Challenges in using GNSS tracks for updating LPIS and parcel boundaries

The UNIFARM project

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The UNIFARM project

- GNSS User forum on Navigation based Innovation for Farmers;
- to present and defend Agriculture's needs in the development of GNSS applications and services.
- FP7 coordination action starting 2012;
- Covering precision agriculture and regulation applications → parcel and LPIS boundary updates;
- Will make use of CAPIGI network.

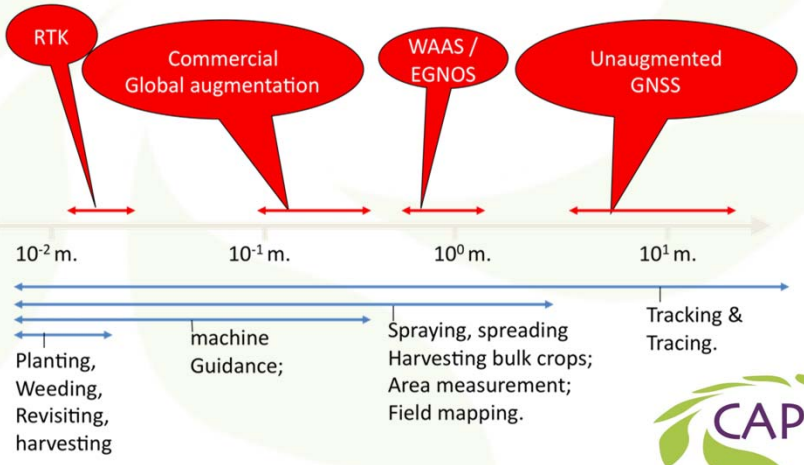
Increased use of on-farm GNSS

- Machine guidance
- Variable rate applications
- Information integration (machine – office)

- Growing amount of farmers have access to very accurate GNSS in their operations.

Different use - different tools

- Rapid uptake of GNSS tools around the world



CAPIGI

POTENCY OF PRECISION AGRICULTURE:

- reduce 20% of the use of nitrogen fertilizers
- reduce 35% of the use of plant protection products
- save fuel
- reduce emission of nitrous oxide

PROGRAMMA PRECISIE LANDBOUW

Stimulation of precision agriculture:

www.pplnl.nl

CAPIGI

EUROPEAN COMMISSION

Brussels, 18.1.2011
COM(2011) 5 final

**REPORT FROM THE COMMISSION
TO THE EUROPEAN PARLIAMENT AND THE COUNCIL**

Mid-term review of the European satellite radio navigation programmes

"It is estimated that 6-7% of GDP in developed countries, i.E. €800 billion in the european union, is dependent on satellite navigation".

US report (Space Policy Institute) impact of GNSS:

- -Delivery Services (100% impact for fleet mgt / T&T)
- -Utilities (60% satnav time synchonisation)
- -Communications (40% smart phones)
- -Banking & Financial (35% for time stamping)
- -Agriculture (10% impact due precision ag.)

These sectors contribute 10% to GDP in EU and in US.

Expected use and impact of Galileo

Agriculture	- improve design and update of land registry information - allow precision agriculture and production monitoring - improve control over the use of EU subsidies	Increase farmers' productivity by 10-20%, reduce CAP enforcement costs

How precise is precision farming?

http://www.youtube.com/watch?v=s1jBsdPlSNE&

Where is it all good for?

- Time reduction is on the top 3 list of reasons for farmers to invest in GNSS. This video shows how you can reduce time in ploughing the field ….

http://www.youtube.com/watch?v=4TczQZUboe0

Where is it all good for?

- Increase our productivity

  while we

- Reduce inputs

  and

- Maintain our landscape

Large Scale Agriculture in a Small Scale Landscape

Farmers want accurate boundaries

- To plan their work;
- To calculate amounts of inputs needed;
- To guide their machines;
- To instruct contractors;
- To order Remote Sensing image products;
- To prove compliance to regulations;
- To apply for subsidies.

Can we use farmers measured boundaries in applications and/or in LPIS update?

- Corresponding object definitions?
- Trusted measurements?
- Adequate tools to receive and control?
- Who 'owns' the information?

CAP 2013+ and Geo-Information

- Simplification;
- Continued need for LPIS / parcel boundaries;
- Emphasis on WHAT, WHERE and WHEN
  - crops; eco focus areas; cross compliance …
- Calls for more emphasis on *process* control:
  - Preventive systems → LPIS
  - Updating process / role of farmer

Benefits for farmers measured boundaries

- Farmer is the 1st to know about changes:
  - Cropping plan;
  - Structural changes;
- Reduces administrative burden:
  - During the application period;
  - During the control / appeal;
- Stimulate precision agriculture and on-farm mapping;
- From control-on-result to control-on-process
  --> "license to operate"

Against …

- Technical issue on mixing photogrammetric reality with terrestrial reality …
- Unavoidable 'slivers' with (ortho based) LPIS:
  - Pixel positioning (68,3% better than 1-sigma);
  - Object identification (2-3 pixels);
- Better idealisation on orthos than in the field;
- Can the farmer be trusted?

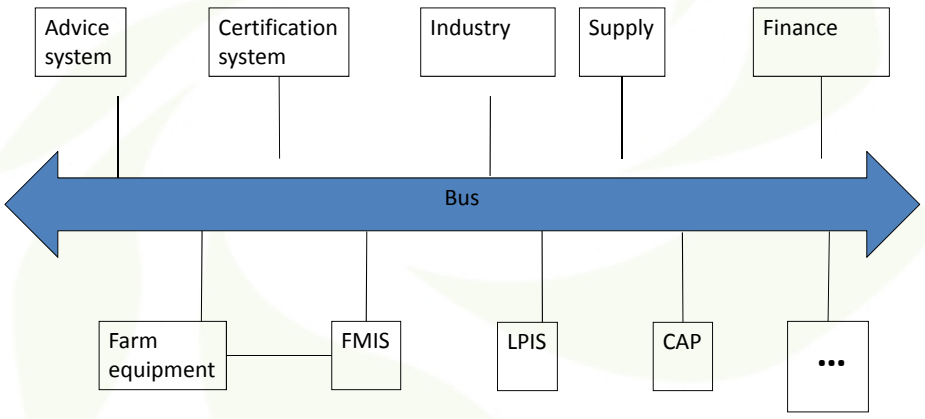
In favour …

- Farmers in the lead of the acquisition process;
- Easy way to get high accurate boundary data;
- Dispute-less (closer to reality);
- Farmer can re-use (sell?) information to other interested parties;
- Farmer becomes/feels responsible for accurate boundary measurements.

What is needed?

- Use parcel definitions that correspond to the farmers reality and daily practical use;
- Build tools/systems to deal with GNSS data:
  - Collection, approval …
- Deal with "the Human factor":
  - Approved procedures and certified execution;
  - Training;

The integrated infrastructure



Ministry of Economic Affairs, Agriculture and Innovation
CAPIGI Amsterdam | April 6, 211


RURAL AREA CASE
Measure once!
digitize
Geometric validation
OK?
YES
NO
CERTIFY
Multiple-use
Subsidies payments
Order crop scans
Machinery guidance
GEO-GO
CERTIFIED PARCEL
Guarantee of origin creates trusted open data
CAPIGI


Ridiculous?
• Open Street Map
• TomTom
• …
OpenStreetMap
TomTom Map Share™ technology
Get daily map updates from the TomTom map community
CAPIGI

OBSERVATIONS

- GNSS tools are rapidly invading the farms;
- Farmers need accurate boundaries;
  LPIS and crop parcel boundaries are not sufficiently accurate;
- Parcel data becomes valuable;
- Need for certification to create 'trusted' parcels;
- LPIS can benefit from this and play important role.

UNIFARM

- User forum for Navigation based Innovation on Farms;
- Develop collaborative research agenda to discuss with EC, manufacturers and other stakeholders;
- Need your cooperation to make the "parcel boundary case".

To conclude

Someone who has clearly no reference system …

http://www.youtube.com/watch?v=TwJK1lURhhk&