



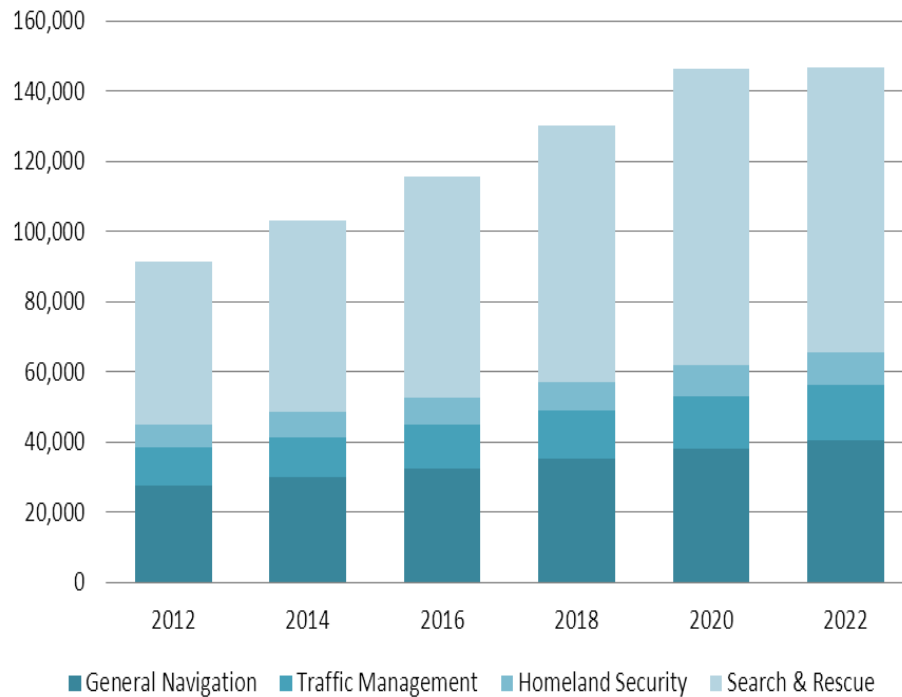
EGNOS and Galileo for Maritime and Maritime applications: opportunities and challenges for European Regions

Gian Gherardo Calini
European GNSS Agency, GSA
Market Development Department

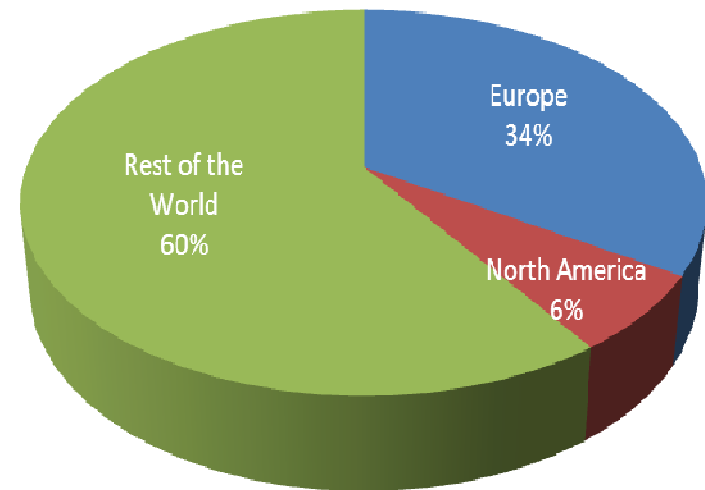
April 16th 2012

The GNSS Maritime market will continue to grow globally

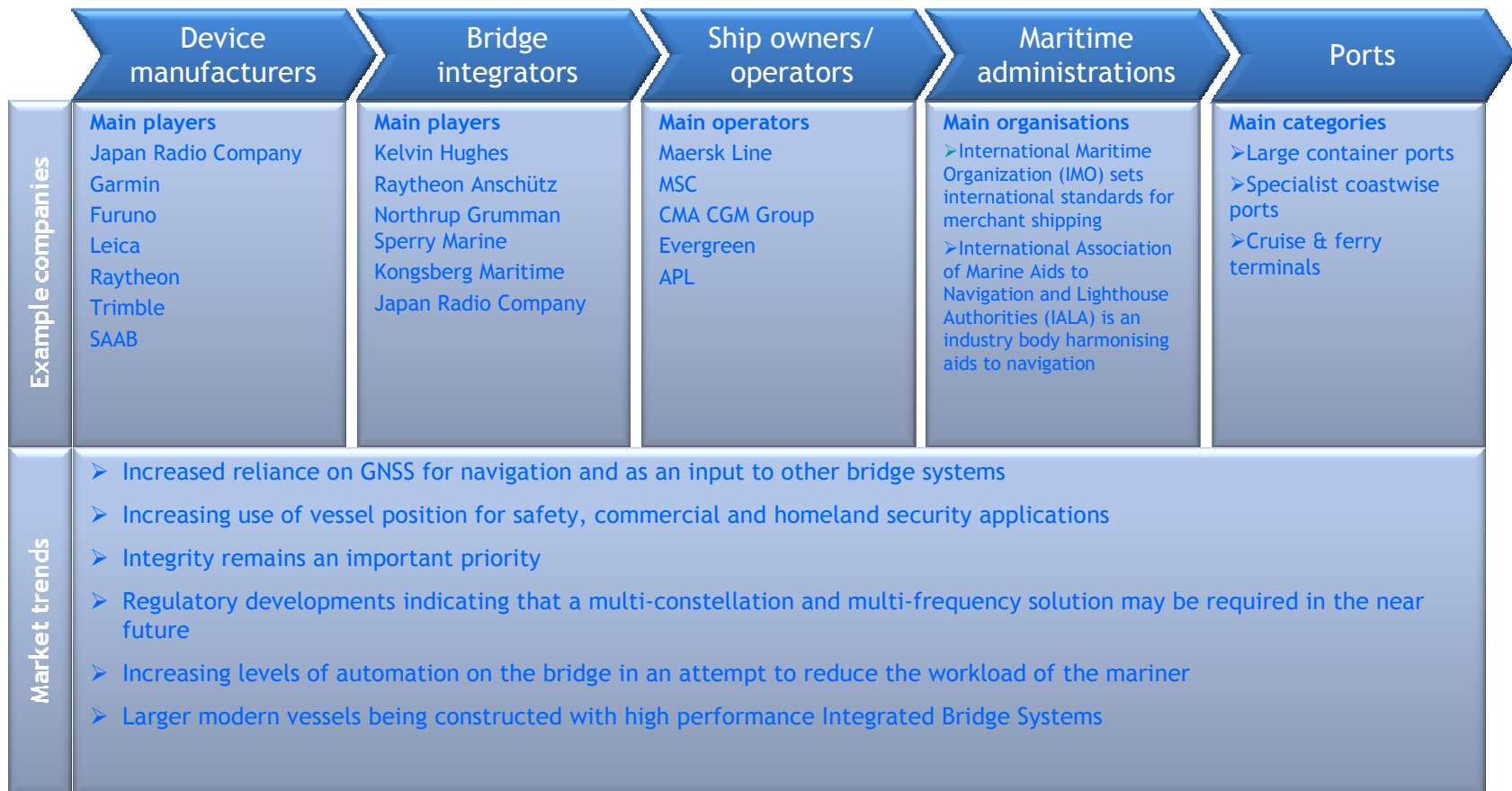
GNSS unit shipments to 2022 by application



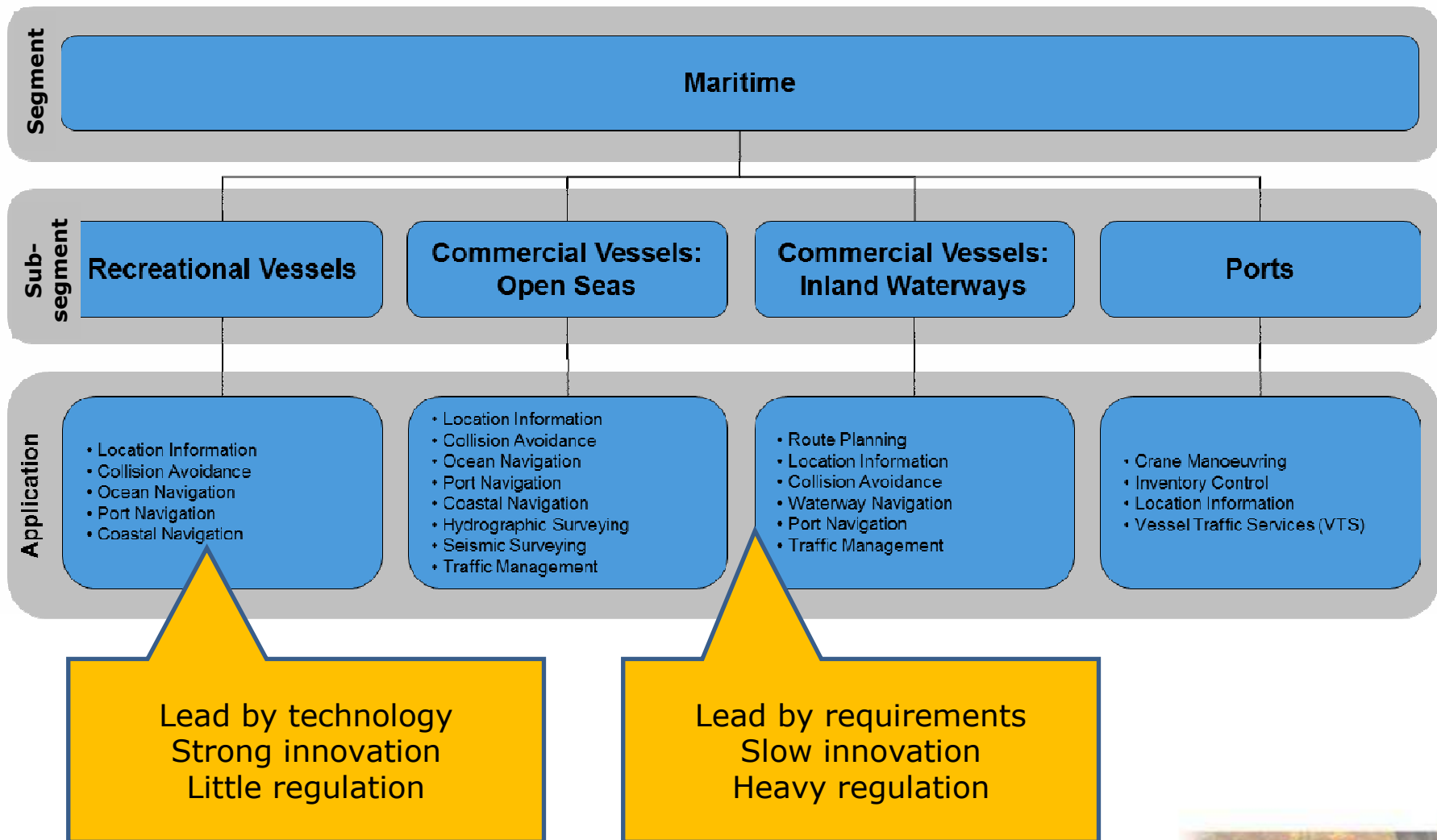
Merchant fleet GNSS market 2010 (by country of vessel operator)



Maritime value chain: wide range of suppliers



The GNSS Maritime market varies in its ability to innovate applications



GSA activities today

Market Development Department

User segments development

Segments
Services

Application development



Market monitoring

Security Department

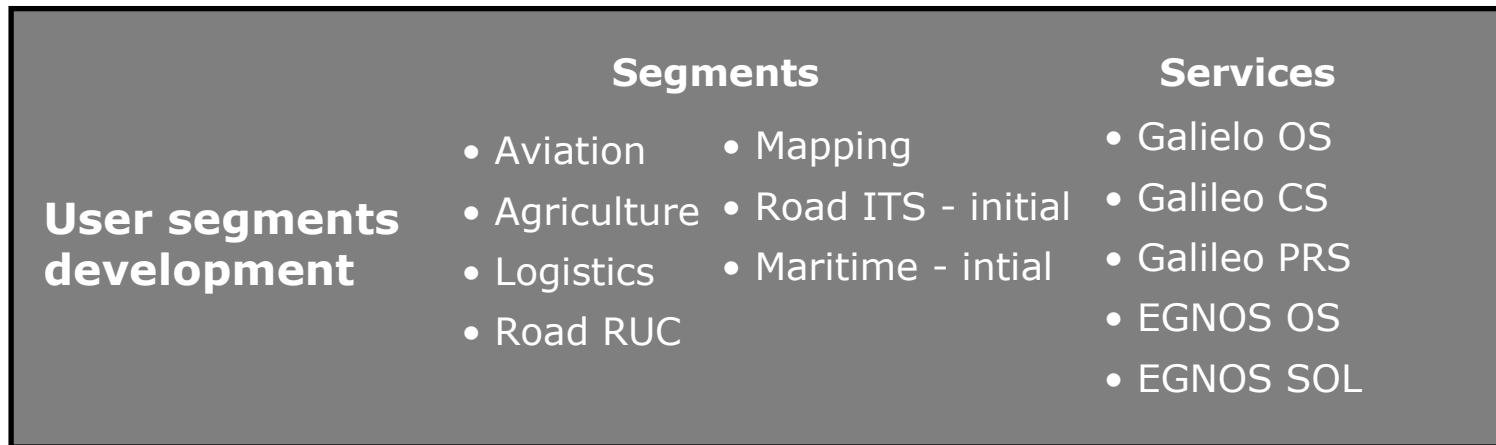
Security Accreditation

Public Regulated Services

GSMC Management



GSA market development activities today



2011 applications market development results



- 1st scheduled EGNOS passenger flight (1 year after certification)
- ACCEPTA funding operators: 3 RA, 4 heli, 2 BA, 3 flight schools

EGNOS



- C. 60% market share of EGNOS-only products, partnership with industry



- CEN standard published for Dangerous Goods and ITS
- French ECOTAX provider adopting EGNOS

EGNOS



- 80+ project portfolio
- 25 products ready for market
- 20 trials and demonstrations
- 45 Project presentations at events and workshops

EGNOS



Market Monitoring and Forecasting process: 1000 downloads of GNSS Market Report so far



European GNSS adds value in Maritime applications

Example of R&D project: SAFEPORT

SAFEPORT has developed and demonstrated an EGNOS based Active Vessel Traffic Management and Information System (A-VTMIS) to manage vessel movements within their jurisdiction. Main benefits are:

-vessels follow safe paths and don't collide with other ships.

-improved efficiency of port operations.

-a developed EGNOS based pilot aid (SafePilot) will ensure that harbour pilots can safely and efficiently navigate the courses provided by the A-VTMIS. Trials undertaken in Dublin Harbour has helped to validate the concept.

-the implementation of GNSS based authentication mechanisms to support identification and safe recognition of assets, cargo, ships, etc. - essential for safety-related operations.



The Galileo Search and Rescue (SAR) service will be one of the early Galileo services. SAR will be Europe's contribution to the "MEOSAR Programme" of the Cospas-Sarsat programme. The SAR will provide:

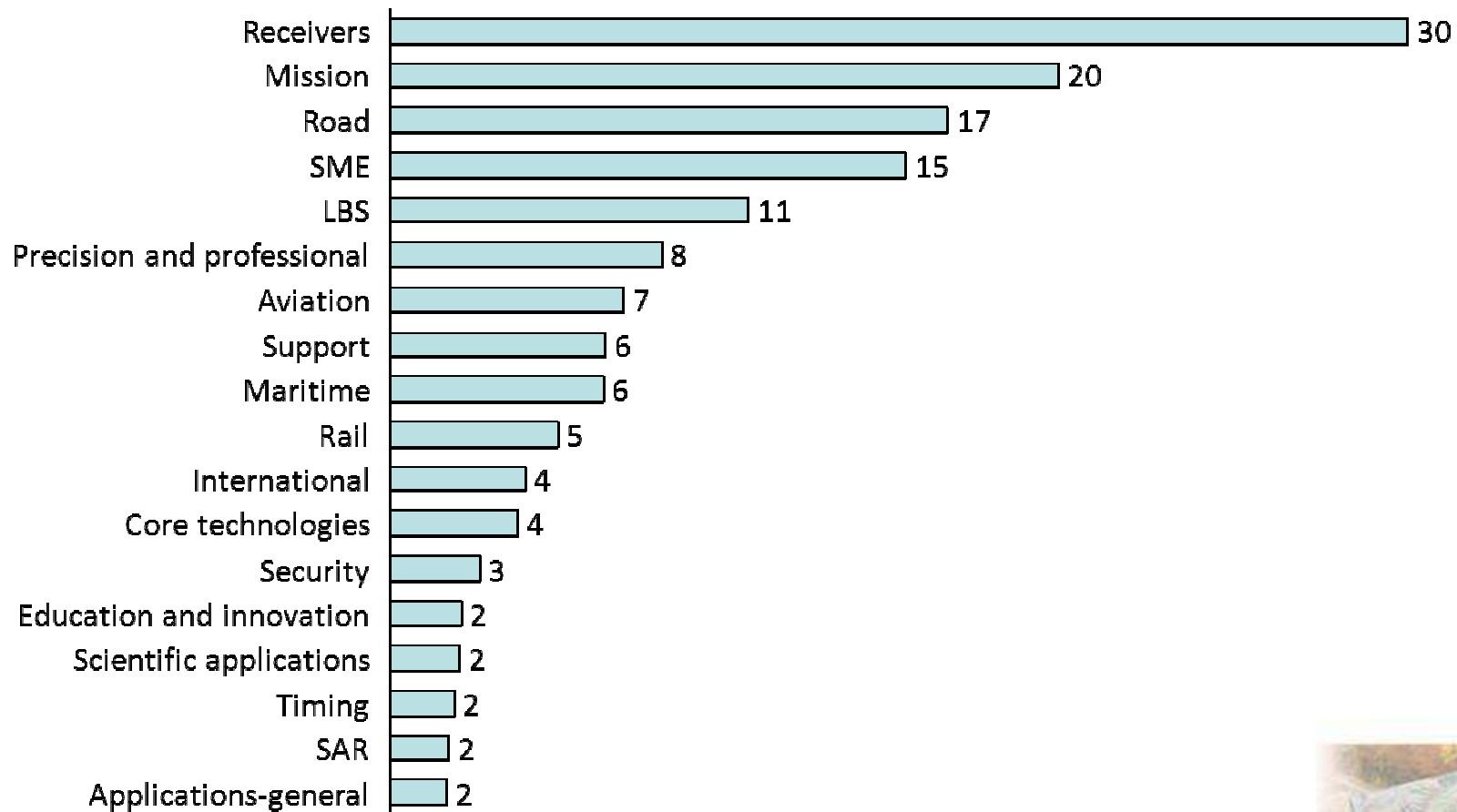
-A "forward link" which allows the detection and localisation of distress signals worldwide.

-A "return link", which is a new Galileo function, which allows the worldwide transmission of short messages to distress beacons, for example acknowledging that a distress signal has been received.



Roughly EUR 145m invested in FP R&D addressing all sectors

GNSS R&D grants FP6-7 (excluding tenders and admin)
€mln



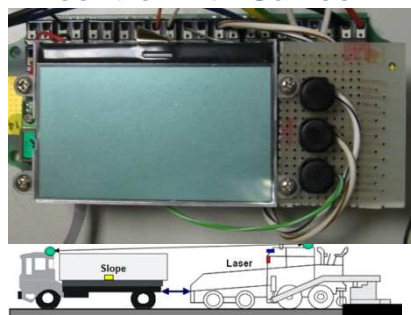
FP7 programme generating concrete application results

19 Proof of concept

HEDGE
ADS-B using EGNOS



ASPHALT
Asphalt machine control with Galileo



24 Prototypes

I²GPS

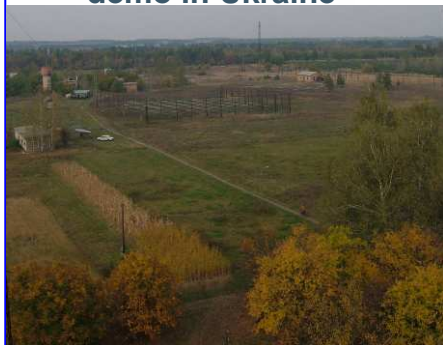


TIGER

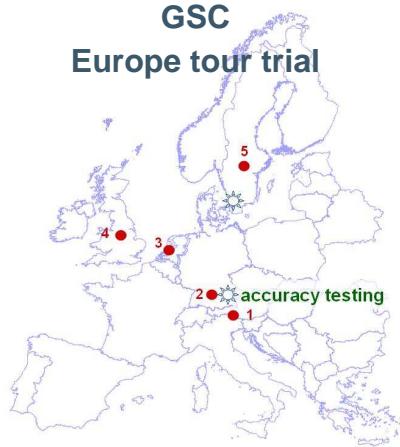


43 Trials and demonstrations

EEGS
EGNOS Extension demo in Ukraine

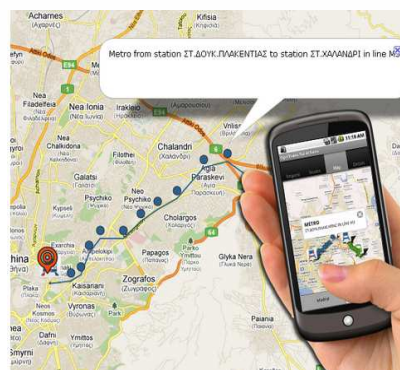


GSC
Europe tour trial



21 Pre-commercial Products

OPTI-TRANS



IEGLO



GNSS Market Report supporting application development

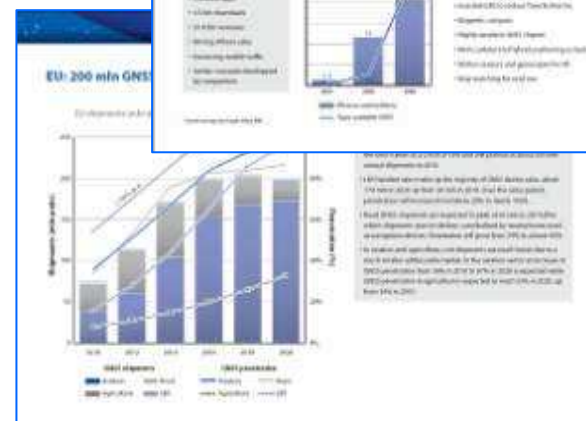


GNSS MARKET REPORT
ISSUE 1

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**Focus on:
AVIATION - ROAD - LBS -
AGRICULTURE**



Note: electronic version can be downloaded from GSA website.



EGNOS Portal for application developers: www.egnos-portal.eu

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Highlights!

- EGNOS Certified for Civil Aviation!** [Read more](#)
- GNSS testing and simulation tools** [Read more](#)







EGNOS network!

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-  Road
-  Agriculture
-  Location based services
-  Maritime
-  Mapping

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[Click here](#)

What's new?
Discover what you've missed since your last visit to the EGNOS Portal! [Click here](#)

News Article:
May 3, 2011
EGNOS gains ground at AERO Friedrichshafen 2011
Pilots at AERO 2011 in Friedrichshafen said they want more EGNOS landing approaches. [More](#)

Apr 18, 2011
Rewarding the best innovative ideas for EGNOS
The search is on for new ideas that could use European Global Navigation Satellite Systems (GNSS). [More](#)

Apr 12, 2011
'Aerodays 2011' provides platform for EGNOS
The EGNOS programme made a strong showing at this year's 'Aerodays' conference in Madrid. [More](#)

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Thanks for your kind attention





Thank you

The added value of new GNSS signals and frequencies

- **SBAS (EGNOS, WAAS, MSAS, etc)**

- Already widely used amongst recreational vessels – standard capability
- For adoption by commercial vessels, it's time to
 - reach consensus with stakeholders on SBAS (EGNOS/WAAS /...) being recognised by IMO as part of WWRNS
 - explore how DGPS and SBAS can be optimised
- Clear added value to pilotage applications in restricted or inland waterways



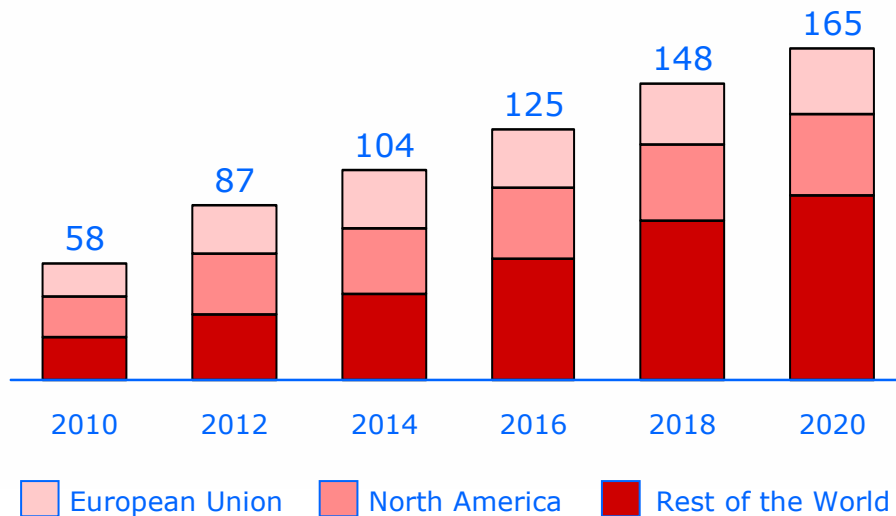
- **Multiple constellations (ie Glonass, Galileo) and multiple frequencies (L1/L5)**

- Long term potential to rationalise ground based infrastructure
- More resilient PNT required for eNavigation
- Multiple constellations  improved integrity
- Multiple frequencies  service robustness



Europe can play a more important role in the growing GNSS market

Global GNSS market size (€ bln)

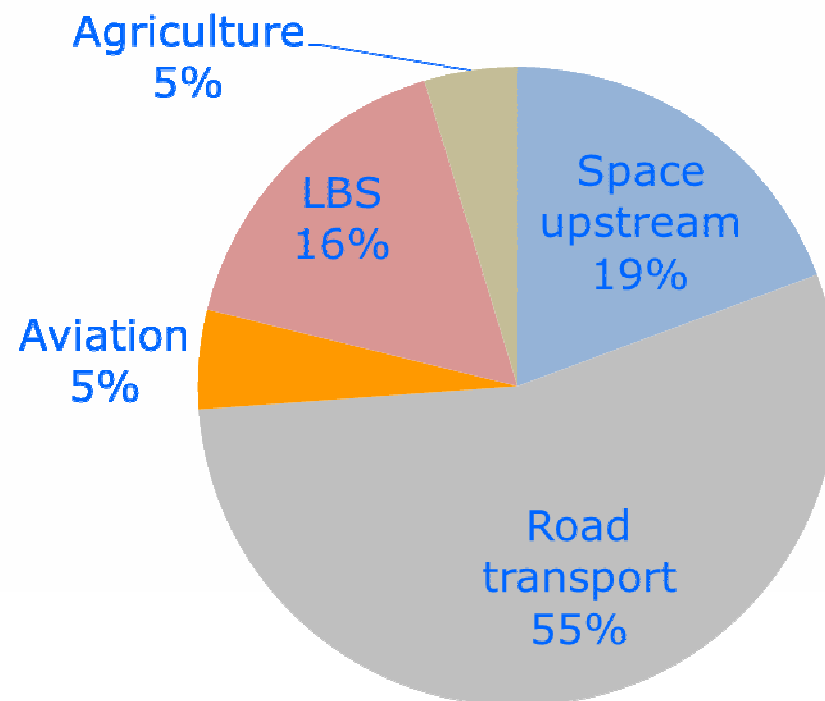


- 165 billion revenues in core GNSS market in 2020
- 11% annual average growth rate in terms of revenues
- 1 billion devices shipped worldwide in 2020



Investing in European GNSS will bring measurable benefits

60-90 bln EUR in economic and social benefits generated from 2010 to 2027



Further segments Maritime, Rail and Surveying are currently being analysed





Thank you

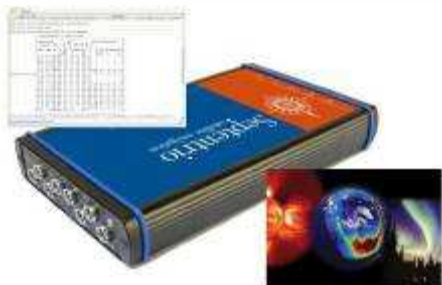
GSA Market Development Activities in 2011



R&D tangible results open new markets for GNSS

Successful results preparing for market launch

CIGALA: Ionospheric-Scintillation Mitigation



PolaRxS Receiver for Ionospheric Scintillation Monitoring
In the market since summer 2011

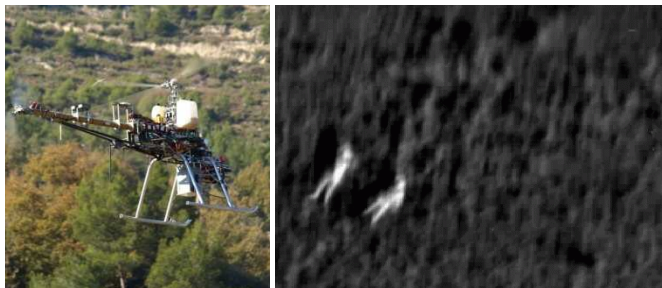
GOLDEN-ICE: Improving efficiency of winter vehicles with EGNOS



Demonstration to dealers in Prague, 12 December 2011

Join us in the next demonstrations!

CLOSE-SEARCH: Saving lives with EGNOS



Demonstration, Castelldefels February 2011

INCLUSION: Improving quality of life of motor impaired people with EGNOS



Demonstration, Market to win 2012, 24 January London
Preparing for Olympic and Paralympic Games

2011 Security results

- Full implementation of the new European GNSS Security Accreditation Board (SAB) and of its subordinate bodies
- Drafting of all core framework documents associated to Security Accreditation (e.g. Security Accreditation Strategy)
- Assess and review system design, qualification, operations and related system risk analysis
- Inspection of 9 ground sites associated to Launch 1
- Preparation of Authorisation to Launch 1 from Security Accreditation Board
- Preparation and protection of Flight Keys for Launch 1
- Preparation of the role of GSA as Galileo Security Monitoring Centre Operator
- Establishment of a first operational team contributing to the monitoring of the security for the satellites launched in 2011
- R&D activities for preparing the development of PRS receivers
- Preparation of a major contract for developing in 2012 the first PRS pre-operational receivers to be used in Europe
- Provision of expertise and support to the Commission for developing the PRS Common Minimum Standards, in line with PRS Access Rules (1104/2011)



GNSS is already central to the merchant maritime market

Merchant fleet

The maritime market includes merchant vessels, leisure vessels and vessels operating on inland waterways. Leisure vessels are by far the largest category with millions of device sales each year. The focus of this report however is only the merchant fleet classed as all sea-going vessels of 100 gross tons or more. Included within this category are vessels that are required to comply with the International Maritime Organization's Safety of Life at Sea (SOLAS) directives. The merchant fleet is largely engaged in trade, passenger transport and in specialist marine engineering services.

Use of GNSS in the merchant fleet

GPS and GLONASS have long been accepted elements of the IMO World Wide Radio Navigation System (WWRNS) and are widely used for navigation either through a standalone receiver on the bridge or integrated with an electronic chart system.

D-GNSS networks, operated by national lighthouse authorities provide additional accuracy and integrity in some coastal waters and is widely used in the merchant fleet.

GNSS is increasingly finding its way into other maritime systems and can now be found on vessels as part of their Automatic Identification System, as part of their search and rescue equipment, to enable them to be tracked for homeland security purposes and to allow them to be accurately positioned for marine engineering purposes.

Search and Rescue (SAR)

Search and rescue (SAR) is about searching and aiding people who are in distress or imminent danger and have activated an Emergency Position-Indicating Radio Beacons (EPIRB). The current international SAR service is provided free of charge by Cospas-Sarsat to national Rescue Coordination Centres and is used by about one million beacon owners for maritime, aviation and leisure applications and over the last 30 years has on average contributed to saving 1300 lives per year.

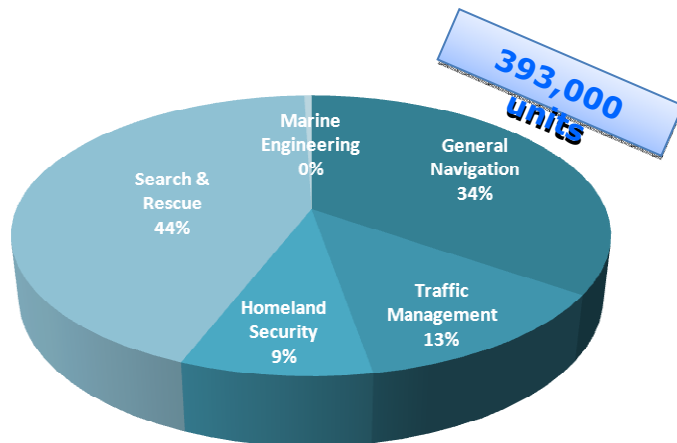
Opportunities for GNSS

The IMO has recently proposed a new concept for safe and efficient maritime navigation known as e-Navigation. It has been recognised that robust PNT is fundamental to the entire e-Navigation concept. As such it is likely to be a recommendation that dual GNSS constellation receivers are used as a means of meeting e-Navigation requirements. e-Navigation implementation could be a driver for Galileo uptake within the maritime community.



The merchant marine GNSS market is driven predominantly by vessel reporting applications

Many of the regulated applications of GNSS in the maritime sector already have high, if not total, GNSS penetration. For these applications, equipment replacement and new vessel construction is the driver for equipment sales.



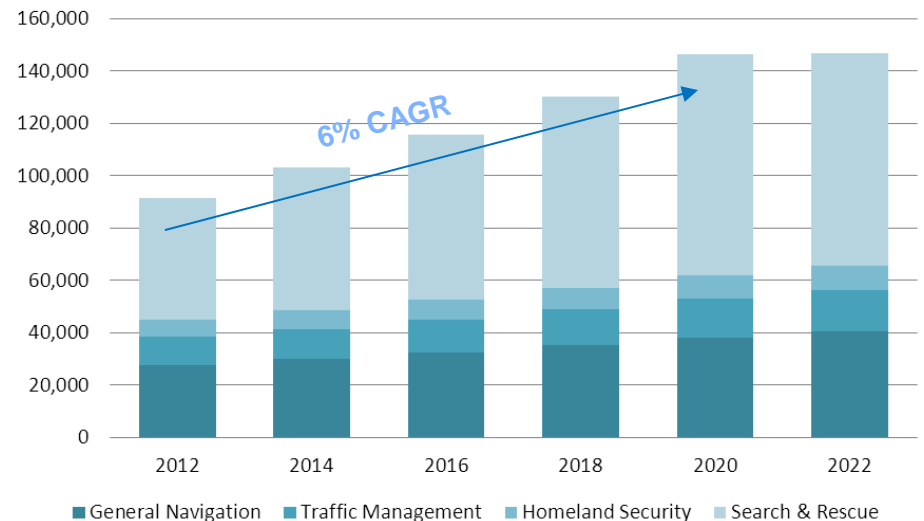
GNSS unit shipments by application (2006-2010)

Sales of devices overall are now dominated by GNSS equipped search and rescue devices for which a number may be installed on each vessel, e.g. on lifeboats. In addition the lifecycle of a search and rescue beacon tends to be shorter than for a standard navigation receiver. Other applications tend to only be installed in smaller numbers.

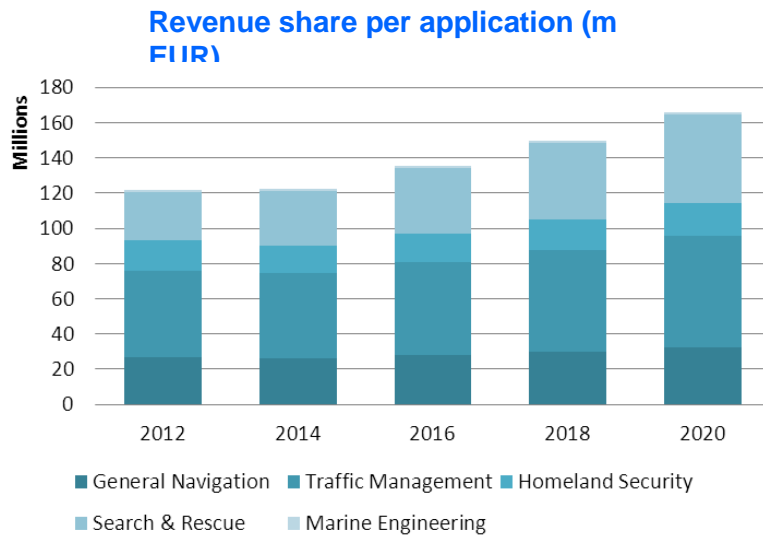
Over the next decade shipments of GNSS devices will be driven by increased penetration of GNSS into search and rescue beacons. This will lead to a CAGR of 6% until 2020.

Future shipments of GNSS navigation equipment are expected to continue to be driven by replacement of old equipment and new vessel construction. Regulation could also impact the market, particularly if the IMO require or recommend dual constellation receivers to be carried as part of the e-Navigation initiative.

GNSS unit shipments to 2022 by application



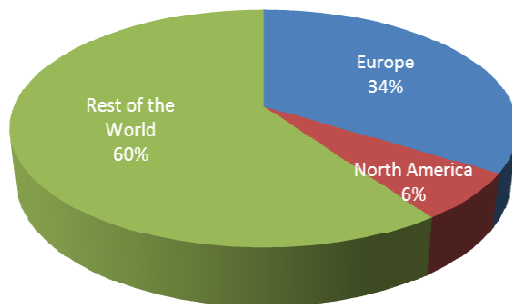
Revenues from GNSS in the merchant maritime domain will reach €169 mln by 2022



In the next ten years the total cumulative revenues from device sales in the merchant marine domain will reach €1.4Bn. More than half of this revenue will be driven by increasing penetration of GNSS within emergency position-indicating radio beacons (EPIRB) as well as a growing market overall. The more traditional use of GNSS for vessel navigation will account for over a quarter of total revenues.

The price per device currently ranges from €500-800 for search and rescue beacons through to €5,000+ for a beacon to serve homeland security applications. These prices are expected to fall marginally over time.

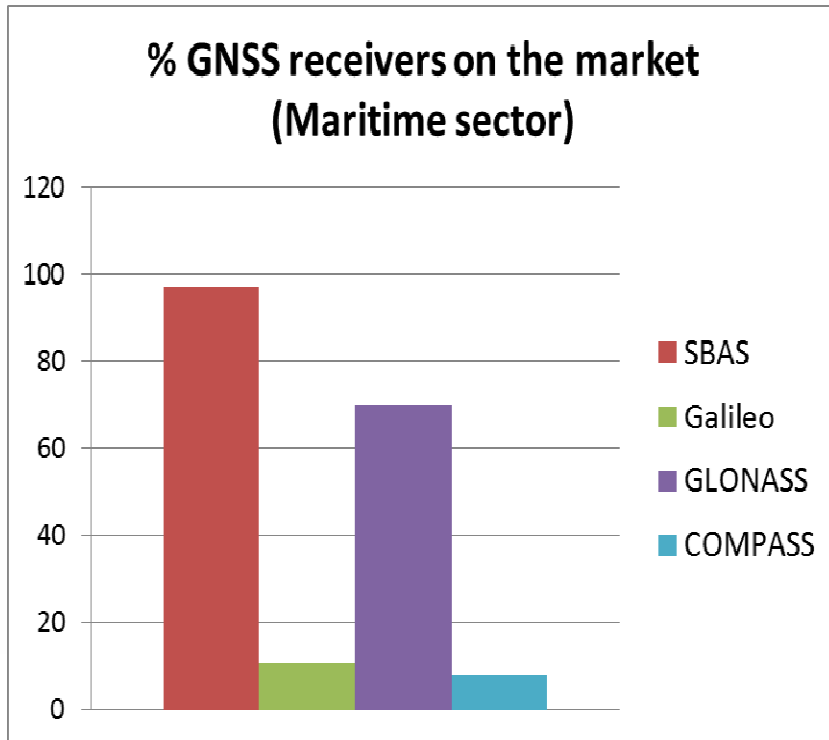
Equipage in the merchant fleet is driven by equipment replacement and by new build vessels entering the global fleet. Growth in recent years has been driven by the expanding economies of Asia and South America.



Merchant fleet GNSS receiver market 2010
(by country of vessel operator)



GNSS suppliers are already anticipating market demand



Source: Analysis based upon GPS World receiver Survey (published in Jan 2012), assuming GPS has 100% penetration

- SBAS is widely adopted in recreational vessels:
 - improved accuracy, at no extra cost
- GPS/GLONASS/Galileo will offer enhanced accuracy/integrity:
 - Receivers need to make use of Galileo IOC capability in 2015/16
- We should have a combined constellation of over 50 CDMA satellites by 2016



The challenge and opportunity for the GNSS industry

1. Robustness/vulnerabilities

eNavigation is driving the need for resilient PNT

- Efforts towards eLoran are yet to bear fruit
- Multiple GNSS systems and frequencies will contribute towards greater robustness in the meantime

2. Take-up of multiple GNSS systems and signals

Maritime Service Providers (e.g. Lighthouse authorities, Port Authorities) need a roadmap

- Recognition of Galileo IOC capability in 2016
- Determination of feasibility, timescales and legal framework to pave the way for IMO recognition

3. Receivers development

Commercial vessels need to future-proof their GNSS capability with new signals

- Next generation of receiver standards must be more flexible to handle potential signal combinations





Thank you
