



# Data access and integrated processing for Earth Observation services

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In the beginning the bottleneck was in data...we were living in a world of scarce EO data sources

EO SERVICE PROVISION was a challenge, more than a business

- *Basic products, universal services (e.g. NDVI) targeting large groups, to be accessible in price, but lightly fit to each individual user needs. Few adopters*
- More complex services for advanced end users, were rather institutionally supported, since only these were able to commit to large amount of resources required. There was no market.



## Now we are becoming flooded with data. Data for free! Too much data ?

EO SERVICE PROVISION is now about how to deal with so much data and extract Value from it

- The bottleneck moved to managing massive amounts of info. How to access all these data? How to organize ? How to use?
- But specially, how to process so large amounts of data effectively?
- Large infrastructures. Its cost being an important component of service price.
- Moving into the Cloud, data will soon be handy. And computing power will become a commodity. But is this enough? How to make Services out of this?
- ...



## EO SERVICES

Services provided to final users where EO data is key

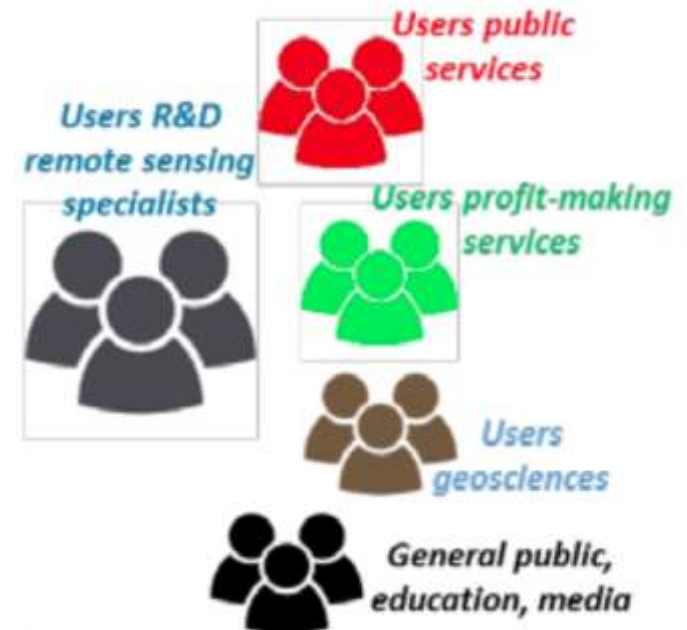
### MAJOR OPPORTUNITY

- Unprecedented amount of EO data
- Large community aware of EO
- Funding opportunities for service creation

### MAJOR CHALLENGES

- Access to EO data
- Knowledge Gap between EO and services
- Awareness from potential users

### 5 interconnected user groups





## EXPLOITATION PLATFORMS

Don't move the data, move the processing platform

NEW PARADIGM

### E.G. ESA THEMATIC PLATFORMS

- Dedicated platforms for generation of thematic EO Services  
Agriculture, Urban, Hydrology, ...
- Infrastructure close to data at ESA



### SenSyF APPROACH

- Cloud platform, close to data
- Can be deployed anywhere, from private cloud to public cloud
- Added advantage: fully scalable

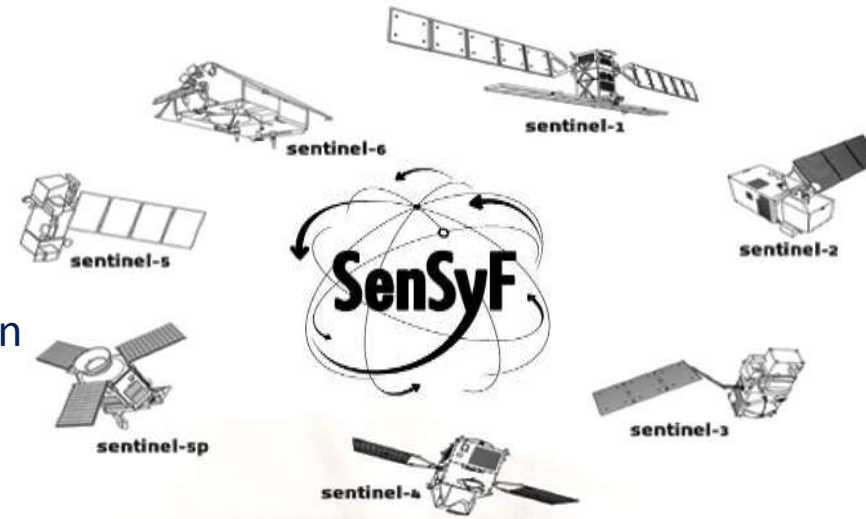


# SenSyF: SENTINELS SYNERGY FRAMEWORK

## THE PROJECT

- EC FP7, 2.-8M€ project, 9 partners
- November 2012 (3 years duration)
- Dedicated to ease Sentinels data integration
- **Space Call 5** topic

*“Preparing take-up of GMES Sentinel data”*



## BEYOND THE PROJECT

- **Post-project commercial deployment** under way
- **Ready** for supporting EO Services development & deployment
- **Continuous evolution** from other projects driven by customers' feedback



## SenSyF KEY DRIVERS

### INFRASTRUCTURE

- Provide easily access Sentinel datasets
- Develop and deploy a scalable processing framework
- Test services for exploitation of "Synergetic Sentinel data"



### CAPABILITIES DEMONSTRATION

- Set of pre-selected services to address the system capabilities
- To provide insightful feedback
- Assess the coverage of specific needs identified as drivers for each Service



## SenSyF KEY ATTRIBUTES

### EARTH IN THE CLOUD

- **Scalable** cloud-based processing capabilities adapted to any service needs.

### FACILITATING COPERNICUS

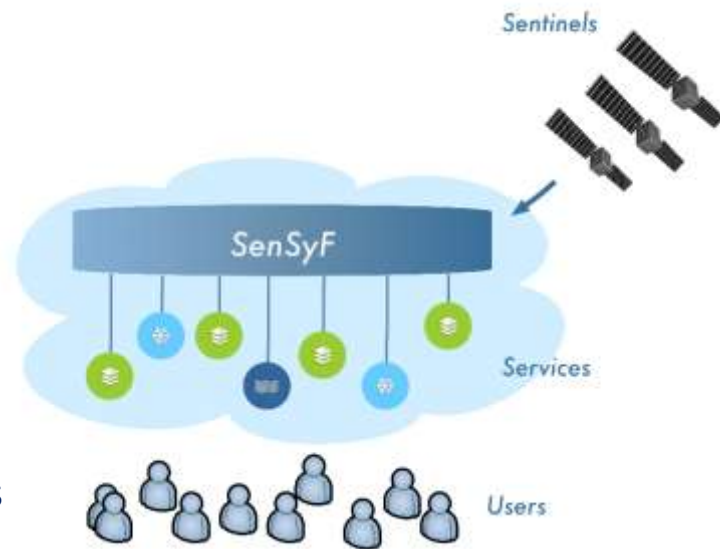
- Enabling widespread and **easy access to Copernicus** large data volumes bringing innovation to the services

### OPTIMISED TOOLKIT

- A dedicated **processing toolkit** handles the major processing activities

### SERVICES INCLUDED

- Seven Test Services included since the beginning and proving the concept ([services](#) from Agriculture, Land Monitoring and Water Monitoring)







## SenSyF COMPONENTS

### DATA ACCESS

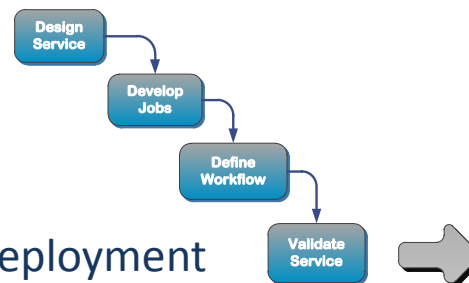
- Sentinels Catalogue and visualisation
- Data search capabilities
- Integration with other catalogues

### CLOUD RESOURCES

- Scalable resources depending on needs
- Fully scalable applications:  
resources, data access and cost
- Extensive local testing before full blown deployment
- Client can select cloud provider e.g. to be close to data

### DATA PROCESSING & REPORT

- Toolkit to ease building of services
- Integration of community tools
- Support for many programming approaches
- Can generate automatic reports





## SIMOcean



### Linked to SenSyF processing & catalogue:

- Catalogue of Portuguese in-situ data from



&



In coordination with



- Online visualisation of co-located data
- Directly connected to SenSyF, allowing further post-processing
- Started September 2015 (1 year duration)
- Will extend SenSyF's with access to further *in-situ* data connected to processing

An





## BRINGS VALUE TO ALL MAIN ACTORS

### SERVICE DEVELOPERS (PUBLIC OR PRIVATE)

- Users that design and implement services using EO data
- Supported in the right development environment (tools, libraries)



### SERVICE OPERATORS/ADMINISTRATORS

- Responsible for the operations and maintenance of the service
- Using an easy interface to monitor and control the service



### END USERS (E.G. NEREUS REGIONS)

- Receiving the output of the services
- With targeted reports fitting their operations





# ONCE DEPLOYED, SERVICES BECOME AVAILABLE TO ALL

Seven Demonstration Services are Currently Deployed

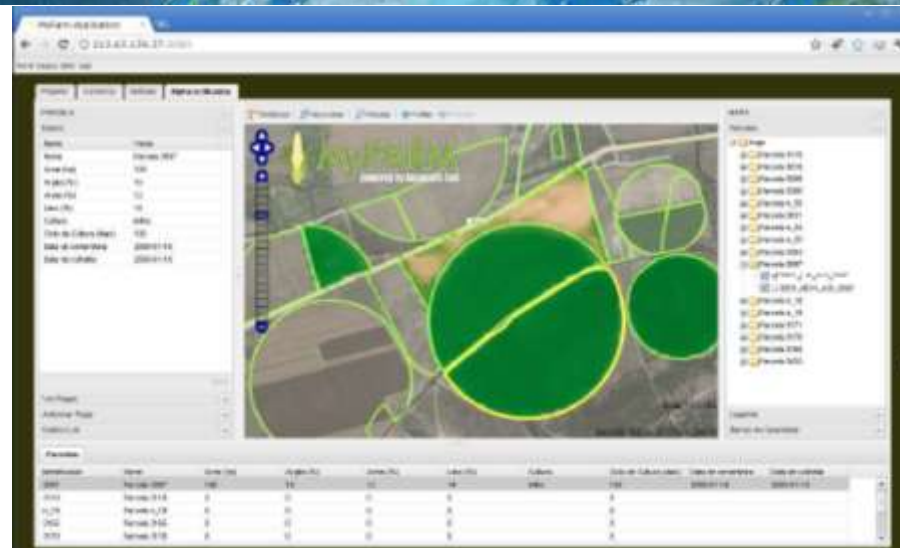
-  Monitor of Continental Fresh Water
-  Arctic-Alpine Growsing Season Mapping
-  Soil Freezing/Thawing Products
-  Spectro-Temporal Integration
-  Multi-Temporal Land Cover Classification
-  Agriculture Support Service
-  Tools for Optical Sensor Calibration and Analisis



## EXAMPLE SERVICES

### mytFarm: AGRICULTURE SUPPORT

- Determines irrigation needs
- Developed by DEIMOS and MARETEC-IST



### WATER MONITORING

- Quality of inland waters
- Developed by ACRI-ST





# EXAMPLE SERVICES

## SPECTRO-TEMPORAL INTEGRATION

- Pansharpen, remove clouds, ...
- Developed by IGN Spain

**Pansharpen de Landsat 8 OLI**  
 (Algoritmo Fast SRF y programa: Universidad Pública de Navarra)

Portugal (203-033)



Original multiespectral 30 m

Pansharpen 15 m (todas las bandas ópticas)



day 148 real



day 148 mask



day 148 synthetic



## NEREUS IN THE CLOUD

- **Share set of services** developed by different regions, but that become available for user in all regions
- Make **full use of Copernicus data** and other sources – data fusion
- Setting up **operational services in any scale** (space, time) at minimum cost
  - Ship monitoring (SAR, Optical, Optical, (SAT-)AIS/VMS, etc)
  - Support to fishing (Optical, TIR, SAR)
  - ...
- **Eliminate technological and market barriers** to
  - Local service developers, targeting local or globally (entrepreneurship)
  - Public administration for land, water and ocean management



## SenSyF: SERVICE IMPLEMENTATION PATH

Request  
information

Have a trial  
period

Select a  
subscription  
plan

Setup your  
platform  
account





## LONG TERM VISION

- Bring forward a **collaborative exploitation platform** where developers, integrators and data providers meet.
- Become an important **Earth Observation Business Engine** improving time to market for the EO applications
- **Engaging with new partners and communities**
- Build a **compelling Partner Program**
- Continue developing the Framework through ESA TEP and future H2020 activities





## FURTHER EVOLUTION

### Co-ReSyF: COASTAL WATERS – RESEARCH SYNERGY FRAMEWORK

- 3M€ H2020 project lead by DEIMOS
- Supporting studies and applications in Coastal Research activities
- Will further evolve SenSyF's tools to higher level interaction
  - Interactive interfaces
  - Collaborative tools
  - ...
- Includes 5 Research Applications
  - bathymetry from EO, water quality, vessel and oil detection, coastal altimetry



- Includes competitive call for further Research Applications (MSc & PhD Thesis)





Promoting Earth Observation Services



## ADDITIONAL INFORMATION

**Website:**

<http://www.sensyf.eu>

**Email:**

[sensyf@deimos.com.pt](mailto:sensyf@deimos.com.pt)





THANK YOU

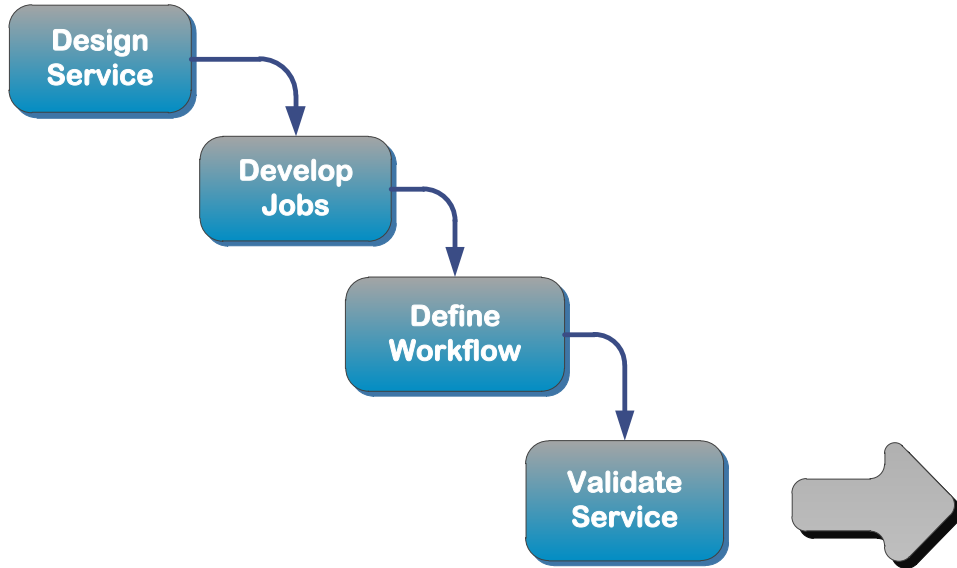




# SPARES



# HOW IT WORKS: DEVELOP/DEPLOY SERVICES STEPS





## DEVELOPMENT ENVIRONMENT (Sandbox Service)

### Remote cost-effective Virtual Machine to:

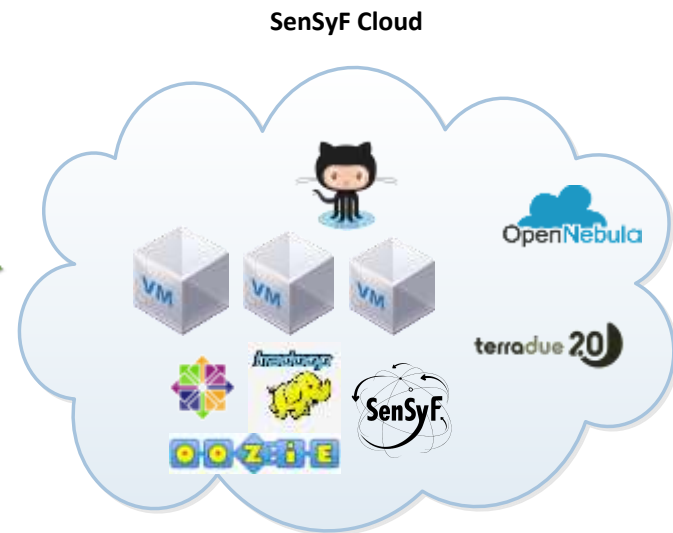
- Deploy the scientific algorithms
- Develop the service workflow (HADOOP MAP/REDUCE)
- Test the service and deploy on Cloud Environment

### The Sandbox Already Includes:

- Data Access tools
- Data Processing tools
- Data Dissemination tools
- Common Function



Develop & Test





## SERVICE DEVELOPMENT KIT

The **SDK** is a **Service** Development Kit, available on the Development Environment (Sandboxes).

It includes **SenSyF** developemnts and EO third party tools (CIOP, Sentinel Toolboxes, GDAL, GRASS)

**Flexibility by design.** Add operations like Tile, Crop, Orthorectification, Re-projection, others...

Design and manage the Map/Reduce workflow

**ALL & EVERYTHING** !!! Some are new developments and other are directly available through GDAL or GRASS.





