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MINISTERIO DE FOMENTO

National Geographic Institute of SPAIN

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The Production of Global **G**eospatial **R**eference **I**nformation (**GRI**) from the countries perspective. Case of Spain

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Outlook

1. **G**eospatial **R**eference **I**nformation (**GRI**).

2. From **coreGRI** to **GRI.**

3. **Global GRI**. National perspective.

4. Harmonized and sustainable **New** Production System.

5. Use Case in **Spain**.

6. Conclusions.

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Geospatial Reference Information (GRI): Key points

- It provides an unambiguous location for a user's data
- It enables merging (aggregating) of data **from various sources**
- It provides a geographic framework or context to allow others to better understand the spatial information that is being presented
- It is subject to a regular data maintenance regime (defined life cycle)
- It is provided by an **authoritative source** with a mandate (responsibility), for its maintenance and availability → NMCA

  - ✓ FGDC, 2005; Rase et al., 2002

Criteria regarding GRI:

- Official (Authoritative)
- Reliable
- Accuracy corresponding to level of requirements
- Sustainable
- Consistent at all level (National, European and Global)

Definition of core data GRD (→ UN GGIM Europe) *"draft"*

"authoritative data from UN Member States that satisfy minimal needs of cross border, European and Global level"

- **This means:**
  - sustainable **data mastered** by countries,
  - data which users can **trust**,
  - data upon which thematic data and users own **data can be based**,
  - data with **temporal and historical dimension**.

- Meant to address **supranational requirements** with homogeneous specifications and content at pan-European level
  - However **core data**: **skeleton** also used at **local and national** level

- **Core data** will address national requirements and they are **minimal** in the sense that they are common to European Countries

Geospatial Reference Information (GRI)
→ Caracteristics

- **GRI Structure:**
  - **Bottom-up** approach
  - **Integrated** production system: Bottom-up (from National to Global) with Top-down approach (from Global to National)
  - **Collaborative** Maintenance of databases (open production including VGI)

- **GRI Contents:**
  - Orthoimagery, DEM, Geographic Data Sets, Land Cover/Use …

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core Geospatial Reference Information (GRI)

cGRI Core Data Sets:

→ The **minimum** geographic data base necessary for all different applications and activities (skeleton of territory).

→ These **Core** Data Sets are essential for all Countries and specially for Developing Countries

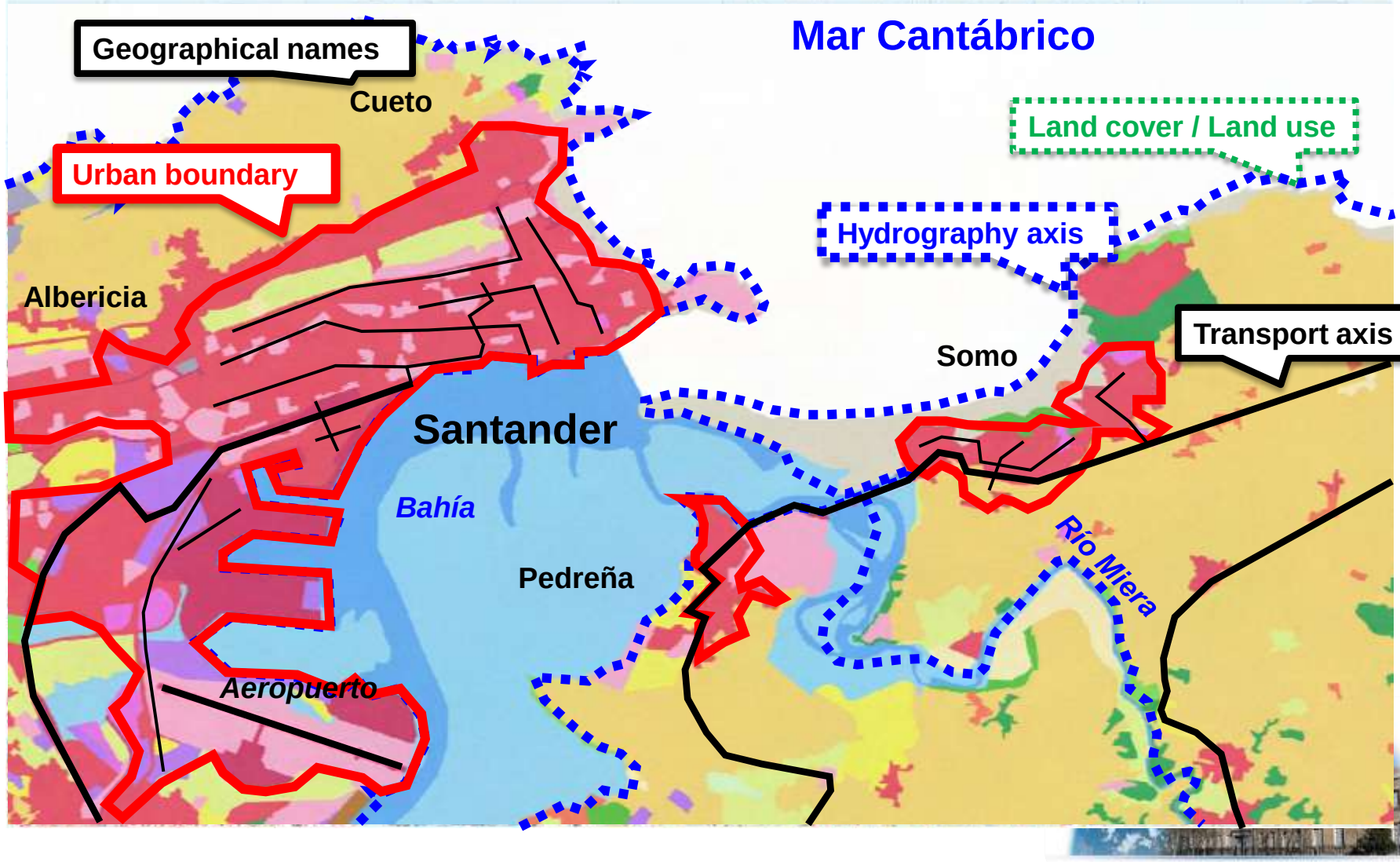
→ ***Contents of coreGRI*** *defined by each Member States regarding National / Continental /* ***Global*** *needs:*

+ Automatically obtained as possible

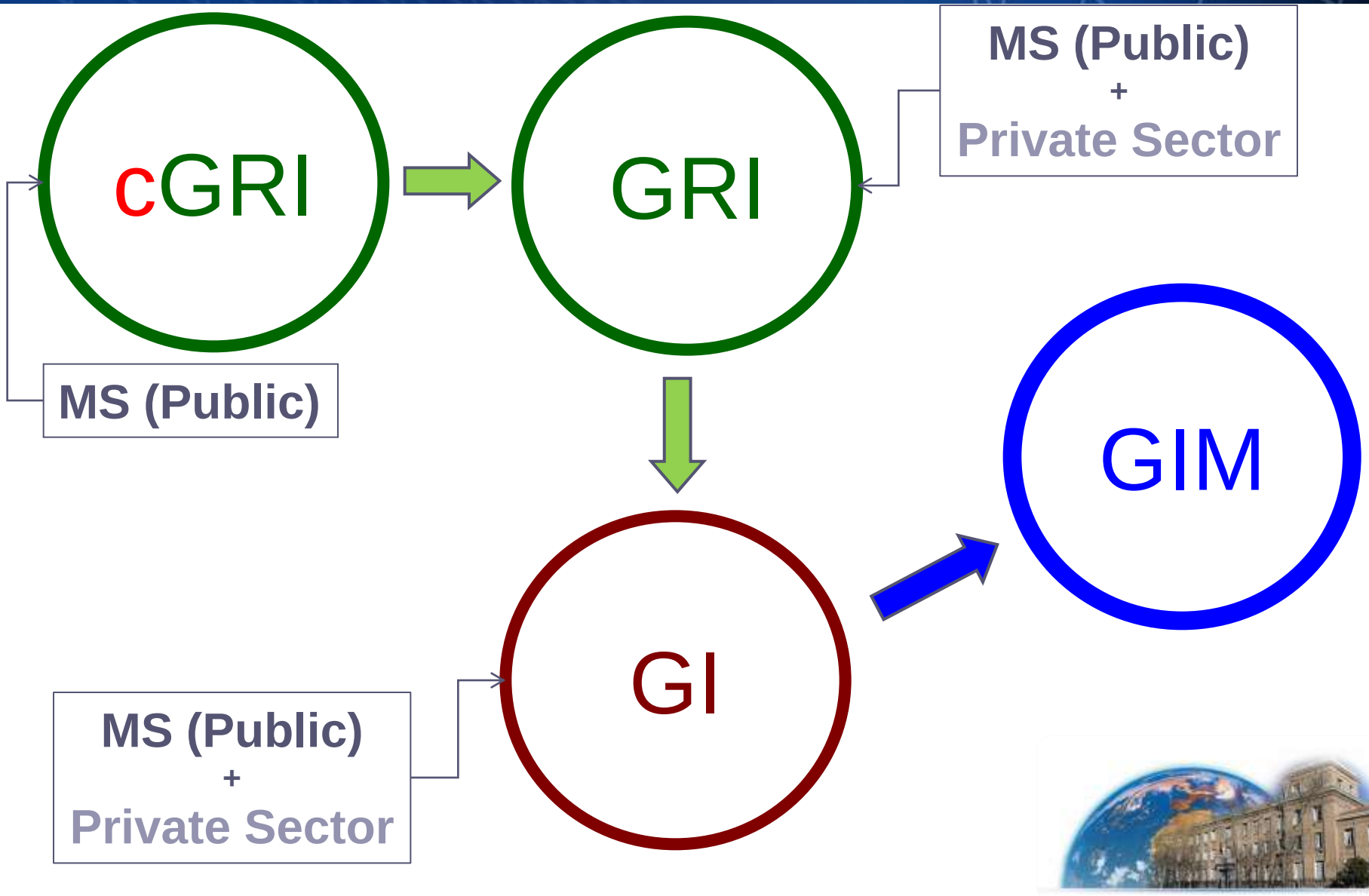
→ ***Fundamental Geographic Data Sets*** **(cGRD = cGRI) ?**

Geospatial Reference Information : coreGRI

coreGRI , example: **Basic** geometry and attributes



Geospatial Reference Information (GRI) and coreGRI



Geospatial Reference Information (GRI) and coreGRI

cGRI

- ✓ **Not subjective**
- ✓ **Accurate** (at maximum level allowed by current technology).
- ✓ Same **skeleton** at all levels of information (National, Continental, Global) → **consistent**
- ✓ **Automatically** obtainable (within the current technology)
- ✓ **Funded** by Member States ?

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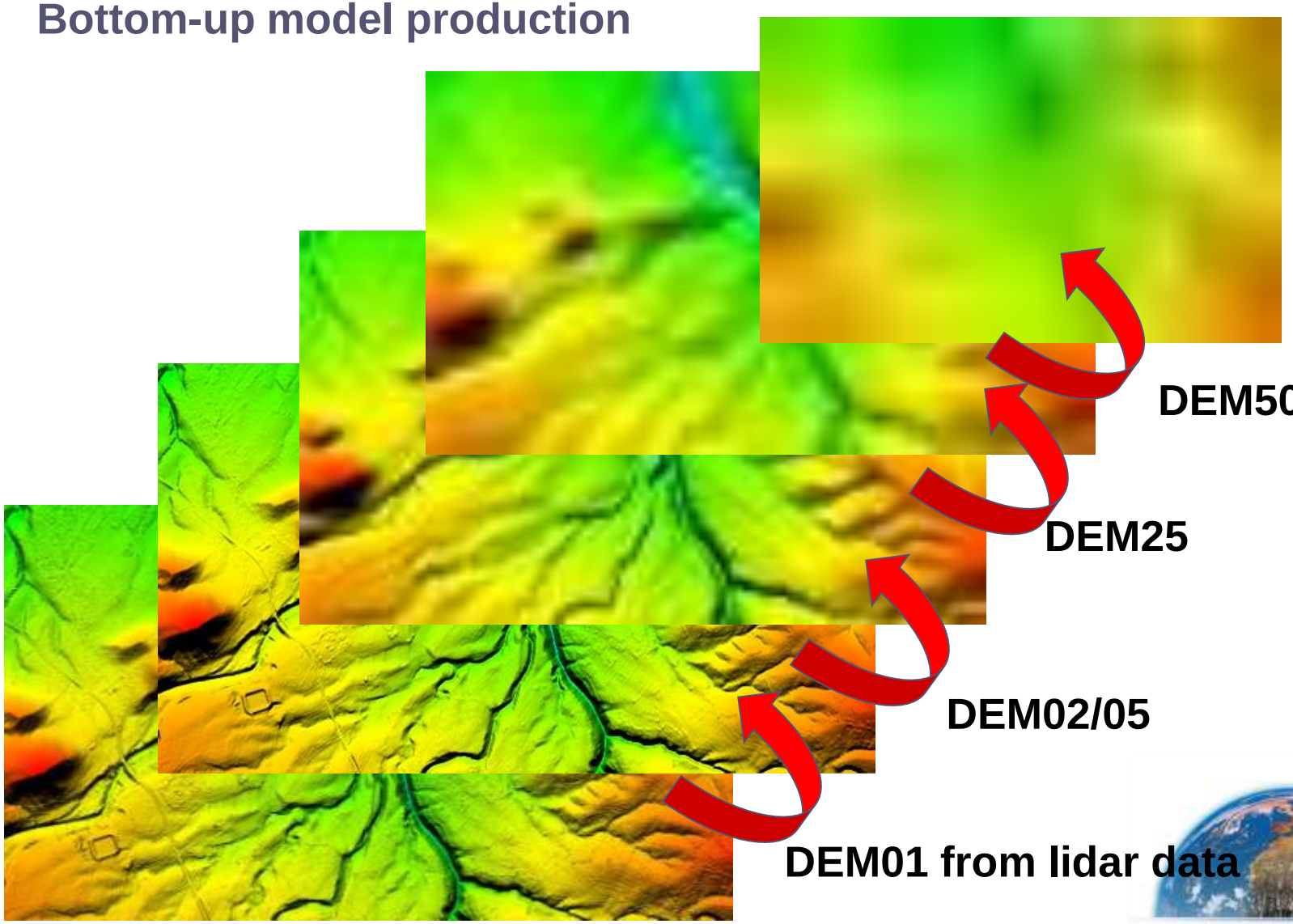
Geospatial Reference Information (GRI) and coreGRI

- **coreGRI** makes possible to define the **transition** from centralised access (top-down) to decentralised access (bottom-up)
- **coreGRI** could (should) be initiated by Member States
- If the content of **coreGRI** is defined, it is possible to schedule the **transition** of :
  - Temporal planning
  - Volume of offered data
  - Actors involved
  - Budget level

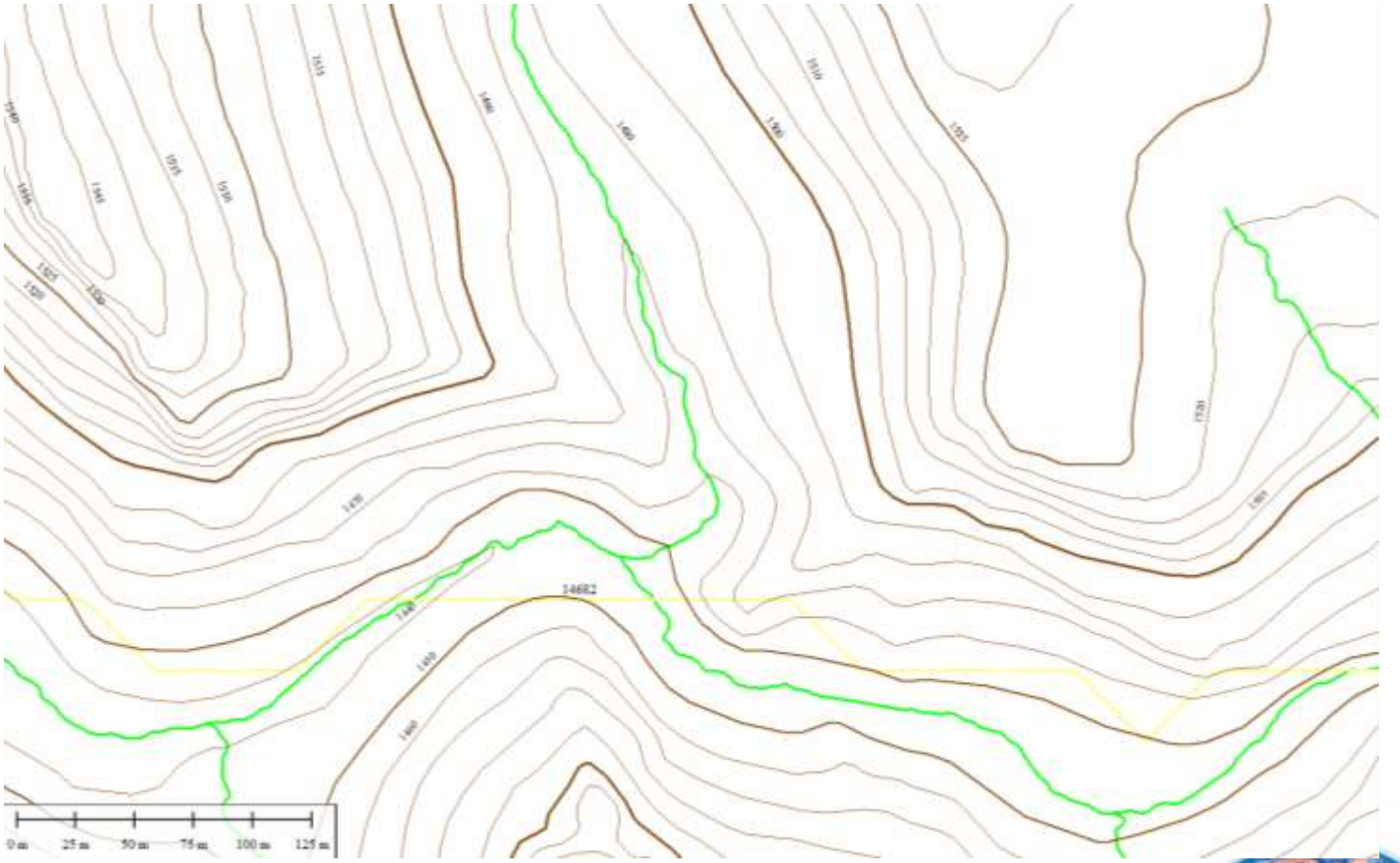
UN GGIM could facilitate this transition

DEM Model Production (example)

Bottom-up model production



e.g: LIDAR-DEM-HYDRO and Contour Lines → consistency



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Harmonized and sustainable New Production System from cGRI to GRI (model/e.g)

UN-GGIM services

Geospatial Reference Information GRI

LEVEL	ACCURACY	IMAGES	UPDATE	PRODUCTION
World (United Nations)	**≤ 10m**	**2.5-5.0m**	**6 years**	Top Down & Bottom Up (MS)
Continental	≤ 5m	1.25-2.5m	3- 6 years	Top Down & Bottom Up (MS)
Member States	≤ 1m	0.25-0.5m	3- 6 years	Bottom Up

TRENDS

New Production System

Core Geospatial Reference Information cGRI

Data Model

UN-GGIM

Internet platform+cloud
Integration cGRI+(GRI)

REQUERIMENTS

UN - cGRD	Elements	UPDATE
Hydrography / DEM	River axis	Each 6 years
Transportation Network	Road axis	Each 3 years
Urban Areas (Settlement)	Urban area perimeter	Each 3 years
Land Cover / Land use	Poligons	Each 6 years

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Use Cases in Spain

GRI Production System in Spain (stakeholders involved):

National Mapping Agency (*Instituto Geográfico Nacional*)

+

National Administration (*others Departments*)

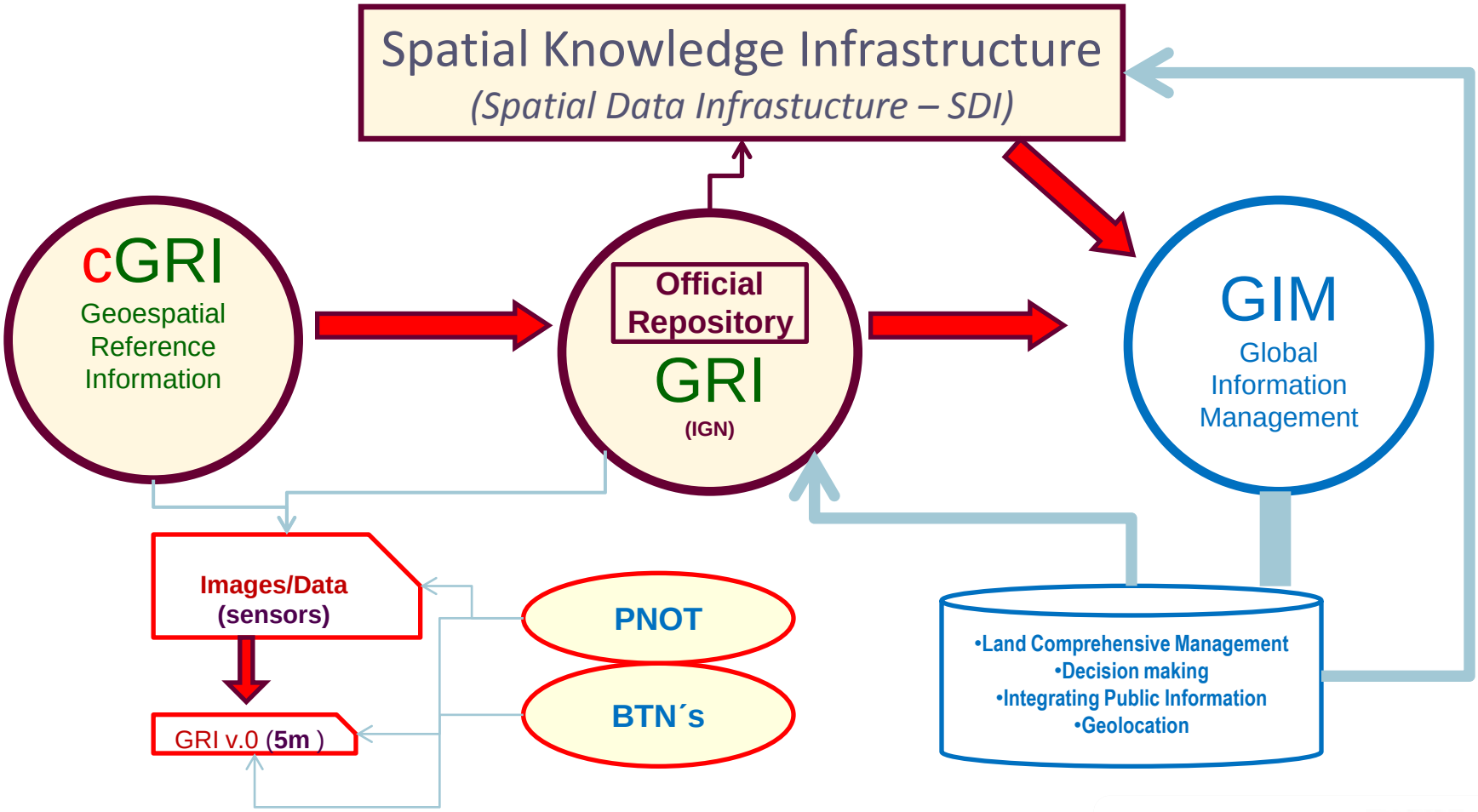
+

Spanish Regional Governments (*Comunidades Autónomas*)

+

Private sector

Geospatial Reference Information (GRI)/coreGRI → Spain



PNOT: National Plan for Land Observation

BTN´s: ExistingTopographical Data Set´s

New Production System of Geospatial Reference Information (GRI)

- **First step → National Plan for Land Observation (PNOT)**
- **Second step → cGRI (…automatically extracted)**
- *Third step* → ***GRI***

1st. National Plan for Land Observation (PNOT):

1.1.- National Aerial Orthophoto Program (PNOA)

Encourages intergovernmental cooperation for the production Digital Images and Information at high resolutions
(shared budget, property and uses)

1.1.- National Aerial Orthophoto Program (PNOA):
→ PNOA IMAGE

scales (**e**) → resolution (**s**)
me= maximum error at 95% (**cl**)

s_v= pixel size visualization
s_c=pixel size for restitution

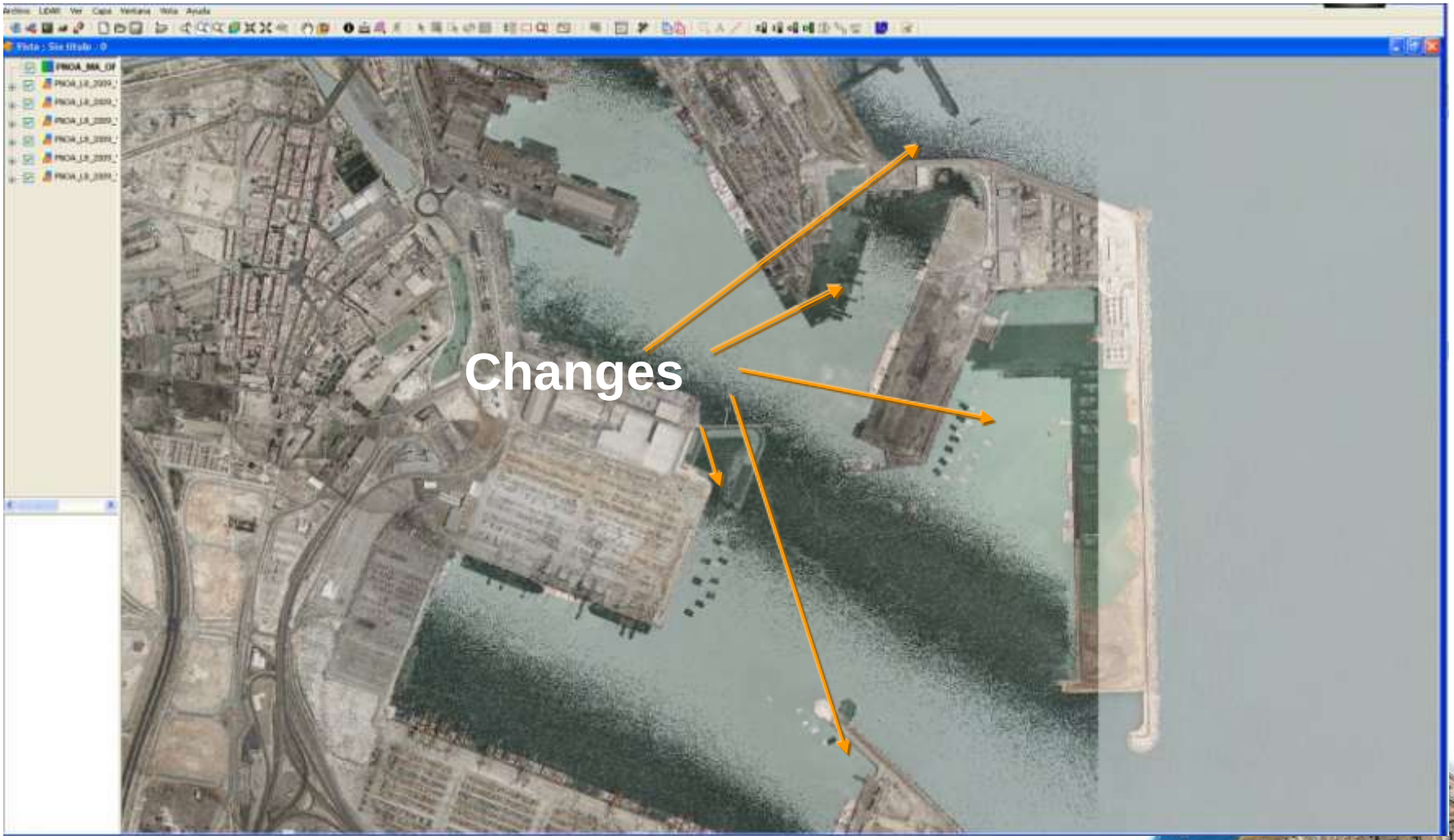
e	me(m)	s_v(m)	s_c(m)
1:25.000	**5**	2,50	1,25
1:10.000	**2**	1	0,50
1:5.000	**1**	0,50	0,25
1:1.000	**0,20**	0,10	0,05/0,10

1.1.- National Aerial Orthophoto Program (PNOA):
→ PNOA LIDAR

Technical specifications and products:

- Average density of 0.5points/m2
- Side coating ≥ 15%
- me ≤ 30cm (95% CL)
- Covering all Spain

PNOA LIDAR → e.g: Automatic change detections



1st. National Plan for Land Observation (PNOT):

1.2.- National Remote Sensing Program (PNT)

Provides regular satellite imagery at low, medium and high resolution
(pixel size: >100, 10-100, 1-10m, <1m)
for all Public sector
(buy once and use free of charge for all Public bodies)

1.2.- National Remote Sensing Program (PNT)

2.1.- Land Cover and Land Use Information System (SIOSE)

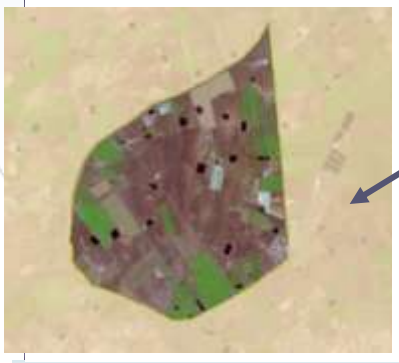
Produce in collaborative system *(Regional and Central Administration)* a periodical **Land Cover and Land Use** Information System at 1:25.000 scale (GIS) every three years

2.1.- Land Cover and Land Use Information System (SIOSE)

Production Methodology

Polygons from 2 at 0.5Ha

Buildings: 50%
Artificial Green Zones: 15%
Artificial Water: 5%
Vials: 15%
Other buildings: 5%
Surface not Built: 0%



Woody crops (fruit): 2%
Arable crops (other than rice): 70%
Arable crops (rice): 20%
Water sheets: 8%

PNOA mosaic, píxel size 25cm

SPOT mosaic, píxel size 2.5m

Old Production System IGN/Spain

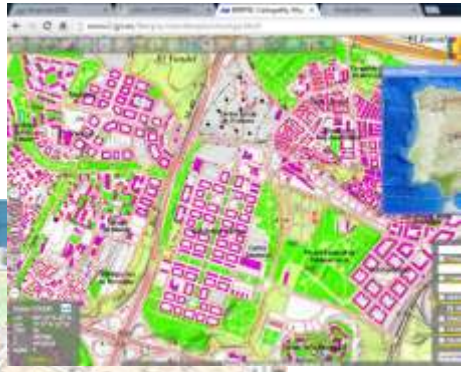
... until now the production of Geographic Information was dedicated for **final** geographic products

Problems:

- → Same issues common to several products (**duplicate information**)
- → Updating: temporal and geographical **desynchronization**
- → **Complex extraction** of GRI: duplication, differences of scale, etc.

New strategy of Production System IGN/Spain

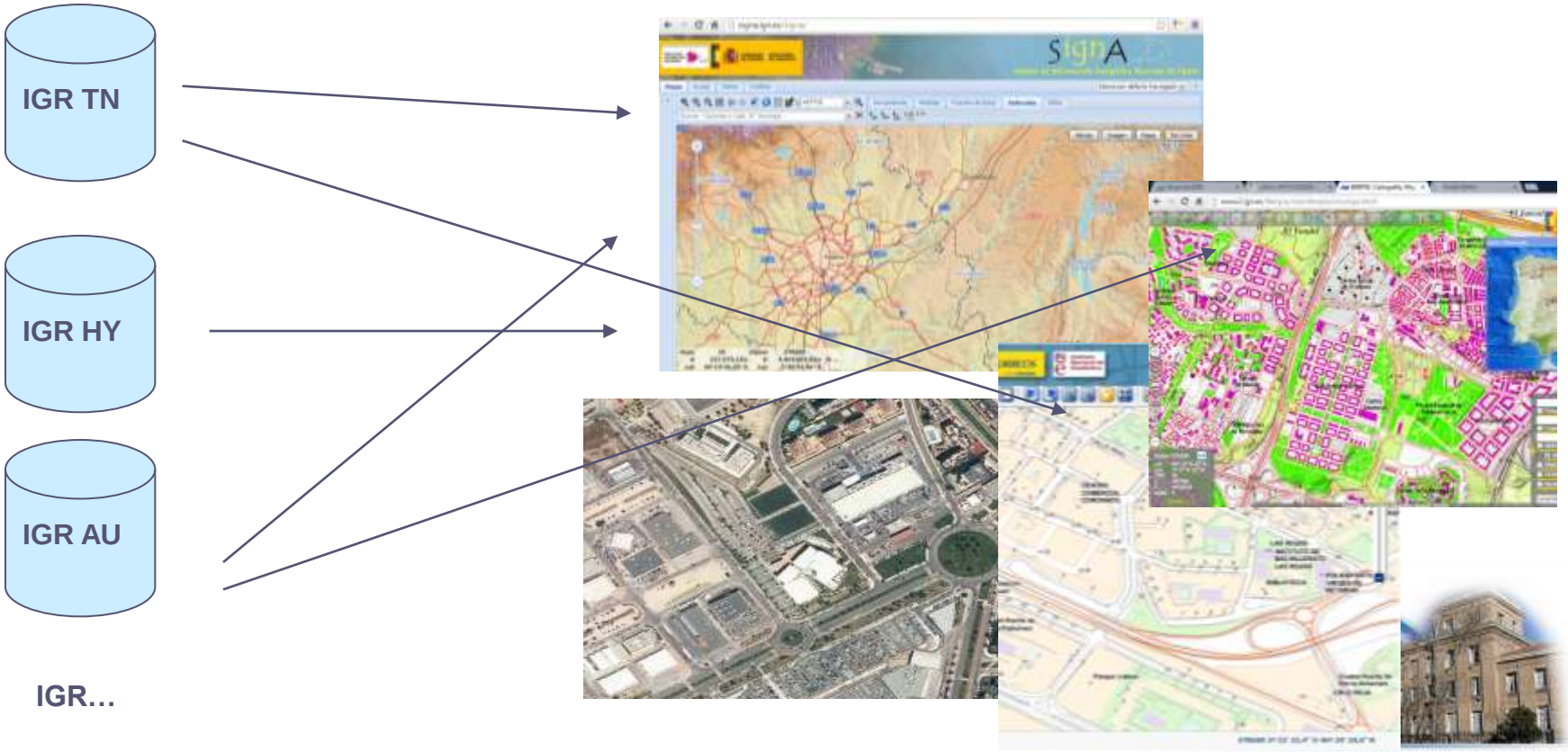
- **First**, from the **existing** Geographical Products:
  maps, topographical data sets, specialized data sets, … → **GRI (v.0; 5m)**



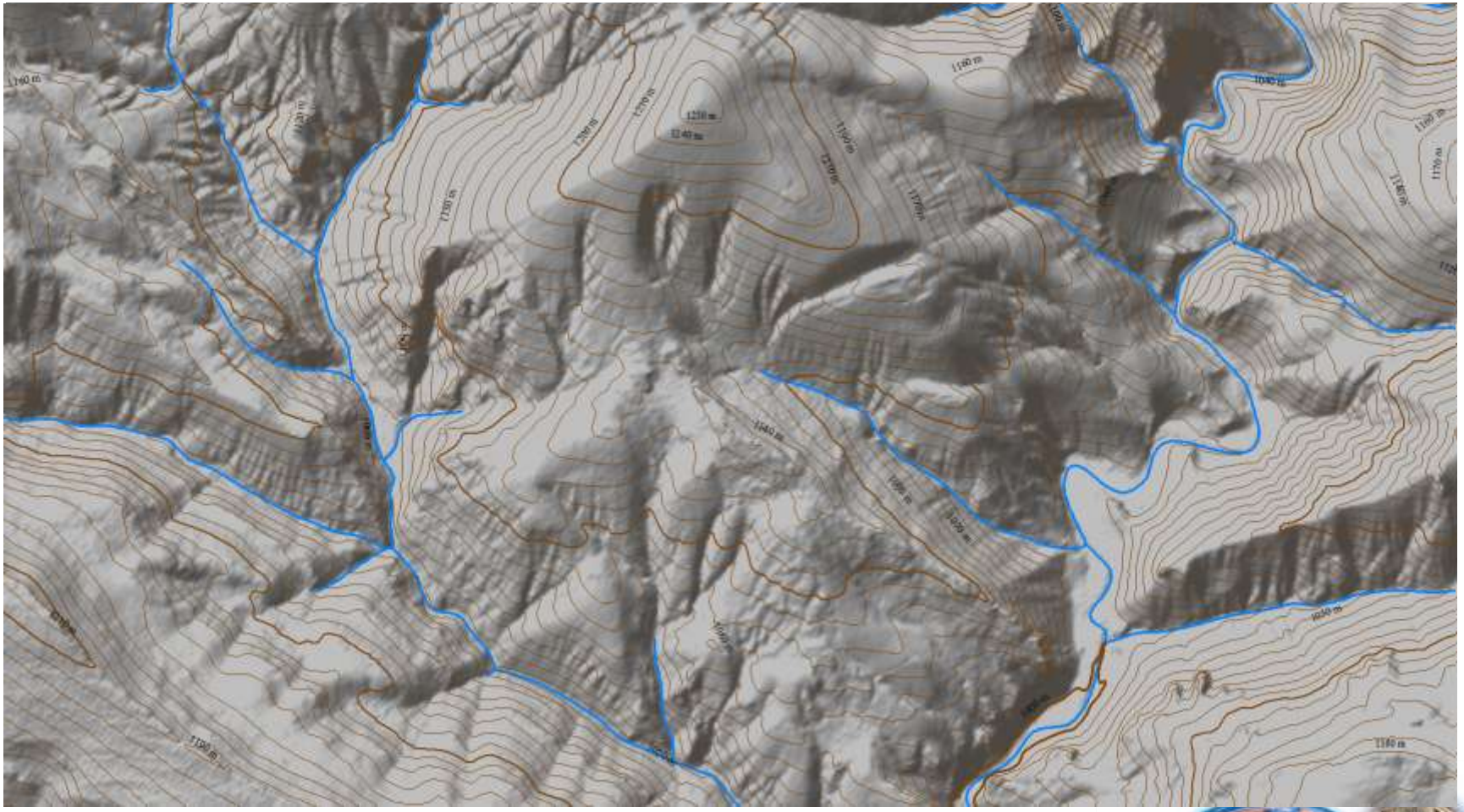
TN	HY	AU	GN	…
X	X	X	X	
		X	X	
X			X	

New strategy of Production System IGN/Spain

- First, from the existing Geographical Products:
  maps, topographical data sets, specialized data sets, … → **GRI (v.0 - 5m)**
- **Secondly**, update **GRI (v.0)** by automatic extraction → **GRI (v.1 – 1/2m)**
- **Third**, from **GRI (v.1)** → Geographical Products



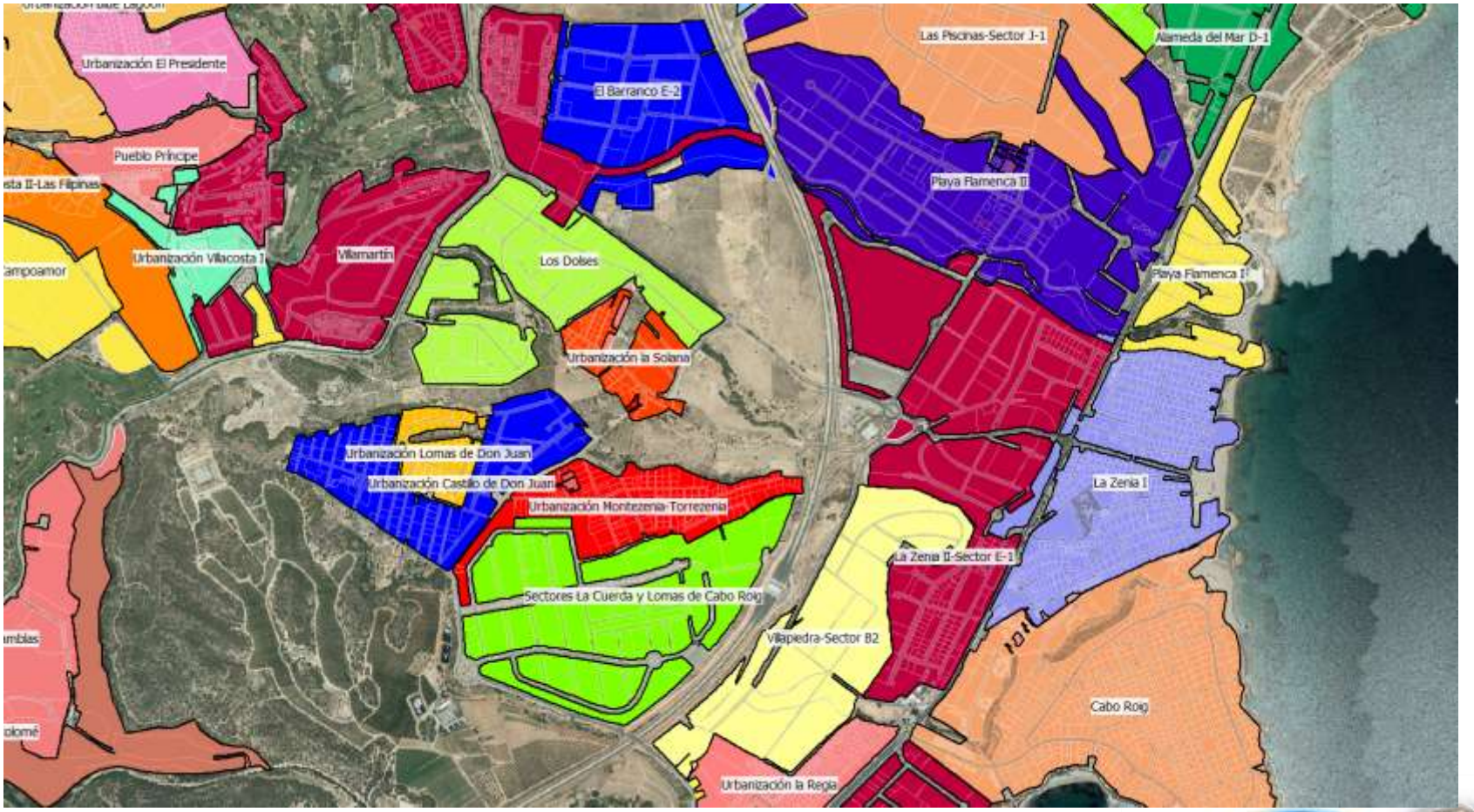
2.2.- **Hydrography:** automatic extraction process



2.3.-Transportation network: automatic extraction process

Vectoring axis

2.4.- Urban/rural areas: automatic extraction process



Budget 2015

IGN	→ 49%
Central Administration (other Departments)	→ 29%
Regional Administration	→ 22%

GRI Production System in Spain

→ Benefits

- Used the **same GRI for everyone** (same and unique **"skeleton"** for land)
- Avoid **duplicities**
- More **efficient** Geospatial Information Management (GIM)
- **Reliable**, guaranteed information from Member States (MS)
- Great economic **savings** (+60%)
- Intellectual **Property** of GRI corresponds to MS:
  → optimal Data Policy for the user (i.e: free of charge)

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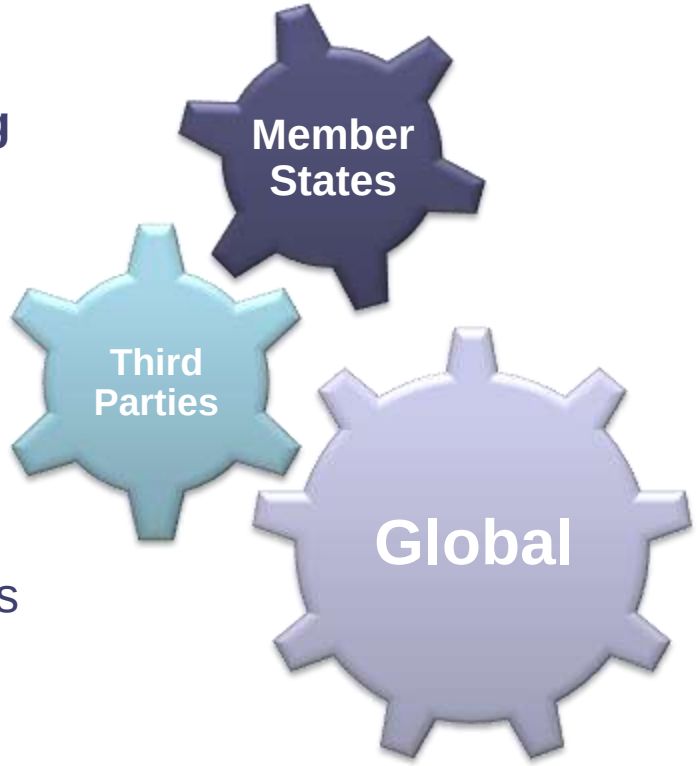
Global production system from Member States: Benefits

- **at Global level**
  - **Official national data** used for Continental and Global responses
  - **Data comparable** between levels, **avoiding misunderstanding**
  - **Cost reduced**, avoiding new production of data
- **for Member States**
  - **Official national data** used for Global responses
  - **New users and new business** perspectives
  - **Sustainability of the production**



- **for third parties**
  - Business in the **data integration** and **homogenization (harmonization)**

Conclusions:

- The National Mapping Agencies **(B-U)** together with other Continental/Global organizations **(T-D)**, could provide a **common system** for Land Observation and GRI (and services) useful for Public Administrations and general users.

- **Member States** must produce the **GRI** or at least the **coreGRI** ,in continuous updating and sustainable manner.

- The **definition** of the GRI or cGRI (*Fundamental Geographical Data Sets*) and **production processes** could be a **priority** for all actors involved.

- The timetable and total/annual costs must be known and previously **assumed** by all agents involved.

Thank you

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