EGNOS, the preferred GNSS technology in precision agriculture
• Precision Agriculture

• EGNOS market and value added

• EGNOS Market initiatives
What is Precision Agriculture?

- Precision Agriculture refers to the use of satellite navigation, sensors, aerial images, and other tools to determine optimum sowing density, fertiliser cover and other inputs.

“Precision Agriculture is about doing the right thing, in the right place, in the right way, at the right time”
Why Precision Agriculture?

- **Agriculture challenges:**
  - Rise in the demand of crops:
    - Population increase
    - Chemical industry diversification
    - Bio-fuel demand
  - Limited resources
    - Limited increase of the cultivable land
    - Water shortage
    - Energy Prizes Rise

- **Precision Agriculture has an answer:**
  - Provides:
    - Increase yield production
    - Better management of resources
  - Reduces:
    - Chemical Pollution
    - Energy consumption
    - Time
- Precision Agriculture
- EGNOS value added
- EGNOS Market initiatives
EGNOS, it’s there. Use it!

- EGNOS is the European Geostationary Navigation Overlay Service
- EGNOS improves the accuracy of position measurements by sending out signals that correct GPS data and providing information on its reliability
- EGNOS signal is free and already widely used in agriculture
EGNOS System Architecture and Service Area

- **6 Navigation Land Earth Stations**
- **34 Ranging & Integrity Monitoring Stations (RIMS)**
- **GPS signals**
- **2 Support Facilities**
- **4 Mission Control Centres**
- **3 Geostationary satellites**
  - INMARSAT 3F2 AOR-E (15.5°W)
  - ARTEMIS (21.3°E)
  - INMARSAT 4F2
- **3 GEO Satellites**
- **Soon to be replaced by**
  - ASTRA SIRIUS 5
  - ASTRA 5B
EGNOS Services – EDAS

EGNOS data (real-time):
- RIMS raw observations
- SBAS messages

Value-added service provider

User-specific information

End users
EGNOS has a wide range of applications …

<table>
<thead>
<tr>
<th>Application category</th>
<th>Application field</th>
<th>Required accuracy level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable</td>
<td>High-value crop cultivation (e.g. potatoes and vegetables) and/or precision operations (sowing and transplanting)</td>
<td>c.2cm</td>
</tr>
<tr>
<td>Arable</td>
<td>Low-value crop cultivation (e.g. cereals) and low-accuracy operations (fertilising and reaping)</td>
<td>c.1m</td>
</tr>
<tr>
<td>Dairy</td>
<td>Individual livestock positioning and virtual fencing</td>
<td>2-5m</td>
</tr>
<tr>
<td>Agro-logistic</td>
<td>Land parcel identification/geo-traceability, post harvest pick-up and supervised tracking of livestock, manure, etc.</td>
<td>c.2.5m</td>
</tr>
<tr>
<td>Legislation/management</td>
<td>Field measurement and boundary mapping and updating</td>
<td>c.2.5m</td>
</tr>
</tbody>
</table>
... and generates strong benefits for farmers

Traditionally, precision agriculture have been characterised by significant equipment investment and costs related to usage. EGNOS can offer an affordable precision solution. EGNOS enhances the benefits of Precision Agriculture.

**EGNOS value added**

- Enhance precision
- Eliminate waste and over-application of fertilisers and herbicides
- Save time and money
- Reduce fatigue
- Extend equipment lifetime by optimizing its use
- Provide geo-traceability
- Optimise crop yields
- Increase profit margins
Value chain of GNSS in Agriculture

Key decision makers

Service providers
- Service companies providing differential signals upon payment of a fee
- Navcom signal is receivable only by John Deere devices

Device manufacturers
- International companies manufacturing and distributing GNSS receivers for both vehicle manufacturers and final users

Vehicle manufacturers
- Agriculture machinery manufacturers offering the possibility to install navigation systems on their products

Farmers
- 80% of farmers purchase vehicles
- The purchase of vehicles and devices may occur at different time

Main Players

Business model

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- The purchase of vehicles and devices may occur at different time
The number of GNSS devices is increasing and EGNOS is the preferred technology

# of tractors in use in EU-27 (000’ units)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Tractors</th>
<th>GNSS Equipped (000)</th>
<th>GNSS Equipped (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>2,822</td>
<td>2,582</td>
<td>92%</td>
</tr>
<tr>
<td>2011</td>
<td>2,810</td>
<td>2,510</td>
<td>90%</td>
</tr>
<tr>
<td>2010</td>
<td>2,799</td>
<td>2,533</td>
<td>91%</td>
</tr>
<tr>
<td>2009</td>
<td>2,788</td>
<td>2,542</td>
<td>92%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGNOS</td>
<td>136</td>
<td>166</td>
<td>200</td>
<td>240</td>
</tr>
<tr>
<td>Other (RTK/DGPS)</td>
<td>1,654</td>
<td>1,634</td>
<td>1,590</td>
<td>1,582</td>
</tr>
</tbody>
</table>

Source: Tractor & Device Manufacturers/MMFP

Product characteristics

- Pass to pass accuracy of +/- 15 cm
- EGNOS-only corrections
- Ideal for fertilising, seeding and spraying
- Entry price, affordable for all farmers

EGNOS effect on farmers

- They start with EGNOS
- They appreciate the benefits
- In few years, some of them, migrate to advanced systems to cover new functions
• Precision Agriculture

• EGNOS value added

• EGNOS Market initiatives
“Harvesting” EGNOS potential

Enhancing EGNOS adoption

- Measure
  - Analyse the market

- Seed
  - Create awareness among manufacturers

- Fertilise
  - Identify EGNOS champions

- Harvest
  - Exploit EGNOS value added
Strong effort on Key levers

Key levers and concrete actions

1. Market awareness
2. Partnerships with Industry players
3. Leverage Framework Program R&D effort to support adoption
4. Test and exploit new service (EDAS)

Maximise EGNOS penetration in Agriculture