EGNOS FOR AGRICULTURE

EGNOS in Precision Agriculture: An affordable solution for a wide range of applications

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Sevilla, 3 June 2013

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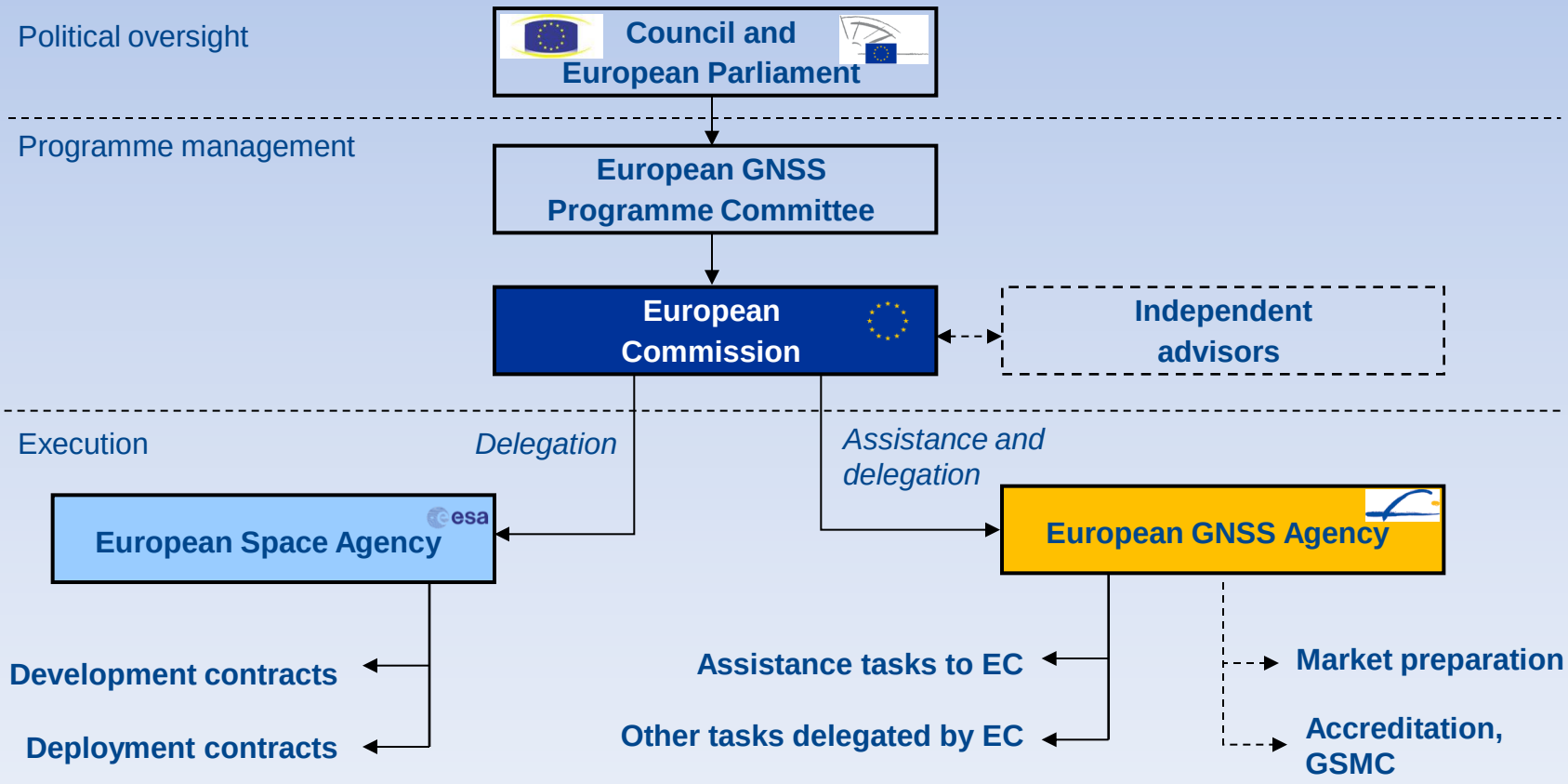
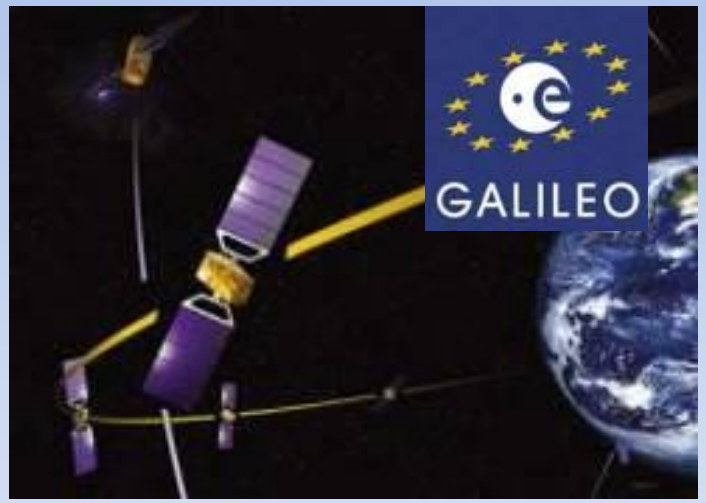
EGNSS Governance



GSMC: Galileo Security Monitoring Centre

The European Satellite Programme: EGNOS/EDAS and Galileo



- Global Navigation Satellite Systems (GNSS)
- Compatible with most other GNSS
- Inter-operable with GPS
- 2 first satellites launched in October 2011
- 18 satellites in 2014/15
- Will support 5 services

- Satellite Based Augmentation System (SBAS)
- Measures and improved GPS performance
- Sends corrections to users via satellite or terrestrial links (EDAS)
- Certified for Safety Of Life since March 2011
- Covers most of EU
- Expansion to Africa, Middle East and Eastern Europe

EGNOS

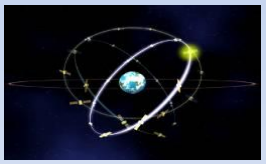
Galileo Implementation Plan

In order for Galileo to be recognized by the downstream market as the second satellite navigation system of choice it is key to deliver early services as soon as 2014/2015.

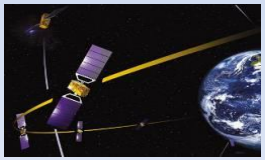
Full Operational Capability
All services, 30 satellites
2019/2020

Initial Operational Capability
Early Services for OS, SAR, PRS
18 satellites
2014/2015

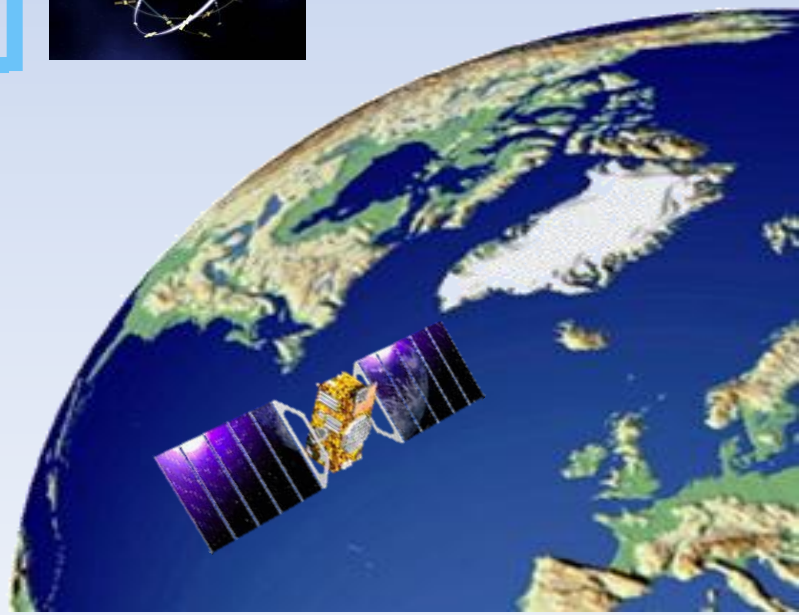
In-Orbit Validation
4 IOV satellites plus ground segment
2011/12



Galileo System Testbed v2
2 initial test satellites
2005



Galileo System Testbed v1
Validation of critical algorithms
2003



EGNOS

The Galileo implementation plan launches are under way

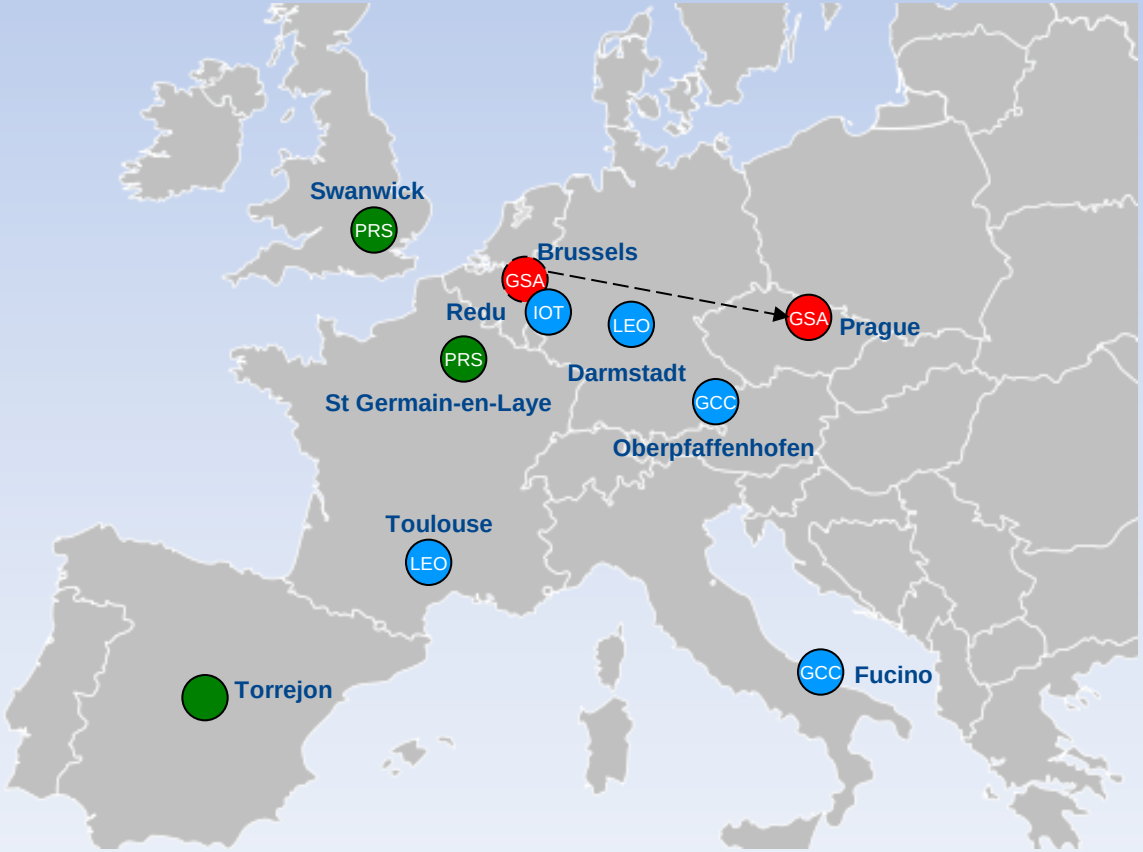
The launch of the first two Galileo IOV (In-Orbit Validation) satellites took place in October 2011 from Kourou, in French Guiana.

Second pair followed October 2012.

These satellites are part of the Galileo final constellation.

http://www.youtube.com/watch?v=lbnie1dt-Gs

The major Galileo centres and facilities are located throughout Europe



- GSA — European GNSS Agency
- GCC — Galileo Control Centre
- IOT — Galileo In-Orbit Testing Centre
- LEO — LEOP Centre
- PRS — Galileo Security Centre (PRS)
- SAR — Galileo Service Centre (OS/CS/SoL)

Note: Only major centres, facilities and stations in view are shown. Not all of them are (fully) implemented yet.

Galileo IOV Control Centres operational

Fucino (IT)

Oberpfaffenhofen (DE)

Credits: ESA

Galileo IOV ground segment sites completed

Kiruna Galileo TTC Site Completed (Nov 2007)

Svalbard Galileo ULS/GSS Site Completed (May 2008)

Credits: ESA

The European Satellite Programme: EGNOS/EDAS and Galileo

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EGNOS

EGNOS, it's there. Use it!

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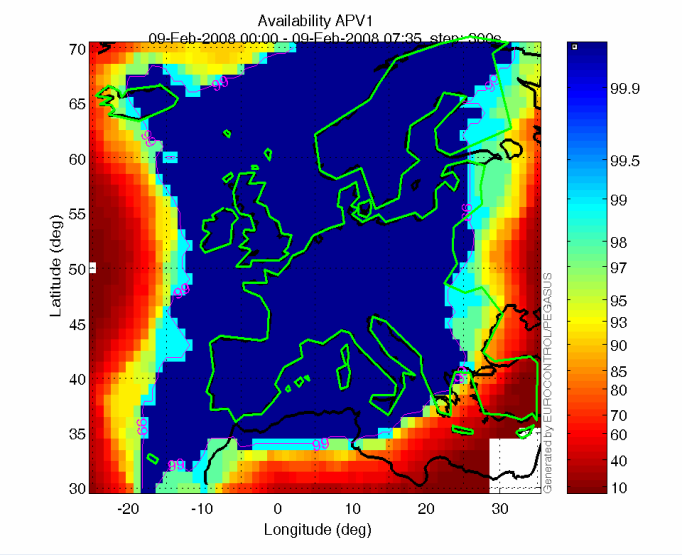
EGNOS availability



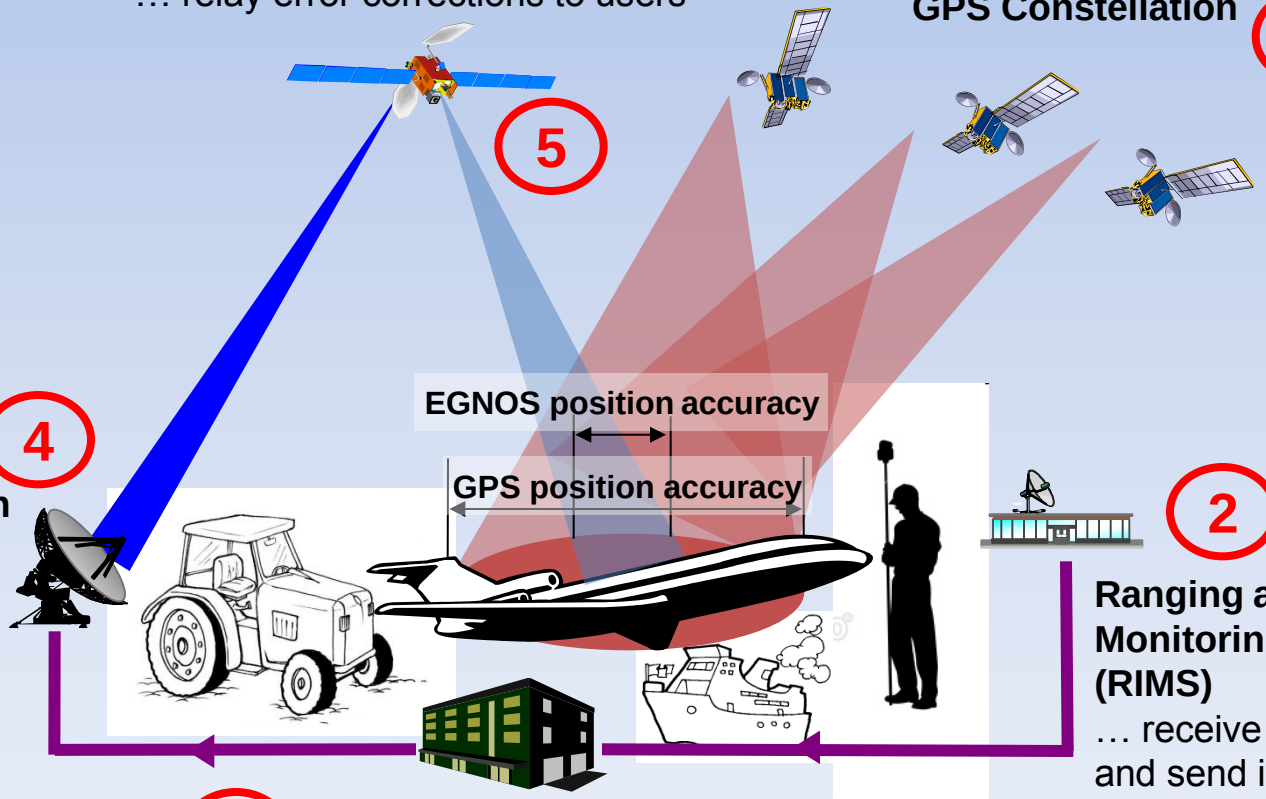
- EGNOS is the European Geostationary Navigation Overlay Service
- EGNOS improves the accuracy of position measurements by sending out signals that correct GPS data and providing information on its reliability
- EGNOS signal is free and already widely used in agriculture

EGNOS improves GPS

3 geostationary EGNOS Satellites
… relay error corrections to users

GPS Constellation 1

5



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Navigation Land Earth Stations (NLES)
… uplink error corrections to EGNOS satellites …

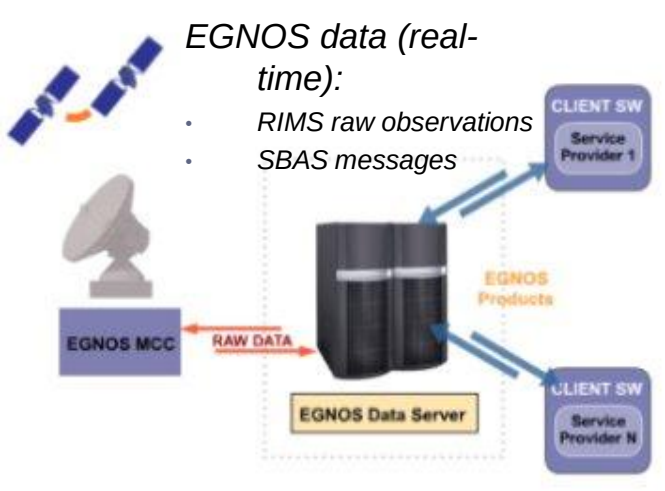
2

Ranging and Integrity Monitoring Stations (RIMS)
… receive GPS data and send it to MCC …

3

Mission Control Centres (MCC)
… process GPS data to determine errors …

The EDAS Service is operational to plug in on EGNOS data via terrestrial channels (internet)



Value-added service provider

User-specific information

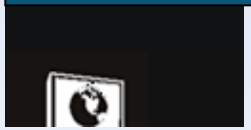
End users

www.egnos-portal.eu

http://www.gsa.europa.eu/go/egnos/edas

EDAS on the way – Plug in for free

EDAS is available. This allows any interested party is invited to sign up



Currently the evolution of EDAS is assessed including service and system enhancements

Why Precision Agriculture?

Agriculture challenges:

- Rise in crops demand:
  - 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

EGNOS: the most affordable solution for a wide range of applications…

"Precision Agriculture is about doing the right thing, in the right place, in the right way, at the right time"

Application category	Application field	Required accuracy level
Arable	High-value crop cultivation (potatoes, vegetables) Precision operations (sowing and transplanting)	**c.2cm**
	Low-value crop cultivation (e.g. cereals) Low-accuracy operations (fertilising and reaping)	**c.1m**
Dairy	Individual livestock positioning and virtual fencing	**2-5m**
Agro-logistic	Land parcel identification/ geo-traceability Post harvest pick-up Supervised tracking of livestock, manure, etc.	**c.2.5m**
Legislation/ management	Field measurement Boundary mapping and updating	**c.2.5m**

EGNOS

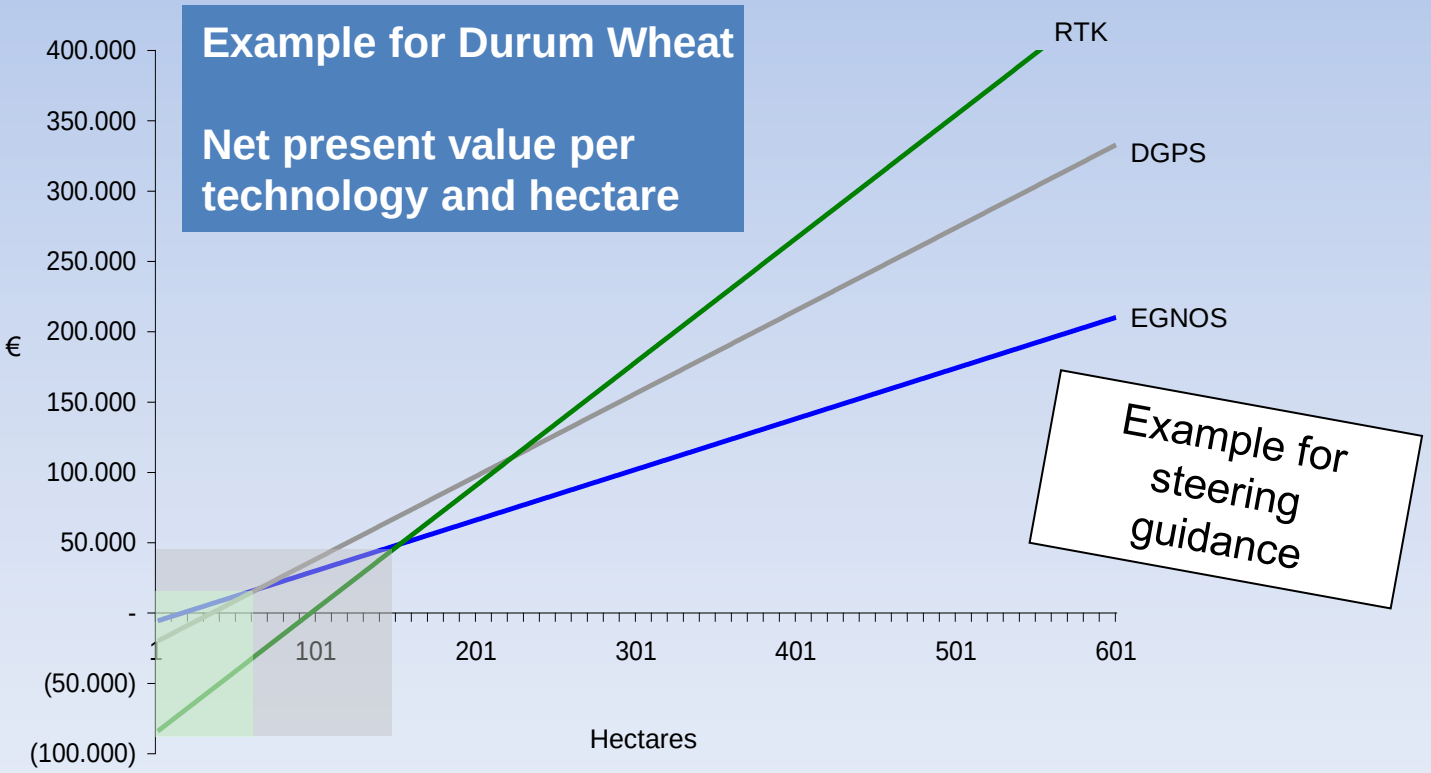
… generating strong benefits for farmers

- Traditionally, precision agriculture have been characterised by significant equipment investment and costs related to usage
- EGNOS can offer an affordable precision solution by enhancing 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
- Optimise crop yields
- Increase profit margins

NPV per technology and farm's hectares: The case of durum wheat



NPV>0 (HA)	EGNOS	DGPS	RTK
	17	35	97

Source: GSA CBA

A practical example

EGNOS is free → No installation costs neither annual subscription costs are required

EGNOS is widely available all over Europe → 1 on 10 tractors in Europe are equipped today with GNSS receivers, most of them are EGNOS enabled

EGNOS is convenient → The application of EGNOS involves:

- 2,36% reduction in time, fuel and seed quantity
- 2,49% reduction in fertilize and Plant Production Products quantities

EGNOS is the best GNSS technology to be applied on a 16 HA farm on average European farms are 16 HA wide

“EGNOS-only” entry products have taken a pivotal role

CO-PILOT TS	MOJO MINI	EZ-GUIDE 250
CLAAS	Leica	Trimble

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

R&D fill technical gaps and pave the way to adoption in High Precision…

UNIFARM

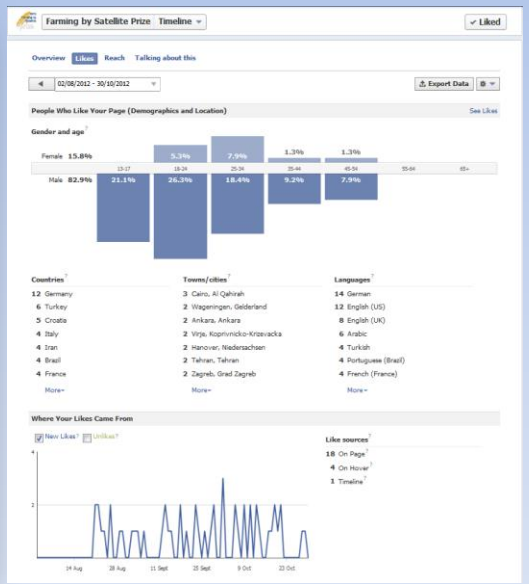
Sets up a user forum to present and defend the needs of farmers in the development of GNSS applications and services

GEOPAL NAVIGATION

Works on system to support in-field and inter-field agricultural logistics activities

...and get ready for Galileo

Farming by Satellite Prize



- New competition to be launched 2013
- Open to young farmers/professionals aged <32
- Last edition with 117 registrations from 25 countries around Europe
- Awarded at SIMA, February 2013

And the winners are…

Ranking	Application
1st	“European Farm Management Information System”
2nd	“A satellite aided bale collection system”
3rd	“Vitismart: Digital Maps for limited-size vineyards”

Thank you!

www.egnos-portal.eu

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