

Connecting Space with the Wider Economy

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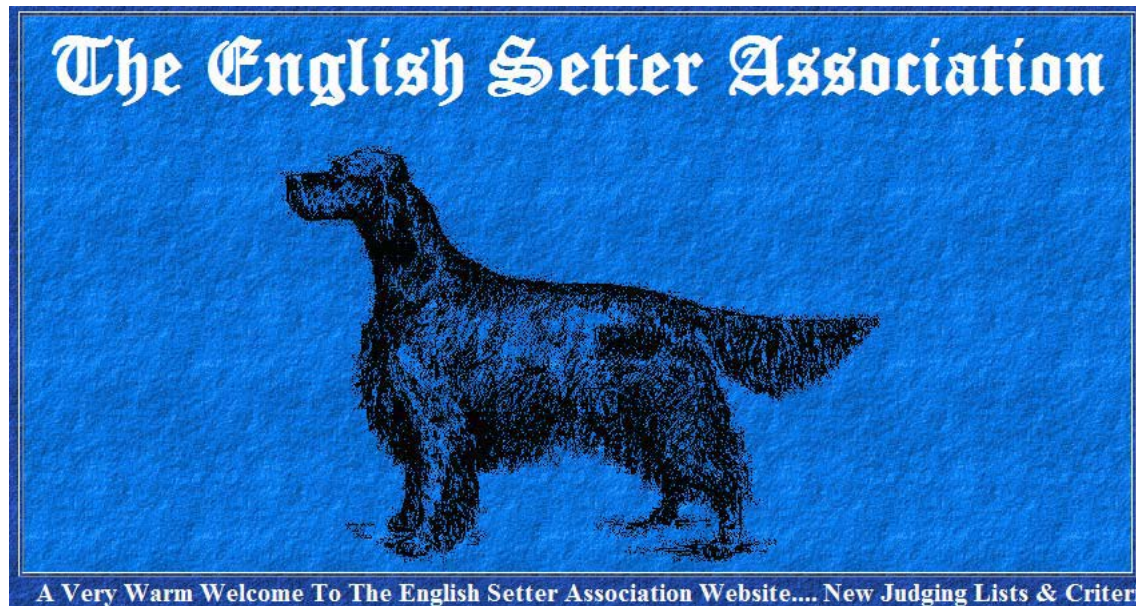
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8th Appleton Space Conference, 6th December 2012

Public view of 'ESA'?



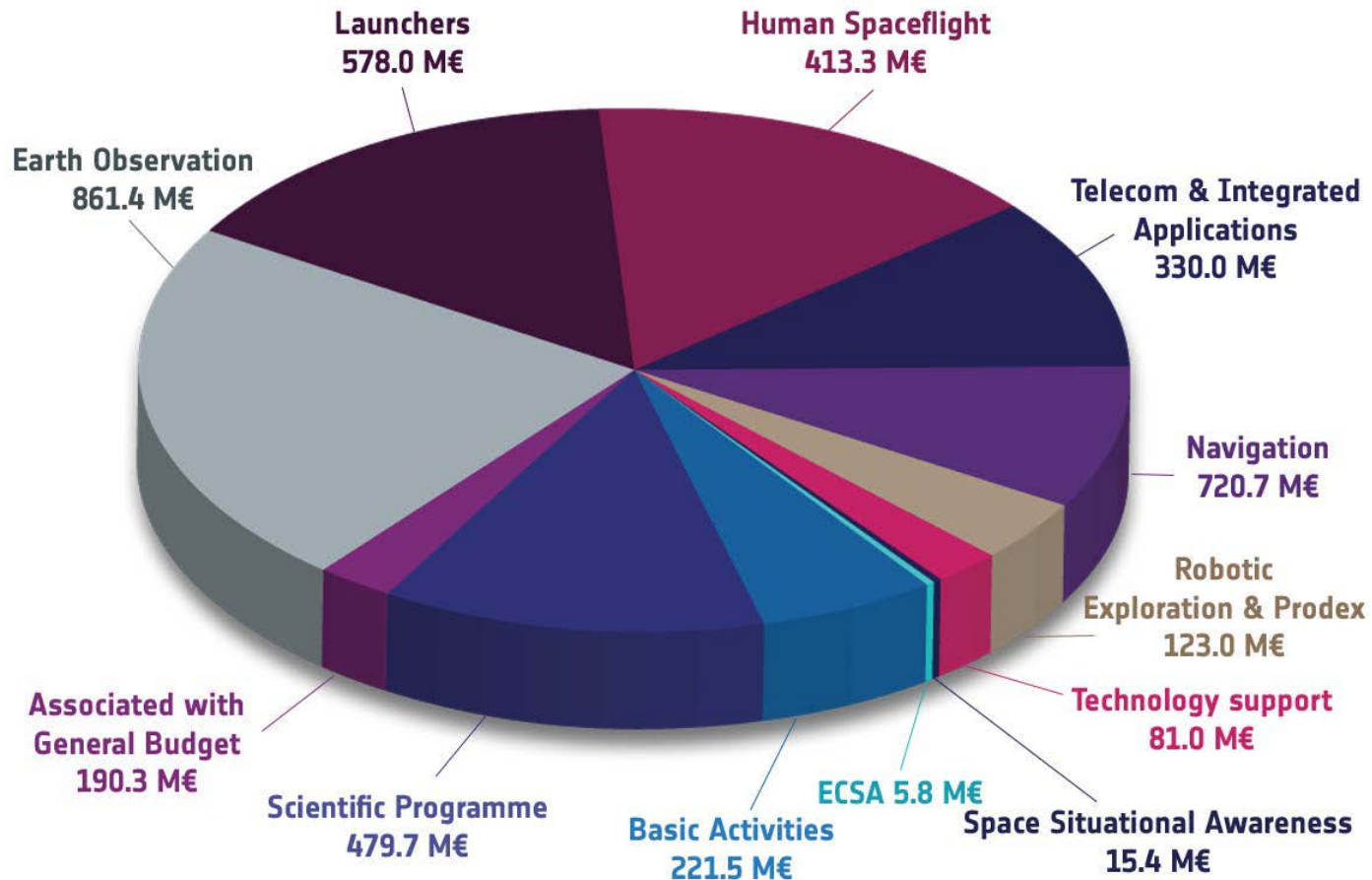
Positive outcome from ESA Ministerial

- UK Space Agency set to invest £1.2 billion over 5 years
- **Provides the UK with increased leadership**
- Builds on UK industry's £9.1 billion contribution to the economy
- **Focus on Telecommunications and Earth observation satellites.**
- Secures around £1 billion of orders per year for industry
- **Lays the foundations for the UK to deliver its ambition to have a £30 billion space industry by 2030.**
- Enables critical mass for Harwell Campus.

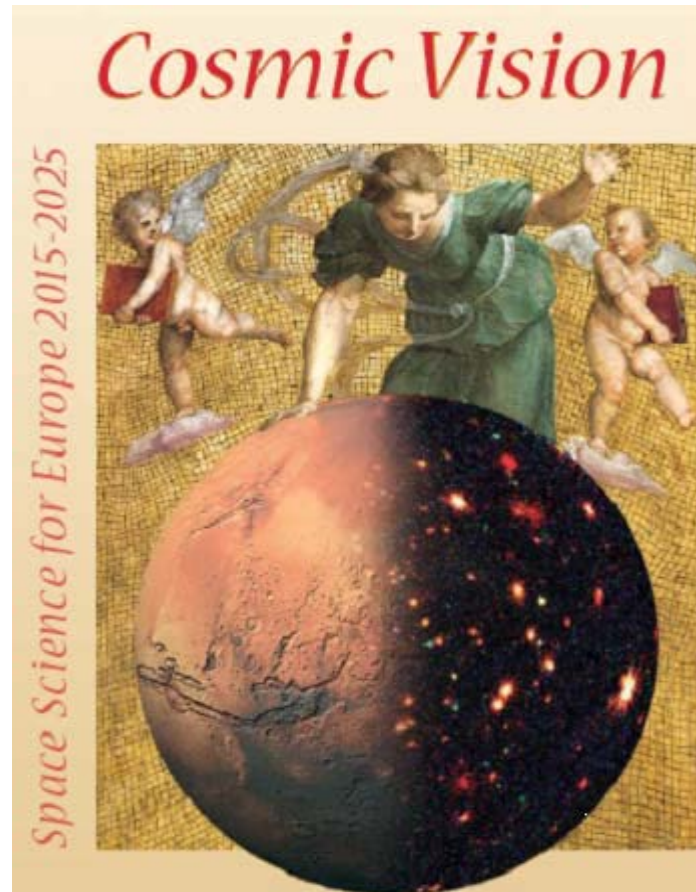
Boost for programmes

- One-off £16m contribution to the ISS
- **£81m for weather satellite Metop 2G**
- £166m for the Earth Observation Envelope Programme (EOEP)
- **£26m for Global Monitoring of the Environment and Security (GMES)**
- £18m in the European GNSS Evolution Programme (EGEP)
- **£18m for Mars Robotic Exploration Preparation Programme**
- £12.4m to join the European Life and Physical Sciences Programme
- **£28m for Generic Support Technology Programme (GSTP)**
- £5.6m for Space Situational Awareness (SSA)

ESA Budget 2012



Space Science Programme



Cosmic Vision : Scientific Themes

- What are the conditions for life and planetary formation?
CHEOPS
- How does the Solar System work? *Solar Orbiter; JUICE*
- What are the fundamental laws of the Universe? *GAIA ; Euclid*
- How did the Universe originate and what is it made of?
Euclid

BUT: Flat cash ESA settlement in recent ministerial meeting
= further cuts to Science Programme.

Institutional indigestion?

- ESA
- ESA Harwell
- EU
- UKSA
- National Space Technology Steering Group (NSTSG)
- TSB
- Space Catapult/ISIC
- STFC/RAL Space
- NERC
- CEMS
- UK Space (Industry)
- Universities
- Space Leadership Council
- BIS (& other Departments)

Challenge: not only to collaborate but to reach out to non Space sectors.

The Chancellor moves on-side

At the Royal Society recently he argued that:

“We are now at a watershed where Space is transitioning from science endeavours into a capability that impacts our everyday lives.”

And stressed that:

- **Scientific curiosity creates a need for new equipment to make science possible**
- **Scientific research base a stimulus for high value inward investment.**

Space activity growth generators

- Skills and Qualifications: Role of NSA and others
- Public engagement/Inspirational projects
- Scientific excellence
- Superfast computing for big data
- E-infrastructure and Critical National Infrastructure
- Integration of space and terrestrial systems and data
- Research clusters and facilities – open innovation
- Instrumentation niches – UKSA & KTNs
- Rising above 'Juste Retour' ceilings
- Inward investment
- Enabling technologies
- Public/Private Partnerships and access to debt/equity markets

Prove the growth potential

- **Space Catapult focus: Transport; Security; Natural Resource Management, Energy and Climate; and Internet of Things**
- **Global growth potential of over \$100Bn over the next decade.**
- **Space Innovation and Growth Strategy Restack Survey**
- **European Space Expo this week in London (GMES/Galileo/EGNOS)**
- **Build on strong European Space capability**

Challenges



What are the key human/natural challenges that we face?

How does Space contribute to their resolution?

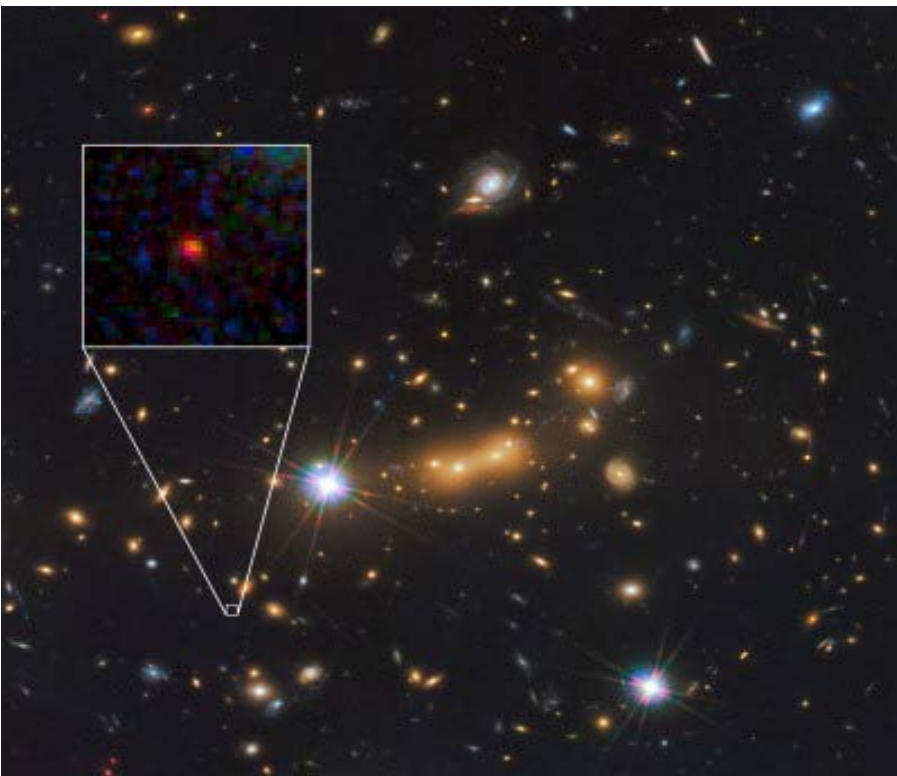
Is Space identified by the public as a problem solver?

- **in generating economic growth to sustain the ever-growing (and ageing) population?**
- **in keeping ourselves fed, warm, watered, housed, healthy, mobile, connected and safe?**
- **in improving food security, demographics, transport/logistics, health, energy, mineral extraction, agriculture, water management, civil protection, security?**

Urbanisation

- By 2050 more than 70% of the world's population will live in cities - consuming the bulk of the world's resources
- **Living PlanIT (of which I am Chairman) is involved in smart city connectivity, resource monitoring and land mapping – key role for space-derived data**
- Smart urban development requires sensor technology with massive data analysis and management.

Big data collection



Key Initiatives

- **Space Catapult**
- **Also Catapults for Transport, Renewable, Connected Digital Economy**
- **Aurora Programme technology spin-offs**
- **NovaSAR : to unlock UK security and other applications**
- **Climate and Environmental Monitoring from Space (CEMS)**
- **Relaunched GIFFTS for EO services**
- **CubeSats & standardised platforms**

Integrated Applications

ESA's IAP – UK contribution doubled to £30m

Objectives of the IAP:

- **expansion of the scope of space activity**
- **new user communities**
- **operational services more innovative, effective, resilient and commercially viable than terrestrial alternatives**
- **support for small and medium enterprises through the network of IAP Ambassador Platforms**

Integrated Applications (2)

IAP is working on emerging markets:

- **Offshore Renewable Energy; Electricity Networks/Smart Grids; Insurance, Reinsurance & Loss Adjustment; Measurement & Management of Carbon Emissions.**
- **IAP's impact not from the relatively modest budget but its outreach. IAP's 'Ambassadors' target non-space users.**
- **ESA is enlarging its domain of action, from development tasks to maximizing the exploitation of the tools and technology/service platforms it has created and will launch.**

Impact Assessment

Tracking diffusion of Space funding to demonstrate impact:

- **Emphasis on collaboration between upstream/downstream companies to ensure future missions deliver data with significant economic growth potential**
- **Encouragement of accuracy, effective flow and intelligent use of data through common standards for operational data transmission**
- **Improved cost/efficiency of access to space (e.g. Reaction Engines)**
- **Disruptive technology makes non-users into users**
- **Innovative solutions attract new users**

Adding Value

- **Microvisk Technologies** - Blood coagulation monitors for use by patients at risk from potentially fatal blood clots, developing from planetary exploration technology;
- **Radius Diagnostics Ltd** - STFC satellite technology being redeployed to create portable X-ray scanners for use in emergency medical care.
- **Cella Energy** – Attracted \$1M of investment from Space Florida to set up research facilities to develop innovative, low-cost hydrogen storage – a potential alternative to petrol-fuelled cars.
- Instrumentation developed for an STFC-funded space mission is being used to develop a rapid and accurate test for **tuberculosis**



Image courtesy of Microvisk Technologies



Image courtesy of Cella Energy

NASA Spin-out list

- Health and medicine
 - 1.1 Light-emitting diodes (LEDs)
 - 1.2 Infrared ear thermometers
 - 1.3 Ventricular assist device
 - 1.4 Artificial limbs
 - 1.5 Invisible Braces
 - 1.6 Scratch-resistant Lenses
- Transportation
 - 2.1 Aircraft anti-icing systems
 - 2.2 Highway safety
 - 2.3 Improved radial tires
 - 2.4 Chemical detection
- Public safety
 - 3.1 Video enhancing and analysis systems
 - 3.2 Fire-resistant reinforcement
 - 3.3 Firefighting equipment
- Consumer, home, and recreation
 - 4.1 Temper foam
 - 4.2 Enriched baby food
 - 4.3 Portable cordless vacuums
 - 4.4 Freeze drying
- Environmental and agricultural resources
 - 5.1 Water purification
 - 5.2 Solar energy
 - 5.3 Pollution remediation
- Computer technology
 - 6.1 Structural analysis software
 - 6.2 Remotely controlled ovens
 - 6.3 NASA Visualization Explorer
 - 6.4 Space Race Blastoff
- Industrial productivity
 - 7.1 Powdered lubricants
 - 7.2 Improved mine safety
 - 7.3 Food safety

Science to Technology to Impact

