



Geoinformation in the CAP – locating farmer's fields

Simon Kay

Joint Research Centre of the European Commission



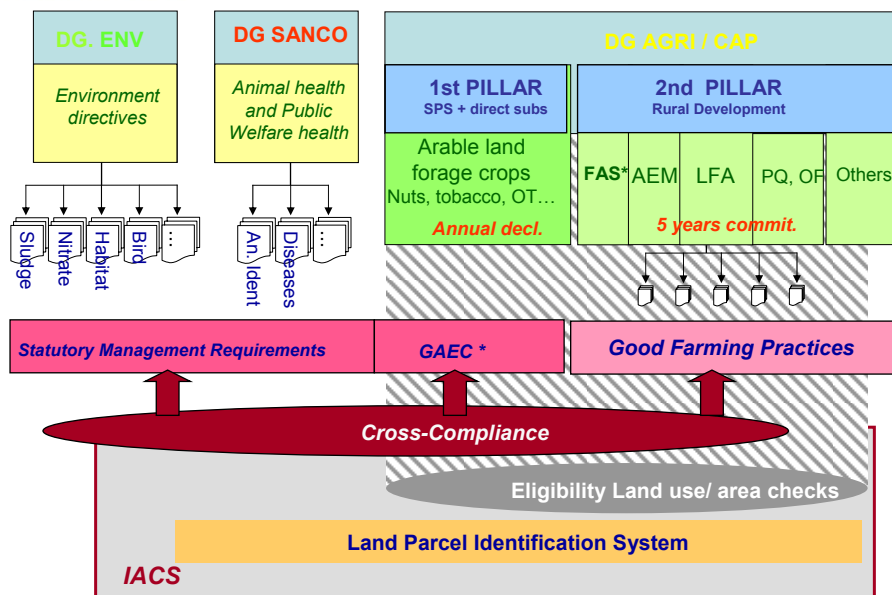
Outline

- GIS technology – scope, EU policy
- IACS-GIS, farmer interaction
- On the spot checks, GNSS (GPS, Galileo)
- Control with Remote Sensing



State of the art: geo-information technology in EU Policy today

- Regulations for Agricultural subsidy management including GIS, RS technology
 - General agriculture (Reg 1782/03, originally 1593/00)
 - Olive oil (Reg 2366/98)
- Links to Environment:
 - Statutory management requirements
- Land Registry
 - Funding, not (direct) policy
- INSPIRE – future...



* GAEC: Good Agricultural & Environmental Conditions

* FAS: Farm Advisory System

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Dealing with legacy systems

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From data to information

Transition from data to information, Jens Pohl

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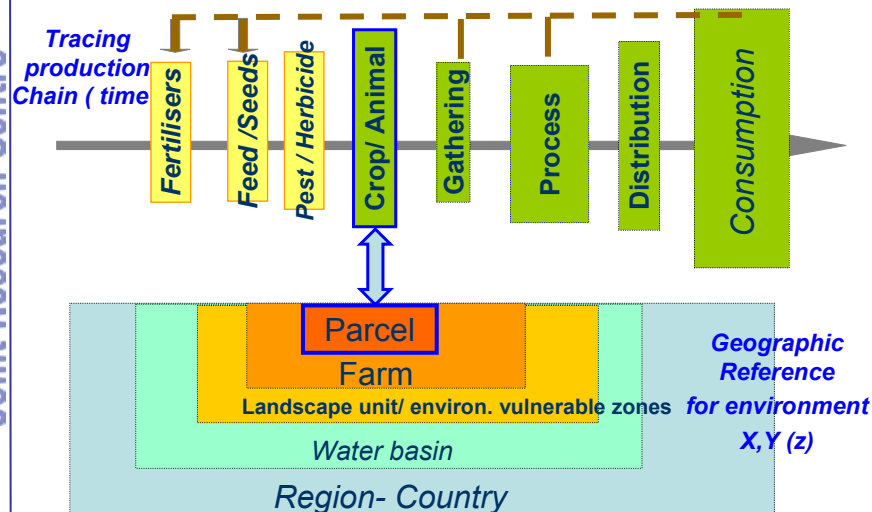
From data to information

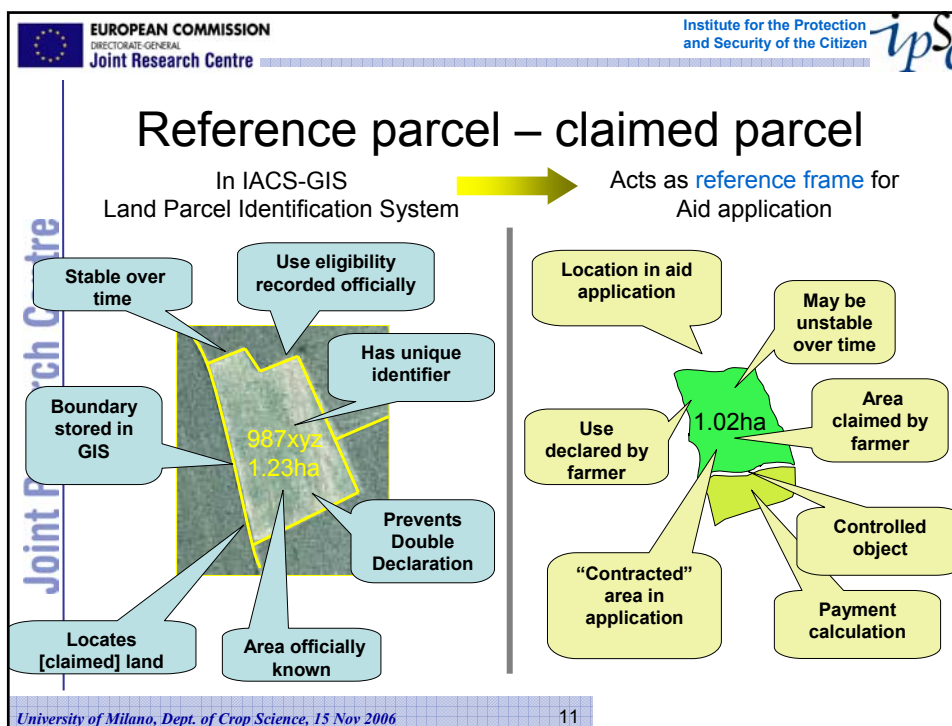
- Geo-Information technology as an **enabler**
 - Focuses the data exchanged
 - Increases relevance
- Manage source data, improve access to information



Geographic information (parcel referencing)

example: link between food traceability and environment





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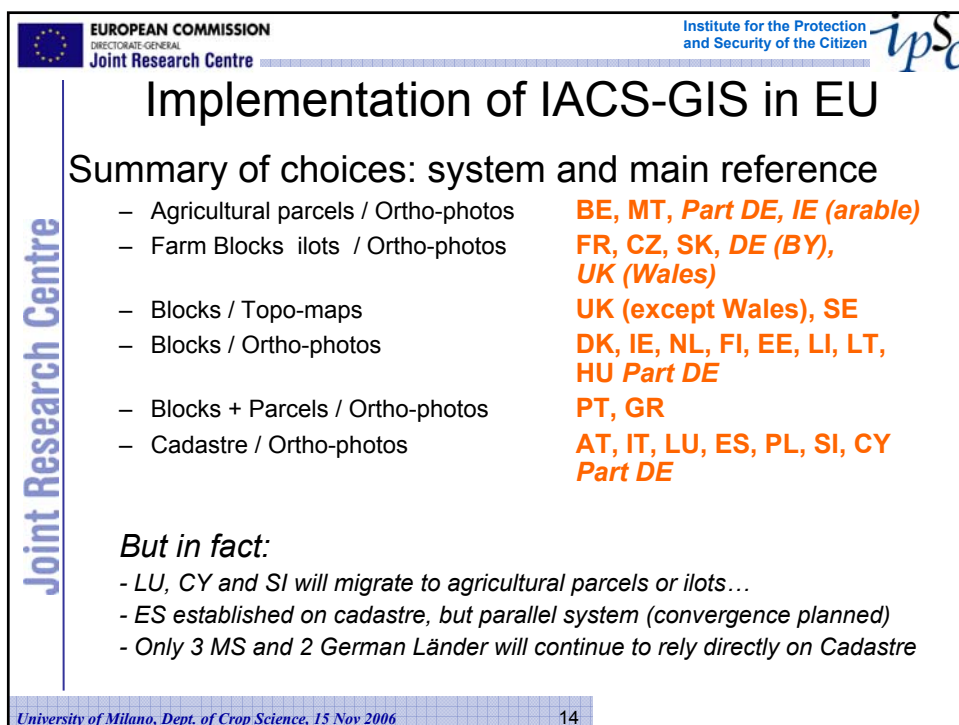
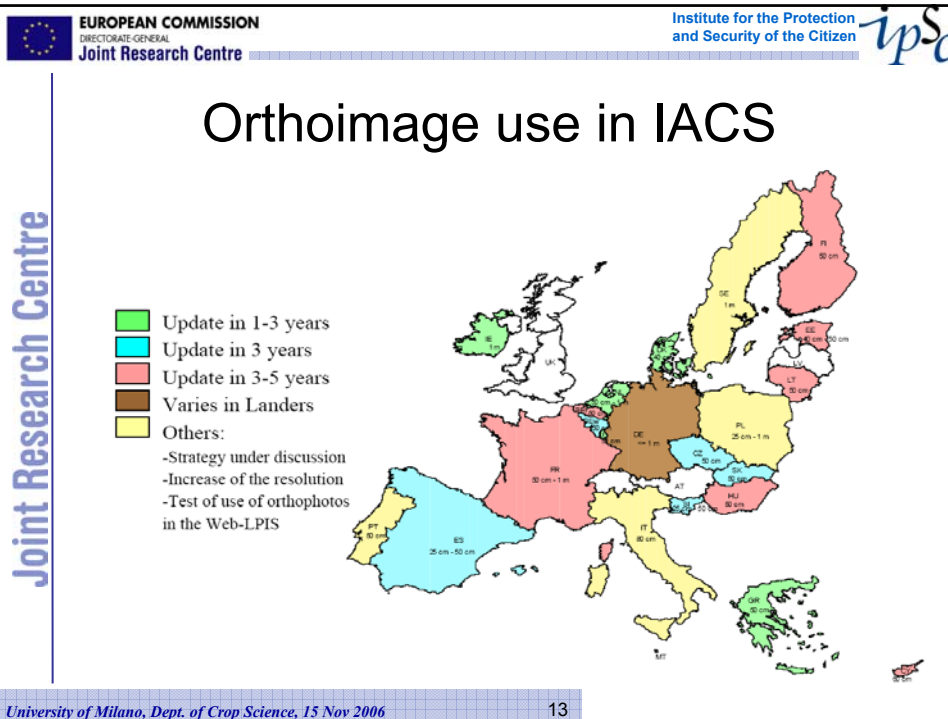
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Orthoimage use in IACS

- Not mandatory – but in practice
 - 23 of 25 MSs use “wall to wall” orthoimagery
 - Remaining two MS use orthoimages for verification
 - Specification:
 - Colour, 50cm pixel frequent
 - DEM <5m RMSE_z
 - Regular 5 year updates usually announced; in some cases 3 year updates
 - Sharing of dataset cost

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Fordevarministeriet markkort - Microsoft Internet Explorer provided by DFFE

Adresse: <http://markkort.gr.chr.dk/map.asp?func=lst>

Ansøger:
Ole Kristensen
Viborgvej 715
8471 Sabro
Ansøgnr: 48810
SE-nr: 49995954
Dato: 20030310

Mark: 1-0
Bloknr: 564228-78

Mark: 2-0
Bloknr: 565229-11

Mark: 2-1
Bloknr: 565229-11

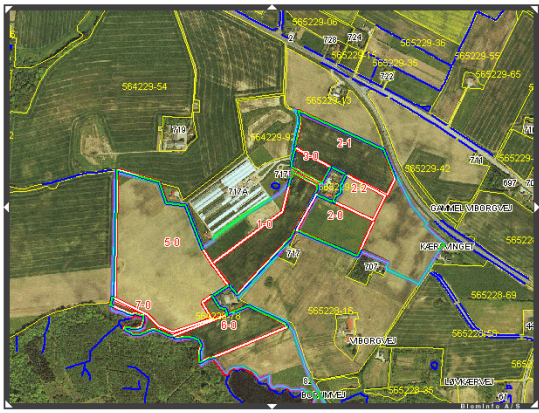
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Bloknr: 565229-11

Mark: 3-0
Bloknr: 565229-11

Mark: 5-0
Bloknr: 564228-78

Mark: 6-0
Bloknr: 564228-78

Mark: 7-0
Bloknr: 564228-78



Zoom ind i kortet

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Adresse: <http://markkort.gr.chr.dk/map.asp?BrowserSize=14>

Ansøger:
Tom Damgaard Nielsen
Ansøgnr: 5554

Træne faciliteter
Opret mark
Rediger mark
Sammenlæg marker
Afbrød tegning

Kopier markblok->mark
Kopier sidste års marker

Slet udyrkede arealer
Slet en mark
Slet alle marker

Mål afstand
Afbrød måling

List alle marker

Søgning på...

Bruger information
Udskriv kort
Kortstørrelse
Skift årstal

Markblok ændringer

Hjælp

Afslut

Externe ressourcer

Drawing tools

- Sketch field
- Edit field
 - delete / add / move points
 - merge fields
 - split field
 - change field number
- Copy fields from last year
- Copy block border -> field
- Delete one / all field(s)
- Measure distance

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Ministry of Food, Agriculture and Fisheries
Directorate for Food, Fisheries and Agri Business



	No. of applications	Internet applications	Internet %	Full electr. Including GIS
2000	56,389	8,988	16%	n/a
2001	53,922	10,865	20%	n/a
2002	51,490	12,117	27%	n/a
2003	48,546	14,760	30%	843
2004	47,454	16,941	36%	996

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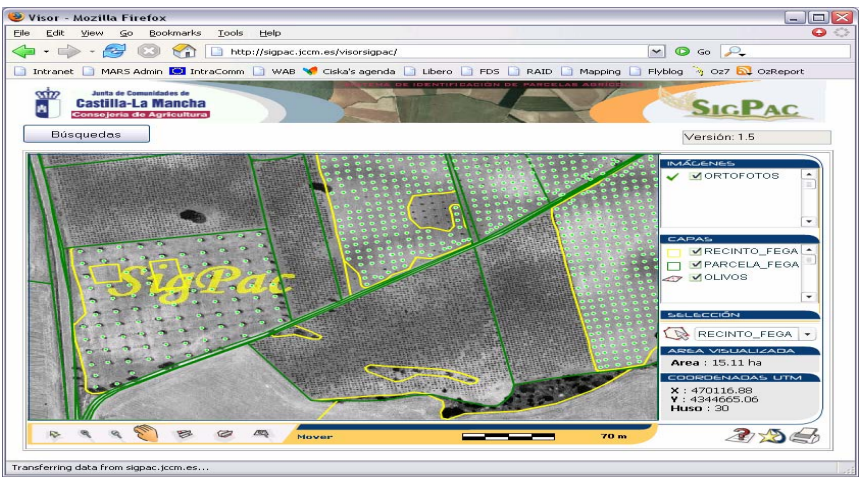
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SIGPAC demo, Spain

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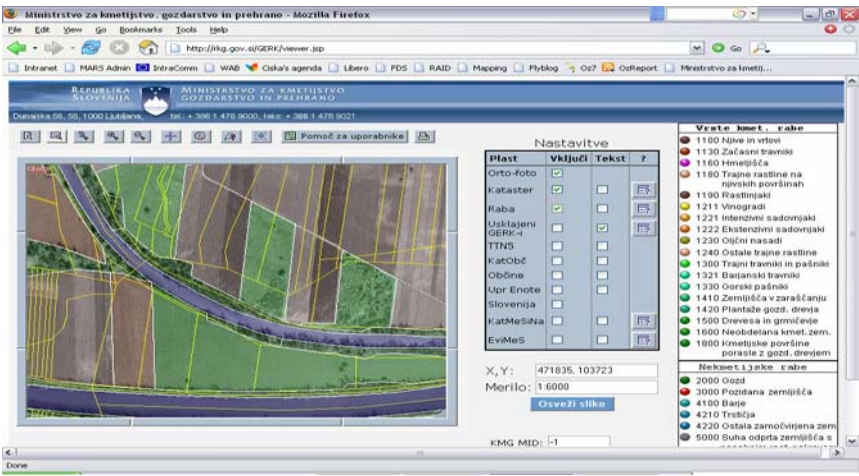
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Slovenia/CosyLab demo

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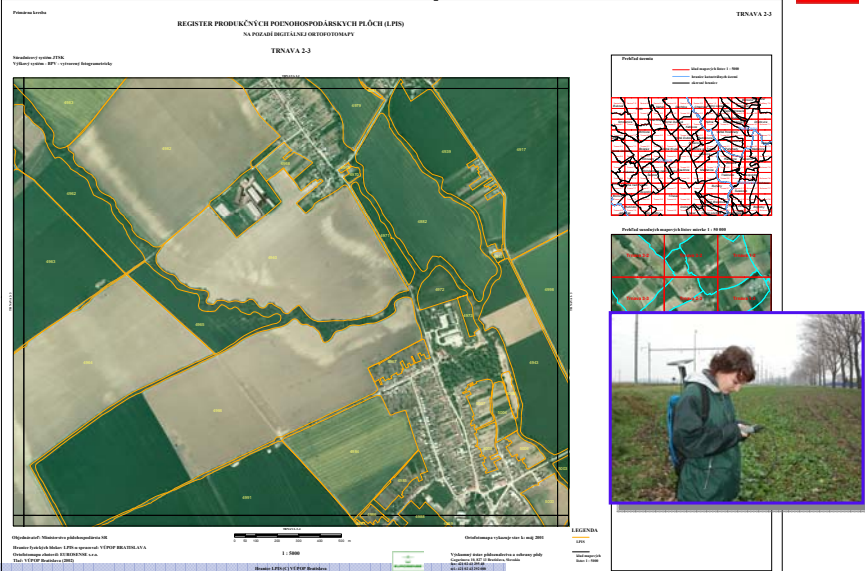
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A short tour of European IACS GIS

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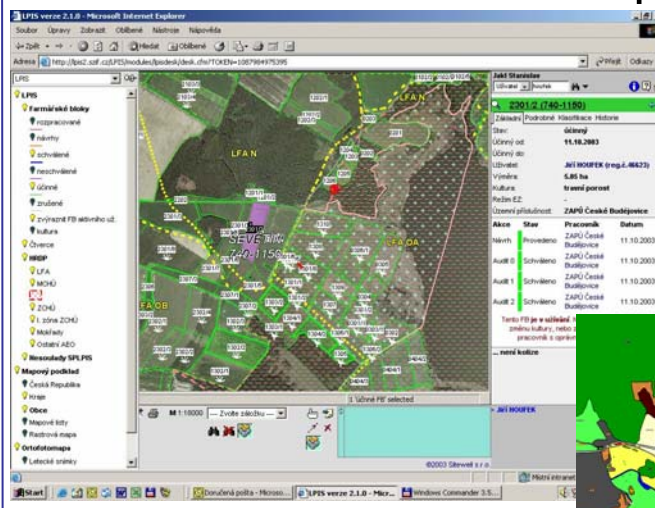
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IACS-GIS – Czech Republic

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- Multipurpose mapping for agricultural areas: orthophoto + GIS

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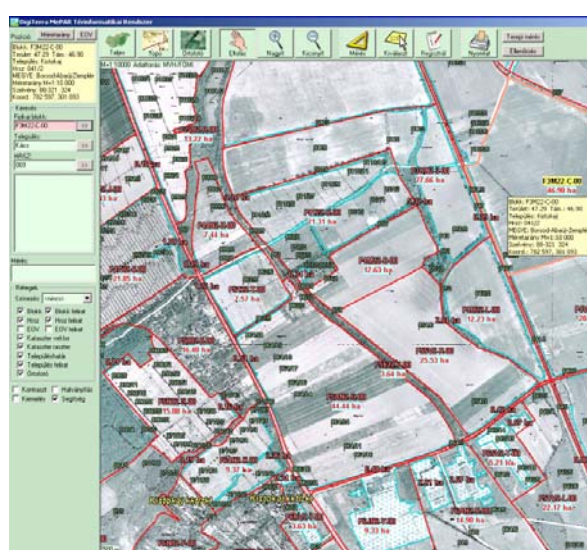
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IACS-GIS in HUNGARY

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- **Ortho-photos**
 - 100% , colour 50cm, 2000
 - flooded areas (5,4%) new images taken in 2003.
- **Block Creation:**
 - 100 % in September 2003.
 - 302 000 blocks, 32 ha average size.
- **Cadastre - ancillary info**
 - visible on the pre-printed maps for 2004 claims
- **Link with farmers**
 - consultation Oct-Nov 2003
 - 19 regional + 135 local MARD offices

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Courtesy of FÖMI

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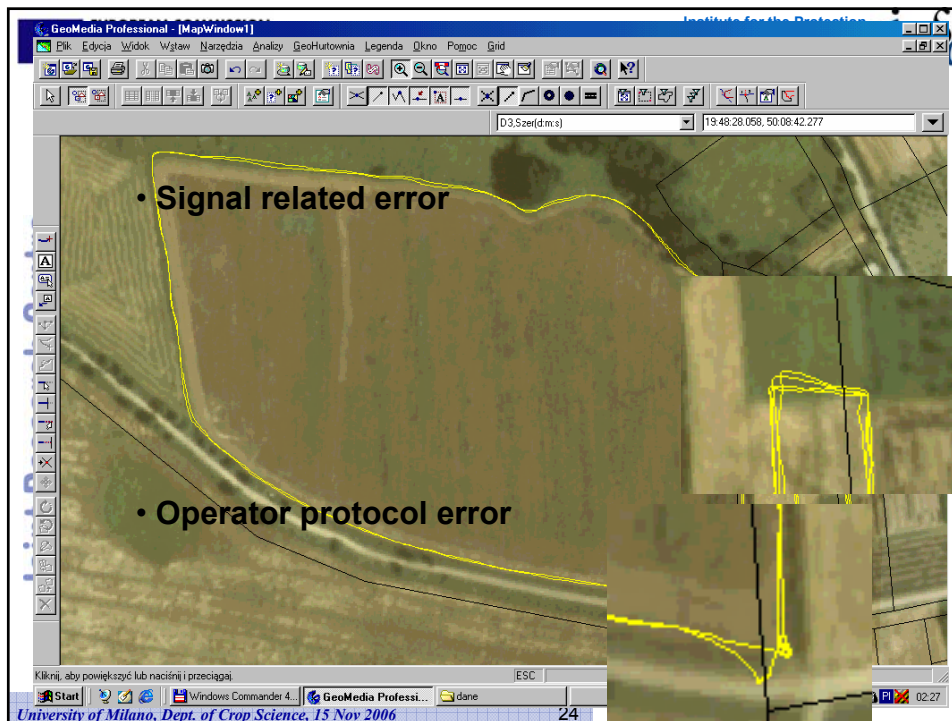






Measuring a field: the CAP way

- GNSS (GPS, Galileo)
- Area measurement
 - Not boundary survey
- Trace of absolute position
- Integration with other data
 - Orthoimage, existing boundaries
- Real time
 - Decision in the field



Measuring a field, simulation using Galileo EGNOS signal

$$\sigma_S^2 = \frac{1}{2} \sigma_\epsilon^2 \left(\sum_{i=1}^n (\hat{r}_i^2 - \hat{r}_i \hat{r}_{i+2} \cos(\hat{\alpha}_{i+2} - \hat{\alpha}_i)) \right)$$

- Variance of measurement can be modelled as function of vertices
- Hypothesis – observed empirically – that under certain conditions, variance of area estimate is weakly influenced by perimeter length

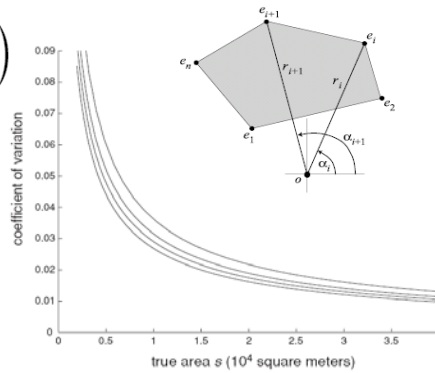
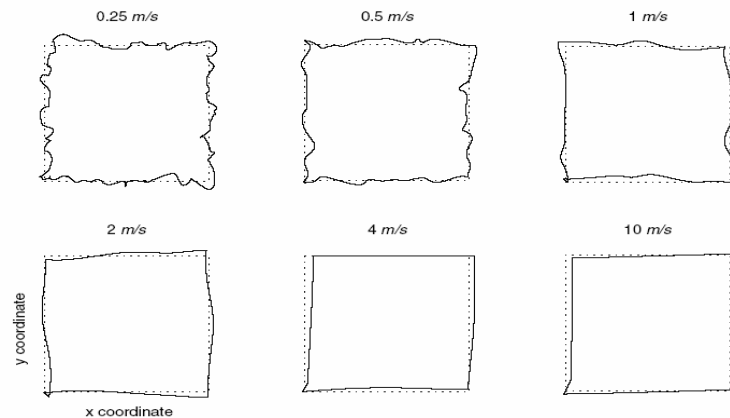


Figure 8. Evolution of the coefficient of variation CV_5 for the area estimation of a rectangular parcel as a function of the parcel area and side length ratios r , with r equal to 1:1 (square parcel, bottom curve), 1:3, 1:5 and 1:10 (top curve).

Bogaert, P., Delincé, J., Kay S. (2005)

Assessing the error of polygonal area measurements: a general formulation with applications to agriculture, Meas. Sci. Technol. 16 (2005) 1170–1178

Measuring a field, simulation using Galileo EGNOS signal



Bogaert, P., Delincé, J., Kay S. (2005)

Assessing the error of polygonal area measurements: a general formulation with applications to agriculture, Meas. Sci. Technol. 16 (2005) 1170–1178



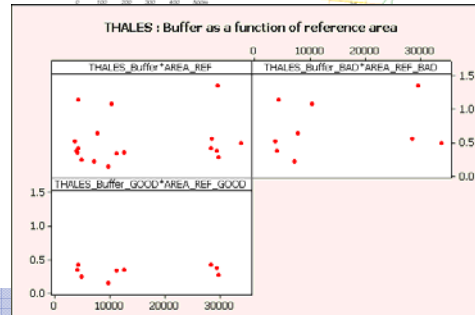
Validating area measurement methods

- Study objectives:
 - Review and evaluate the existing JRC validation approach;
 - Review the statistical basis for such assessment, with reference to industry standard approaches (e.g. ISO 5725);
 - Demonstrate by conducting the necessary field experiments
 - Provide the interpretation of these results



Study contract partners:

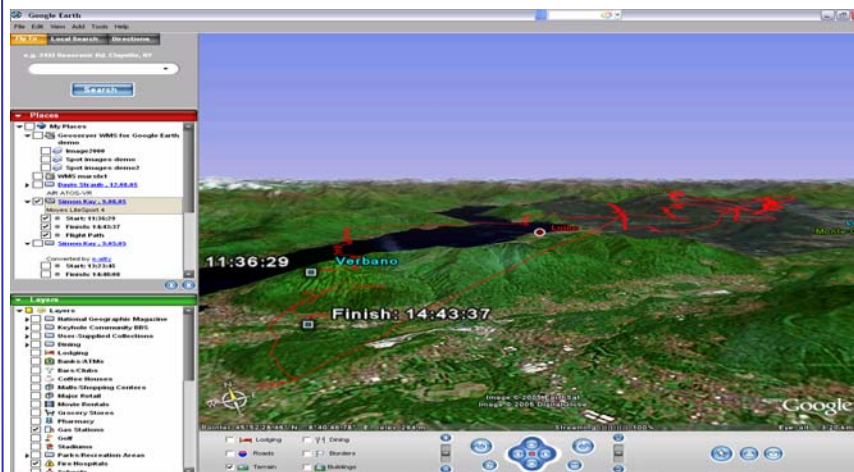
- AGH University of Science and Technology (Kraków, PL): Dept of Photogrammetry and Remote Sensing
- University of Warmia and Mazury (Olsztyn, PL): Dept of Satellite Geodesy and Navigation
- Faculté Universitaire des Sciences Agronomiques (Gembloux, BE): Dept of Statistics and Computer Science



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Google Earth GPS track Demo

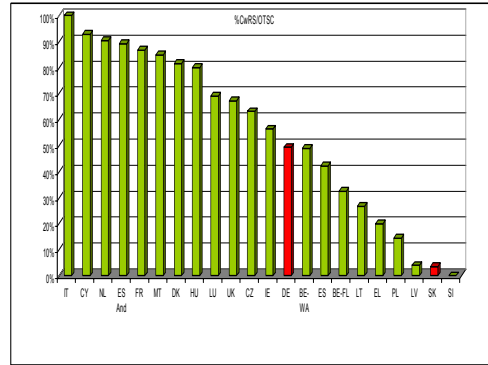


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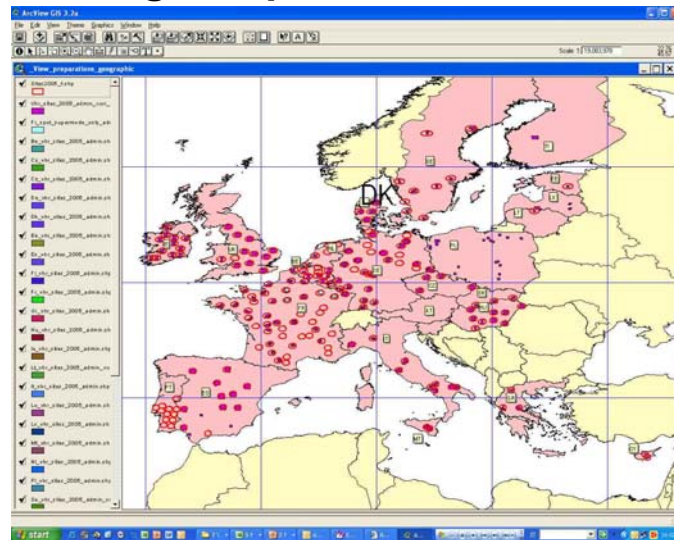
EU Control with Remote Sensing, 2004

- 22 MS involved in the program (AT,EE,FI out)
 - 25 contractors
 - More than 164 000 farms checked
 - ~800 images
 - VHR, >50,000km²
- 2005:
 - Budget >€5M
 - VHR acquisition planned ~150,000km²



EU control image acquisition 2005, sites

- 182 HR
- 163 VHR



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- Farms selected with 80% of area inside site) are selected (except dossiers <2ha)
- Limitation due to the environment

An aerial photograph of a rural landscape with a grid overlay. A large red circle is drawn over a central portion of the grid, indicating a specific area of interest. The fields are colored in various shades of green, yellow, and brown, representing different land uses or crop types.

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An aerial photograph of a rural landscape with a grid overlay. A large red circle is drawn over a central portion of the grid, indicating a specific area of interest. The fields are colored in various shades of green, yellow, and brown, representing different land uses or crop types. Labels with arrows point to specific areas on the map:

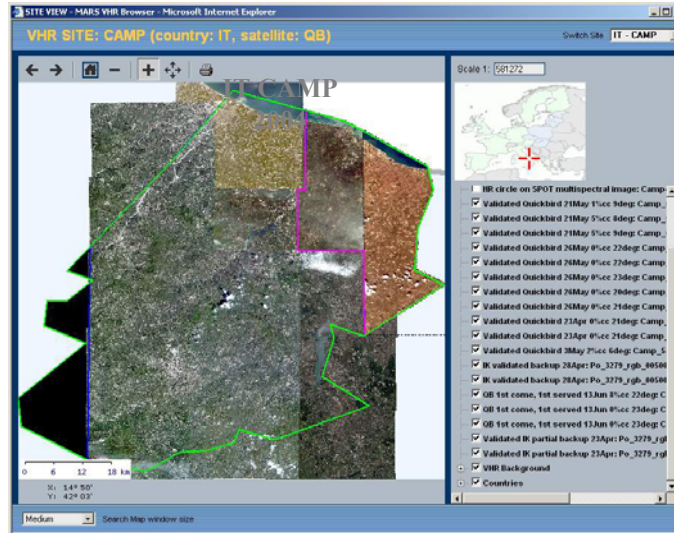
- Winter rape seed
- Winter Wheat
- Winter barley
- Alfalfa
- Sugar beet
- Grain maize
- Summer barley
- Built up area

QuickBird Image - panmerge
PAN Resolution 60 cm
TEUE, DE – 2004 CwRS sit

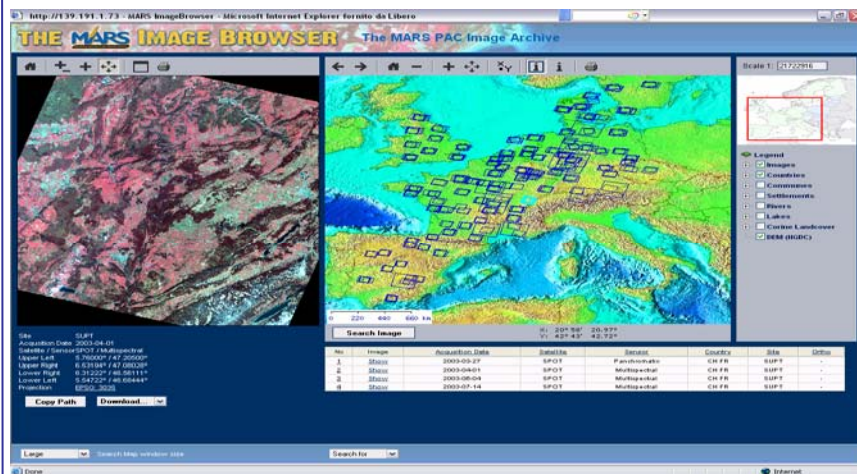
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Example QB site (3,200 km²) acquired over 2 months



MARS ImageServer demo



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Google Earth WMS Demo

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Summary

- Geo-information technology is well embedded in EU policy
 - Agriculture is the leading example
- EU wide datasets are developed, operational
 - Some already widely used
- Access policy is member state responsibility – and variable
 - But INSPIRE is supposed to change this
- Orienting applications and services for users is critical
 - Information, not data