



# THE LIVING LAB APPROACH FOR THE DEVELOPMENT OF SPACE APPLICATIONS: LESSONS LEARNED FROM THE RITA PROJECT

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# RITA : Origin of the project

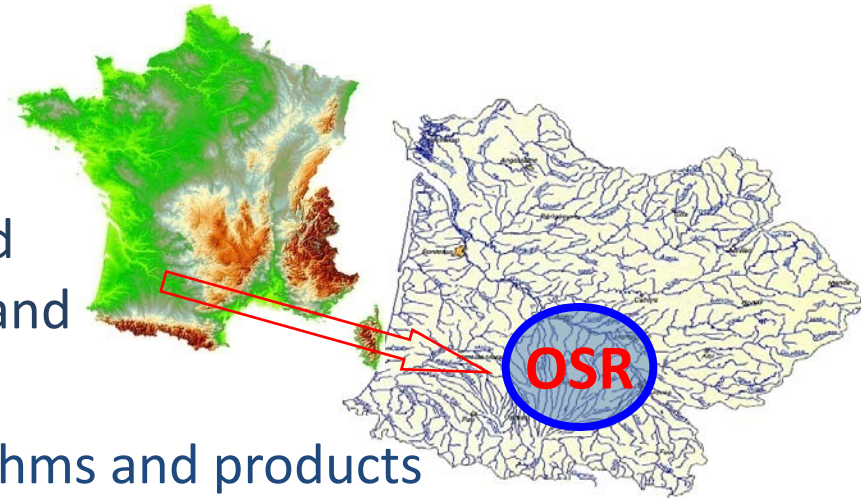
- **The RITA project was developed at the crossing of two different concerns emanating from different actors:**
  - ◆ Remote sensing research community's concern (CESBIO, ICTA/UAB) :
    - A number of new methods and results exist that could be turned into applications
    - But the development of applications is slow, and EO is underused
  - ◆ Concern of the local authorities of rural territories (PPG, CCLG) : economic, social and environmental development of rural territories in a society where major cities are driving the economy
  
- **RITA was built upon two existing projects:**
  - ◆ The Observatoire Spatial Régional (OSR)
    - Regional Space Observatory
  - ◆ The Pôle d'Expérimentation et d'Application des Technologies Spatiales (PATS)
    - Cluster for the Experimentation and Application of Space Technologies

# The Observatoire Spatial Régional (OSR)

❑ **Started in 2001**

❑ **Objectives:**

- ◆ Research on the functioning of land surface: water and carbon fluxes, land cover/use, crop monitoring, ...
- ◆ Calibration/validation of EO algorithms and products
- ◆ Experimentation to prepare new EO missions (SMOS, Venùs, Sentinel 2)



❑ **Approach: Long Term Experiment**

- ◆ Routine in situ measurements: fluxes at the soil/vegetation/atmosphere interface, LAI, biomass, etc
- ◆ Systematic acquisition of one cloud free high resolution satellite image (SPOT, Formosat) every month since 2002
- ◆ Partnerships with local actors
- ◆ Distribution of the data through internet OGC services (ongoing work)

# OSR: In situ measurements



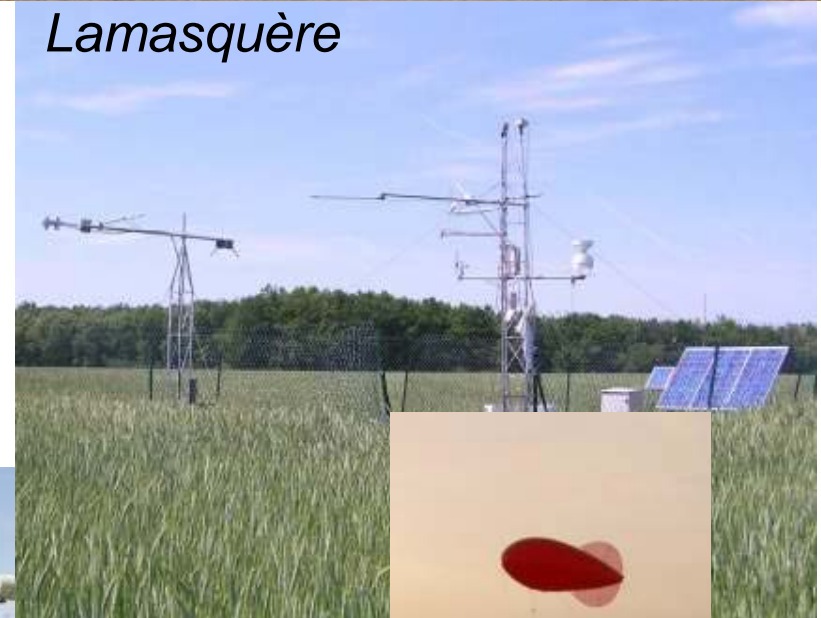
Lewis Radiometer (SMOS)



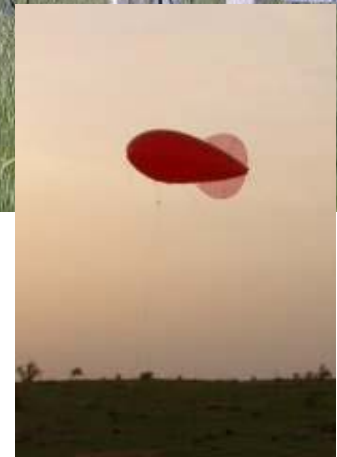
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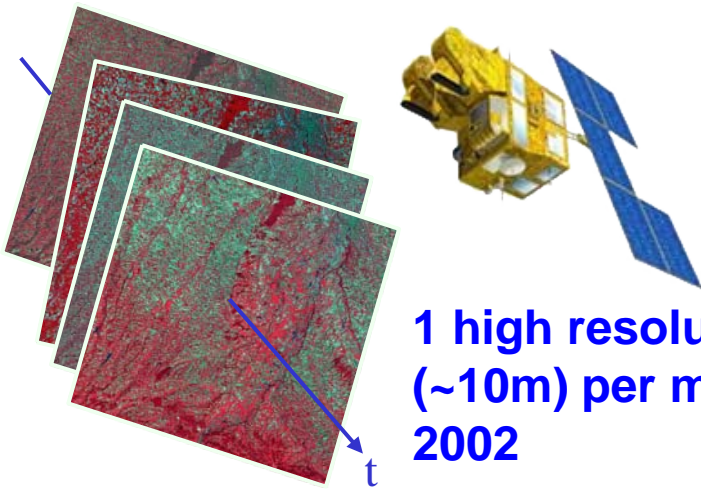
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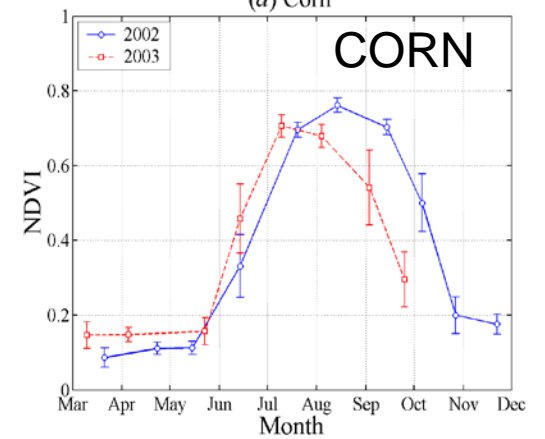
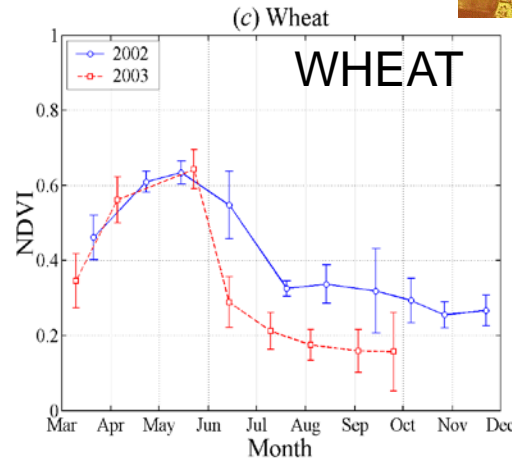
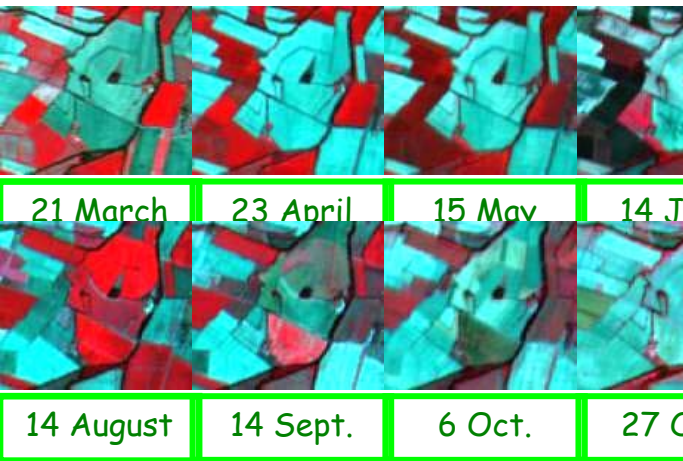
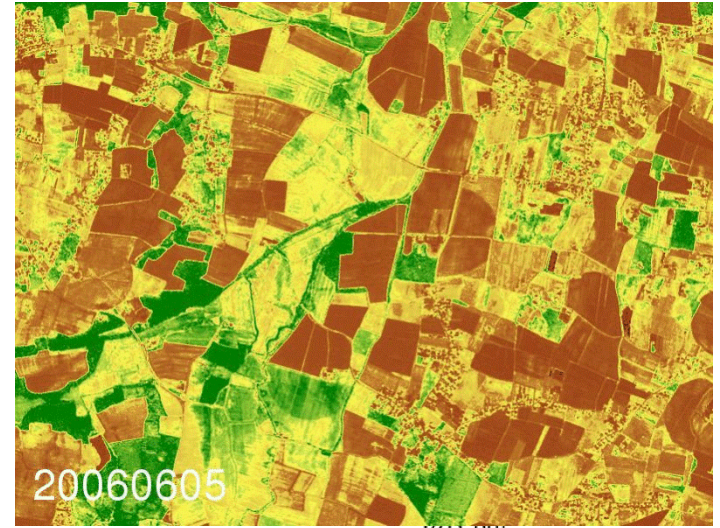
Lamasquère



# OSR: Satellite data



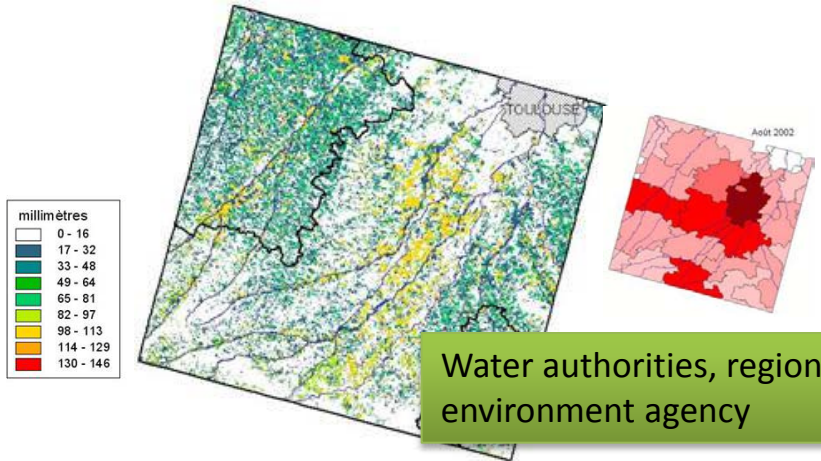
1 high resolution image (~10m) per month since 2002



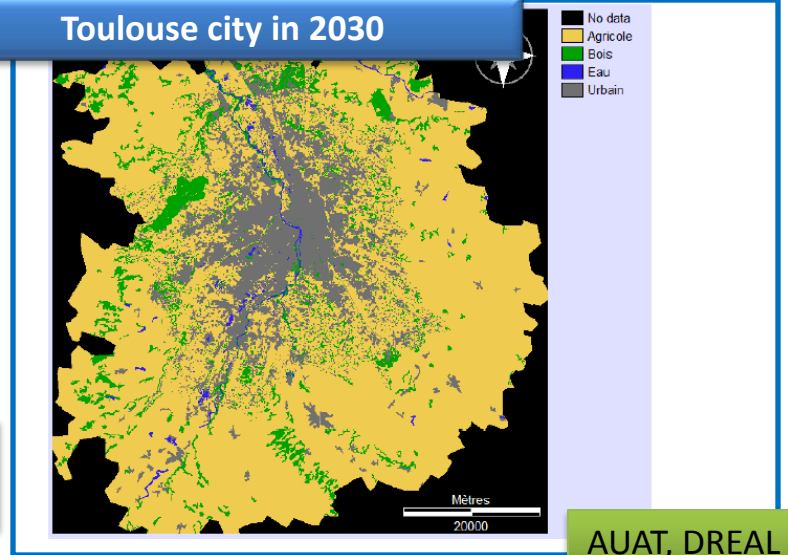
Mean and standard deviation of monthly NDVI over a 50x50 km area, in 2002 and 2003

# OSR scientific uses

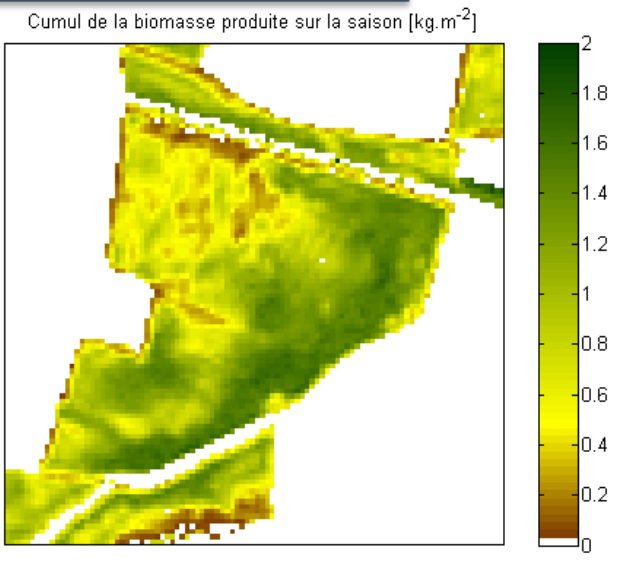
## Water requirements (corn)



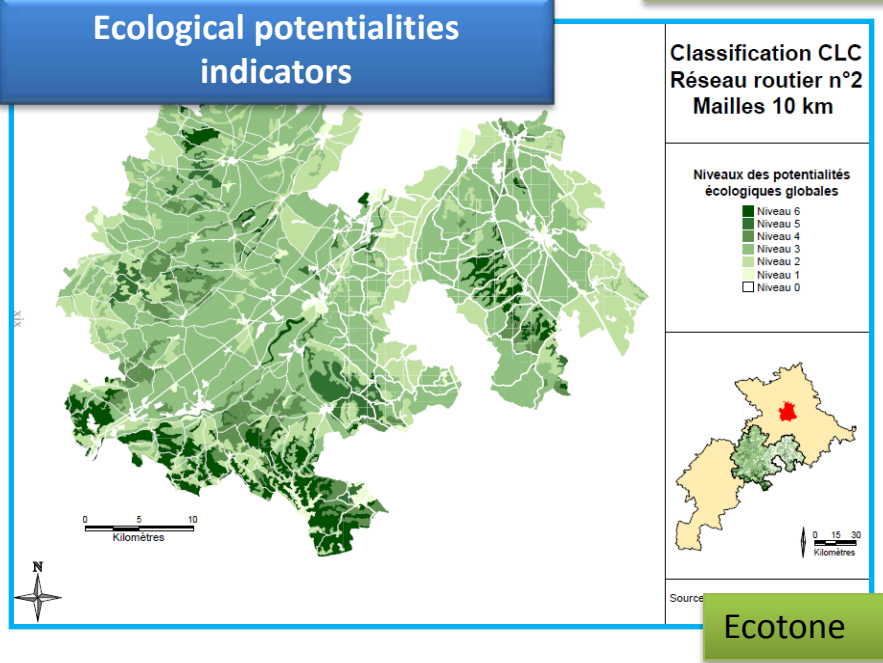
## Toulouse city in 2030



## Biomass of sunflower crop



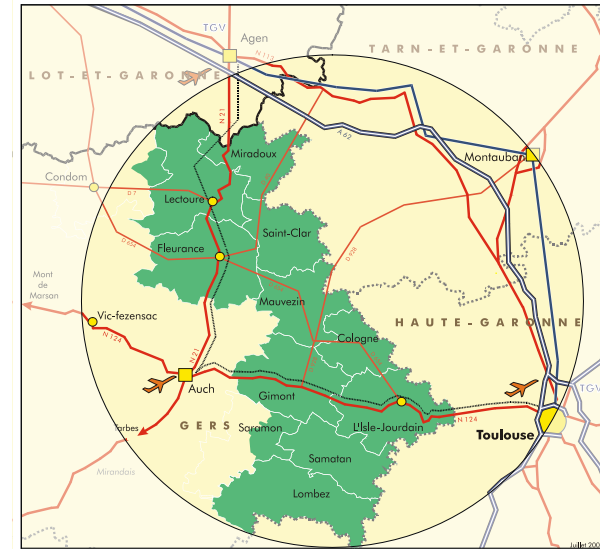
## Ecological potentialities indicators



# From the OSR to the PATS

## □ PATS: Pôle d'Expérimentation et d'Application des Technologies Spatiales (2007)

- ◆ Cluster for the Experimentation and Application of Space Technologies
- ◆ Driven by local authorities (Pays : 159 municipalities, 2047 km<sup>2</sup>)
- ◆ PATS aims to developing the rural territory and creating innovation



## □ PATS organizes the partnership of local authorities, research laboratories, SMES and stakeholders

- ◆ PATS' territory is an experimental territory for space technologies
- ◆ Projects are built with the active participation of users.
- ◆ PATS is a territorial Living Lab, E2L, member of ENOLL
- ◆ Agreements with 3 clusters: Aerospace Valley, Agrimip, Cancer-Bio-santé

### □ The goal of the PATS experimental territory is to offer a framework and resources to favor:

- ◆ Development of services which exploit satellite technologies
  - Experimentation: identification of needs, users and partners, R&D, validation, economic model, marketing
  - Reduce cost and time for developing new applications and favor innovation
  - Support the development and creation of SMEs
- ◆ Academic and finalized research
- ◆ Networking and partnerships : public authorities, local public and private actors, laboratories and enterprises

## □ Living Lab approach

- ◆ Panels of users
  - Local authorities/policy makers
  - Managers: development corporations, chambers
  - Agricultural sector : farmers, farmers associations, cooperatives, agriculture chambers, public services
- ◆ Pooling / sharing in situ data, maps, satellite data
- ◆ Implementation of a SEIS as a way to provide information, but also to structuring the partnerships and to collect information
- ◆ Partnerships and networking with actors with the aim to experiment and to improve services. Not built on a single project, rather a long term strategy, with several fundings to support specific parts

# What is a Living Lab?

- **A Living Lab is a real-life test and experimentation environment where users and producers co-create innovations. Living Labs have been characterized by the European Commission as Public-Private-People Partnerships (PPPP) for user-driven open innovation. A Living Lab organizes four main activities:**
  - ◆ Co-Creation: co-design by users and producers
  - ◆ Exploration: discovering emerging usages, behaviors and market opportunities
  - ◆ Experimentation: implementing live scenarios within communities of users
  - ◆ Evaluation: assessment of concepts, products and services according to socio-ergonomic, socio-cognitive and socio-economic criteria.

<http://www.openlivinglabs.eu/>

## □ Living Lab approach

- ◆ Panels of users
  - Local authorities/policy makers
  - Managers & technicians: development organizations, land planning, ...
  - Agricultural sector : farmers, farmers associations, cooperatives, agriculture chambers, public services
- ◆ Three main sectors: agri-environment, land cover/use, services to citizens (health)
- ◆ Pooling / sharing in situ data, maps, satellite data (from the OSR)
- ◆ Implementation of a SEIS as a way to provide information, but also to structuring the partnerships and to collect information
- ◆ Partnerships and networking with actors with the aim to experiment and to improve services. Not built on a single project, rather a long term strategy, with several fundings to support specific parts

# RITA builds upon the OSR and the PATS



## □ RITA: FP7 project, “Region of knowledge”, 2008-2010

### □ RITA general objectives

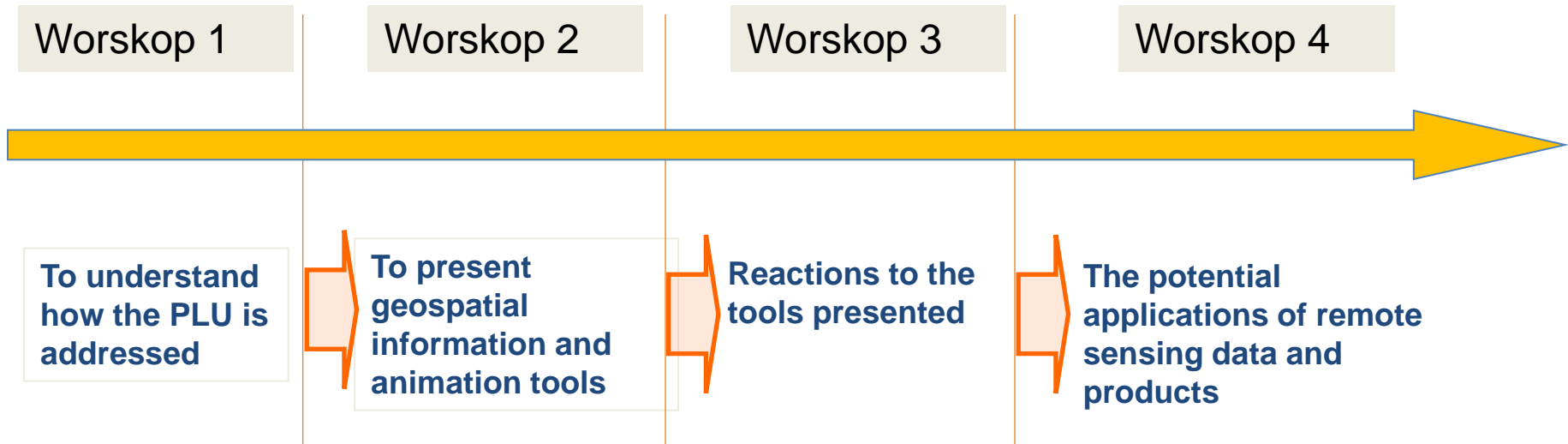
- ◆ To imagine new ways of developing the uses of remote sensing
- ◆ To test the applicability of the PATS territorial Living Lab concept in Catalonia, Spain
- ◆ To assess two assumptions:
  - A significant potential of development for the applications of remote sensing exists at local and regional scales
  - GeoSpatial systems are amongst the most promising way to help developing and disseminating such applications
- ◆ To prepare for a European networking of similar initiatives

### □ Specific objectives

- ◆ To draft the high level specification of a Shared Environmental Information System
- ◆ To test the concept of Living Lab as a tool for economic innovation within the concerned territories

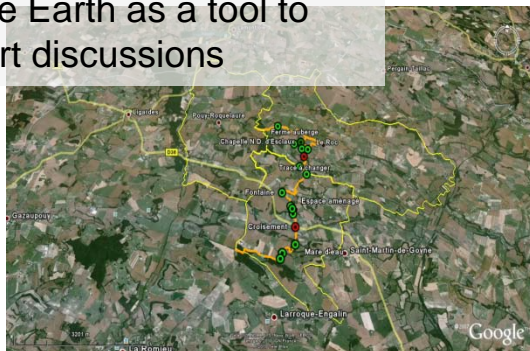
# Example of the approach: establishment of planning documents

(PLU = Plan Local d'Urbanisme: Local Development Plan )

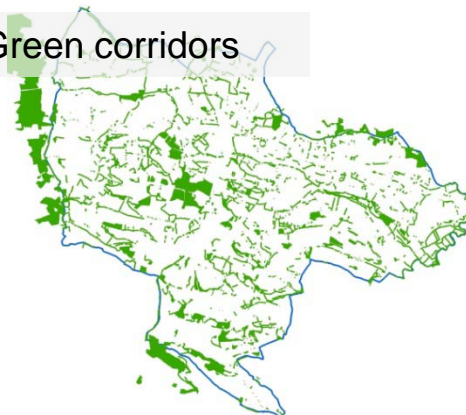


Three rural municipalities involved in the process, about 18 participants in every workshop

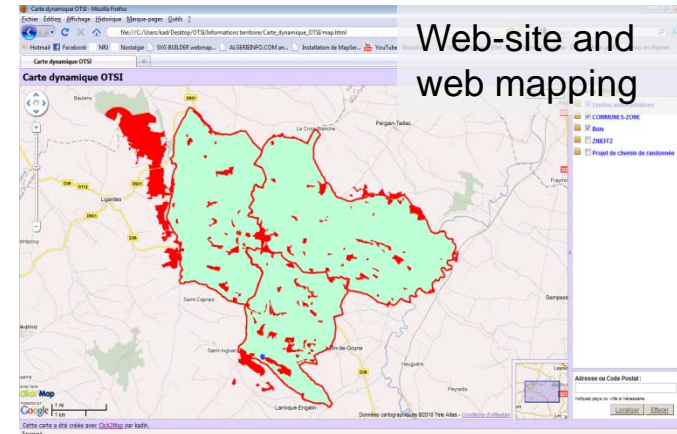
Google Earth as a tool to support discussions



Green corridors



Web-site and web mapping



# Main learning from the RITA project (1)

## □ Review of the existing SDIs and SEIS in Midi-Pyrénées and Catalonia:

- ◆ SDIs tend to comply with international norms and follow the rules of the EC INSPIRE directive and of the OGC (Open Geospatial Consortium). SDI interoperability is seen as a major goal.
- ◆ Apart from the CORINE land cover datasets, space remote sensing products are seldom used by the analysed SDIs in both regions
- ◆ The degree of awareness of the institution on the capabilities and limits of remote sensing is generally low
- ◆ Only a limited number of SDI propose to access the data using standards such as WCS and WFS which allow the user to process the data on its own computer
- ◆ Few actors anticipate the capabilities of Web-GIS and SEIS as a support for decision making
- ◆ Very few examples of WPS (transactional) implementation

## Main learning from the RITA project (2)

### □ Specifications of Shared Environmental Information System

- ◆ Implementation of WCS and WFS is required if one wants to develop the use of satellite data
- ◆ SDI should not only provide information from the servers towards the users, but would be more efficient if the architecture and the software allow users to upload data on the server and interact with applications
- ◆ A variety of client interfaces are needed to fit specific requirements, even if the servers accessed are the same.

## Main learning from the RITA project (3)

### □ **The role of public research laboratories is crucial when building a territorial Living Lab**

- ◆ Bring scientific expertise and connections with the scientific community
- ◆ Are (shall be) neutral actors, with no commercial or political interests

### □ **Research labs must have their own scientific strategy**

- ◆ Policy makers have the legitimacy to encourage innovation. And they know everybody !
- ◆ The time of policy makers is not the one of research, and their short term priorities might change quickly
- ◆ The setting up of an experimental framework and the start of data collection prior to engage in a Living Lab project is a way to stabilize the relationships with the actors
  - But it may take time (~4 years)

## Main learning from the RITA project (4)

- ❑ **Social sciences experts (e.g. sociologists) are to be included in the project as soon as possible: conducting meetings with stakeholders, decoding actors position and fears, connecting local actions to upper-level policies, territorial development...**
  - ◆ Within RITA, the Aida consulting company played this role
- ❑ **Significant efforts have to be devoted to train users to new technologies and to listen to their needs : the applications are built collectively (co-construction)**
  - ◆ Rural territories have little skilled manpower. At least in the beginning, the process heavily relies on academic staff
- ❑ **Users are not only end-users, they also bring expertise and data**
- ❑ **Users are not guinea pigs : they shall benefit of the experiments, possibly outside the main focus of the project**

## Main learning from the RITA project (5)

### □ **SMEs and private companies in general are the most difficult actors to involve in a Living Lab**

- ◆ Perceive as a risk the share of ideas, softwares, methods
- ◆ Reluctant to join a cluster of enterprises and to work within an open innovation approach :
  - Limited investment capacities
  - Intellectual properties issues
  - Risk of partner failure
- ◆ Open innovation could be useful for building web mapping softwares

### □ **The availability of small fundings (20-40k€) with simplified formal procedures and quick and frequent selection rounds would be an asset for exploring new ideas of applications**

# Value chain of remote sensing for regional applications

Satellite data acquisition

Raw data  
*Satellite operational ground segments*

Levels 1-3 Processing :  
reflectances,  $\sigma_0$ ,  $T_s$ , ...  
(Geometry & radiometry)

General purpose data  
*GMES cores-services & operational data providers (e.g. Eumetsat Land-SAF)*

Other data (weather, ...)

Generic thematic products  
(e.g. GEO Solar radiation)

Limited purpose data (e.g. one topic, one region)  
*Generic algorithms e.g. image classification, possibly complex processing (models, etc)*

Providers of customized thematic products

Studies & analysis

Consultancy & decision support

Project management & monitoring

Professional services  
*(close to the end users, same economic sector)*

Users/customers

Farmers

Policy makers

Water authorities

...

- ❑ **The concept of experimental territory is an original form for running a Living Lab**
- ❑ **Innovation is fostered by the proximity between research laboratories, training institutions, economic actors, policy makers, public sector organizations and users**
  - ◆ A very rich experience
  - ◆ Needs a long term commitment
  - ◆ Positive returns also for research : new questions, new data, ...
  - ◆ Space applications are only one of the possible topics. The Living Lab approach can help to create a culture of innovation in any sector (side-effects of Rita on tourism, gastronomic products, “green” materials ...)
- ❑ **The bottom-up approach is the key**



**Thank you for listening**