# **Astrium GEO-Information Services**

IGIS Downstream applications and services to support agriculture management, emergency situation and urban planning Becej, 15 October 2013





ASTRIUM COMPANY CONFIDENTIAL



- Presentation of Astrium Geo-Information Services
- Agriculture Land Parcel Information System (LPIS)
- Services of crop management at the field scale
- Services of crop inventory and production forecast
- Services to support agricultural land use management
- Services to support emergency situations
- Services to support urban planning



#### WHO WE ARE

# The Power of the EADS Group





**GCASSIDIAN** 



**G**AIRBUS



**ASTRIUM** 



€ 56.5 billion revenue 140,000 people

> € 5.8 billion revenue 18,000 people





**Astrium Services** 





**Business Communications Services Government Communications Services** 

**GEO-Information Services** 







#### OUR ASSETS

## **A Unique Satellite Fleet**





## **Astrium Services at a Glance**

# 100

Astrium Services serves customers in more than 100 countries Astrium Services, GEO-Information accesses 6 Earth observation satellites, 2 radar and 4 optical

# 1.5 billion

Number of people using our imagery worldwide every year

# 100 billion km<sup>2</sup>

Over 100 billion square kilometres of satellite imagery, archived since 1986



Number of direct reception station partners worldwide

110 🚺

110 resellers worldwide

April 2013 Information



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## **Service description**

### Target users

- Public organizations: ministries and related regional entities
- Commercial entities: cooperatives, industry

# Content: Agriculture Information System including

- Digitized field boundaries
- Field information (agronomic data, farmer's description)
- Possible interface with:
  - Subsidy payment / control system (IACS: Integrated Administration and Control System)
  - Geo-traceability systems



## **Service benefits**

# Basic tool to efficiently plan, implement and manage agricultural policies

- Crop inventory and location: accurate estimates of crop acreages
- Monitoring of practices and of other parameters influencing achievable production levels
- Optimization of farmer-dedicated direct aid programs
  - Optimization of institutional budgets: reduction of administrative management costs thanks to a direct access to useful data
  - Better identification of crops and/or regions requiring subsidies
  - Reliable data for the control of farmers' eligibility for subsidies

# Basic tool for an improved promotion of agriculture products through:

- The implementation of an efficient health monitoring system
- The implementation of a geo-traceability system
- The definition of 'terroirs' and of designations of origins
- Improved competitivity on the export market

Farmstar field

information system





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### SERVICES OF CROP MANAGEMENT AT THE FIELD SCALE

## **Service description**

*œnoview*<sup>®</sup>

#### FARMSTAR Vos parcelles vues du ciel



# Target users

- Public organizations: ministries and related regional entities
- Commercial entities: farmers, cooperatives, industry, insurers

## • Content:

- Regular delivery of field-scale maps of
  - Crop development status
  - Disease and pest impacts
  - Practice recommendations
  - Disease risk

The delivery of such maps requires a customization phase including the collaboration with local agronomic experts

- Customized support for the use of the delivered maps and for the implementation of recommendations
- Astrium has an experience of more than 10 years in the delivery of precision agriculture solutions
  - FARMSTAR: service tailored for French wheat, barley and rapeseed (www.farmstar-conseil.fr)
  - PixAgri: scalable service for the management of crops outside France (www.pix-agri.com)
  - oenoview<sup>®</sup>: service for vineyards (worldwide)



# Farmstar: the field-scale crop management in France

The status of crops for each farmer's field is estimated from satellite images ...

... to generate a set of tall made maps delivered at the main crop development stages...

...dedicated to farmers and cooperatives to optimize practicies

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#### SERVICES OF CROP MANAGEMENT AT THE FIELD SCALE



AN EADS COMPANY AN ALS COMPANY ARVALS

#### SERVICES OF CROP MANAGEMENT AT THE FIELD SCALE



### **Service benefits**

### Benefits to farmers:

- Reliable monitoring of field during the crop cycle
- Global overview of all farm's fields, leading to time saving
- Optimization of decision making and of the efficiency of interventions thanks to easy-to-use data provided at key decision dates
- Improved scheduling of interventions

# Benefits to commercial users

- Optimization of field scouting thanks to a global view on a large set of fields
- Optimization of logistic production tasks (distribution of fertilizers, organization of technical supports, organization of harvest)

# Benefits to public entities

- Support to the implementation of efficient and
- **sustainable** agriculture thanks to a precise monitoring of field inputs
- Optimization of crop yield and harvest quality



Vineyard monitroed by oenoview®





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## **Service description**

### **Target users**

- Public organizations: ministries and related regional entities
- Commercial entities: insurers

# Content, at local and regional scales:

- Information products providing
  - The spatial distribution of crops and crop acreages
  - Estimations of the **production level** per agricultural areas
- Regular monitoring of crop development to estimate and forecast crop final production





# Example: local scale agricultural landcover map



SERVICES OF CROP INVENTORY AND PRODUCTION FORECAST

Regional scale: monitoring crop development in quasi-realtime with MR sensors



SERVICES OF CROP INVENTORY AND PRODUCTION FORECAST

## Service quantifying fodder crop production

# Quantification of fodder crop production to support the payment of compensation by insurers

Indice compris entre :

Indice compris entre :

[0.3, 0.75] (30% à 75%)

]0.75 , 0.90] (75% à 90%) Indice compris entre : ]0.90 , 1.1.] (90% à 110%) Indice compris entre : ]1.1 , 1.25] (110% à 125%) Indice compris entre : ]1.25, 2] (125% à 200%)



Fodder crop production index per commune in 2012 (Index (year n)= ratio of the production of year n wrt the mean historic production)



Variability of fodder crop production of a commune between 2003 and 2011



**Service benefits** 

- Assessment and optimization of the performance and of the potential of a country's agriculture sector
  - More efficient agricultural policies thanks to a detailed and spatialized knowledge of cultivated acreages

# Anticipation of decisions to be taken on the markets

- Improvement of production estimates
- Reduction of the vulnerability of fragile sectors wrt market fluctuations
- Early risk warning (climatic, disease impact)
  - Reduction of crisis management costs (food security)
  - Limitation of negative impacts of climatic fluctuations on production
  - Improvement of irrigation management





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#### SERVICES TO SUPPORT AGRICULTURAL LAND USE MANAGEMENT

# **Service description**

# Target users

Public organizations: ministries and related regional entities

## Content:

- Maps of agro-ecological zones characterized by:
  - Their natural resources (land, water, soil, terrain)
  - Their climate
  - The constraints related to human activities
- Geo-information large scale indicator maps describing the sustainability of farming systems
  - Area agricultural potential, productivity and land suitability
  - The impact of agriculture on the environment
  - The impact of climate change on agricultural activities









SERVICES TO SUPPORT AGRICULTURAL LAND USE MANAGEMENT

# **Examples: assessment of the environment 'State'**

February 2012





Selvaradjou, S-K., Montanarella, L., and Panagos, P. 2007. Office of Official Publications of the European Communities, Luxembourg

Monitoring of FAPAR over Europe using MERIS data geoland2 project

geolandi2 FAPAR



January 2012

FAPAR: Fraction of Absorbed Photosynthetically Active Radiations

September 2011

SERVICES TO SUPPORT AGRICULTURAL LAND USE MANAGEMENT

# Examples: assessment of the 'Pressure' on the environment



No Data 0 - 10 % 10% - 20% 20% - 30% 30% - 40%

40% - 50% 50% - 60%

60% - 70% 70% - 80%

80% - 90% 90% - 100%



*Impact of agriculture on water quantity* 



Impact of agriculture on water quality

*Impact of agriculture on occurrence of bare soils geoland2 project* 



## **Service benefits**

# Provides basic indicators to define and implement an efficient sustainable agriculture

# Definition of a long-term agriculture policy

- Compatible with the environmental characteristics of the country
- Taking into account the possible impacts of climate change

# Analysis of the capacity to develop new agriculture sectors as a function of region potentials

# Regular monitoring of the evolution of environmental conditions

- Evolution of land use and land cover
- Evolution of water resources
- Evolution of soil quality





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# **Disaster management services (1)**

ASTRIUM disaster management services aim at supporting to manage main disasters, in particular:

- Flood, Drought, Fire : Increase of preparedness / prevention and crisis anticipation
- They provide efficient Geo-Information products to support users all along the disaster management cycle:
  - ■Reference mapping → pre-disaster
    - Reference maps: cartographic & population information main infrastructures and network, DEM
    - Scale: 1:5 000 to 1:500 000
    - During crisis, delivered in 6 hours
    - Increase of preparedness / prevention and crisis anticipation





# **Disaster management services (2)**

They provide efficient Geo-Information products to support users all along the disaster management cycle (following)

- Disaster extent mapping and damage assessment 

   time-critical crisis period
  - Disaster maps: event timing, location, extent and level of hazard
  - Damage maps: information on damage to settlements, infrastructure, environment
  - Scales 1:10 000 to 1:100 000
  - Delivered within 12-24 hours based on a 24/7 service organization
  - Improve disaster management and support civil protection activities
- Risk site monitoring, including surface movement monitoring 
   pre-disaster to post-disaster
  - Guaranteed satellite revisit capacity on target sensitive sites
  - Precise altimetric change maps
  - Increase of preparedness / prevention and crisis anticipation



Flood extent map



Monitoring of polluted mudslide



#### **DISASTER MANAGEMENT**



Reference map Porong, Java, Indonesia (Scale: 1:25 000)

Am-Safer

Surface movement map Amsterdam Moderate (yellow) to significant (red) surface movements

# **Examples of products**



Flood extent map. Elbe river, Germany, June 2013 (Scale: 1:30 000)





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# **Ortho-imagery: SPOT5, SPOT6, Pleiades**

# Individual images or country-wide, cloud-free mosaics







# Land Cover: SPOT Thema

# A typical multi-layer, multi-temporal product

- SPOT Thema is a land use/ land cover product
  - A GIS vector database derived from interpretation of SPOT satellite imagery ranging from 2.5m to 20m
  - Delivered as a hierarchical product:
    8 → 29 → 46 classes
- Multi-temporal analysis allows to monitor land cover evolution



## Go Monitor: a surveillance & monitoring service

 User-configurable service : choice of sensor/resolution, revisit frequency, interpretation level

Possible applications in urban planning : public works monitoring, illegal housing detection, etc.

+ - 4

**Theme:** Illegal housing **Monitoring objectives:** "Every month we want to receive VHR imagery to locate any new housing construction."

Revisit: Surveillance mode: Analysis level: Monthly Panoramic Vision

DIEPSLOOT WITH ANALYSIS

8 shots for 1 cloudless image over AOI







# VHR– Case study: Nice Urban Community basemapping



Unicate

Nice (France) 2010-2012 Client: CUNCA (Urban Community of Nice) 600 km<sup>2</sup> Aerial survey 10cm TrueOrtho 10cm 3D basemap 1/1000 XY accuracy < 20cm DTM Z accuracy < 25cm Detailed 3D model Hi-resolution textures

#### Multi-purpose usage

Communication (internal, external), GPS & topographic surveys, Infrastructure projects planning, GIS & cadastral base layer

