



making the UK the Place for Space

Update for Appleton Conference

Dr David Parker, Chief Executive

3 December 2015

<http://www.bis.gov.uk/ukspaceagency>

Spinning plates and Russian dolls...

To secure capability and seize the growth opportunities:

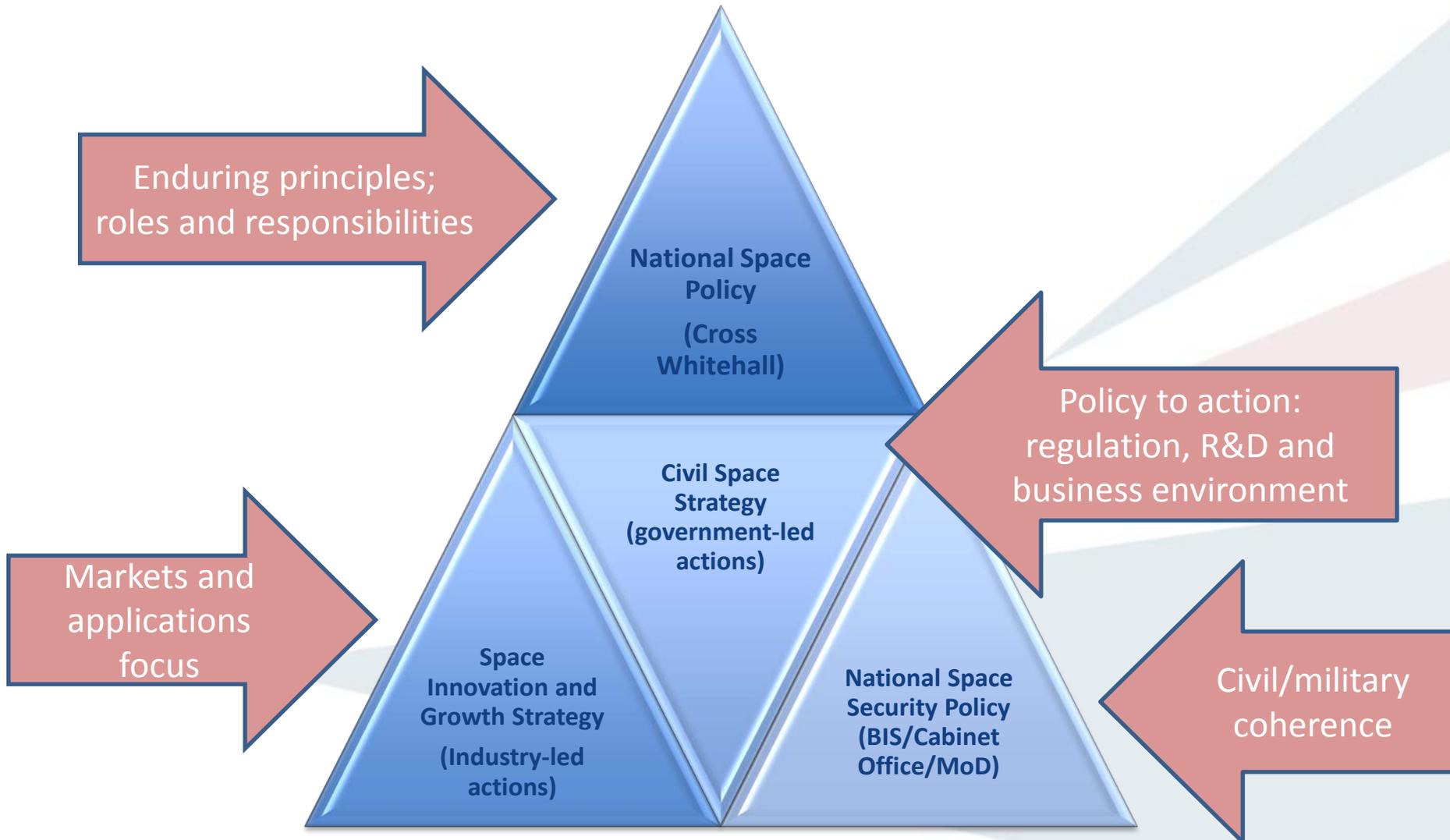


- the UK Space Agency provides leadership in:
 - Policy
 - Regulation
 - Innovation
 - Science
 - Applications and Services
 - Business growth
 - Civil space security
 - Education and skills

- Leadership requires coordination with stakeholders at local, regional, national, European and global levels

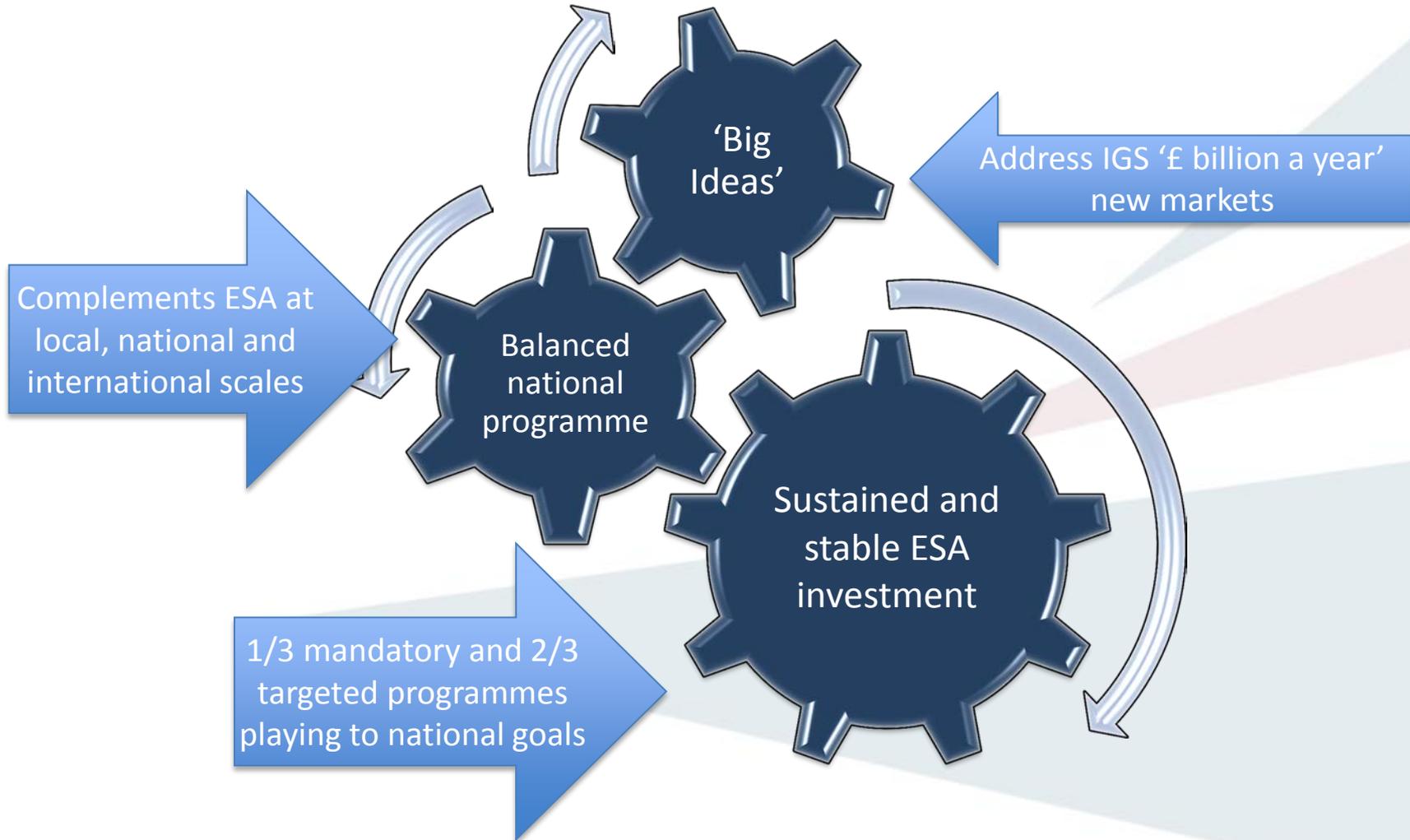


Policy framework



	Local & Devolved Administrations	National	European	International
Policy & Regulation	<ul style="list-style-type: none"> - Developing local DA & regional space policy - SSGP supporting local policy delivery 	<ul style="list-style-type: none"> - Space licensing - European regulation (CMS) - Cubesat traffic light approach - SSGP cross-Whitehall - Spectrum in support of space 	<ul style="list-style-type: none"> - Influencing European policy e.g. PRS, EO high resolution data - New EU space policy 	<ul style="list-style-type: none"> - Influencing: e.g. spectrum (WRC) - Bilateral MoUs - CEOS & GEO - ISECG
Business Growth	<ul style="list-style-type: none"> - SME policy work with CBI - IGS Industrial Policy - Inward investment - Local incubators - City & growth deals 	<ul style="list-style-type: none"> - Industrial policy - National facilities - Support to venture capital fund - Exports work with UKTI - UK Space Gateway and BIC 	<ul style="list-style-type: none"> - Public Private Partnerships via ESA e.g. Quantum, ICE, ViaSat apps factory - Galileo spacecraft 	<ul style="list-style-type: none"> - IPSP - Working with UKTI to mature UK as 'place for space' e.g..
Education & Skills	<ul style="list-style-type: none"> - 'Space for All' local outreach projects 	<ul style="list-style-type: none"> - Tim Peake projects - National Space Academy - National Skills Portal 	<ul style="list-style-type: none"> - ESERO - Alpbach Space School (ESA) 	<ul style="list-style-type: none"> - International Space University
Applications & Services	<ul style="list-style-type: none"> - Incubation work 	<ul style="list-style-type: none"> - Sentinel data access - National Galileo PRS work - SSGP - Cosmo SkyMed UT 	<ul style="list-style-type: none"> - ESA IAP - ESA EOEP applications - EU H2020 - EURISY 	<ul style="list-style-type: none"> - International Charter - IPSP projects
Science	<ul style="list-style-type: none"> - Cosmic Vision and Aurora programme supporting universities 	<ul style="list-style-type: none"> - Cosmic Vision national - Aurora national - ELIPS national 	<ul style="list-style-type: none"> - Cosmic Vision & CTP - ESA ELIPS - ESA exploration., MREP - ESA EOEP and CCI - CNES bilateral projects 	<ul style="list-style-type: none"> - Hinode - STEREO - SWIFT - ISS - Jason 3/Jason CS
Technology & Innovation	<ul style="list-style-type: none"> - University centres MSSL/OU/SSC/RAL etc. - Regional clusters support e.g. propulsion, CubeSat cluster, bio-medical) 	<ul style="list-style-type: none"> - CEOI - NSTP - NovaSAR - SABRE - National Spaceflight 	<ul style="list-style-type: none"> - ESA ARTES - ESA GSTP - ESA TRP - EU H2020 	<ul style="list-style-type: none"> - AlSatNano - IPSP projects
Security: of space from space	<ul style="list-style-type: none"> - Local resilience plans 	<ul style="list-style-type: none"> - Space elements of SDSR - Critical National Infrastructure policy lead - Space weather infrastructure planning - GSMC 	<ul style="list-style-type: none"> - Euro SST Consortium - ESA SSA programme - Galileo & Copernicus security - EU Govsat 	<ul style="list-style-type: none"> - UN Code of Conduct - NEO threat work - IADC debris work - Conjunction alerts from SPOC

Investment Strategy



Some recent national investment decisions

Item	Description	Status
Spaceport project office	National spaceflight project office + UK operation	<ul style="list-style-type: none">• Agency committed £500k for 15/16 for two supporting studies + DfT investment• Potential further investments for 16/17
Jason C/S	UK part of international climate change mission (sea surface height)	<ul style="list-style-type: none">• 20 M€ commitment made to EUMETSAT project to follow on Jason 3
SABRE	Co-funded large project for breakthrough propulsion	<ul style="list-style-type: none">• Treasury approved £60m public investment• £20m equity from BAE Systems
Plato	UK instruments for next scientific mission	<ul style="list-style-type: none">• £25m capital investment for UK instrumentation now fully approved
Space education	Over twenty projects to maximise impact of Principia mission	<ul style="list-style-type: none">• £3m allocation over three years
JUICE	instrumentation for exploration of Jupiter's icy moons	<ul style="list-style-type: none">• £5.8m for magnetometer and other UK contributions

2015/16 – Key Performance Indicators

1. Achieve best value for money outcome for the UK Space Sector from next Spending Review
2. Improve evidence of the value added of the UK Space Agency to the UK economy
3. Implement the UK strategy for Earth observation from space
4. Exploit the education and inspiration value of the 'Principia' mission to the International Space Station
5. Efficient programme delivery at the local, national, European and global level



KPI 1: Spending Review

Huge amount of preparatory work

- SLC considered and agreed future priorities in Spring 2015
- Included early assumptions for ESA C-Min 2016
- Key overall outcomes for BIS announced last week
 - Science resource budget protected in cash terms and augmented by a new £1.5B global challenges fund and confirmation of £6.9b capital budget
 - Individual allocations for funding bodies including the UK Space Agency being developed for consideration by ministers in coming months



KPI 2: Evidence gathering

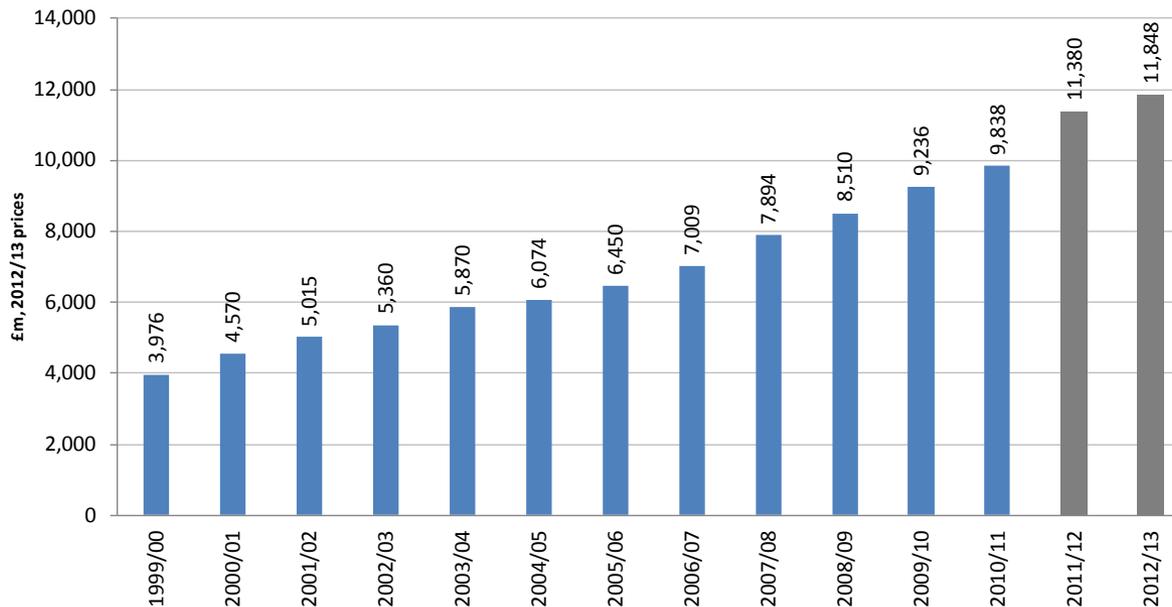
Dual emphasis on improving business cases and measuring impact of our work

- 'Case for Space' independent economic report published
- Evaluation strategy published on website
 - First set of programmes to be evaluated:
 - GSTP
 - Ukube 1
 - Herschel
 - Centre for EO Instrumentation
- New 'how to' guides produced for investment strategy and business case preparation



Turnover & growth

- UK space economy had aggregate turnover of **£11.8bn** in 2012/13
- Compound annual growth rate of **8.6%** since 2008/09



Note: due to improvements in methodology 2011/12 and 2012/13 figures include additional space applications companies, so actual growth between 2010/11 and 2011/12 will be lower than that shown here
Source: 'Case for Space 2015', commissioned from London Economics by the UK Space Agency, Innovate UK, Satellite Applications Catapult and UK Space trade association



Launch of Sentinel 1-A,
April 2014

KPI 3: Earth observation

Implementation plan for EO strategy published

- Agency enabling access to free Copernicus data via data servers at Harwell
 - DECC Perm Sec chairing cross Whitehall EO Working Group supported by Agency → *government ambition to become a major user of satellite data*
 - UK support for **Jason CS** climate change project triggered overall European agreement to start project
 - co-investment for an commercial EO constellation to secure strong UK role
 - UK industry to build next ESA EO mission, BioMass
 - Evaluating possible participation in new projects such as CNES MicroCarb CO₂ monitoring project
- 

KPI 4: Tim Peake

Launch scheduled for 11:02 GMT on 15 December

- Via ESA ELIPS, range of UK science
- Launch events in 4 capitals and 17 science centres

Unprecedented range of education projects including:

- Over 3000 schools participating in 'Rocket Science'
- Astro-Pi: senior schools competition complete
- Principia grant projects selected including:
 - Project with NERC to use images from ISS to compare Earth today and 50 years ago
 - Kids fitness challenge to cover distance from Earth to ISS
 - Multi-media publishing for visually impaired children
 - Competition to make schools videos
 - Space diary by Lucy Hawking (daughter of Stephen Hawking)
 - 'Three minute learning' modules for education



6 November:

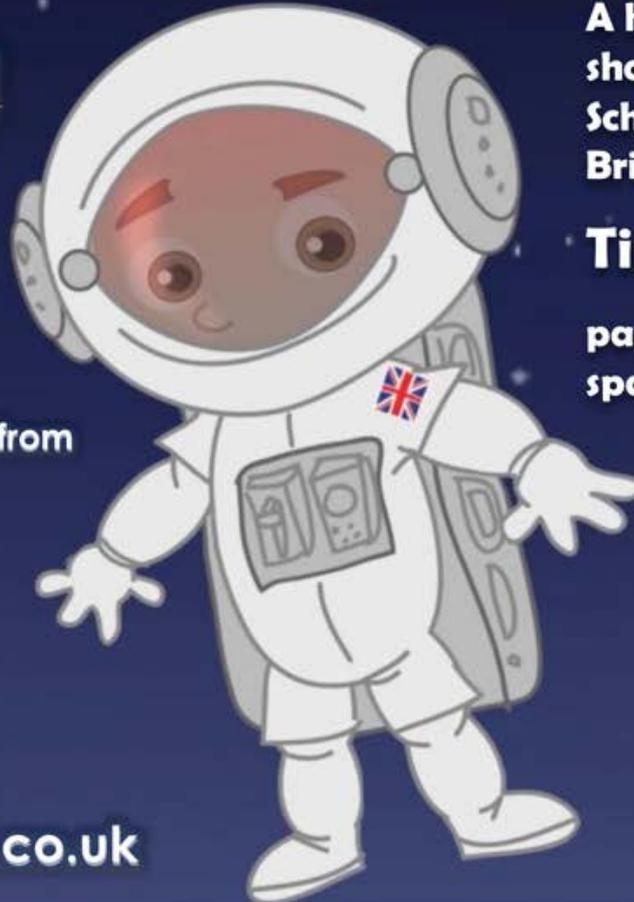
- BBC Breakfast space special
- Science Museum Press Conference
- One Show appearance

Inspiring the next generation...

TEAM TIM

Touring Primary Schools from
September 2014...

www.spacefund.co.uk



A hugely entertaining science
show that invites Primary
School audiences to help
British Astronaut

Tim Peake

pass his training and go into
space!



Featuring Tim Peake!



"Maths, Biology, Programming, Science, Technology, Drama and
Space – all wrapped up in a brilliant show. What more can you want?"

KPI 5: Programmes



National
Space
Technology
Programme



Exploration
national
programme



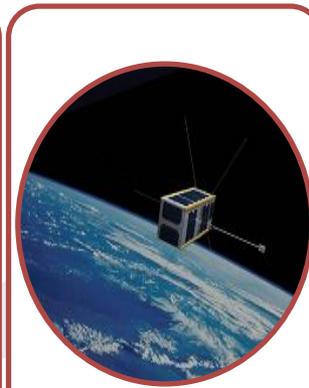
Cosmic
Vision
National



Space for
Smarter
Government



International
Partnership
Programme



UKube-1,
Outernet &
AISat Nano
cubesats

**Basic R&D through flight demonstrations to applications
+ Innovate UK tools (KTN, launchpad...)**

Space for Smarter Government Programme



[Home](#) [About Us](#) [Satellite Applications](#) [Gateway to Data](#) [Advice & Funding](#) [Programme Activities](#) [Downloads & Events](#)

Enabling the public sector to save money, innovate and make more effective policy decisions by using space technology and data

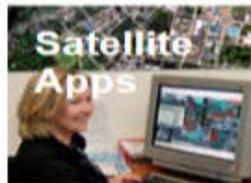
Space for Smarter Government Programme (SSGP)

The Space for Smarter Government Programme (SSGP) is a strategic, national, programme established and led by the UK Space Agency in 2014 and delivered in collaboration with the Satellite Applications Catapult to drive the uptake and use of space products, data and services across government departments.

The aim is to increase the public sector use of space as an enabling technology to stimulate innovation and growth whilst at same time making government more efficient and 'smarter'.

Key programme activities:

- Raising awareness and inspiring use of satellite applications and data
- Providing neutral support for government departments / public sector
- Funding and leveraging funding for creation of operational services using satellites



Case Study: Mersey Care NHS trust: optimising health services for the disabled



Latest News

January 2015 - Boosting public services with satellites

Downloads

- [SSGP Leaflet](#)
- [Satellites for Everyone brochure](#)
- [2030 Vision](#)
- [Satellite Applications Catapult videos](#)

Useful Links

- [UK Space Agency](#)
- [Satellite Applications Catapult](#)
- [Eurisy](#)
- [Innovate UK](#)
- [ESA ARTES Applications](#)

Email the SSGP team or call 01235 239 634.

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Led by the UK Space Agency
Delivered in collaboration with the Satellite Applications Catapult



IPP: Partnerships with global communities

eHealth



Rural Education



eFinance



Border
Management



Rapid Urban
Planning



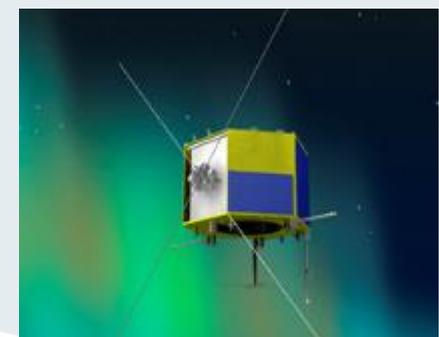
Sustainable
Resources



Humanitarian
Services



Inspiring Science &
Technology



Quantum - key new UK PPP



A new UK product for the global commercial market

- Customer Eutelsat
- project management ESA
- GEO satellite platform SSTL
- advanced payload Airbus
- UK public funder UK Space Agency
- Business case and oversight Innovate UK

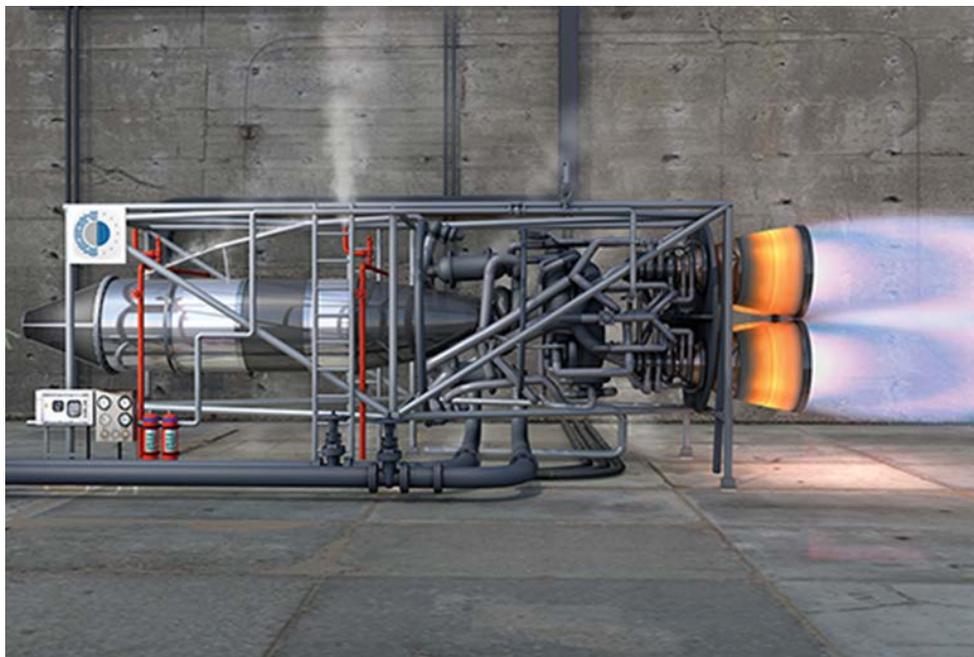
Galileo

- Successful Launch of Satellites 9 and 10
- Common Minimum Standards (CMS) Delegated Act adopted by the Commission
- Once CMS has become law, we will introduce national legislation to create the UK Public Regulated Service 'Competent Authority'
 - without this legislation we are unable to exploit the benefits to Government and industry that PRS is expected to deliver.
- UK PRS technology programme team presented 3 years of development to ESA, EC and international regulators on 24 September to wide acclaim



SABRE – Phase 3b and 3c

Detailed planning underway for full engine test programme





INSPIRED WORK

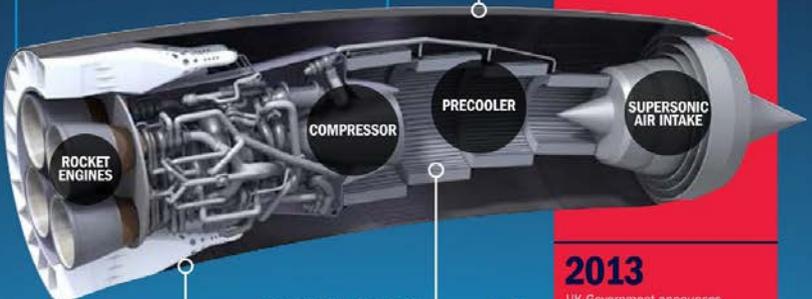


SABRE™

THE NEXT LEAP FORWARD IN POWERED FLIGHT

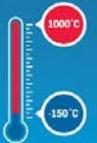
Reaction Engines and BAE Systems are collaborating to develop Reaction Engines' SABRE – a revolutionary class of aerospace engine that can power aircraft from standstill on the runway to Mach 5, and then transition to a rocket mode allowing spaceflight at up to Mach 25.

ENGINE POD
SABRE engines can be installed in an engine pod like jet engines.



EFFICIENT THERMODYNAMICS
Heat energy absorbed by the heat exchanger powers engine components, significantly reducing fuel consumption at high speeds.

ULTRA-LIGHTWEIGHT HEAT EXCHANGERS
New technology cools incoming air from temperatures of 1,000°C to -150°C in less than 1/1000th of a second, keeping the engine cool at high speeds. Frost control technology stops it becoming blocked with ice.



2015
BAE Systems invests £20m in Reaction Engines Ltd and the SABRE test engine.

2013
UK Government announces £60m support towards a SABRE test engine.

2012
Successful trials of the pre-cooler heat exchanger technology.

2003
Frost control breakthrough.

1990
Development work begins on SABRE (Synergetic Air-Breathing Rocket Engine).

1981
NASA Space Shuttle begins operation. Later used to launch Hubble and retrieve ISS.

1969
The Boeing 747 'Jumbo Jet', powered by high bypass turbofans, makes long haul air travel accessible.

1962
First commercial satellite launched, starting a new space industry.

1952
The jet age begins with the Comet allowing high speed, smoother commercial flights.

1935
Piston engine propelled DC-3 flies, helping to open up mass air transport.

1903
Orville Wright piloted first recorded flight in North Carolina.

TIMELINE OF POWERED FLIGHT

SABRE is an unregistered trade mark of Reaction Engines Ltd.

2015: a year in pictures...



Big Bang Fair 2015



'Rocket Science' @ Chelsea Flower Show...



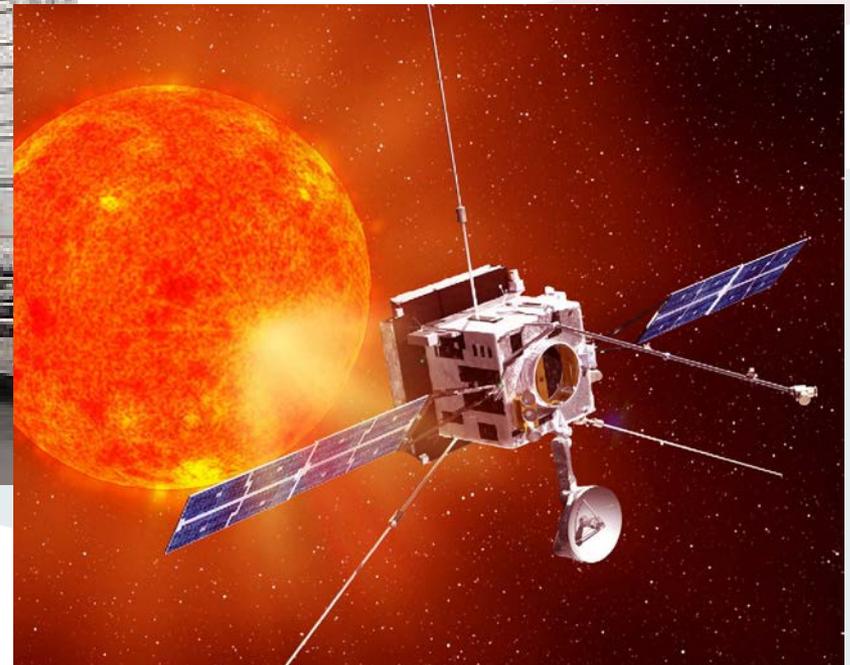
...attracted many visitors



Big science in preparation

Solar Orbiter STM ready for shipment to ESTEC

- UK science industrial prime
- Multiple UK instruments



Harwell science days...



and summer openings: ECSAT...



And RAL 100



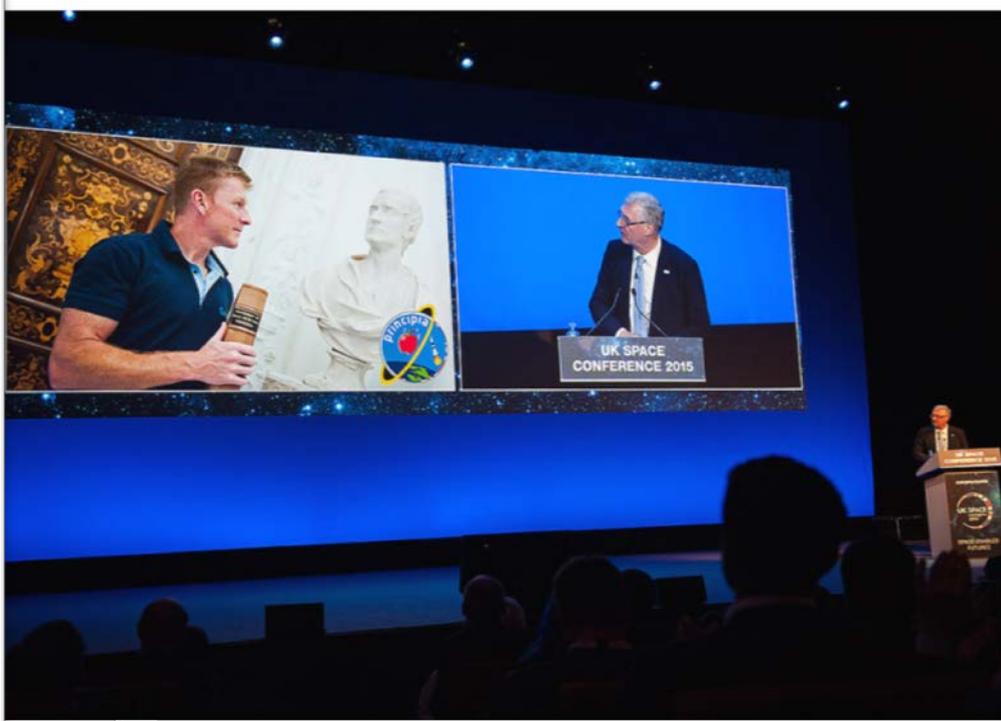
UK Space Conference 2015 Liverpool



Bigger and better than ever



- **Over 1,000 attendees** from the space community heard 167 speakers
- **More than 100 exhibitors** took part, showcasing the latest innovations and technologies from across industry
- **Over 50 broadcast, national press and professional media** attended
- **Five plenary sessions** featuring UK and overseas experts
- **25 parallel sessions** covered topics ranging over spaceports, EO for climate services, driver-less vehicles and international partnerships
- **Welsh Space Strategy** launched, in partnership with Agency
- **Tim Peake** spoke live to the conference from Space City
- The UK Space Education Resources Office held an inspiring **two-day teacher conference** attended by 90 teachers.
- Education outreach programme engaged **236 secondary school pupils**.
- **Space Art exhibition** created by school children
- launch pad for the **UK Space Environments Association** and the **UK Space Life and Biomedical Sciences Association** (UK Space LABS)



2016 - a sneak preview

- January - European Space Policy Conference
- European Commission starting major new work on policy to exploit Galileo and Copernicus and multiple launches
- Year of Mars – both ExoMars TGO and NASA Insight launch in March; arrive October
- July – AISat Nano launches
- July - Farnborough 2016 including Size and Health survey update
- December – ESA Council of Minister 2016
- Development of UK Civil Space Strategy 2017-2020

STARGAZING LIVE
Tuesday 15 December

BBC one



CREDIT: NASA