

GIS Intro Workshop

23rd Nov 2015

- Don't worry, if you have never used GIS before
- Key aims:
- Give all participants overview of the opportunities in Open Source GIS, open data and open standards
- Provide resources for further learning and development
- Build future collaboration opportunities for joint bids/proposals

- 09:30 -10:00 – Registrations, Tea/Coffee
- 10:00-10:15 – Welcome and NGI/GRACE/GNSS Introduction – Suchith Anand
- 10:15-11:15 – Introduction to GIS – Suchith Anand
- 11:15 -11:45 –Tea/Coffee Break
- 11:45-12:15 – Opportunities of Open Source, Open Standards, Open Data in GIS – Suchith Anand

- 12:15 – 13:00 - GIS Intro Practical 1 (using QGIS and open data)

13:00 -14:00 – Lunch/Networking

- 14:00 – 15:15 – GIS Intro Practical 1 (using QGIS and open data)
- 15:15 -15:30 - Tea/Coffee Break
- 15:30 – 15:45– Funding opportunities (Horizon 2020, KTPs etc) opportunities and How GRACE/NGI can collaborate – Suchith Anand
- 15:45-16:00– Open Discussions and follow up ideas

- More than 43,500 students
- 34,000 based in UK
- 19,000 International students
- 20% are postgraduate students
- 7000 staff
- Research income over £160M per year
- Top four in the UK for Engineering



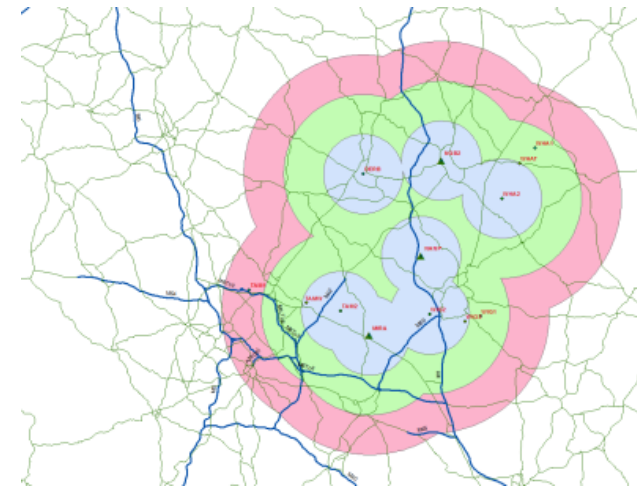
Core Research Themes

- Engineering Surveying & Remote Measurement
- Geospatial Science
- Positioning & Navigation Technologies
- Propagation Effects on GNSS

Application Themes

- Environmental monitoring
- Global Food Security
- Intelligent Transport
- Disaster Response and Mitigation

- ✓ Simulation & testing facilities
- ✓ Integrated positioning testbeds
- ✓ Business accommodation & incubation

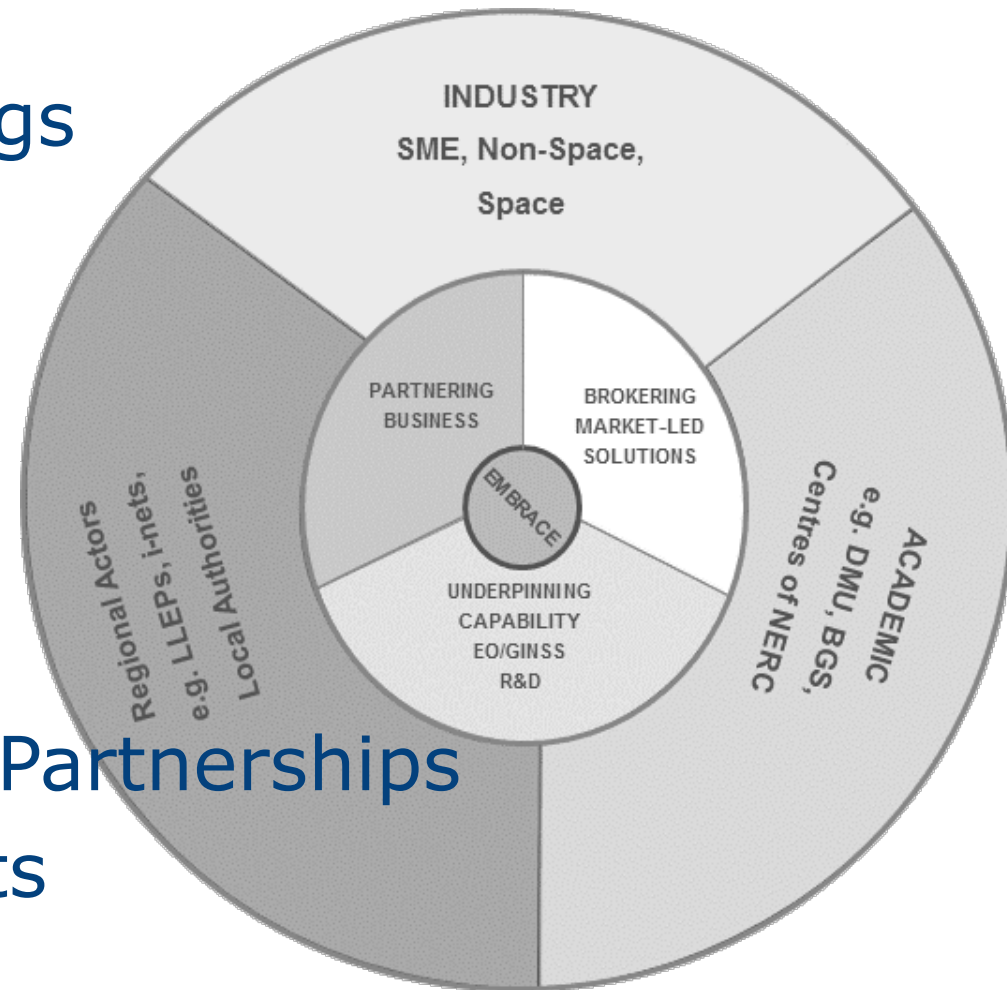


GSS9000

- 1000Hz update rate
- 640 multipath channels per box
- 160 channels per box

[Learn More](#)

- ✓ Workshops & Briefings
- ✓ Training Courses
- ✓ Initial Consultations
- ✓ Pilot Studies
- ✓ Internships
- ✓ Innovation Vouchers
- ✓ Knowledge Transfer Partnerships
- ✓ Collaborative Projects
- ✓ Services Rendered



Absolute Beginners Guide to Sat Nav / Earth Observation

No previous knowledge assumed

Principles of GNSS / Earth Observation

Assumes the ability to understand the basics of the science, when explained

Fundamentals of GNSS / Earth Observation

Assumes some prior knowledge and mathematical ability equivalent to A-Level

Advanced / Specialist e.g. Multi-Sensor, Vulnerabilities

Minimum duration 3 day courses that require minimum prior knowledge at “fundamentals” level and good working knowledge of GNSS



- Applied GIS examples
- **Network of European Regions Using Space Technologies**
- The NEREUS video "The voice of regions for Space" regional examples of space based services (EO/GMES, GNSS, Telecommunication etc.) for the benefits of regions and their citizens.
- http://www.nereus-regions.eu/NEREUS_videopage

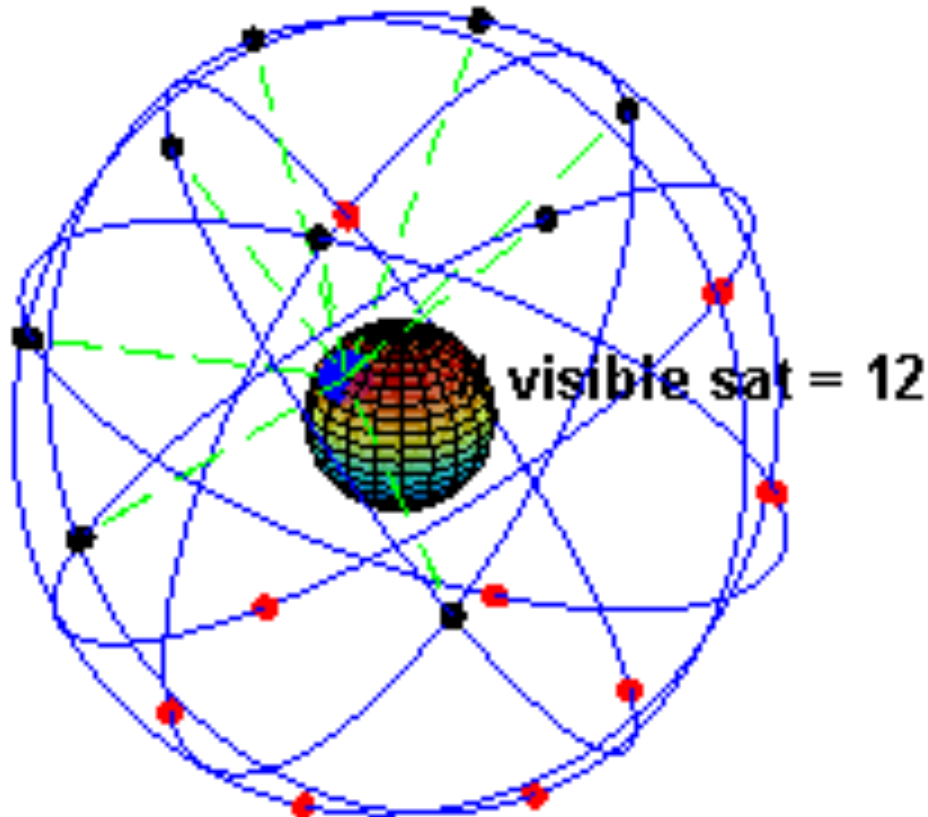


NAVigation Satellite Timing And Ranging Global Positioning System

Operated by the 50th Space Wing, USAF
Space Command
Schriever Air Force Base
Colorado Springs, Colorado



- US government developed and operated (\$32b landed investment)
- GPS receiver and signal specifications made available in 1983 - for the public good!
1st SV launched in 1989, 24th in 1994
- Selective Availability switched off in May 2000 (GPS III will not include SA)



- ✓ **24 or more satellites**
- ✓ **Could be all MEO**
- ✓ **Could be a mix of MEO, GEO and IGSO & SBAS**
- ✓ **Should give world-wide coverage**
- ✓ **Work on ranging and timing synchronisation**
- ✓ **Should be interoperable**

- ✓ **Main systems are GPS, GLONASS, BEIDOU & GALILEO**

Global Navigation Satellite Systems

WHY

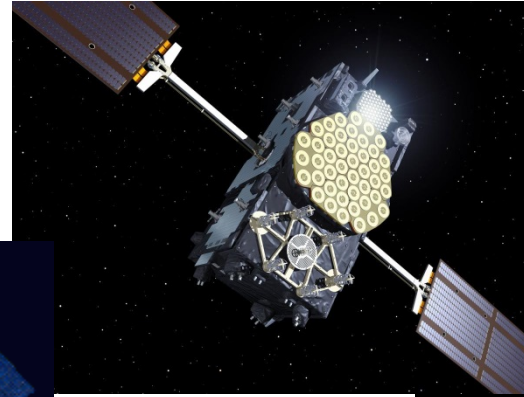
- ✓ **Sovereign capability**
- ✓ **Multiple applications**
- ✓ **Driver for economic activity**
- ✓ **Critical Infrastructure**



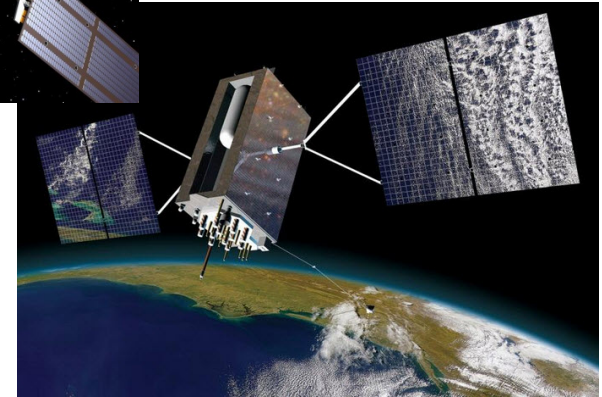
BEIDOU



GALILEO IOV



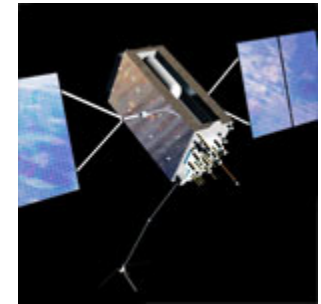
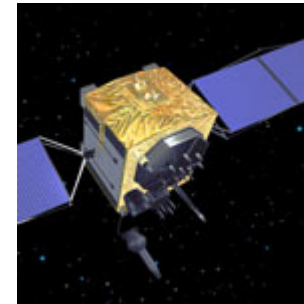
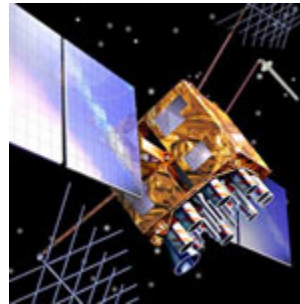
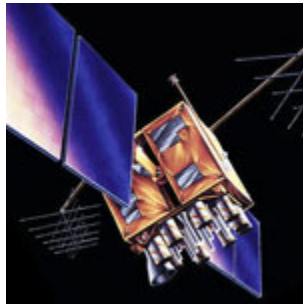
GLONASS M



GPS III



***GPS, GLONASS, BEIDOU, GALILEO, QZSS, IRNSS, WAAS,
EGNOS, GAGAN, MSAS, SDCM***

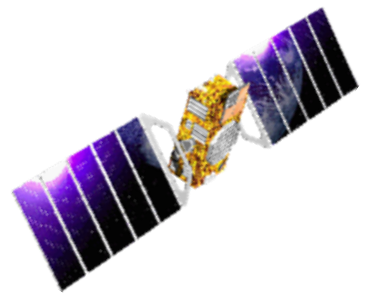


BLOCK IIA	BLOCK IIR	BLOCK IIR(M)	BLOCK IIF	GPS III
3 operational	12 operational	7 operational	9 operational	Now in production
<ul style="list-style-type: none"> • Coarse Acquisition (C/A) code on L1 frequency for civil users • Precise P(Y) code on L1 & L2 frequencies for military users • 7.5-year design lifespan • Launched in 1990-1997 	<ul style="list-style-type: none"> • C/A code on L1 • P(Y) code on L1 & L2 • On-board clock monitoring • 7.5-year design lifespan • Launched in 1997-2004 	<ul style="list-style-type: none"> • All legacy signals • 2nd civil signal on L2 (L2C) • New military M code signals for enhanced jam resistance • Flexible power levels for military signals • 7.5-year design lifespan • Launched in 2005-2009 	<ul style="list-style-type: none"> • All Block IIR(M) signals • 3rd civil signal on L5 frequency (L5) • Advanced atomic clocks • Improved accuracy, signal strength, and quality • 12-year design lifespan • Launched since 2010 	<ul style="list-style-type: none"> • All Block IIF signals • 4th civil signal on L1 (L1C) • Enhanced signal reliability, accuracy, and integrity • No Selective Availability • Satellites 9+: laser reflectors; search & rescue payload • 15-year design lifespan • Begins launching in 2016

Legacy Control System

Architecture Evolution Plan (AEP)

Next Generation Control Segment (OCX)



Galileo System Testbed v1
Validation of critical algorithms
2003



Galileo System Testbed v2
2 initial test satellites
2005/08



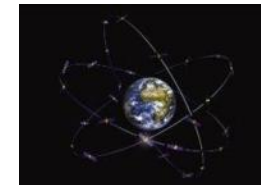
In-Orbit Validation
4 IOV satellites plus ground segment
2012



Initial Operational Capability
Early Services for OS, SAR, PRS
18 satellites
2014/15



Full Operational Capability
Full services, 30 satellites
2020

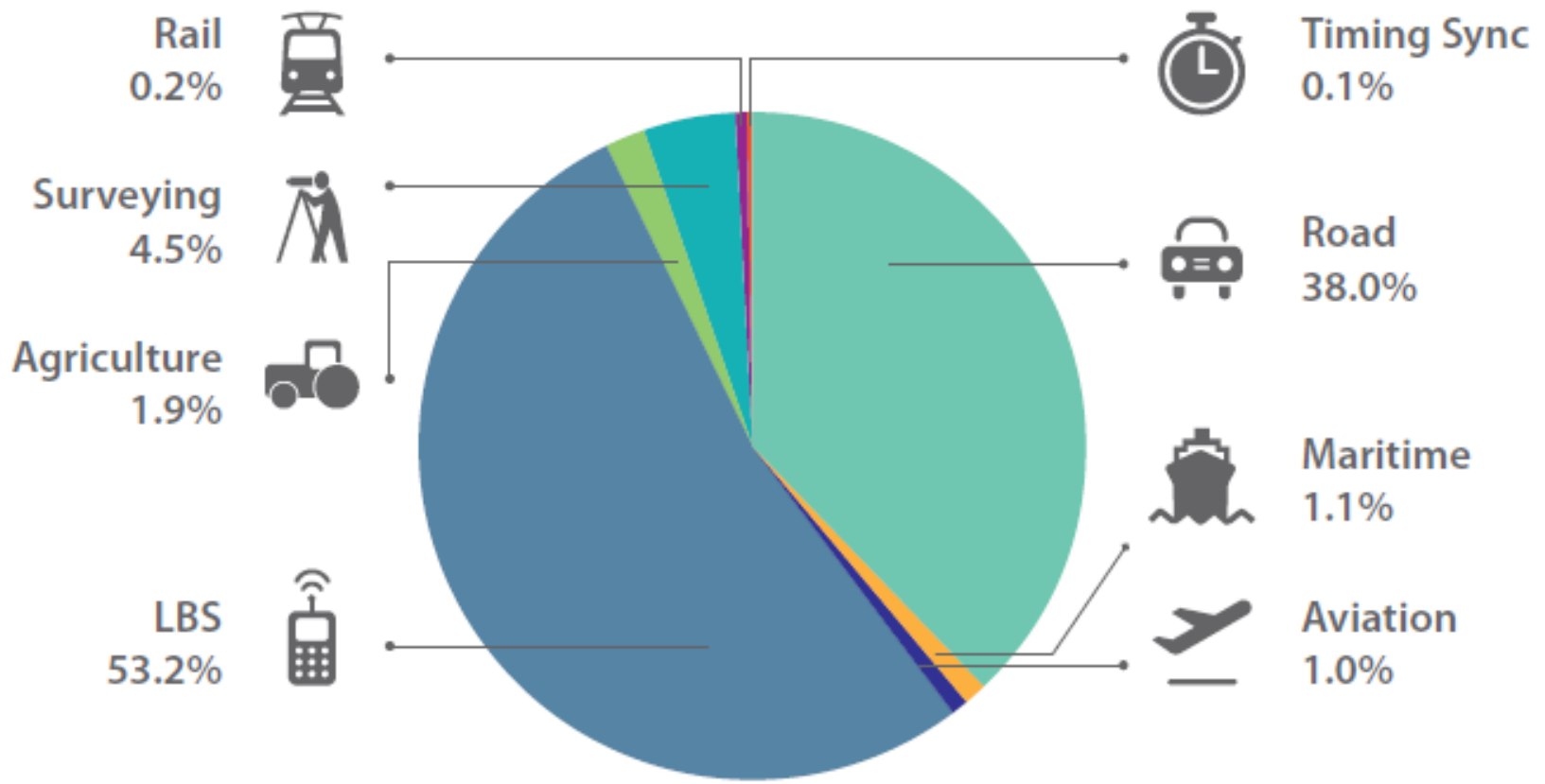





in charge of managing the European satellite navigation programmes, Galileo and EGNOS

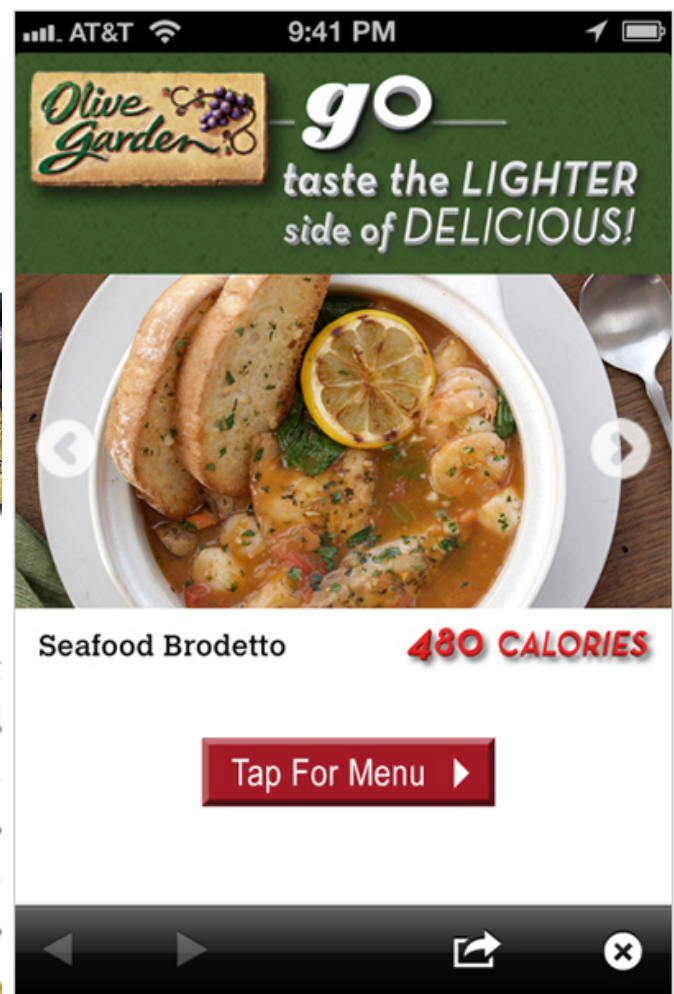
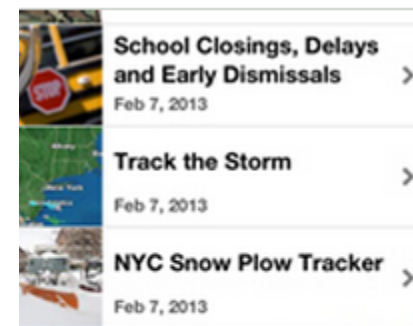
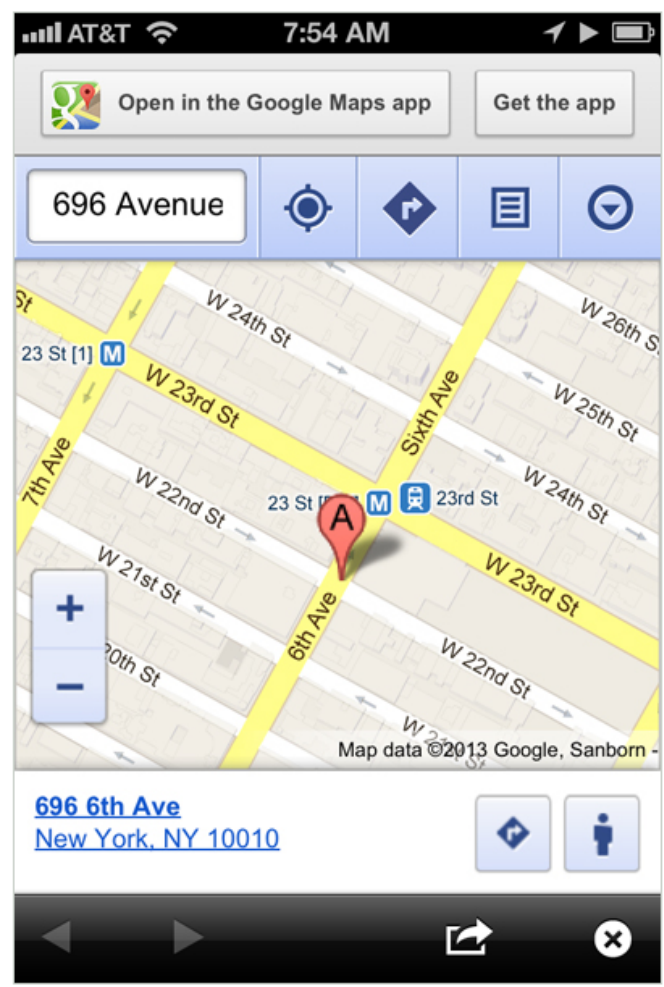


€290b pa by 2023



- **91%** of adult mobile phone owners have their phone within reach **24/7**
- Payment by phone is set to increase, making the unit an-all-in one marketing and payment tool.
 - Near Field Communication
 -  Google wallet and others...
- Linking with other social media for news and offers, googlenow, foursquare, twitter, facebook, linkedin...





NBC 4 New York News App



Market Penetration

Standards

Connectivity

Privacy

Personalisation

Pricing

Trust/integrity

Interfaces

Download Speeds

Roaming

Reliability

Synchronisation

Adoption

Power

Value Adding Services

Availability

Business Models

Robustness

Seamlessness

Map Update

Accuracy

✓ *One of the 8 great technologies*

Space Innovation and Growth Strategy
2014-2030

Space Growth Action Plan

✓ *High Growth*

✓ *£40b by 2030*

_connect



Knowledge
Transfer
Partnerships

Innovate UK
Technology Strategy Board



- **SMART AWARDS**
- **INNOVATION VOUCHERS**



- **€80 billion**



Space for smarter government

SBRI / / Competitions / / Space for smarter government



Status: Open

Key features: A key goal of the programme is to also make use of existing investment in space and allow UK government to become first, intelligent customers for satellite products and services that could generate economic growth through export

Programme: SBRI

Award: Up to £700,000 for phase 1

Opens: 29 Jun 2015, 00:00

Registration closes: 09 Sep 2015, 14:01

Closes: 16 Sep 2015, 12:00

Support phone number: 0300 321 4357

Registration is required to enter this competition. Please note that registration will close 6 days before the competition application deadline.

helping the public sector create sustainable operational services from satellite data and enable smarter, more efficient operations, reduce risk and enhance policy making.

- Natural Hazard Risk Management
- Environment
- Local Authorities and or Devolved Administrations
- Other



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DATA

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Organisations with Specialist Advice

Key support organisations in the UK space sector

UK Space Agency

The UK Space Agency is responsible for all strategic decisions on the UK civil space programme and provides a clear, single voice for UK space ambitions. At the heart of UK efforts to explore and benefit from space, the UK Space Agency is responsible for ensuring that the UK retains and grows a strategic capability in space-based systems, technologies, science and applications. It leads the UK's civil space programme in order to win sustainable economic growth, secure new scientific knowledge and provide benefit to all citizens.

- Website: www.gov.uk/government/organisations/uk-space-agency/about
- Email: info@ukspaceagency.bis.gsi.gov.uk
- Telephone: +44 (0)20 7215 5000



<http://www.spacebusinessportal.co.uk/>

CATAPULT
Satellite Applications

GRACE

Thank you!!

For more info contact GRACE

<http://www.nottingham.ac.uk/grace/>