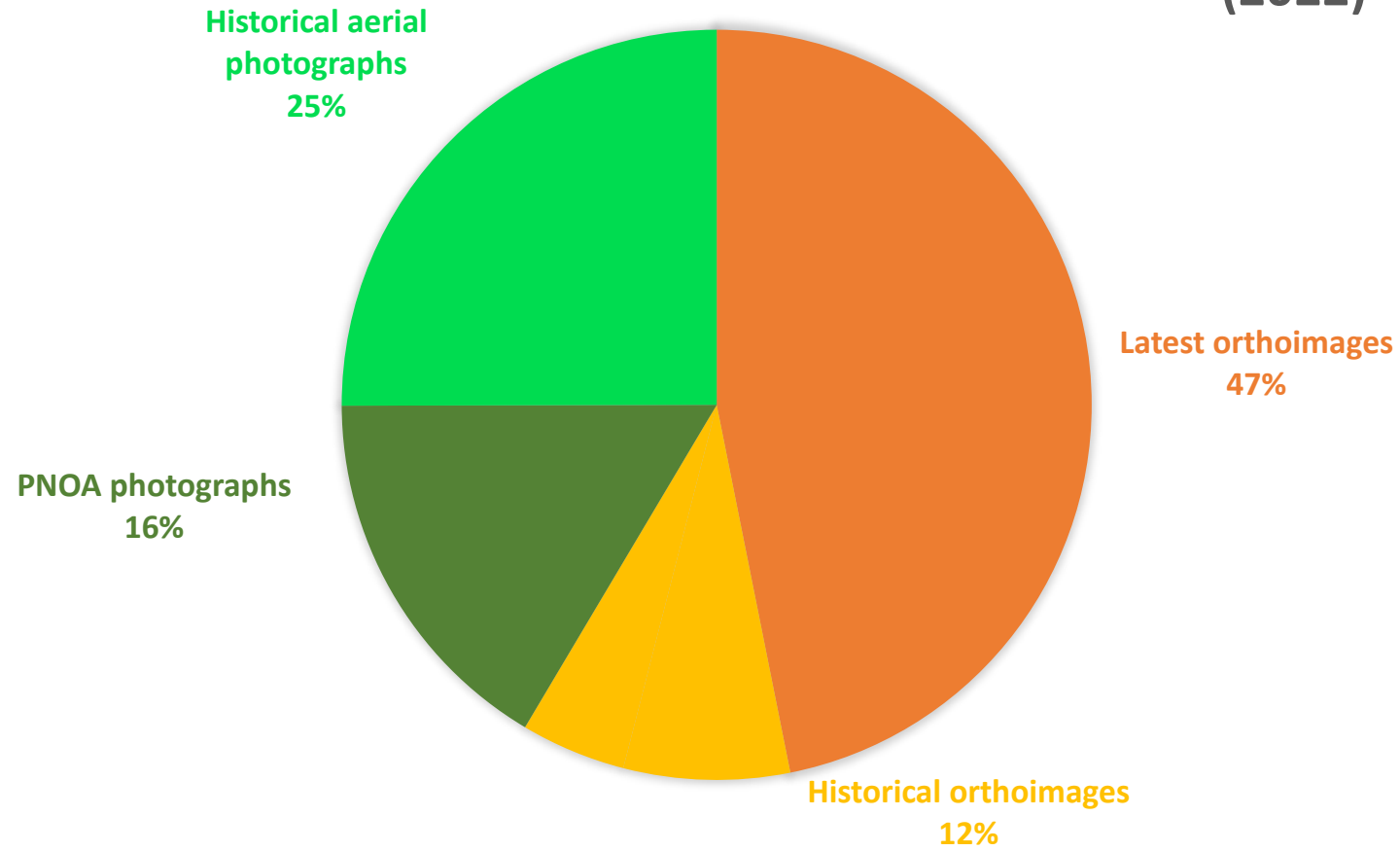
Download Units: Each mosaic covers a MTN50 sheet (National Topographic Map at 1:50 000 scale).

Format: ECW

[See + Metadata Auxiliary Information](#)

Download Centre: some figures

**987.148 DOWNLOADS
(2022)**



Web View Services of aerial photographs and orthophotography

Web Map Service (WMS) of aerial photographs

<https://wms-fototeca.idee.es/fototeca>

Web Map Tiled Service (WMTS) of historical orthophotography

<https://www.ign.es/wms/pnoa-historico>

Web Map Tiled Service (WMTS) of latest orthophotography

<https://www.ign.es/wms-inspire/pnoa-ma>

OGC and INSPIRE compliant

- Coverage of the aerial survey
- Photocenters geometry
- Information:
 - Frame code
 - Strip
 - Date

Aerial Imagery Viewer

Photographs Comparison

1973-1986 Interministerial

Photograph Information

Photograph

Flight

Formats Availability

File name

h50_1058_fot_134-0010_cog

Format

cog

Code

P-0223_1058_134_00010

Strip

134

Date

21/07/2022

Photocenter X coordinate

522876.663

Photocenter Y coordinate

4061120.615

EPSG

25830

Print and certify

> Print options

Size

A4: 21.0x29.7 cm

Scale

15000

Custom

Orientation

Vertical

> Request Certificate (Optional)

This service is optional and has an [additional cost](#).

Check Paper or Digital to request the certificate that you will receive by mail or e-mail respectively. To view your order access our Virtual Store through the shopping cart icon.

☐ Paper

☒ Digital

Accept

Photographs Comparison

Select the photographs of a flight for each screen to be able to compare them

Screen 1:

1973-1986 Interministerial

Screen 2:

2022 Vuelo PNOA

PHOTOGRAPHS	ACTIONS
☒ A-0004_1058_cof_2609	
☒ A-0004_1058_cog_2625	
☒ A-0004_1058_cog_2627	

PHOTOGRAPHS	ACTIONS
☒ h50_1058_fot_134-0007_cog	
☒ h50_1058_fot_134_0009_cog	
☒ h50_1058_fot_134-0010_cog	

Open comparator

The Aerial Imagery Viewer is developed from API-CNIG, a common core technology based on OpenLayers 6.

Functionalities: visualization, comparing, printing, downloading and certificating photos digitized by IGN.

It also allows spatial and alphanumeric queries to look up the analogic surveys guarded by IGN thanks to the connections between the WMS and the DB.

17,000 sessions and 8,000 users per week.

Citizen attention service

- In person, telephone, email

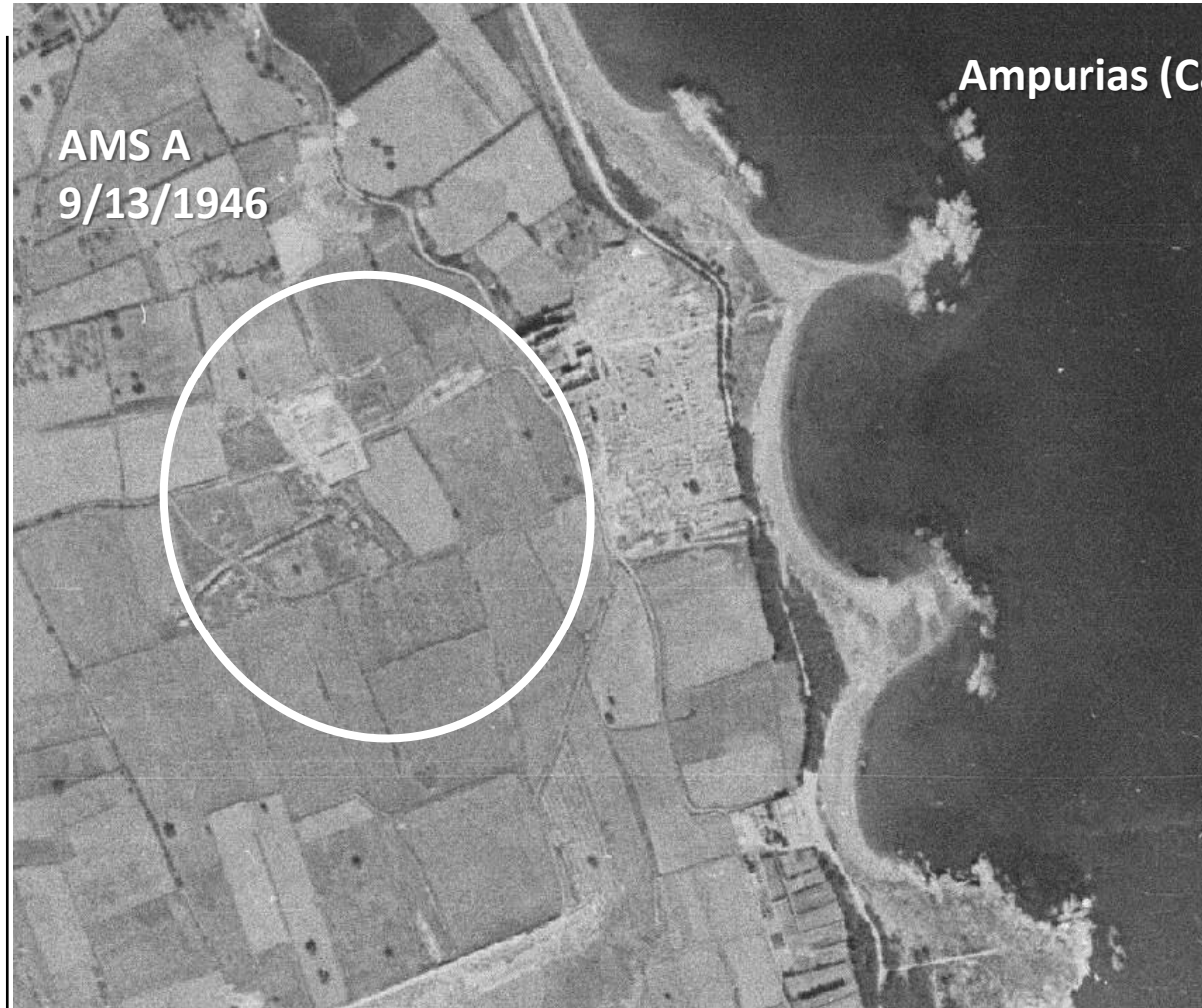




Citizen attention service

- In person, telephone, email
- Use cases
 - Base information for new geographic products: cartography, DTM and orthoimages.
 - Source for historical researching on cartography, archaeology, natural disasters, and geology.







PNOA 2014
9/10/2014

Flysch
Zumaa (Vasque Country)



PNOA 2021
2/14/2021



Citizen attention service

- In person, telephone, email
- Use cases
 - Base information for new geographic products: cartography, DTM and orthoimages.
 - Source for historical researching on cartography, archaeology, natural disasters, and geology.
 - Urban and land evolution: how the territory has been developed.

Pozuelo de Alarcón (Madrid)

Referencias Madrid
7/1968



Nacional
7/22/1984



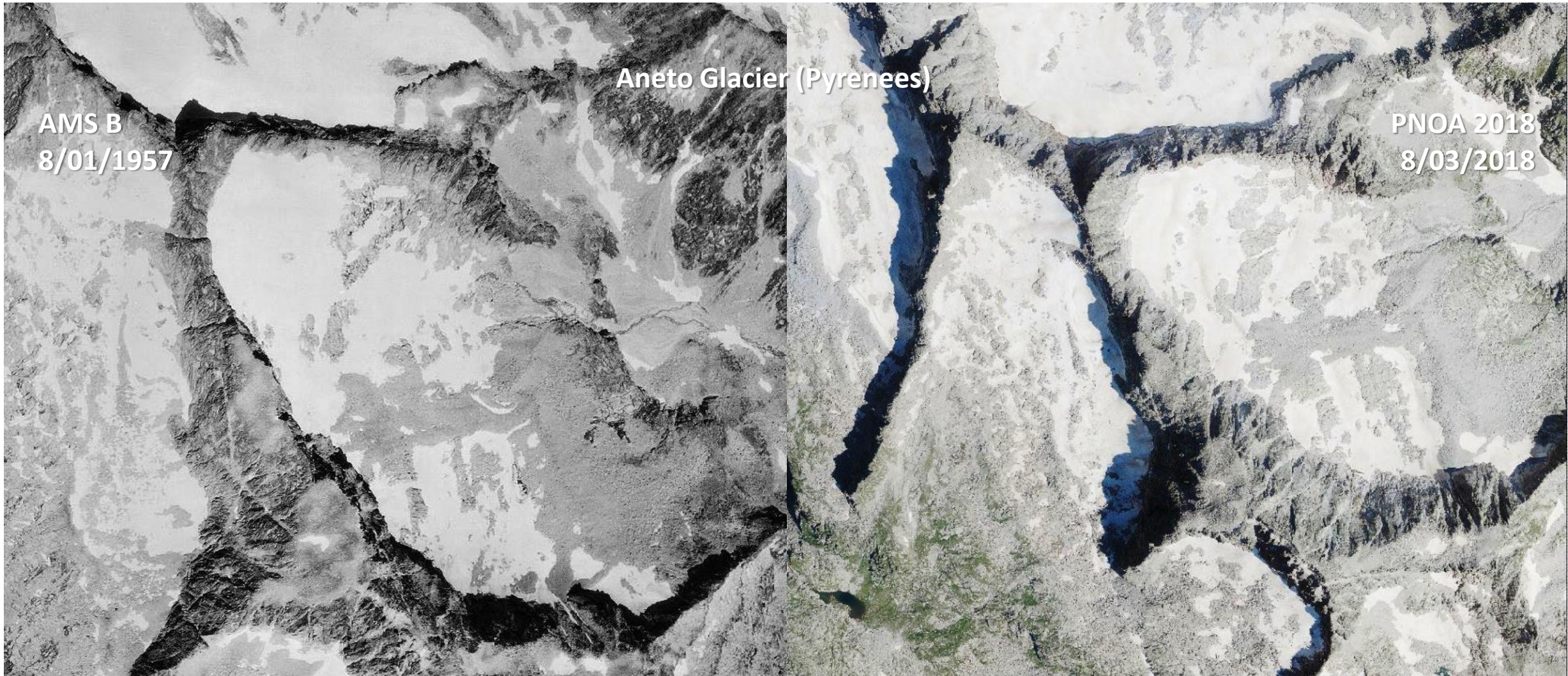
PNOA 2006
4/30/2006





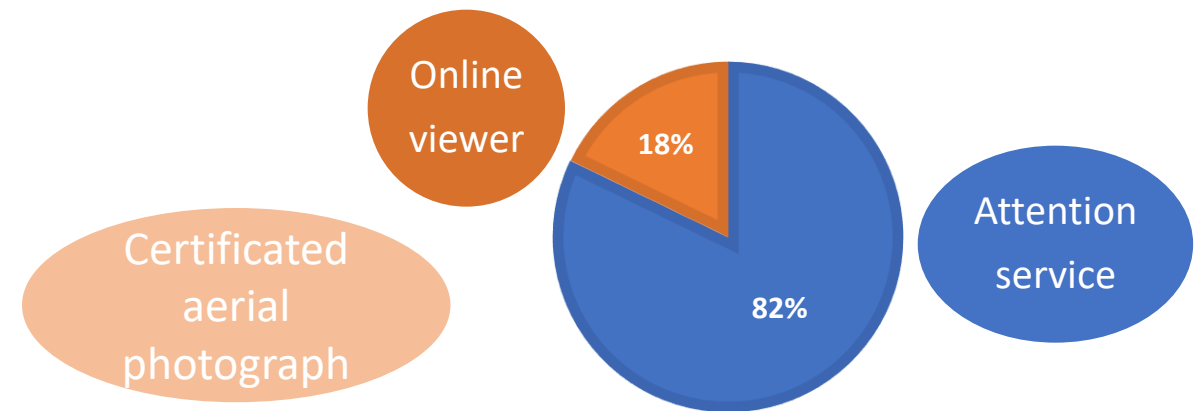
Citizen attention service

- In person, telephone, email
- Use cases
 - Base information for new geographic products: cartography, DTM and orthoimages.
 - Source for historical researching on cartography, archaeology, natural disasters, and geology.
 - Urban and land evolution: how the territory has been developed.
 - Climate changes and environmental studies: shore or glacier changes.



Citizen attention service

- In person, telephone, email
- Use cases
 - Base information for new geographic products: cartography, DTM and orthoimages.
 - Source for historical researching on cartography, archaeology, natural disasters, and geology.
 - Urban and land evolution: how the territory has been developed.
 - Climate changes and environmental studies: shore or glacier changes.
 - Evidence about how the territory was: aerial photography certification helps in legal and cadastral issues about the territory in a certain date.

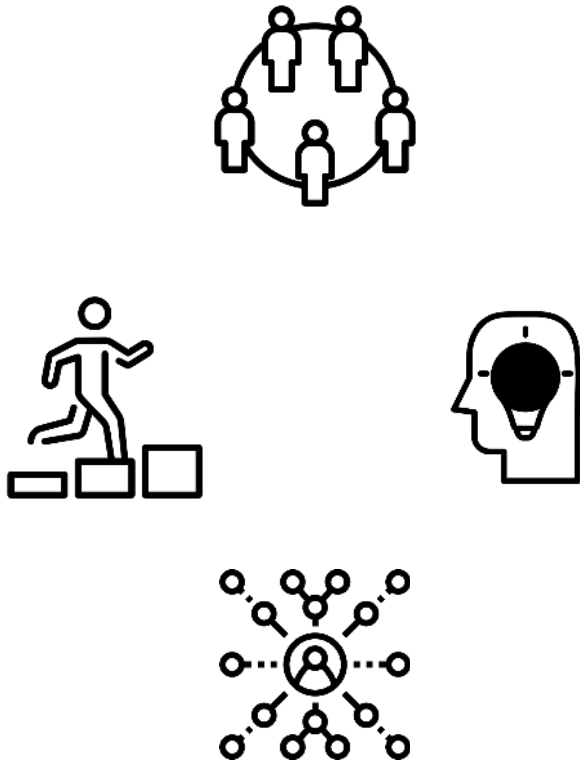






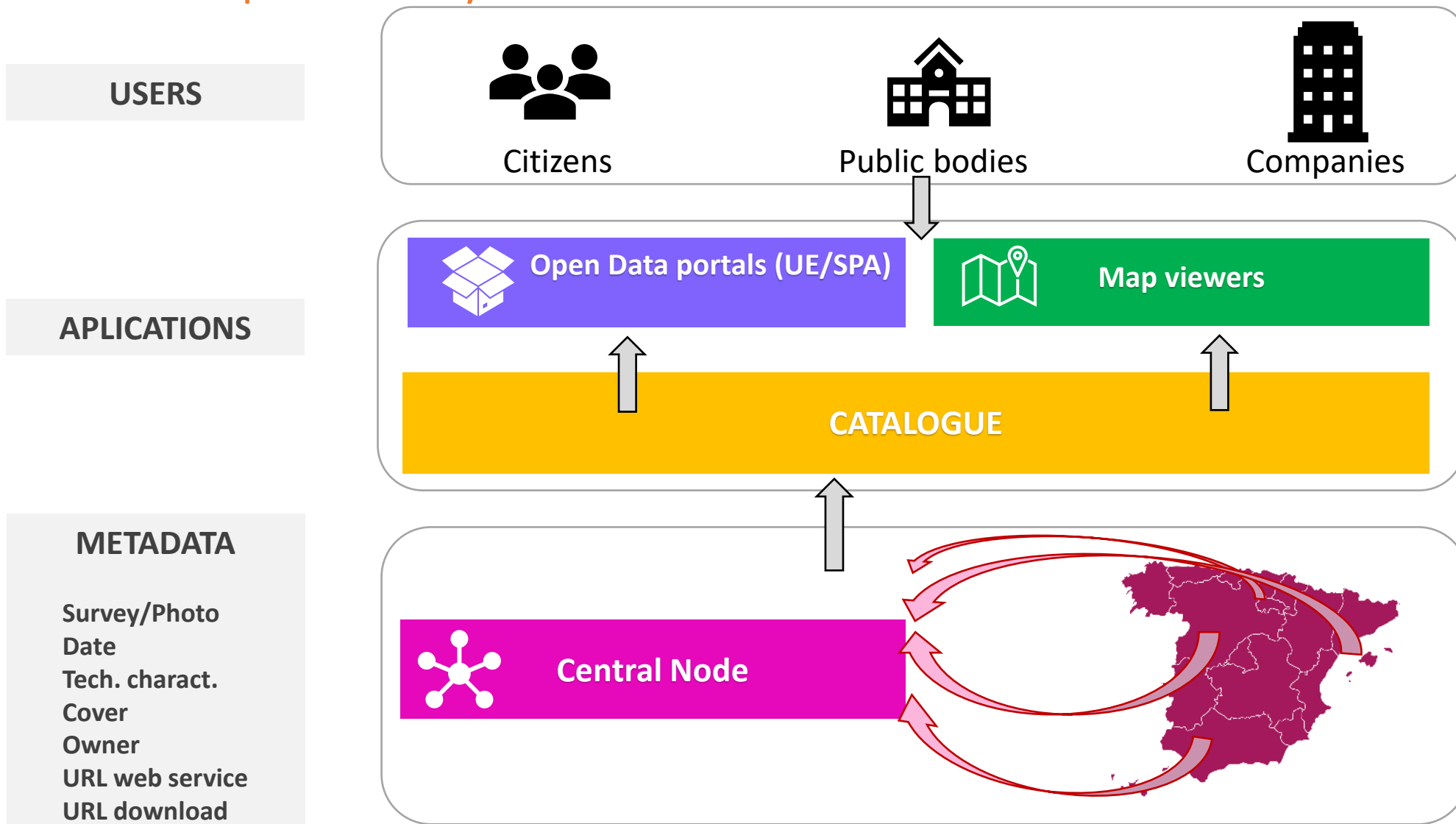
Prospects





- Create a REST service to offer the orientation parameters of aerial surveys.
- Continues improvement of the preservation and dissemination of analogic photographs and other related information.
- Increase the investment in orthophotography generation.
- Promote the federation of public bodies that guard historical aerial photographs in Spain.

Federated photo library



www.ign.es

THANK YOU
FOR YOUR ATTENTION

Ana Velasco Tirado

ana.velasco@cnig.es

<https://fototeca.cnig.es>