

Methodological aspects of the geospatial aid application

Wim DEVOS

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Stimulating innovation
Supporting legislation*

outline

- Background
 - Previously
 - Panta Rhei questionnaire results
 - Reference Parcel >< geospatial application >< Agricultural parcel
- Practical cases
 - Correctness of boundaries
 - Effectiveness of crosscheck
 - Tolerances
- What now?
- Conclusion

previously: purpose




Declaration of areas

- *introduction of the "geo-spatial aid application"*
 - the pre-established form shall be provided in an electronic format +
 - the corresponding geographical material shall be provided through a GIS-based software application
- *purpose:*
 - to better support the farmer to declare correctly the area
 - to render administrative cross-checks more effective
→ spatial intersection with the LPIS
 - to reduce the control burden + to reduce the error rate
 - required to allow exemption from crop diversification in specific cases – (art.44(3)(c) of R.1307/2013)
 - required for the calculation of the increase of the permanent grassland ratio – (art.44(3) 2nd subparagraph of DA on DPR)




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previously: implementation issues



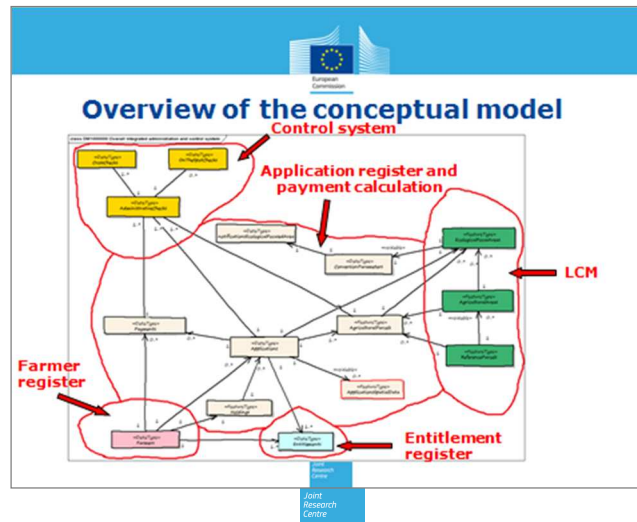
Implementation questions

- *Two farmers declare overlapping areas*
 - Article 28(3) of IA IACS:
MS may provide for a proportional reduction of the overlapping areas
- *Graphical cut-off*
 - An agricultural parcel can only be declared geo-spatially within the LPIS reference parcel boundaries. Otherwise, update of the LPIS reference parcel is required (farmer's notification).
 - Immediate update of the LPIS => pro-active approach to keep the information in the LPIS accurate, reliable and up-to-date
- *Tolerances to be applied – incorrect/inaccurate/shifted geographic data (agricultural parcel) declared*
- *Other questions*



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previously: GA central role in IACS



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perceived benefits/advantages

1. Simplification 12
2. Better applications 21
 - Readability (esp. EFA)
 - Less errors
3. Faster controls 16
 - Automation
 - Faster processing
4. Extra: more efficient and cost-effective OTSC
 - Abolition of redundant paper channel

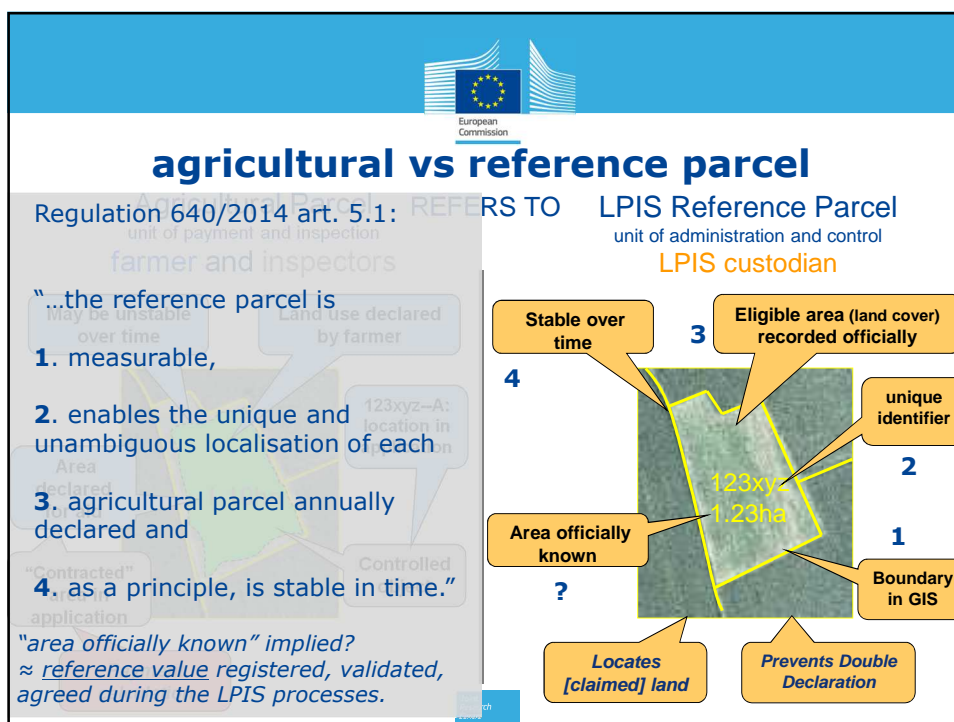
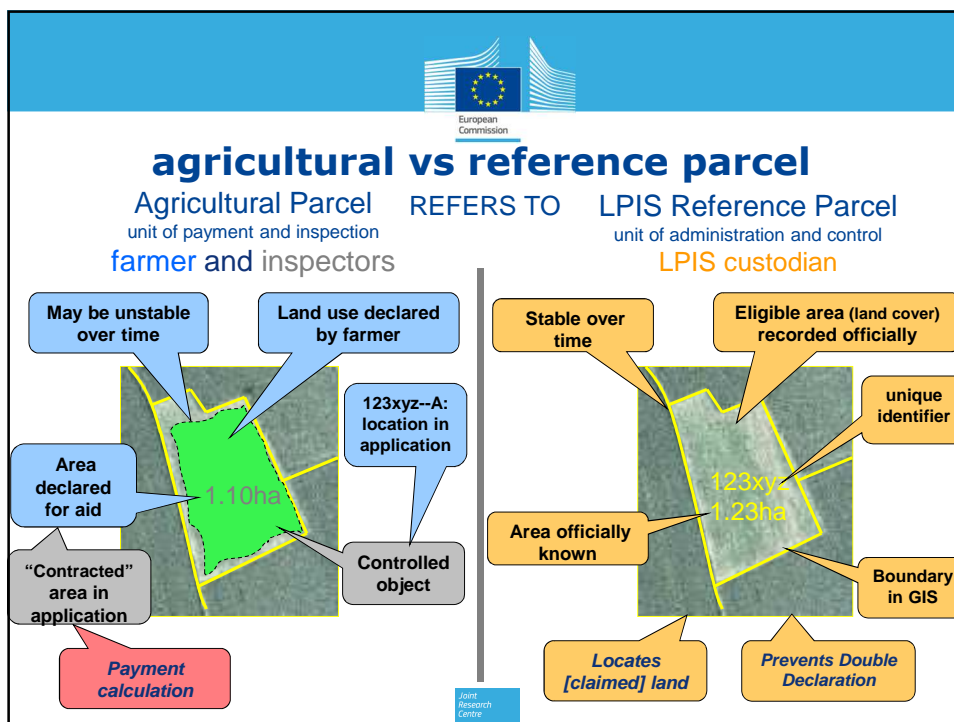
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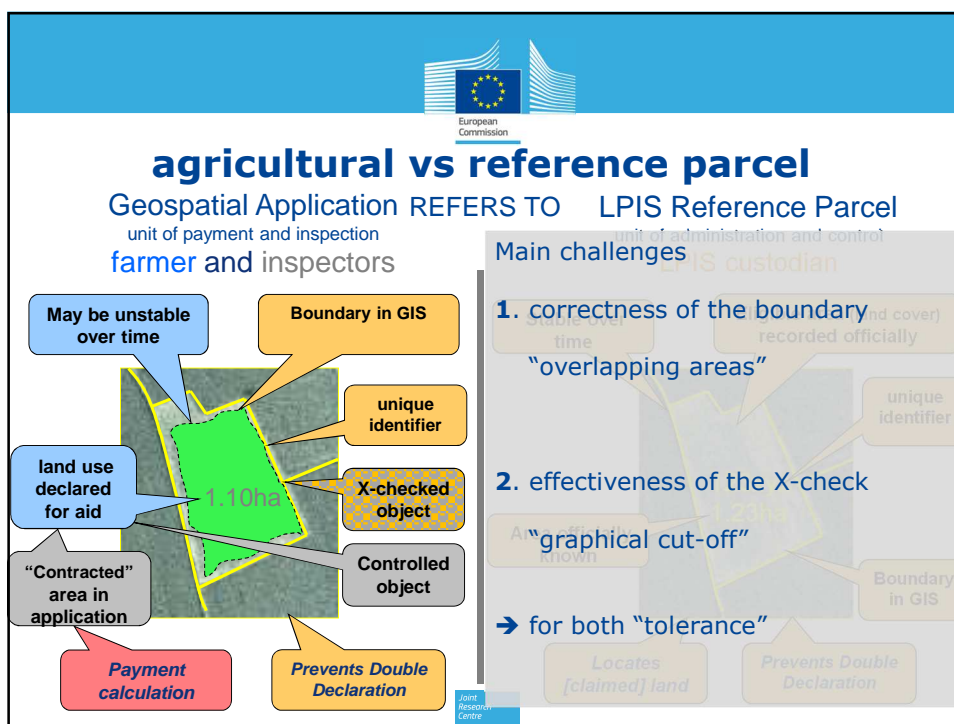
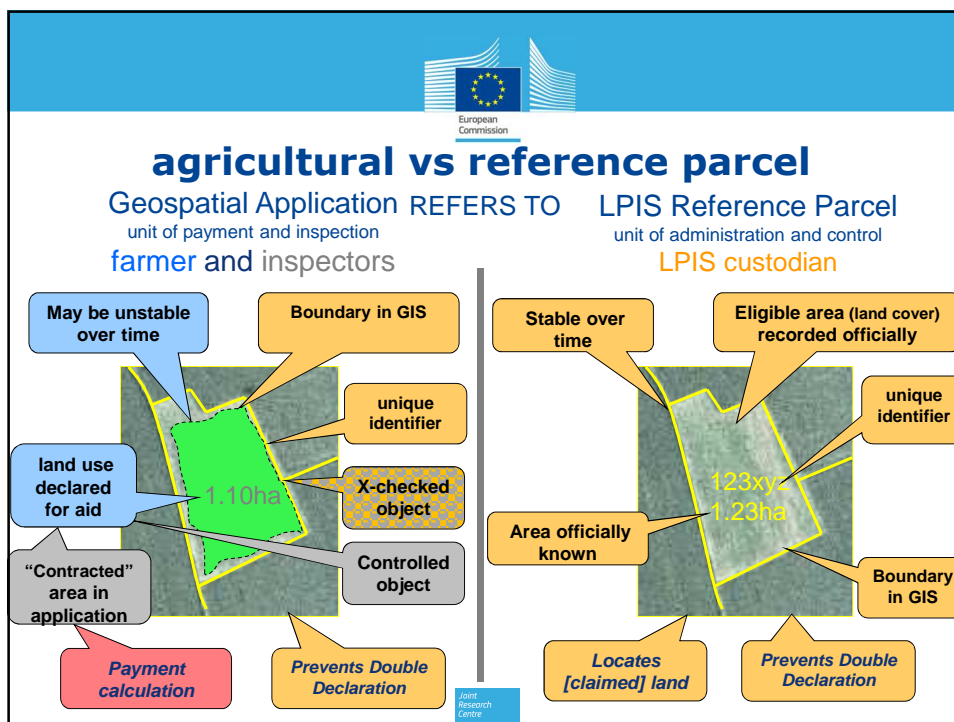
perceived disadvantages

1. Locate + draw precisely all AP+ all EFA 12
2. Discrepancy with LPIS polygons 6
3. Slower controls 4
4. More "penalties" 11
5. Extra: organisational
 - Preparation: More labour intensive, time consuming
 - Shift in PA staff profile
 - Shift in farmer's advice and training
 - Budget and Cost/benefit of development
 - Interaction with LPIS management
6. Extra: technical
 - IT infrastructure (bandwidth and storage)
 - Data model extension, complexity
 - Delayed 2015 start-up, development time
 - Unclear requirements

suggested remedies

1. Resources
 - Capacity increase
 - Better imagery
 - Appropriate SW and tools
2. Process
 - Simplify
 - Avoid redundancy of paper system
 - Avoid concurrency with LPIS update
3. Support
 - Training (internal, farmer, 3rd party)
 - Local offices, advisory system, helpdesk
 - Service providers (e.g. farmer associations, consultants)





cases: correctness of boundaries

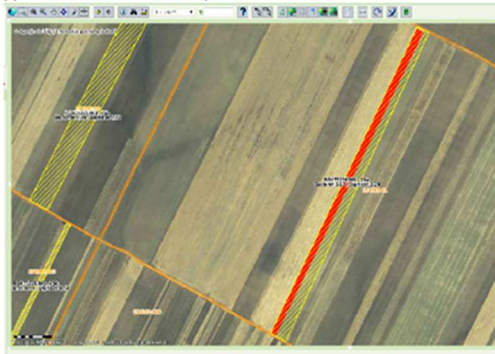
Some challenges detected in previous MS presentationa



for sake of topical discussion, not criticize the implementations

example 1

APIA 4. Useful tools for farmers and administration
Warning graphically error shown in red when one overlap larger than 200 sqm appear between two or several parcels



LPIS management and challenges
22nd - 24th April 2014 - Brussels

Chronology:

- application is Y
- "neighbour" can be Y-1
- image can be Y-3

Challenge:

If application Y is different from Y-1, how can the farmer map it correctly?

Note: physical block boundaries are correct

example 1

APIA

4. Useful tools for farmers and administration

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example 2

100 m2 digitisation



Pro-rata 100% (90-100)
24 digitized features
RP area: 10.91 hectares
MEA: 10.91 hectares

1,000 m2 digitisation



Pro-rata 100% (90-100)
5 digitized features
RP area: 11.33 hectares
MEA: 11.33 hectares

Eligibility:

- West is 100%
- East is pro-rata

Challenges:

How to

- define the (pro-rata) land cover classes and mapping rules?
- ensure the farmer has the CAPI skills?

Note: physical block outer boundaries seem correct

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example 2

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example 3

Electronic declaration

- Main GIS features
 - ~300 different checks (GIS and alphanumeric)
 - detect errors and offer advice
 - Real-time cut-out of all ineligible layers
 - show correct maximum area
 - Visualise overlaps with neighbours
 - GIS tools for the farmer
 - Copy parcel
 - Split parcel
 - Merge X parcels
 - ...



GIS Methodology:

- combines mapping and x-check for "correctness"

Challenges:

How to

- model the mapping rules?
- ensure the farmer has the GIS skills?
- KISS?

cases: effectiveness of the cross-check

Cross-check: administrative check that allows assessing consistency between different data records in IACS, or consistency of IACS data records with third party data:

Administrative check: eligibility check based on internal data, (doesn't require new field observation as OTSC or other external input)

Some issues for previous presentations



for sake of topical discussion, not to criticize

JRC MEA for crosschecks

= MINIMUM VALUE between


- **LPIS: RP reference area** (mapped hectares)
- **previously determined area** (recorded SPS&SAPS use)

Formula: $MEA_n = \min(MPE, DA_{n-1})$
 where $MPE > DA_{n-1}$

→ >90% of cases: area determined_{n-1} = area declared_{n-1}
 → Requires 2 distinct update and validation procedures

Example:

← LPIS reference: 1.23 ha
 area determined₂₀₁₀: 1.10 ha →
 MEA₂₀₁₁: 1.10 ha



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example 4



4. Useful tools for farmers and administration

Blocking messages:- does not allow the farmer to finalize their own application before the errors are corrected:

- The declared parcel area is zero
- one parcel is digitized in two or several reference parcels
- there is no correct numbering for the parcel
- the reference parcel number was changed in the LPIS update process
- the difference between declared and digitized area is outside the tolerance used for digitization on the screen
- the axis II measures are not available for selected parcel
- other specific checks that don't allow the errors in the preparation of the area based declaration

Automated rules:

"blocking" ≠ "alerting"

A single point is digitized?

Why not? compulsory in OTSC!!!!

Manual identification?

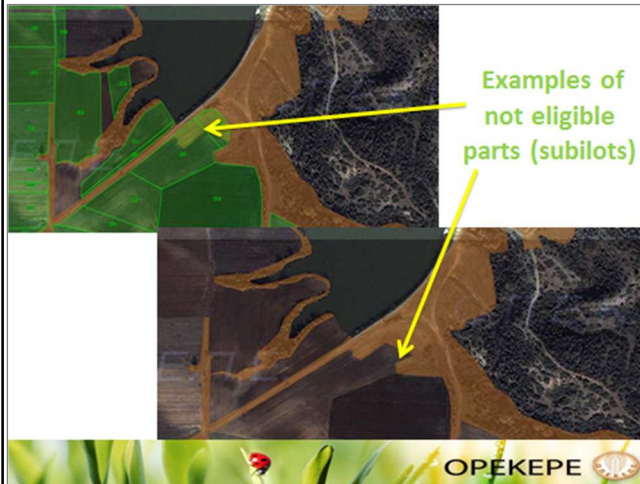
What can the farmer do?

1. What difference?
2. What tolerance?

*Note: This left slide, out of context, doesn't elaborate what is "blocked" nor how the crosschecks work
 → For discussion's sake only!*

LPIS management and challenges
 22nd - 24th April 2014, Brussels

example 5



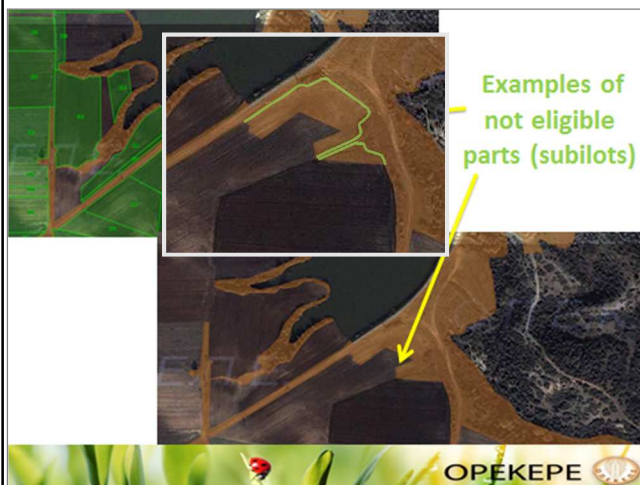
Value of the reference:
Image: eligible
RP: ineligible

Challenges:
Which is "reference"?
What is update basis?

*Note: for a good AP-type
LPIS design, the image
is presumed reference
→ **Image quality!!!!***

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example 5



Value of the reference:
Image: eligible
RP: ineligible

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Which is "reference"?
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spatial overlay

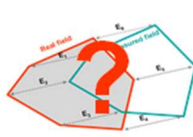
Correct area estimation AND boundary position

Risks of current area measure methods:

Correct area estimation !!!

BUT

!!! Wrong boundary position !!!



Correct shape, shifted



deformed



irregular

Valid intersection of two polygons requires:

- accurate position
 - compatible resolution
 - co-existence @time
- Else meaningless "slivers"

Challenge:
Source data quality!

Note: this concern is also relevant for LPIS upkeep and "hybrid" RP-designs

example 6

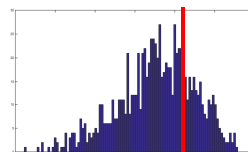
Neighboring parcels are missing in zero state GML
→ No completeness/integrity check possible



- 2 neighbouring GSAA
- ca 4ha each
 - "competing" farmers
 - 30 repetitions each
 - 2.5m ditch (EFA?)

Results:

- ditch excluded ☹
- outliers: 1 intersecting
- P_N conf: [3.94-3.98]ha
- P_S conf: [4.94-4.99]ha
- ditch area: 622m²



“tolerances”

In absence of a “known” population parameter (i.e. a reference area), tolerance is

- regarded as “engineering tolerance”: the ability for IACS to cope with variation while it can still process the application
- not to be confused with the statistical “tolerance interval”, as only confidence intervals can be calculated

Aid application guidance rules:

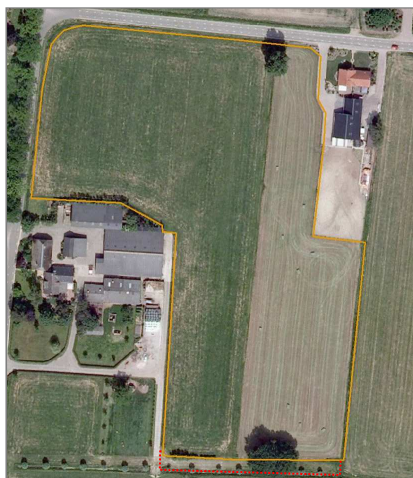
- $AP_{areadeclared} = AP_{areageometry} \pm \text{single buffer tolerance (“margin”)}$
- RP perimeter/boundary masks AP geometry
- $RP_{referencearea} \geq \sum RP \text{ Area}_{declared}$

→ based on RP/AP parcel properties, not on intersections



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alternative “example 6” revisited



2 neighbouring GSAA in 1 RP

- ca 1ha each
- “competing” farmers
- 30 repetitions each
- no ditch/feature in between

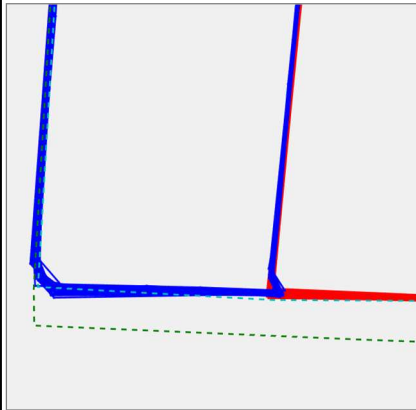
reference area: 26774m²

ETS_{areaobserved}: 26056m² (+slight shift)

ETS_{areaobserved} considered true area!

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measurement results



ETS _{areaobserved} :	26056m ²
AP _{geom} ^{Aga} :	9059-9243m ² (9151)
AP _{clipped} ^{Aga} :	9024-9195m ² (9110)
AP _{geom} ^{Slavko} :	16383-16707m ² (16545)
AP _{clipped} ^{Slavko} :	16284-16452m ² (16368)
Margin ^{Aga} :	538m ²
Margin ^{Slavko} :	664m ²
intersections:	0.6-33m ² (max 68)
gaps:	15-170m ²
matches:	nadazero
avg. sum clipped declarations:	25478m ²
adding two "margins":	26680m ²

observations from this experiment

The GSAA margin prevents unnecessary "guidance alerts" in perfect conditions.

But, possible secondary effects,
if:

$\text{area}_{\text{declared}} \equiv \text{area}_{\text{geometry}}$ 2.2% of the reference area undeclared

$\text{area}_{\text{declared}} = \text{area}_{\text{geometry}} + \text{SBT}$, ca 2.4% over-declaration → "alert!"

Adoption loops are allowed:

cfr. ETS inspection, how many loops to reach a known target?

GSAA should not encourage speculative behavior



snowball?

Manage the resources needed for processing “guiding alerts”

A. Application register (loops)

1. Inform all beneficiaries
2. adoption of applications
3. amendment of application

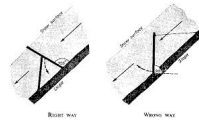
B. LPIS (data inconsistencies)

1. confirm/ignore an alleged inconsistency
2. process the confirmed inconsistency
3. document decisions



X-checks stress the robustness of the IACS implementation!

- if relevance beyond the application process
- compatibility between spatial data sets
- compatibility inside a spatial data set



to round up

In general:

- The challenges on IT, ICT, organization, training and support have already been well-identified

Mapping

- The issue identifying/interpreting land can be tricky ($LU > LC$)
- The issue of an appropriate mapping base is a bit neglected

X-Check

- There is no concept of reference, so how to deal with concurrency and mismatch?
- Appropriateness for the application process needs investigation
- Avoid “snowballing”

and now?

If geospatial aid applications merely “delegate” responsibility for a correct aid application onto the beneficiary, disappointment might follow.

The aid application guidelines elaborate:

- application process functional requirements
- pre-established form content and portrayal

An implementation strategy should also include to:

1. reduce GA mapping to the absolutely necessary cases
2. base that mapping on a true and current reference.
3. apply the appropriate business rules: no less, no more

reducing GA mapping needs

“institutional”

- 2009R1122 art (6).1 “operate at reference parcel level such as cadastral parcel or production block which shall ensure unique identification of each reference parcel”

Direct aid process: LPIS parcel is referenced for 3 applications

1. **identification** (e.g. declaration, performing the CC check)
Ideal 1: 1 spatial object = 1 farmer unit
2. assessing the **eligibility value** of the identified land (informing the farmer and performing the crosscheck)
Ideal 2: 1 spatial object = 100 % eligible
3. performing the OTSC
Ideal 3: 1 spatial object = 1 crop group



Good RP design is key!


GA inherits RP-geometry blindly when the RP:

- + is a **unit** of farming land
- + represents **eligible** land
- + reflects **stability**

→ Consider LPIS-upgrade


Note:

- these *ideals* are embedded in LPISQA quality elements
- these *conditions* cannot always be met



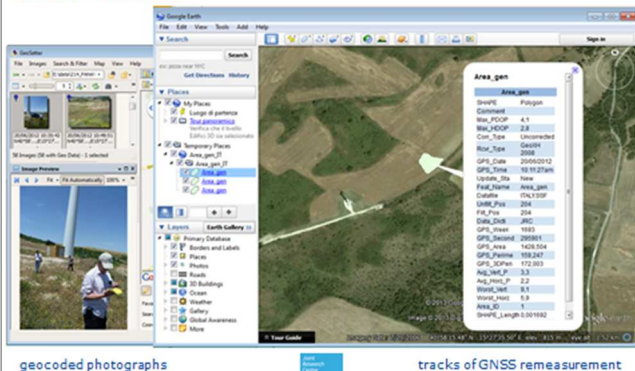
European Commission

true and current reference



European Commission

anno 2015?



geocoded photographs tracks of GNSS remeasurement

Open GIS for data entry!


In the field @application:

- + no time difference
- + optimal interpretation
- + known accuracy (GNSS)
- + real time concurrency
- + reference can be checked

➔ Share apps


➔ Share practices

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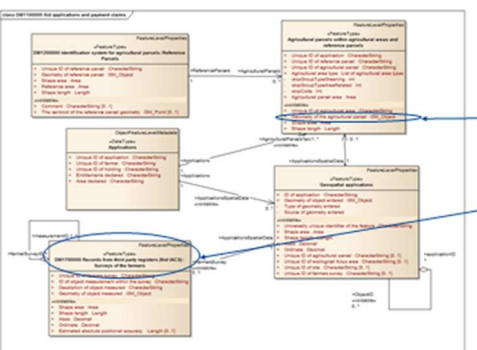
European Commission

suggested GA business rules



European Commission

Two ways of presenting geometries



1. From the system (from LPIS based on agricultural parcels or from previous declarations)

2. External data (farmers' measurement, SDI)

NB: LPIS (not based on agricultural parcels) plays an auxiliary role

Internal consistency

Challenges:

Respect legal requirements:

- + Timing!
- + Actor responsibility

Respect technical limitations

Document X-check resolution

➔ consult LCM for ideas

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conclusion

Merely adding a spatial attribute to the AP and leave it to the farmer to get it right will not be sufficient

To get the benefits from the GA, the paying agency needs to play an active role in:

- investments in ICT, organization, training and support
- sharing practices/portrayal/tools
- defining crosschecks appropriate for the GSAA process
- managing data quality
- and, maybe, consider to
 - upgrade the LPIS to hold mostly parcels that reflect farming reality (rather than an eligibility mask, wherein AP are sketched)
 - facilitate farmers to enter external data into the GIS system (cfr OTSC)

Thank you!



With special thanks to the presenters whose slides I recovered
and to Slavko, Agnieszka and Dominique