

# European GNSS Programmes



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**Europe's venture into satellite navigation consists of two systems.**



- **EGNOS**
  - Non-autonomous infrastructure
  - Improves GPS performance
  - Coverage of European countries
  - 3 services but mainly designed for aviation users (« Safety-of-Life » service)



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- **Galileo**
  - Fully autonomous infrastructure
  - Performances similar to those of GPS
  - Global coverage
  - 5 Services





**EGNOS**

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**'It's there, use it'**



# It's there, ...



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European Commission Vice-President Tajani,

Oct 1, 2009, declaration of Open service availability:

“Both the Open Service and the Safety-of-Life Service are provided free of charge, and the European Union is committed to supporting EGNOS for the long term, even after Galileo has become operational.

This includes extending its geographical scope within the coverage of the three satellites involved.”

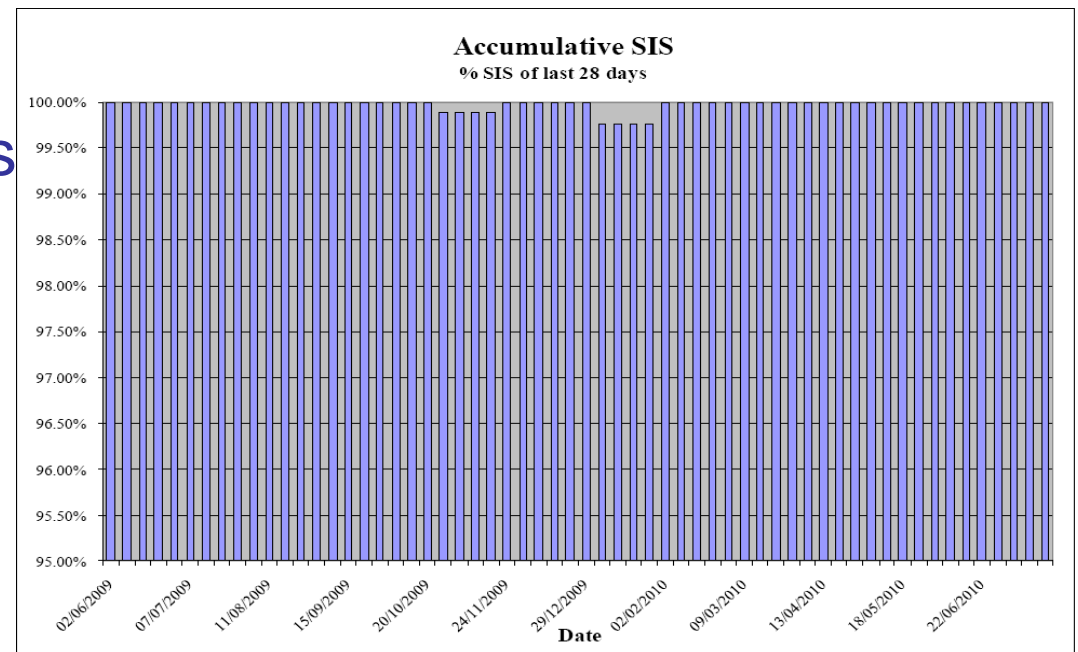


Figure 3 - Operational SIS Broadcast since June 2<sup>nd</sup> 2009



# EGNOS Services – Current Status



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Service	Accuracy	Service Status	Expected Lifetime
Open Service	accuracy ~1m, free	available since October 2009	20+ years
Safety of Life Service	accuracy ~1m, compliant to aviation standards	to be made available beginning of 2011	20+ years
Commercial Service (EDAS)	accuracy <1m, corrections are provided by terrestrial networks	experimental service since 2008; official service to be made available in 2011	20+ years

SIS.....Signal in Space

SARPS.....Standards and Recommended Practices

SoL.....Safety of Life



# Use it! - agriculture

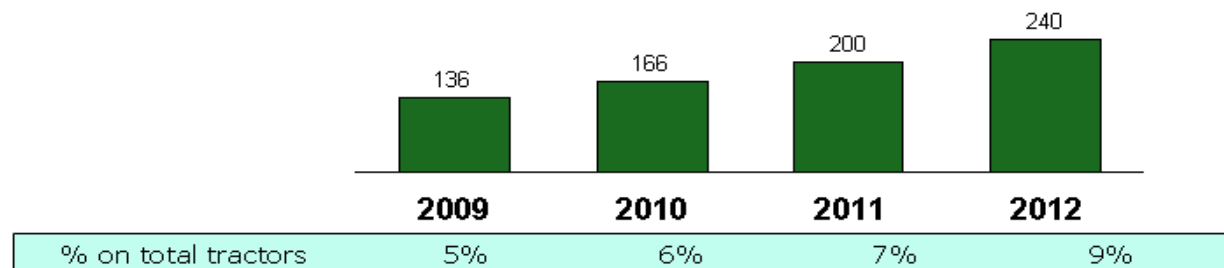


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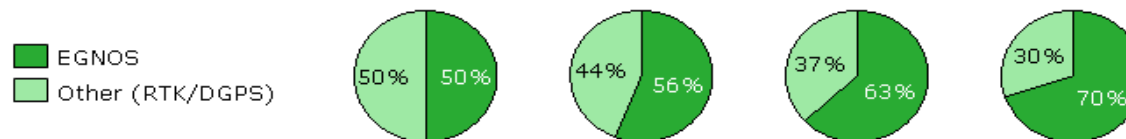


## Market evolution

# of GNSS-equipped tractors in EU-27 (000' units)



# EGNOS market share of devices sales in EU-27



Source: Receivers Manufacturers/MMFP

## EGNOS Challenges

- GNSS tractor enabled market growth

**2010**

→ 166.000 GNSS equipped tractors

- EGNOS market share

**2010**

→ 90.000 EGNOS equipped tractors





**Jerzy Koronczok, a member of Agrocom Polska, told the story of how a farmer in the Upper Silesia region of Poland switched to using EGNOS after his Real Time Kinematic (RTK) Satellite navigation installation failed. The farmer used EGNOS to complete the winter wheat seeding on a 1,300 hectare plot. “He was satisfied with the performance of EGNOS and was able to complete the seeding,” Koronczok said.**



**DLG Feldtage 2010  
Hannover, Germany**



**“There is increasing demand among farmers for SatNav-based steering,” said Michael Quinckhardt, the Managing Director of CLAAS Agrosystems. “It is a growing market. In four to five years it will be standard on farming equipment such as tractors and combine harvesters. It means reduced costs, less chemicals and a more economical and environmentally friendly farming operation.”**





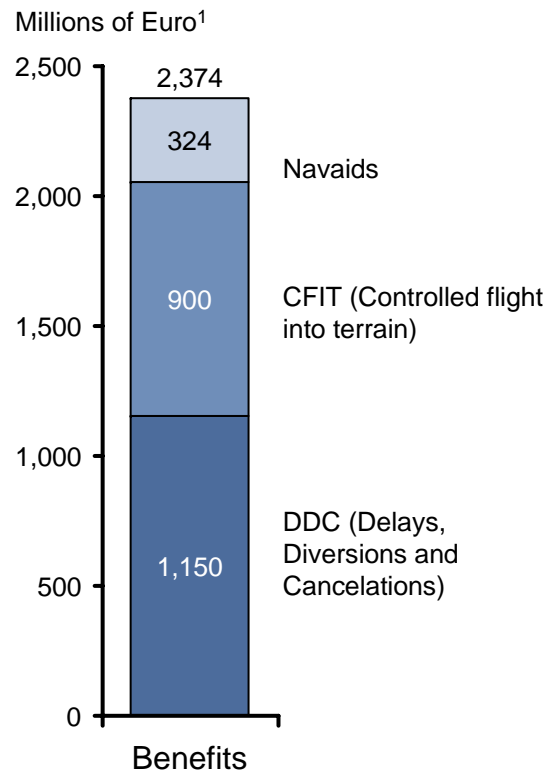
# EGNOS users - aviation



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## Market evolution

### Benefits in final approach in EU-27



Source: LEK/Eurocontrol study, 2009

## Experimental or planned EGNOS procedures in Europe (2010)

City (runway number)

### France (35 procedures)

Limoges (22) Calais (35)  
 Clermond F(26) Colmar (19)  
 Merville (04) Cannes (17, 35)  
 Vannes (22) La Rochelle (28)  
 Le Bourget (27, 07) Le Mans (02)  
 Orly (02, 04, 06, 24, 26) Melun (28)  
 CDG (08, 09, 20, 26, 27) Pau (31)  
 Marseille (13, 31) Saint Nazaire (08)  
 Albert Bray (09) Saint Yan (33)  
 Angoulême (28) Tarbes (20)  
 Bordeaux (5, 23) Valence (01)  
 Caen (31)

### Italy (4)

Bologna  
 Florence  
 Naples  
 Perugia

### UK (3)

Southampton  
 Alderney  
 Gamston

### Spain (14)

Valencia (12)  
 San Sebastian (04)  
 Cuatro Vientos (10)  
 Santander (11,29)  
 Cordoba (03,21)  
 Granada (27)  
 Almería (08,26)  
 Salamanca (21)  
 Malaga (13,31)  
 La Palma (01)

### Poland (2)

Mielec  
 Katowice

### Switzerland (2)

Les Eplatures  
 Altenrhein

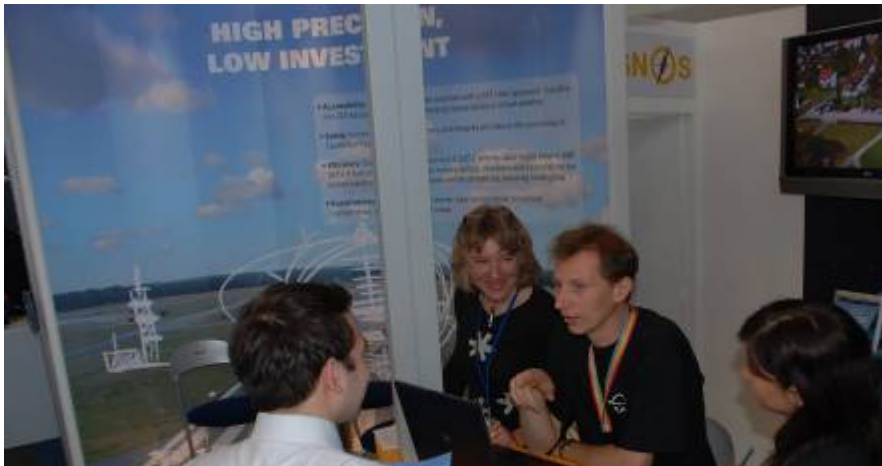
### Germany (1)

Donauwoerth



\* Non exhaustive, non binding list. Number indicates runway number planned for procedure





**European Regional Airlines Association Director General Michael Ambrose said: "We are desperately in need of better satellite navigation services. That's why we are keeping a close eye on the EGNOS programme, and of course we are looking further ahead to new capacities to be made available by Galileo."**



**In an interview, European Business Aviation Association (EBAA) President and Chief Executive Brian Humphries said EGNOS is vital to the sector. He called for the quick take up of EGNOS once it is certified for use by the aviation sector later this year.**

**"The certification of EGNOS will be the most exciting thing to hit European aviation in a long time - we are great fans"**

**EBACE 2010, Geneva, Switzerland**



# EGNOS for Road apps

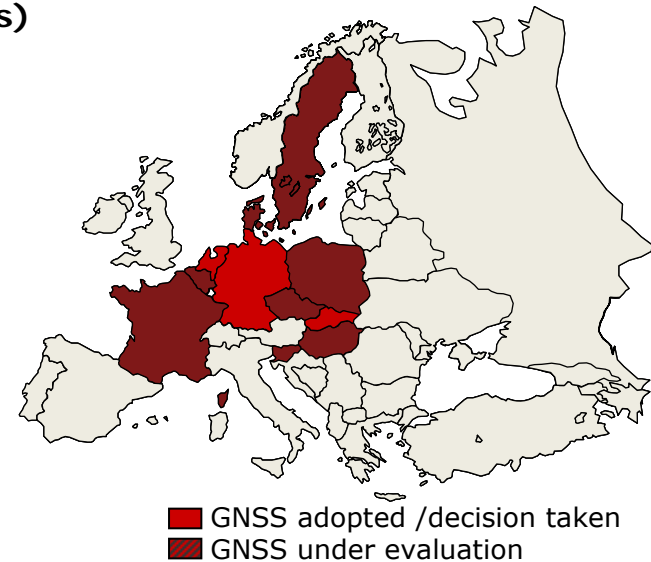
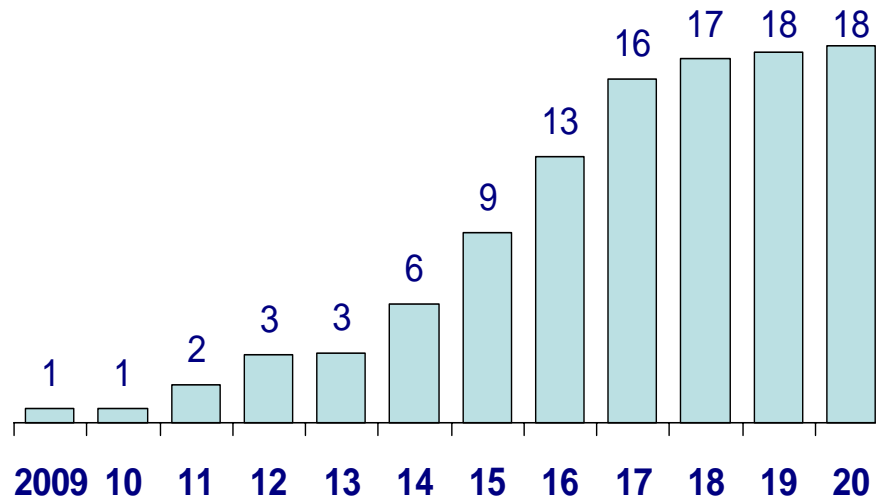


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## Market evolution

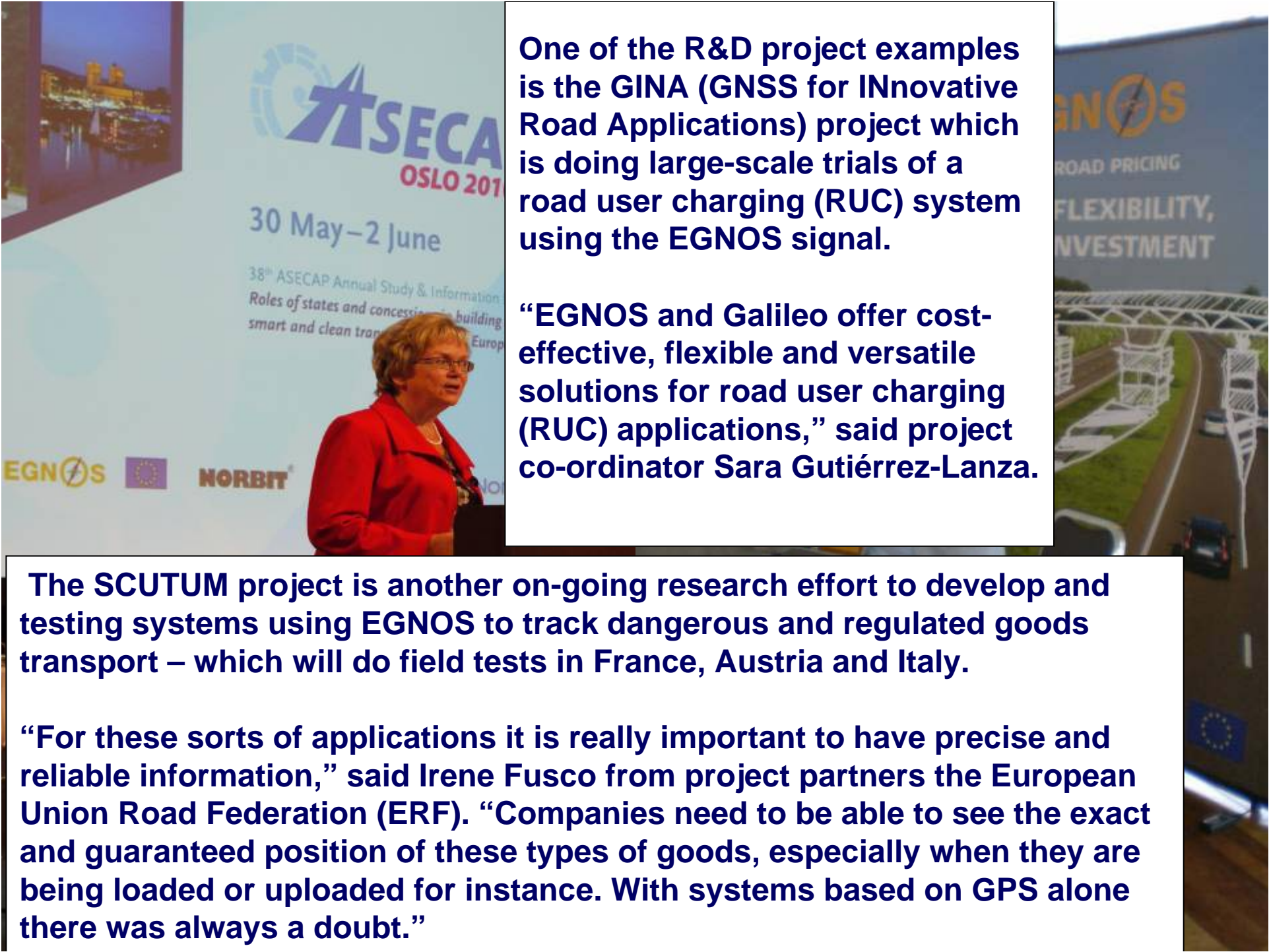
# of Road Network Management OBUs in EU-27 (million units)



## Challenges

- Grow the market, shifting focus to network management efficiency from specific road traffic schemes
- Increase GNSS market share, demonstrating benefits vs. costs to decision makers
- Support EGNOS adoption in all GNSS based-schemes, demonstrating the benefits





One of the R&D project examples is the GINA (GNSS for INnovative Road Applications) project which is doing large-scale trials of a road user charging (RUC) system using the EGNOS signal.

“EGNOS and Galileo offer cost-effective, flexible and versatile solutions for road user charging (RUC) applications,” said project co-ordinator Sara Gutiérrez-Lanza.

The SCUTUM project is another on-going research effort to develop and testing systems using EGNOS to track dangerous and regulated goods transport – which will do field tests in France, Austria and Italy.

“For these sorts of applications it is really important to have precise and reliable information,” said Irene Fusco from project partners the European Union Road Federation (ERF). “Companies need to be able to see the exact and guaranteed position of these types of goods, especially when they are being loaded or uploaded for instance. With systems based on GPS alone there was always a doubt.”





Dominique Bonte, ABI Research's Practice Director, Telematics & Navigation, who outlined ongoing developments in the LBS markets. Satellite positioning is expected to pervade all portable devices, from handsets to digital cameras and camcorders, according to the company's research.

“We are seeing the emergence of a transparent and integrated location experience,” he said. “There is a shift from dedicated devices and applications to location as an embedded feature. This shift will result in an integrated environment where location experience becomes ubiquitous, seamless and transparent.”

The inclusion of GNSS is enabling an ever growing number of location-aware applications for social networking, local area searches, geotagging, location-based marketing and advertising, messaging and micro-blogging. Out of the 2.14 billion devices on the market in 2014, about one billion will be GNSS-enabled, ABI Research estimates.

“There is a very important evolution lying ahead of us,” he said. “The relevance of EGNOS and Galileo is very clear. More systems will improve coverage, improve the time to first fix and improve reliability.”





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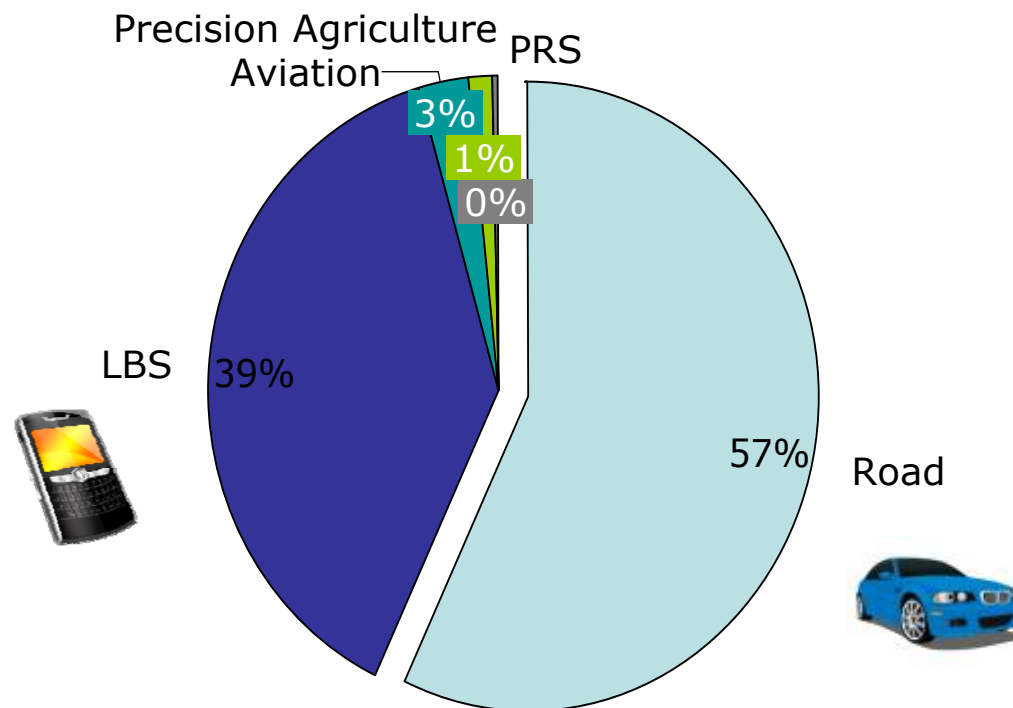
# Galileo is contributing to a large, fast developing market



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## Segment distribution of EGNOS/Galileo EU market growth 2010-2027

%, 100% = EUR 22.9 bn\*



\* The EUR 22.9bn in EU market growth corresponds to EUR 13.9bn in EU value add

Note: Galileo impact on overall market is modest, though it is still significant

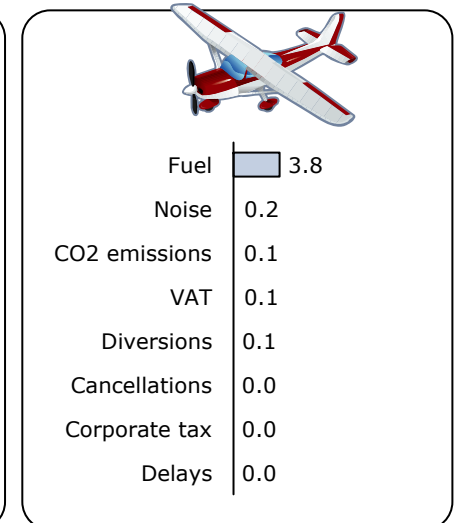
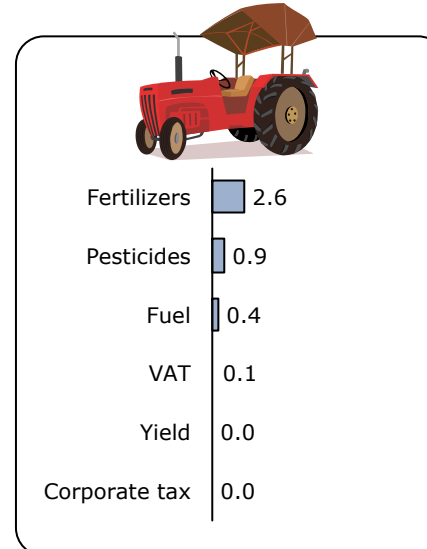
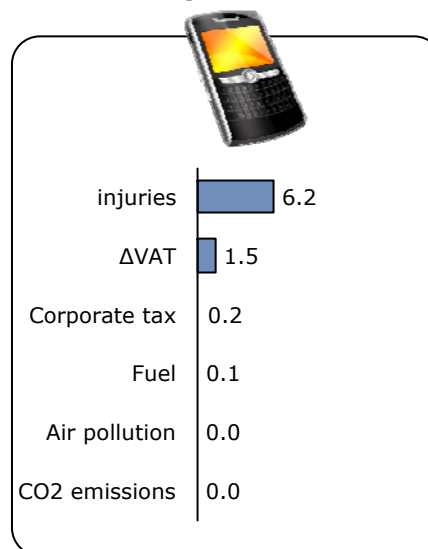
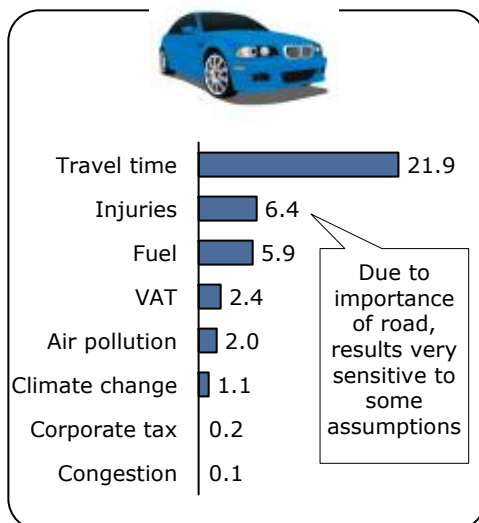
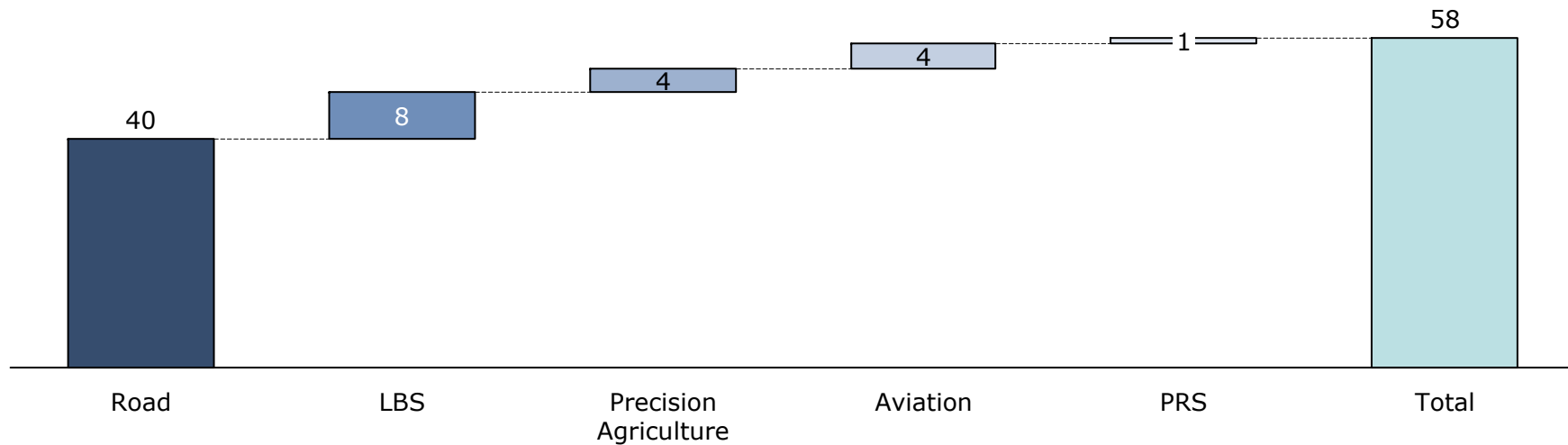
Source: GSA analysis



# Public utility 2010-2027 (Euro bn)



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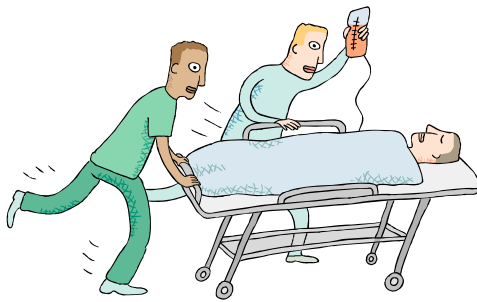
• Importance of road consistent with Commission ITS action plan



# Other public benefits have not been monetized



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**8,500 lives saved\***



**6,000 jobs\*\***



**2 mln lives improved\*\***



**1.2 trn m3 of water saved\***



**Insurance against GPS breakdown\*\*\***

\* Cumulative until 2027

\*\* Average from 2015-2027

\*\*\* Estimated insurance value = EUR 2 -4 bn

Source: GSA Analysis



# Galileo Implementation Plan

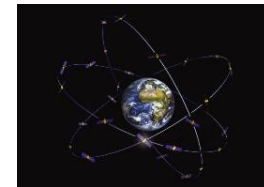


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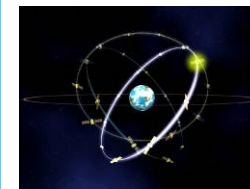
In order for Galileo to be recognized by the downstream market as the second satellite navigation system of choice it is key to deliver early services as soon as 2014/2015.

**Full Operational Capability**  
All services, 30 satellites  
**2016/2017**

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



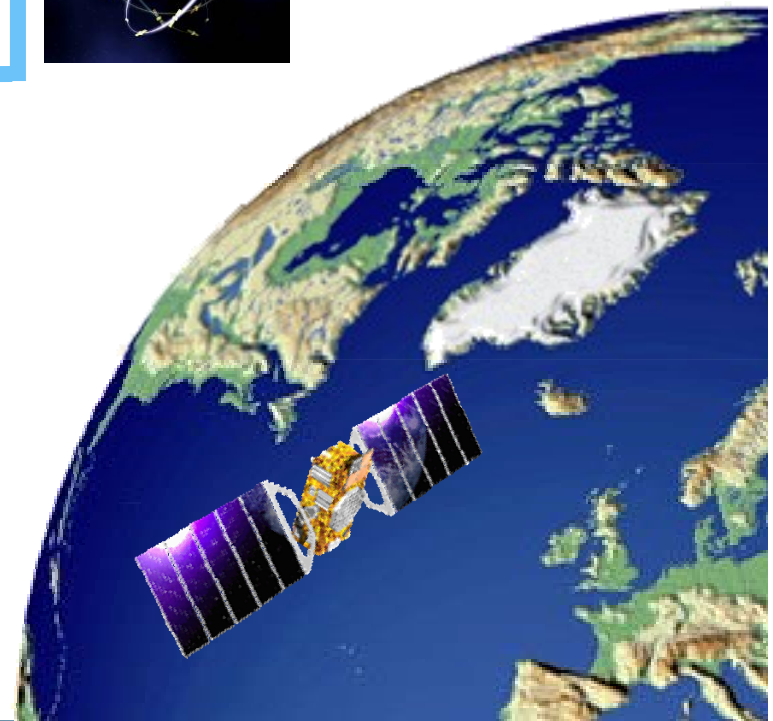
**In-Orbit Validation**  
4 IOV satellites plus ground segment  
**2011**



**Galileo System Testbed v2**  
2 initial test satellites  
**2005**



**Galileo System Testbed v1**  
Validation of critical algorithms  
**2003**










# Galileo Services



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**Galileo will be offering five services.**

<b>Open Service</b>	Free to air, mass market, simple positioning	
<b>Commercial Service</b>	Encrypted, high accuracy, added-value service	
<b>Safety of Life Service</b>	Adds integrity to Open Service	
<b>Public Regulated Service</b>	Encrypted, robust, continuous availability	
<b>Search and Rescue Service</b>	Near real-time, precise, return link	



# Galileo market report

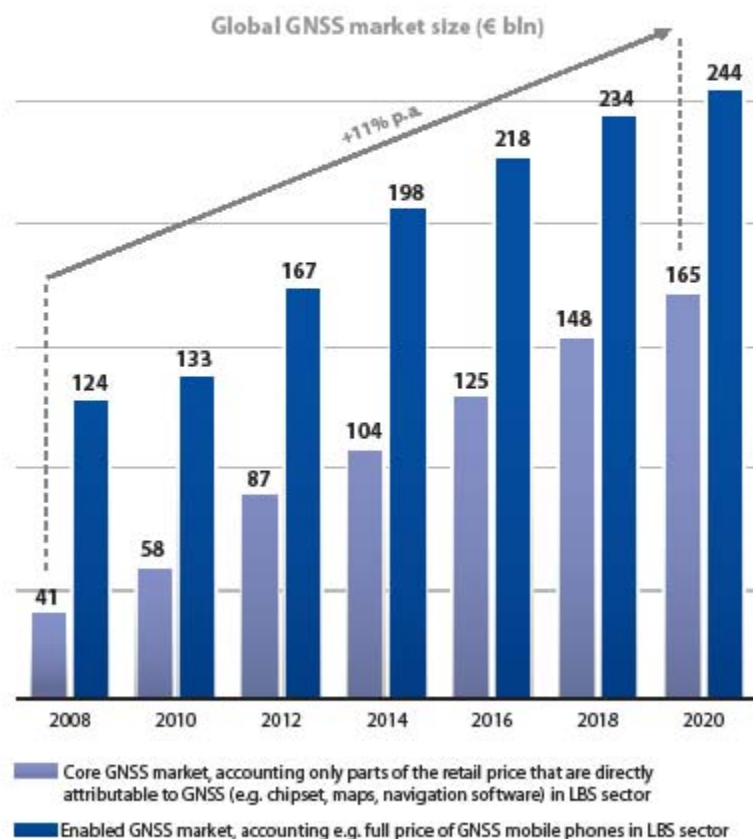


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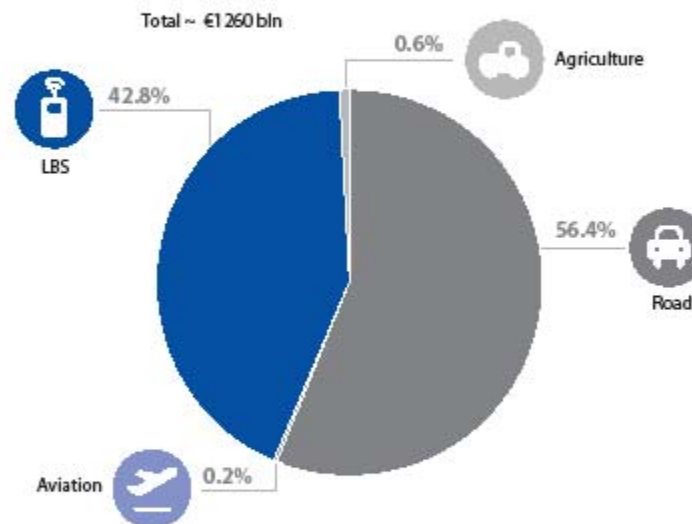
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## EXECUTIVE SUMMARY

### The market for GNSS will grow significantly over the next decade



Global core GNSS market by segment (cumulated revenues 2010-2020)



- The worldwide GNSS market is growing fast and revenues are expected to increase at a 11% CAGR over the next decade.
- The total enabled GNSS market size in 2020 is estimated at €244 bln, the core global GNSS market is estimated at €165 bln.
- LBS and Road will be the market sectors with the highest revenue generation.