A CAPACITY BUILDING STORY
FROM SATELLITES TO EO SERVICES

SCERIN-6 Capacity Building Workshop

11-14 June 2018, Zagreb, Croatia

Faculty of Geodesy, University of Zagreb, Croatia
Croatian Forest Research Institute, Jastrebarsko, Croatia
Faculty of Forestry, University of Zagreb, Croatia

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INNOVATING SOLUTIONS

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WHAT WE DO & QUALITY COMMITMENT

FROM SATELLITE IMAGES TO SERVICES: 3 CAPACITY BUILDING SCENARIOS

- PREPARE → ESA EO4SD
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- MYSUSTAINABLEFOREST → H2020

WHO WE ARE

WHO WE ARE

A GLOBAL TECHNOLOGY GROUP

Multinational technology group

Headquarters in Spain (Madrid)

Over 1,600 employees

Aeronautics, Space, Defense & Security, Cybersecurity, Intelligent Transport Systems, Healthcare, Banking & finances, and ICT industries.

Private capital

Subsidiaries in 10 countries

Founded in

1984

Roots tied to the Space and Defence industry

Engineering, development and integration of systems, software, hardware, specialized products and services

TECHNOLOGY & TEAM LEADERSHIP

#1 Worldwide Satellite Control Center provider to commercial telecom operators (+300 Satellite missions worldwide)

First ever **worldwide** intraoperative radiotherapy planning system

Responsible of safety critical systems of European GNSS systems (EGNOS and Galileo)

Leader of Intelligent Transportation Systems for the **public transport sector** (+100 cities in Europe, Asia and America)

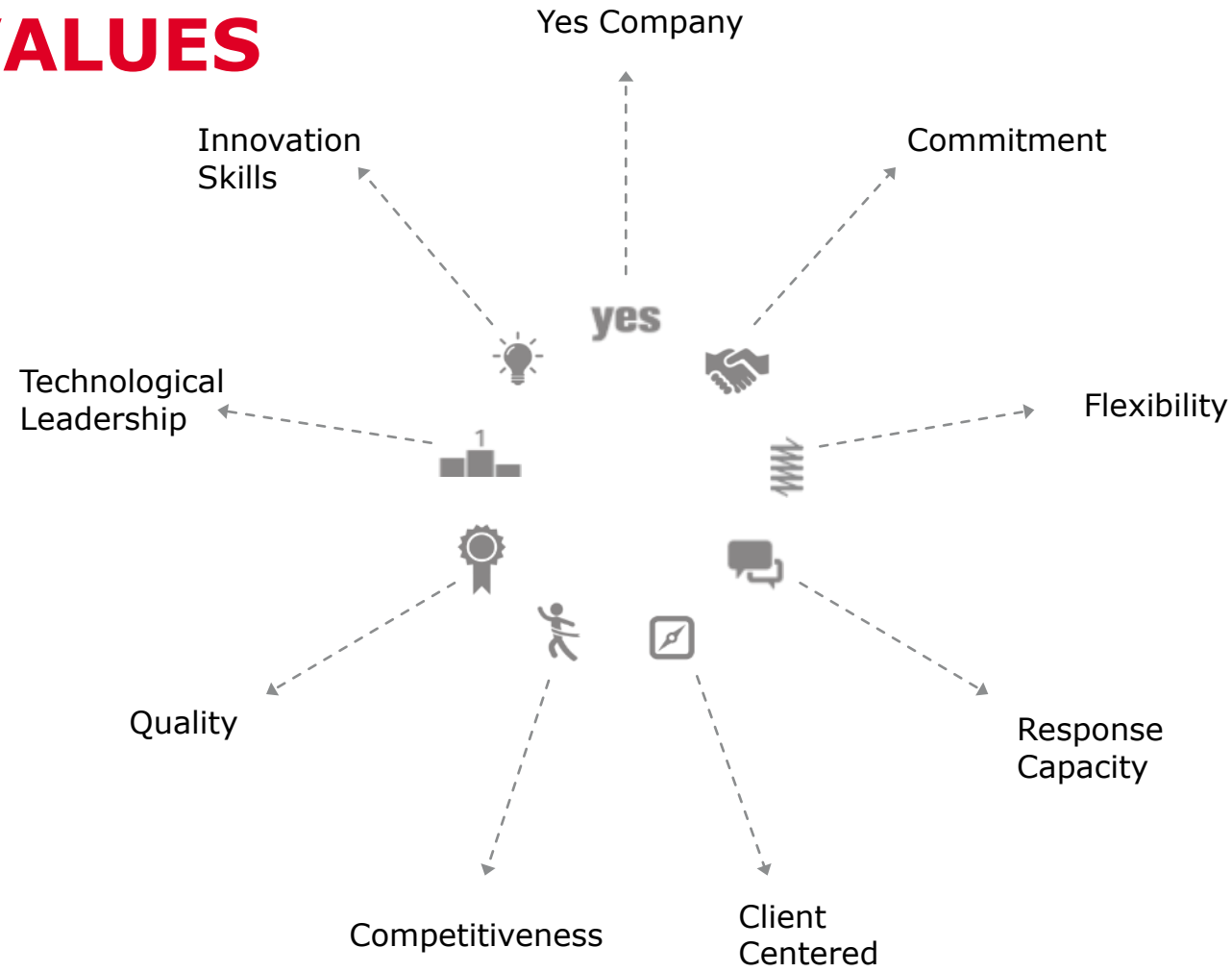
GMV's ***checker ATM security*** is the **worldwide leader** as multivendor cyber security protection for **ATMs**

Team Work + **Passion for Challenges** + **Imagination** + **Innovation** + **Technology** + **Customer Focus** + **Hard Work**

Having the best professionals is the true source of competitive advantage

WHO WE ARE

OUR VALUES



WHO WE ARE

GMV IN THE WORLD

SPAIN

MADRID – HEADQUARTERS
VALLADOLID
SEVILLE
BARCELONA
VALENCIA
LEON
ZARAGOZA

COLOMBIA
FRANCE
GERMANY
MALAYSIA
NORTH AMERICA
PORTUGAL
POLAND
ROMANIA
UNITED KINGDOM

BRANCHES AND OFFICES

PROJECTS

STRUCTURE AND ORGANIZATION

A GLOBAL CONGLOMERATE

GMV Innovating Solutions, S.L.
HOLDING SOCIETY

GMV Aerospace and Defence S.A.U.
Aerospace and defense markets

Grupo Navegación por Satélite Sistemas y Servicios S.L
Galileo development and exploitation

GMV Seguridad Integral S.A.U.
Security market

Grupo Mecánica del Vuelo Sistemas, S.A.U. (GMV Sistemas)
Transportation and Industry markets

GMV Soluciones Globales Internet S.A.U.
Telecommunications and e-business markets

GMV Innovating Solutions S.A.S.
Aerospace, Defense, Transportation, and Telecommunications markets of COLOMBIA

GMV Innovating Solutions SARL
Aerospace, Defense, Transportation and Telecommunications markets of FRANCE

GMV Insyen AG.
Aerospace, Defense, Transportation and Telecommunications markets of GERMANY

GMV Innovating Solutions B.V
Aerospace, Defense, Transportation, and Telecommunications markets of The NETHERLANDS

GMV Innovating Solutions Sdn. Bhd.
Aerospace, Defense, Transportation and Telecommunications markets of MALAYSIA

GMVIS Skysoft S.A.
Aerospace, Defense, Transportation and Telecommunications markets of PORTUGAL

GMV Innovating Solutions Limited
Aerospace, Defense, Transportation, and Telecommunications markets of UNITED KINGDOM

GMV Innovating Solutions Inc.
Aerospace, Transportation and Telecommunications markets of USA

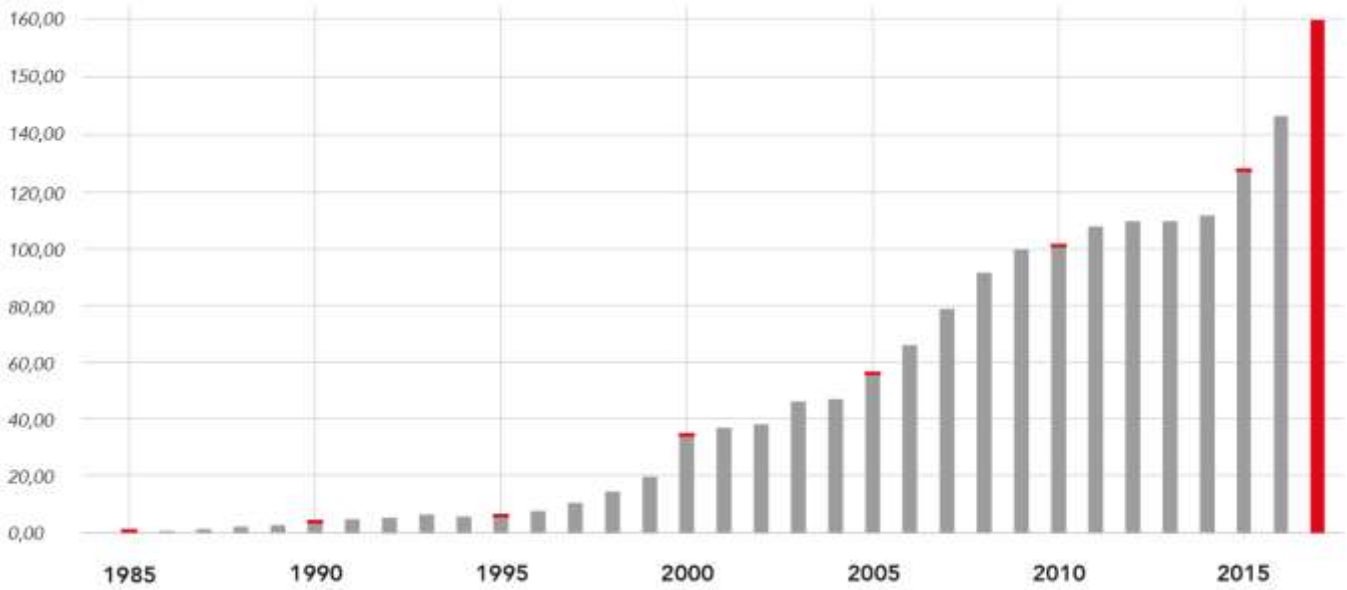
GMV Innovating Solutions Sp.z o.o.
Aerospace, Defense, Transportation and Telecommunications markets of POLAND

GMV Innovating Solutions S.R.L.
Aerospace, Defense, Transportation and Telecommunications markets of ROMANIA

Syncromatics Corp.
Intelligent Transport Systems markets of USA

SUSTAINED GROWTH

Revenues M€



WHAT WE DO

WHAT WE DO

AERONAUTICS

GMV has pioneered the development of GNSS based precision approach and landing systems.

GMV has developed simulation modules for a wide range of aircraft, from full flight simulators to part task trainers.

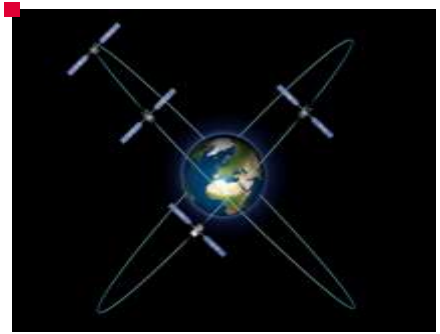
GMV has developed advanced platforms for GNSS flight testing for the Spanish Navigation & Airport Authority (AENA).

GMV is one of the few European firms with the capacity of developing safety critical onboard systems and Integrated Modular Avionics.

WHAT WE DO

SPACE

#1 Worldwide Satellite Control Center provider to commercial telecom operators (+300 Satellite missions worldwide).



European leader in satellite navigation processing ground segment (**EGNOS** and **Galileo**).

Reference supplier for on-board **GNC/AOCS** subsystems.

Major provider of EO Services and Applications.

WHAT WE DO

DEFENSE

Trusted Supplier of **Spanish MoD, Portuguese MoD** and **international Defense** organizations such as NATO and EDA.

Spanish Army **C4I** systems **main supplier**.

Main contractor for **NATO MAJIIC** Spanish contribution.

Main supplier of **SIGINT** data fusion and processing centers of the Ministry of Defense.

Company and personnel have required **security clearances**.

Facilities to carry out **classified projects**.

Defense quality certifications **AQAP 2110** and **2210**.

WHAT WE DO

CYBERSECURITY

Major companies select GMV for developing adaptation guides to the **National Security Scheme**. The **National Library of Spain** (the oldest cultural institution in Spain) is an example.

GMV is chosen by the **European Space Agency** (ESA) to conduct an analysis of **cybersecurity risks** and set up a policy that establishes a series of control recommendations for the space missions.

GMV developed ***SimulIT***, the **only product of its category**. It calculates the resilience, the recuperation capacity of an information system asset by asset, with the objective of **protecting critical infrastructures** from possible cyber-attacks and guaranteeing the continuity of its activity.

Spanish leader in **Security Managed Systems**, highlighting the work done on two of the most important public institutions in the security sector: **INCIBE** and **Red.es**.

WHAT WE DO

SECURITY AND EMERGENCY MANAGEMENT

Main contractor for the development of the **EUROSUR Network** for the FRONTEX border surveillance agency.

GMV has successfully implemented in different Security and Armed Forces its product ***hegeo***®, designed for managing public service and emergency fleets and personnel.

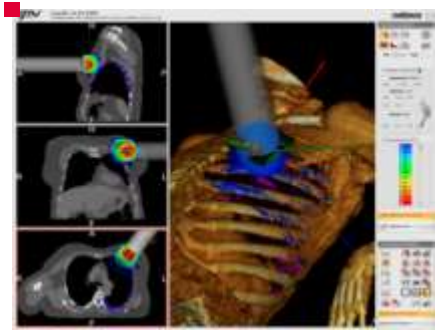
GMV provides for national and European authorities systems of maritime security under the European security project GMES.

Provider of **advanced access control** systems for **security-critical** institutions.

WHAT WE DO

HEALTHCARE

GMV developed ***antari***, the eHealth platform used in KidsCare, a **groundbreaking** in-school **telemedicine pediatrics service** for primary and secondary school.



GMV has developed the **world's first and only** intraoperative radiation therapy (**IORT**) planning system, ***radiance***.

GMV **leads** a project for the Galicia Health Service (**SERGAS)** using **Big Data** for the **first time ever** in the healthcare area at a national level. It calculates clinical and epidemiological data for the purposes of obtaining clinical evidence.

Rehabilita. This project radically overhauls rehabilitation procedures in their three main forms: cognitive, physical and cardiorespiratory.

INTELLIGENT TRANSPORT SYSTEMS

Leader of FMS/FCS for passenger transport:

- 24,000 buses, trams and trains worldwide
- 100 cities
- 250 operators
- 300 clients
- Solid references in Spain, Poland, USA, Morocco, Malaysia, Mexico, Uruguay, Sweden, Portugal, Malta, Cyprus, Taiwan, Australia, Chile…

Only company to provide management **systems** for the **Spanish railway transport** company RENFE.

Worldwide GMV's AFCS manage **1.7 billion trips per year.**

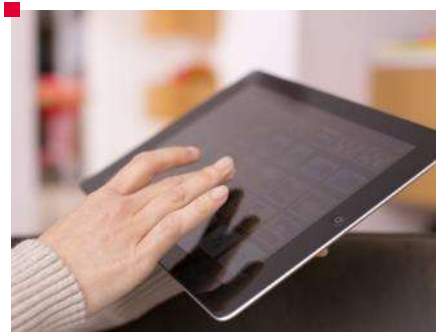
Near 2 million cars (Renault-Nissan, Daimler) are equipped with TCUs firmware "made by GMV".

TELECOMMUNICATIONS

Supplier of **Vodafone** since it started to operate in the 90s. Our collaboration over these years has spawned a host of projects, notably in the area of Value Added Services (VAS), security and testing.

ONO´s Intranet, developed by GMV, is hailed as one of the "**world´s 10 best Intranets of 2013**", by the company Nielsen Norman Group.

GMV developed **Network Performance Monitoring**. This OSS carrier grade platform provides early incident detection of network and services. It gathers information from the network to send alerts in real time, providing enormous flexibility in defining alerts and customized reports.



B2BGW. GMV has developed an integration platform between the operator´s backend and third parties like which ensures secure B2B interconnection to facilitate the sale of additional services by the operator.

PUBLIC SECTOR AND CORPORATE ICT

GMV has great experience in the development electronic administration portals: **Portal of Universidad Autónoma de Barcelona, Portal Open Data of the Regional Council of Castilla y León, Portal of the Regional Council of Andalusia**.

GMV has developed the **Corporate Portal of Club Hofmann**, a platform with its whole infrastructure in the cloud, both servers and storage spaces. This approach helps to simplify and optimize resources.

Single Administrative Information System of the Regional Council of Castilla y León. This is one of **Spain's most modern and advanced websites**.

GMV has created a **mobile application** for the Agencia de Medio Ambiente y Agua (Environment and Water Board) of the **Junta de Andalucía,** showing geological heritage trails of Andalusia, with the aim of promoting geotourism within the region.

BANKING AND INSURANCE

GMV's ***checker ATM security*** is the **worldwide leader** as multivendor cyber security protection for ATMs. ***Checker*** already protects nearly 100,000 ATMs around the world.

Overall **security management system** of **Grupo BBVA** for monitoring all security incidents that may crop up in the group´s head offices and banks **around the world**.

GMV provides **e-laCaixa** with technological consultancy on the **state of the art** of handheld technologies and services now available or in pipeline in Spain and other countries.

Application of **groundbreaking artificial-intelligence technology** (dubbed "Artificial Immune Systems") for **early fraud detection**.

OUR CLIENTS

COMMITMENT TO QUALITY

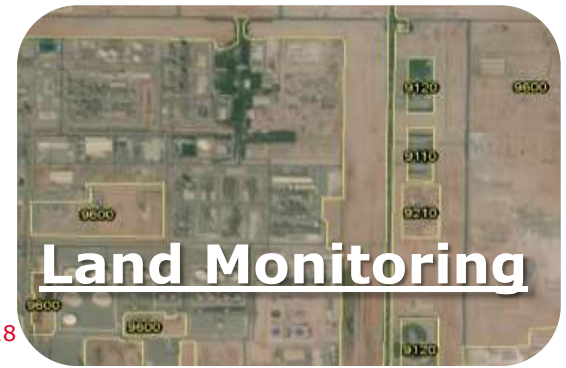
	GMV Aerospace and Defence S.A.U.	GMV Innovating Solutions, Inc.	GMV Soluciones Globales Internet S.A.U.	GMV Sistemas S.A.U	GMVIS Skysoft S.A.	GMV Innovating Solutions Sp.z o.o	GMV Innovating Solutions S.R.L	GMV Insyen AG
CMMI Level 5	✓	✓			✓	✓		
CMMI Level 3								
PECAL/AQAP 2110	✓							
PECAL/AQAP 2210	✓							
PECAL/AQAP 2310	✓							
CEPE/ONU Nº10				✓				
UNE-EN ISO 9001:2008	✓	✓		✓	✓	✓	✓	
UNE-EN ISO 9001:2015			✓		✓			✓
UNE-EN ISO 9100:2010	✓	✓			✓			
ISO 13485:2003			✓					
ISO 27001:2014 (including UNE-EN 71502:2004)			✓		✓			
ISO 20000-1:2011			✓					
ISO 22301:2012			✓					
UNE 166002:2014			✓					
NRTL-C/US								✓

REMOTE SENSING APPLICATIONS AND PLATFORMS

SATELLITE IMAGES TO SERVICES

BUILDING CAPACITIES

RS APPLICATIONS & SERVICES



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ONGOING ACTIVITIES

AfriCultuReS

Enhancing Food Security in **Afri**can Agri**cultu**ral Systems with the Support of **Re**mote **S**ensing

URBAN GREEN UP

New Strategy for Re-naturing Cities through Nature-Based Solutions

My Sustainable Forest

Earth observation services for silviculture

Operational sustainable forestry with satellite-based Remote Sensing

MED-GOLD

Turning climate-related information into added value for traditional MEDiterranean Grape, OLive and Durum wheat food systems

European Union EXTERNAL ACTION

Copernicus Support to External Actions Service

FRONTEX

SatCen

Copernicus Reference Mapping Service

NEXTSPACE

User Requirements for the Next Generation of the Copernicus space component

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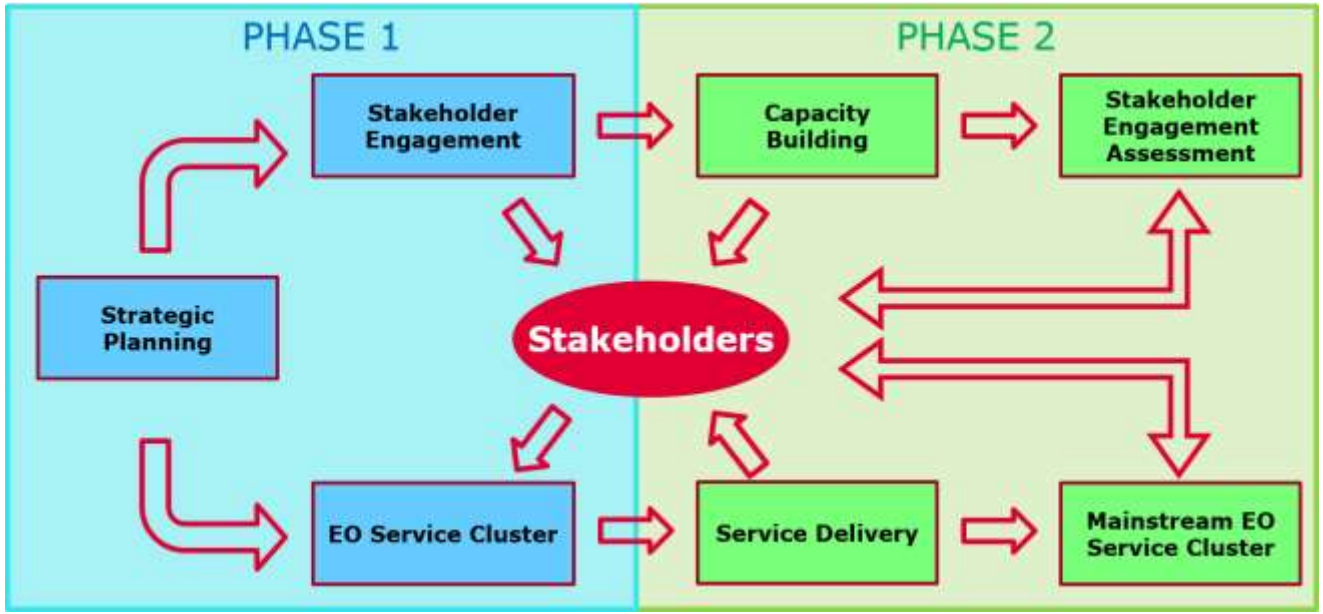
EO for Sustainable Development in the Climate Resilience Domain

PREPARE

PREPARE

ESA call **Earth Observation For Sustainable Development In The Climate Resilience Domain**

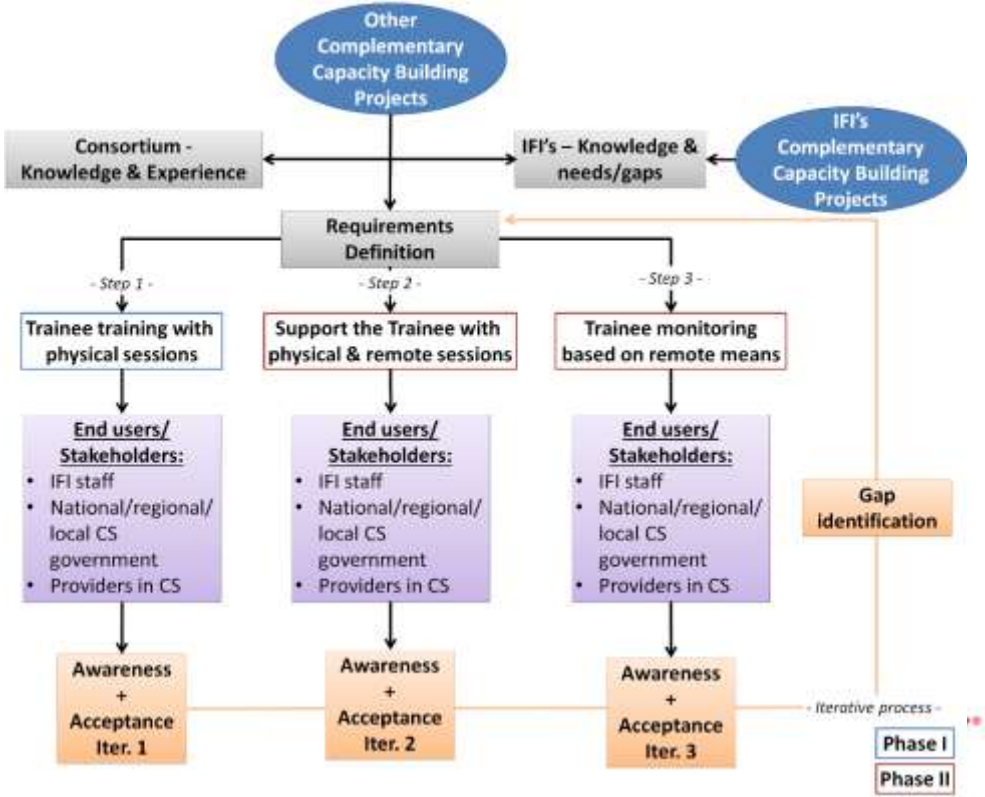
Objective → EO services supporting climate resilience decision making at regional and national scale



PREPARE

Consortium Capacities

ESA call. Liaison with International Financial Institutions



PREPARE

SERVICES

- **Climate Resilience Screening Service**: screening and assessment of multiple climate-related risks at the global scale
- **Climate Resilience Risk Assessment Service**: use cases in partnership with stakeholders to derive high-level products supporting the monitoring and management of risks

KNOWLEDGE TRANSFER

- **Climate Resilience Capacity Building Service**: developing educational content and partnerships to maximise outreach through capacity building

INTERNATIONAL FINANCIAL INSTITUTIONS

World Bank

International Fund for Agricultural Development (IFAD)

European Investment Bank (EIB)

Asian Development Bank (ADB)

European Bank for Reconstruction and Development (EBRD)

Inter-American Development Bank Group (IDB, IADB)

African Development Bank (AfDB)

Enhancing Food Security in African Agricultural Systems with the Support of Remote Sensing

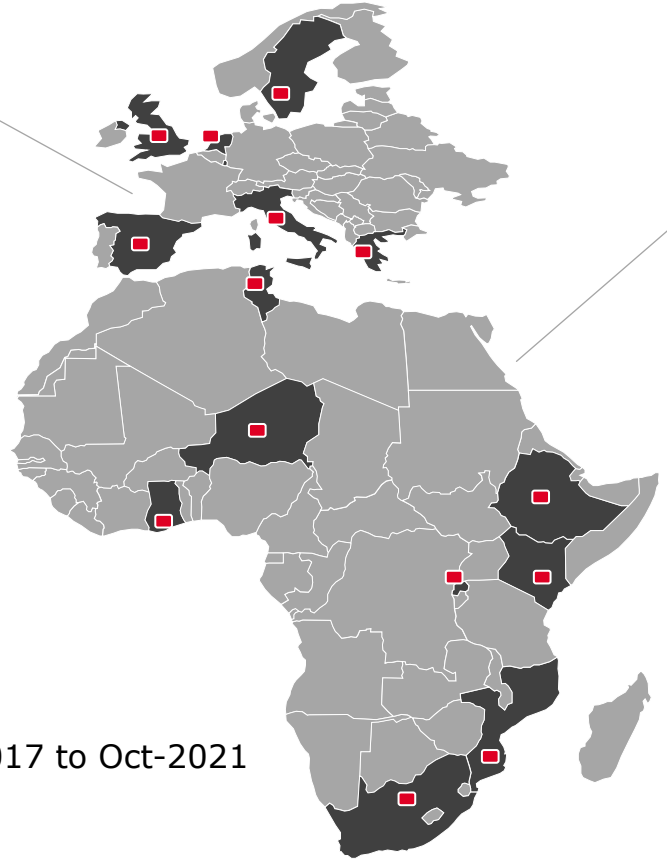
AFRICULTURES

KEY FIGURES

H2020 - <u>SFS-43-2017</u> *"EO services for the monitoring of agricultural production in Africa"*

17 Partners | 50% African + 50% European | Industry & Academia | Multidisciplinary Team

- GMV (lead, ES)
- Aristotle University of Thessaloniki (GR)
- DRAXIS Environmental Technologies (GR)
- HCP International (NL)
- Sapienza University of Rome (IT)
- Swedish Meteorological and Hydrological Institute (SE)
- University of Cantabria (ES)
- University of Leeds (UK)
- University of Sheffield (UK)



- Centre Régional AGRHYMET (NE)
- CGIS – University of Rwanda (RW)
- CERSGIS – University of Ghana (GH)
- GeoSAS (ET)
- LocateIT (KE)
- Observatoire du Sahara et du Sahel (TN)
- South African National Space agency (ZA)
- Eduardo Mondlane University (MZ)

EC grant 8.5M€ | 48 months | Nov-2017 to Oct-2021

SUPPORTED BY…

European Commission | Horizon 2020 European Union funding for Research & Innovation

African Union

NEPAD TRANSFORMING AFRICA

GEO GROUP ON EARTH OBSERVATIONS

AfriCultuReS is envisaged to be a **GEO** (**GEOGLAM, AfriGEOSS, EUROGEOSS**), **Copernicus** and **GMES & Africa** contributing action

AfriCultuReS partners are **heavily involved in GEO, Copernicus and GMES & Africa**

AfriCultuReS

GEO: HCP

Copernicus: gmv, HCP, SMHI

GMES AND AFRICA: sansa, gmv

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This project has received funding from the European Union's Horizon 2020 Research and Innovation Framework Programme under grant agreement No 774652

Operational Sustainable Forestry with Satellite Based Remote Sensing

MYSUSTAINABLEFOREST

MYSUSTAINABLEFOREST

MySustainableForest seeks the provision of satellite based services for integrated forest management at pre-commercial stage through a thematic platform

Services' tests are building new capacities in 7/11 partners (2 SCERIN institutions, new in H2020)

Preliminary user requirememnts gathering → 470 URs from contacs with stakeholders (170)

The commercial platform shall be automatic and preserve the IPRs of partners per product processed

MYSUSTAINABLEFOREST

Services:

FOREST SITE CHARACTERIZATION → facts on forest status and condition: extension, stand delineation, infrastructures, forest types, disturbances,…

WOOD CHARACTERIZATION → models and maps of wood fiber attributes linked to wood potential and performance, i.e: pulp yield, density, strength and stiffness of lumber

BIOMASS AND CO_2 STOCKING → estimates living volume of trees and CO_2 stock content. Key for the biomass industry and carbon accountings

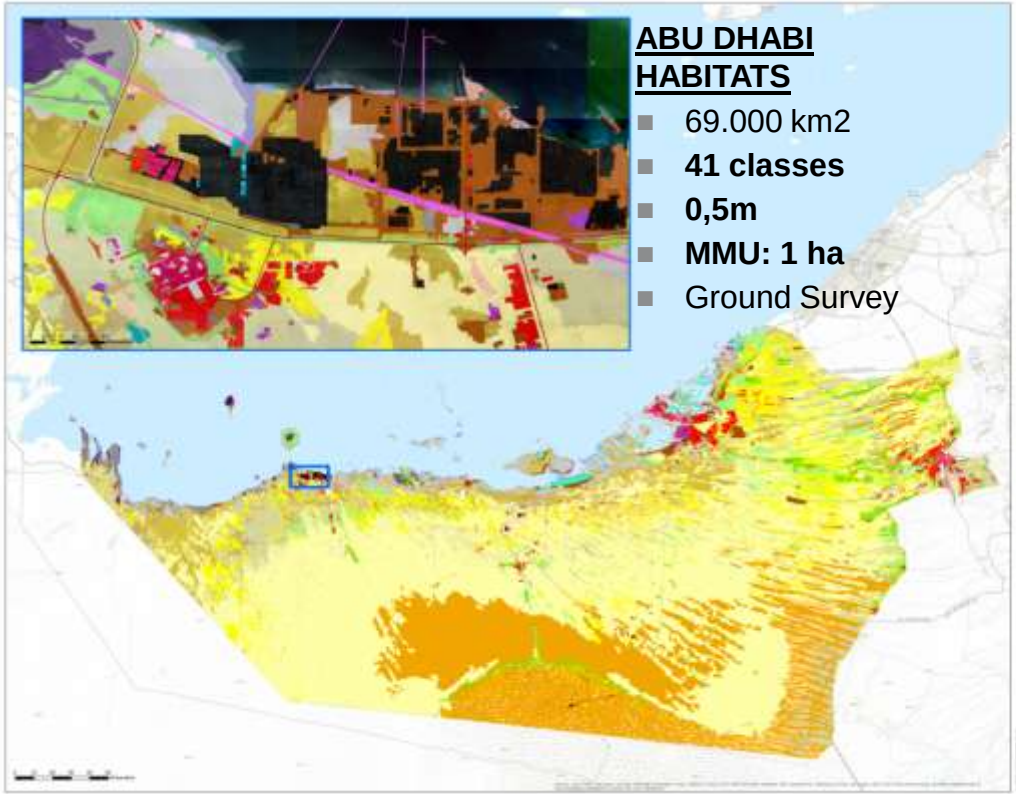
FOREST CONDITION → monitors and measures health condition

ECOSYSTEM VULNERABILITIES → informs about an array of ecosystem descriptors and vulnerabilities, namely: watershed extent, hydrologic network, biodiversity indicators, habitat fragmentation, floods and forest fire risks.

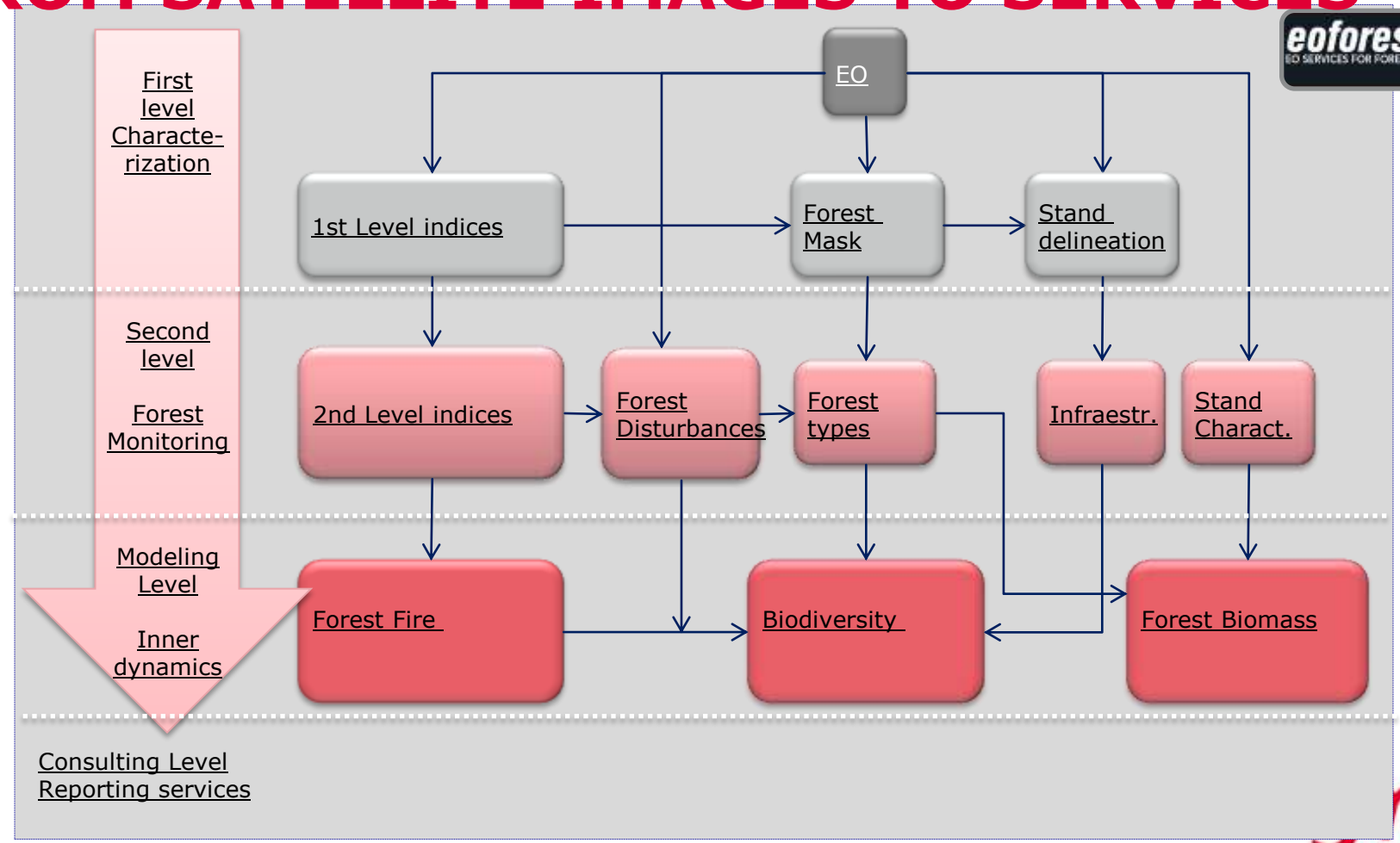
SOCIOECONOMIC FUNCTIONS AND CONDITIONS → analytics based on UN System of Environmental Economic Accounting (SEEA)

FROM SATELLITE IMAGES TO SERVICES

- Massive contracts in terms of area, EO data, in situ data, multitemporal data, seasonal revisit, number of products, ….
- Need to automatise processes
- Need to include LiDAR
- Need to include wood properties
- Beta version of the platform → EOFOREST



FROM SATELLITE IMAGES TO SERVICES



FROM SATELLITE IMAGES TO SERVICES

FOREST SEGMENTATION

Aggregates homogeneous forest units on account of given criteria, e.g.: dominant species, age and/or trees density.

The linear (forest paths, harvesting tracks, fire breaks, electric lines..) and non-linear elements are also extracted.

OUTPUT PRODUCT: polygon (stands) and line (linear infraestructures) vector datasets.

RELATED SERVICES
The stands and infrastructures delineation supports forest management.

New uncontrolled infraestructures might indicate illegal loggings.

FROM SATELLITE IMAGES TO SERVICES

HARVESTING

Tracks the location, perimeter and areas extent of forest loggings (both legal and illegal).

PRODUCTION PROCESS
Two dates are needed the first time the map is derived.

OUTPUT PRODUCT: polygon vector datasets.

RELATED SERVICES
Managers demand updated harvesting data to optimize wood extraction rates and reforestation tasks, including precise cost estimation.

Logging inventories are key for carbon stock accounting and GHG inventories.

Enable the analysis of deforestation, forestation and degradation trends.

FROM SATELLITE IMAGES TO SERVICES

TREE DELINEATION AND TAGGING

1. Forest deliniation → reference geometric units to which biophysical parameters will be associated
2. Compute biophysical parameters relating vegetation health
3. Organize information in a geospatial database

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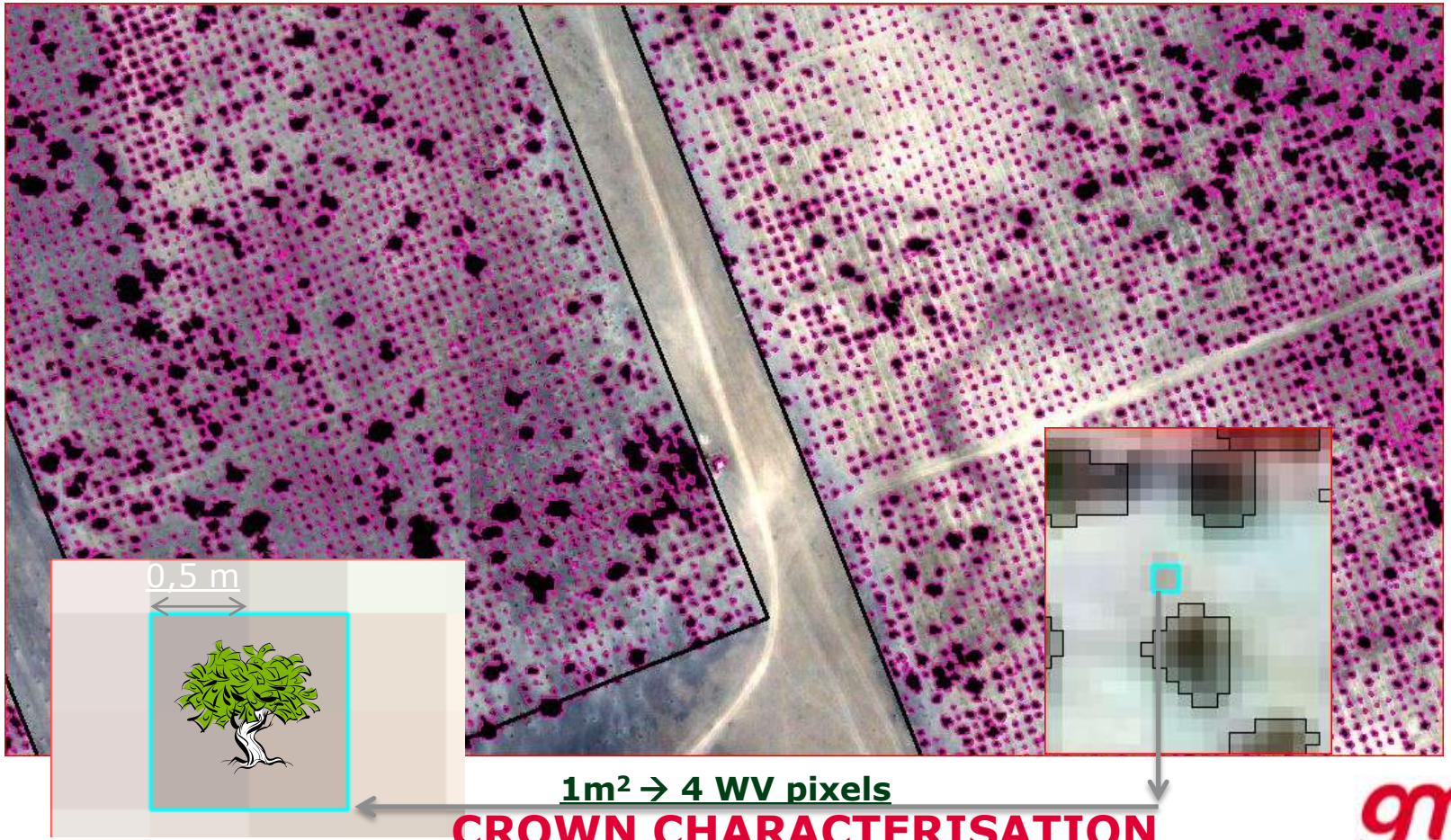
FROM SATELLITE IMAGES TO SERVICES



FROM SATELLITE IMAGES TO SERVICES

ABOVE GROUND FOREST BIOMASS

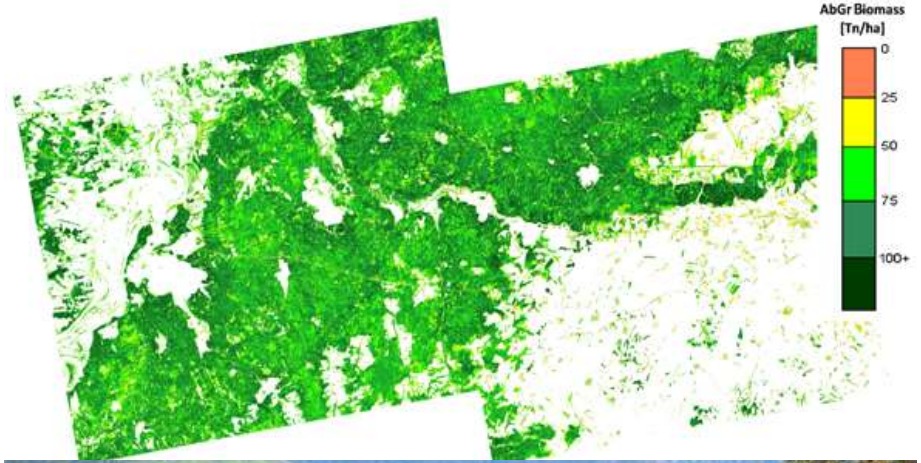
Defined as all living biomass above the soil including stem, stump, branches, bark, seeds, and foliage. Values are given in [t/ha].

OUTPUT PRODUCT: raster maps

RELATED SERVICES
Above ground biomass is also required to estimate **forest carbon stocks**. This information is key for international reporting, and for measuring the reduction of GHG emissions within the compliance and the voluntary markets (REDD+).

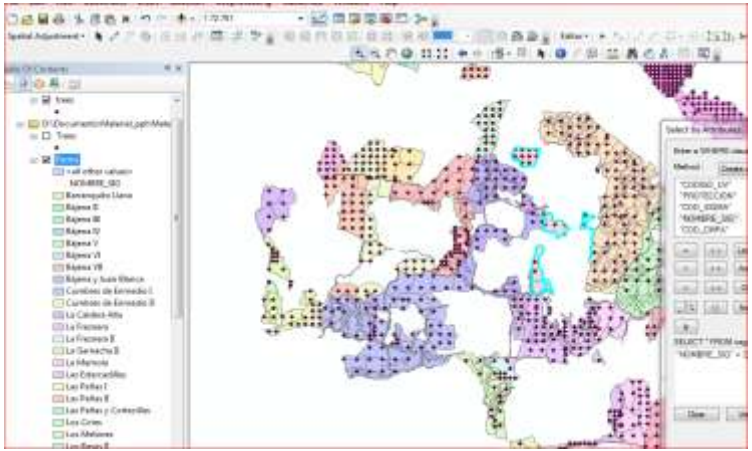
This product is the basis for assessing forest productivity.

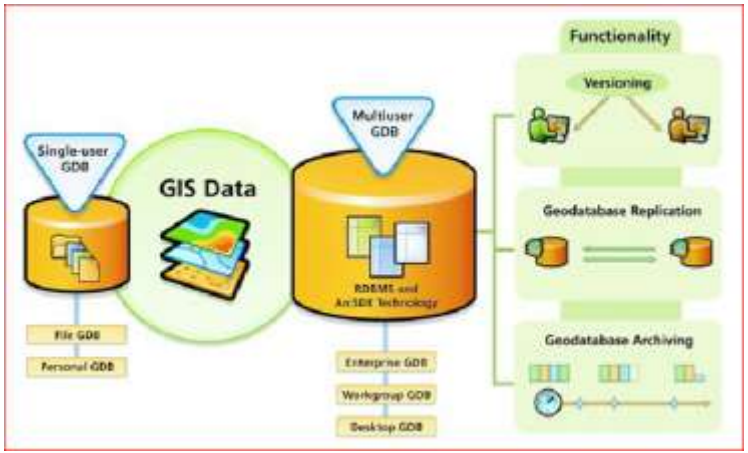
Supports the purpose of defining the carbon reference line and for MRV of carbon stock changes and emissions reduction purposes.



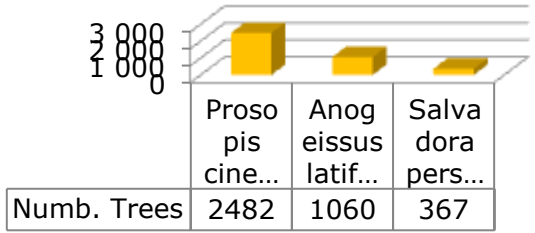
FROM SATELLITE IMAGES TO SERVICES

STATISTICS AND GRAPHIC REPORTS

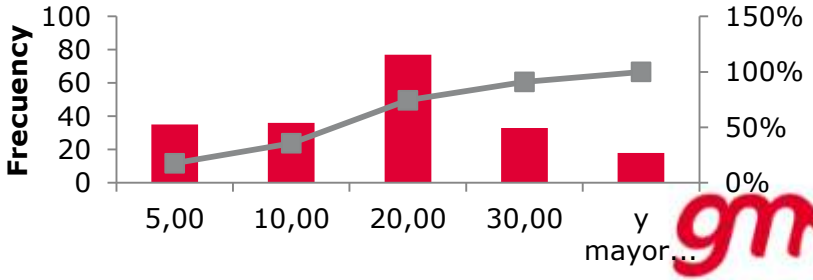




Number of Trees per species within the Forest areas

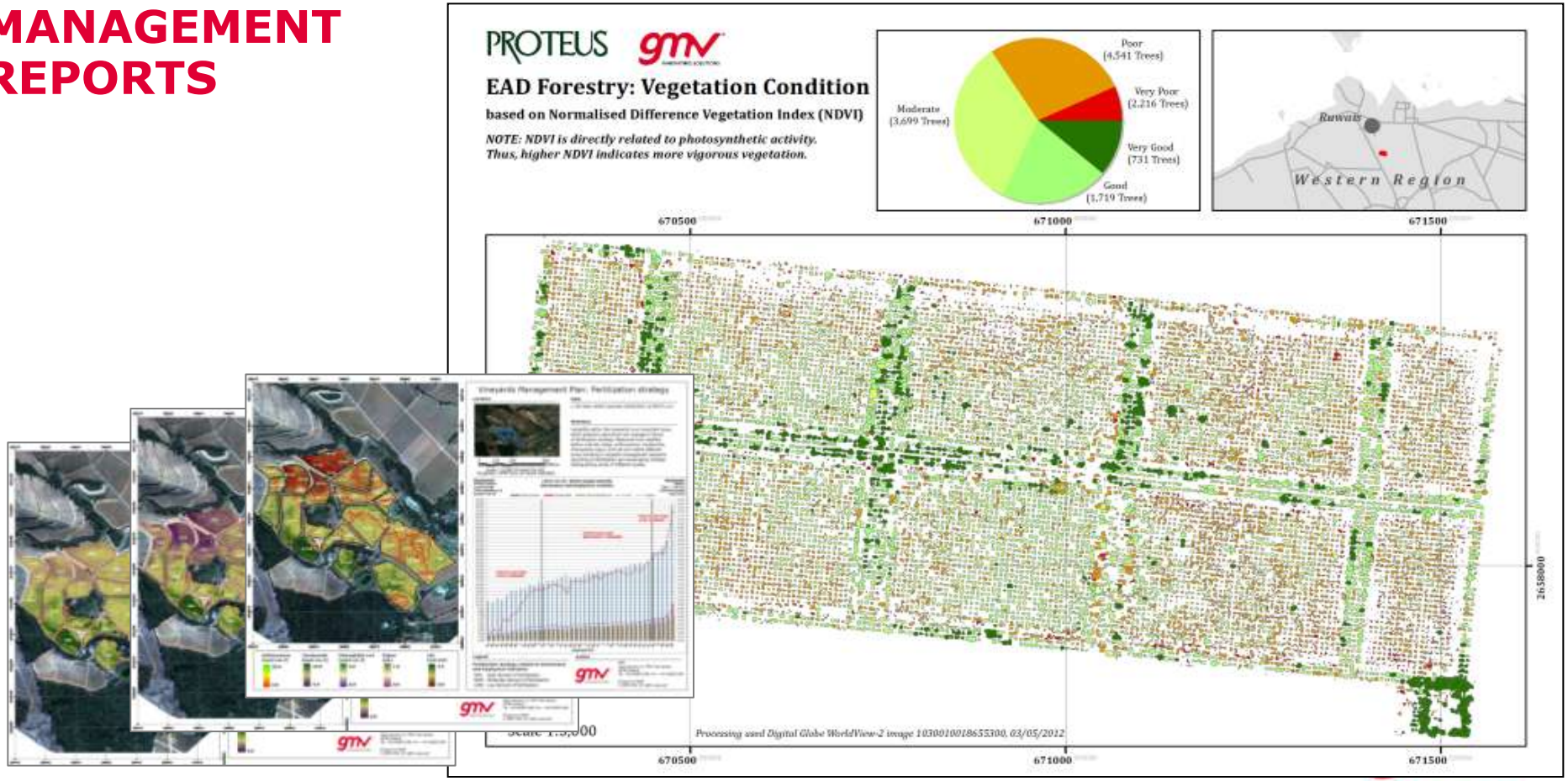


Crown Proyection (SQM)



FROM SATELLITE IMAGES TO SERVICES

MANAGEMENT REPORTS



BENEFITS

- Sharing capacities, multiplies
- Win-Win for all partners
- Reduces ground activities costs
- Repeatability
- Supporting forest management policies
- Reduce time to service

www.gmv.com

THANK YOU

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gmv BLOG