

# **UK Space Strategy in 2009 and Beyond:** ***Impact through Innovation***

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## **The UK has a dynamic space programme**

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**Right now, we are:**

**Using space-based systems for communications,  
weather forecasting and coping with natural disasters;**

**Exploring the furthest reaches of the Universe;**

**Understanding our changing planet from the unique  
vantage point of space;**

**Building a high technology industry that benefits  
everyday life.**

**The British National Space Centre is at the  
heart of this programme**

*Here's how ...*



## The British National Space Centre

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Created in 1985 as a voluntary partnership of public-sector organisations that use space, we:

- develop UK space policy;
- invest in the growth of the UK space industry;
- represent the UK in international space programmes.

BNSC reports to the Minister for Science and Innovation

BNSC HQ is co-located with its main funding organisations



# Our Strategy

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Seek new knowledge through:

**Understanding our changing planet**

**Exploring the Universe**

Use innovation to build tomorrow's economy:

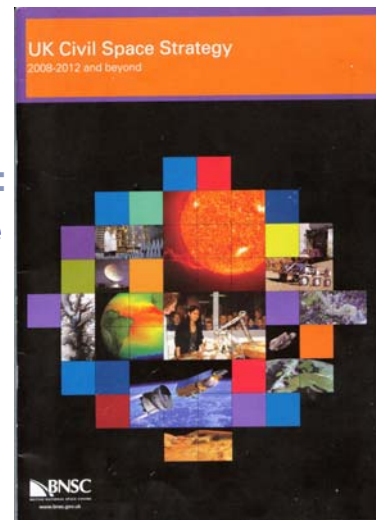
**Increasing the UK's share of the global space market**

**Using space to support public services and create new businesses**

Show why space matters and thus:

**Increase public and political recognition of the value of space as part of the critical national infrastructure**

**Use space to inspire and train the next generation**



## **Strategy + Action = Success**

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*“Strategy (n.) - a plan of action in business or politics” (Greek – ‘generalship’)*

Oxford English Dictionary

Yes, we have a strategy ...

... but a strategy is only useful if the actions planned are actually implemented



## Our work has helped create...

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The world's most profitable global mobile satcoms operator

The world's first public-private partnership for secure military communications

The builder of the world's most advanced satellite telecommunication systems

Successful businesses in software and satellite control technology

Outstanding achievements in space-based astronomy, planetary science and solar physics

Excellence in Earth science for climate monitoring

The world's leading small satellite company and through it, the global disaster management constellation, DMC;

And much more....



- 
- European Space Policy
  - European and Global partnerships
  - Education and Skills

## **Galileo and Telecommunications**



*Innovative services for Government and business*

## **The UK's strategic priorities in space**



**Earth science from space**  
**Global Monitoring for Environment and Security (GMES)**

*Data from space to understand Climate Change, protect our environment and quality of life*



**ESA's Cosmic Vision**  
**The Global Exploration Strategy**

*Space exploration for science, technology and inspiration*  
*UK role in a global framework*

## **So what is BNSC actually doing in 2009 ?**

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Delivering the suite of space projects defined in the UK civil space strategy and so:

Securing new knowledge, products and services

Working with ESA on its new facility at Harwell

Supporting an industry-led 20 year plan for UK space ('Space IGT')

Building an education programme to exploit the excitement of space to motivate the next generation

Increasing our efforts to explain and inform

*... and much else besides!*





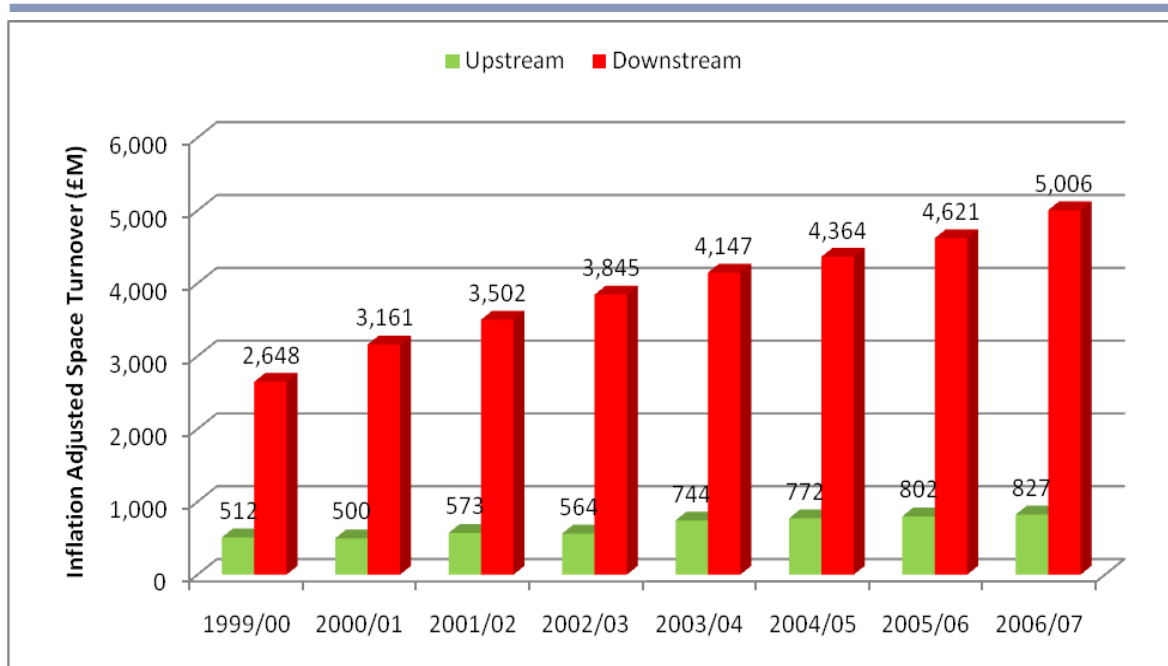
# **Innovation turned into Economic Impact**

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*The shape of our industry and its growth*



## UK Space Industry Turnover (£M)



## Developing tomorrow's economy

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The UK space sector contributes £6.5bn to the economy

Direct employment is 19100

68,000 jobs are supported by space activities

57% of staff are graduates

Value-added per employee is 3 x UK average

The UK space industry is six times more R&D intensive than the UK economy as a whole

The UK space sector has been growing at 9% pa

By 2020, predicted to be worth £14.2B/year and supporting 115,000 jobs in the UK

*Data from Oxford Economic Forecasting/SEEDA*



# Innovation

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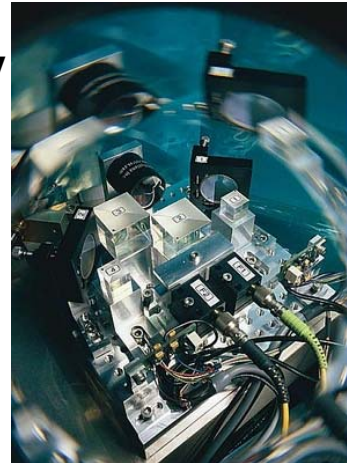
*Stimulating new technology and services and ensuring its full use in society and the economy*

## ESA General Budget

**The core funding stream for early stage, high risk studies and technology for the UK's space programme**

**It also funds ESA's education and technology transfer programmes, all of which benefit the UK economy**

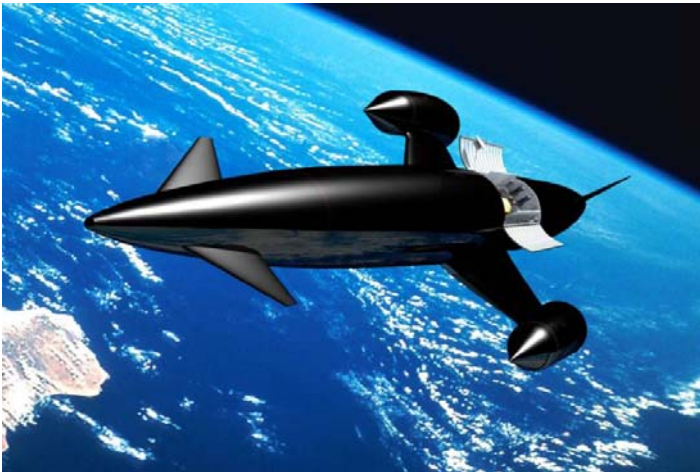
**The UK is the second largest investor**



## Why is basic technology funding essential ?

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### An example



UK funding via ESA supporting private sector investment to demonstrate basic technologies for the *Sabre* air breathing engine for the *Skylon* 'single stage to orbit' spaceplane

Success in creating a reusable launch vehicle could transform the economics of space for all space users ...

... but it is technically challenging and risky.

*BNSC investment helps bridge the gap*



## Technology Transfer

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BNSC & ESA take action to exploit space technology created through public investment

UK successes include:

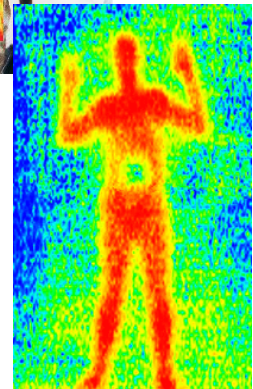
**Security scanners for concealed items**

**Healthcare (cancer detection; TB diagnosis for sub-Saharan Africa)**

**Moisture detection in food**

**Measurement of oil and water in offshore oil pumping.**

**Robotics for terrestrial applications**



Terahertz Radiation  
reveals objects hidden  
under clothing  
Copyright ThruVision



# **Telecommunications and Navigation**

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*Innovation in technology enabling new  
business and new services*





## Renewed UK Investment

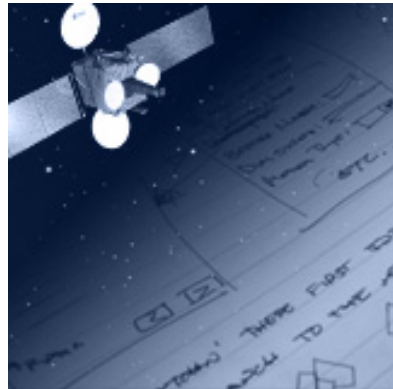
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R&D of satellite telecoms is through the ESA ARTES (Advanced Research into Telecommunications Systems) programme.

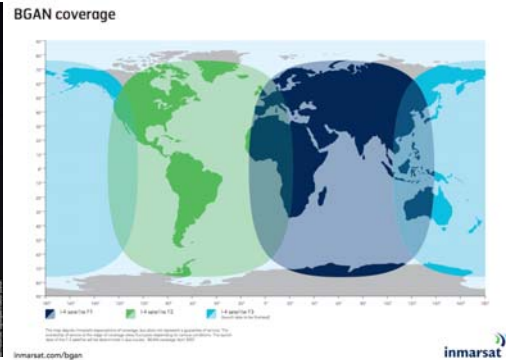
A 'co-funded' scheme whereby industry matches public funding.

ARTES has achieved a high return on BNSC investment

Over 100 M€ invested at 2008 ESA Ministerial



## Telecoms – Some recent UK successes



**Third Astrium-built Inmarsat 4 satellite launched in August 2008 providing global broadband-speed internet access from space.**

**Third Skynet 5 military satcom satellite: UK-based Paradigm provides the UK MoD and third parties with secure global communications.**

**Other launches in 2009/09 include Nimiq 4, Astra 1M, HOTBIRD 9, and HOTBIRD 10.**



# Space Science and Exploration

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*Exploring our Universe in search of new knowledge*



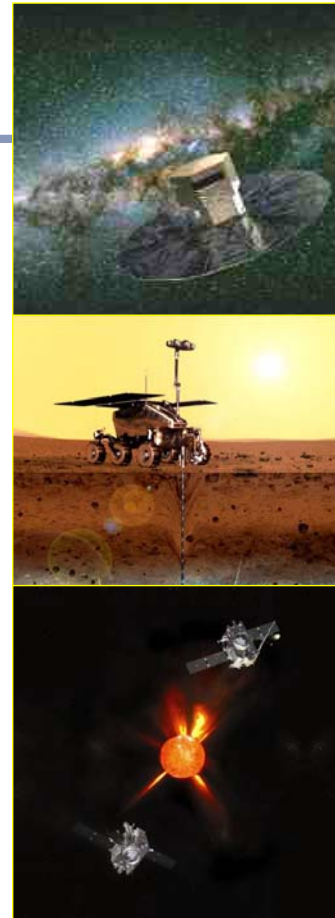
## Three pillars of UK space science and exploration

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ESA Science Programme for major, projects exploring the Sun, our Solar System and the Universe beyond

ESA Aurora Programme for robotic exploration of Mars, leading to the first international Sample Return mission

Projects with other international agencies for important niche science



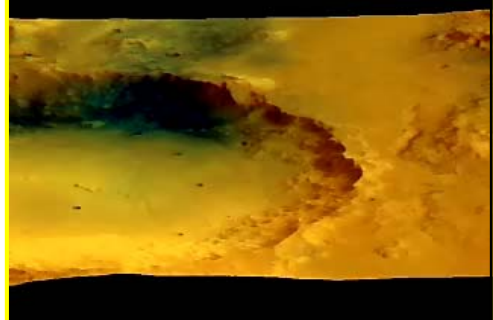
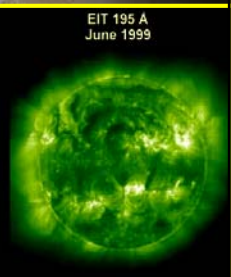
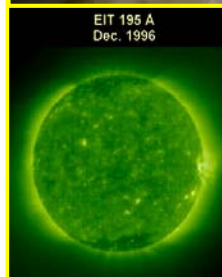
## UK Space Science in 2009...

*...Science enabled by technology*

10 university groups building space instrumentation

2 National laboratories providing expertise, facilities and instruments

50 + industrial companies winning contracts from ESA to build and operate the most advanced of spacecraft



## Earth Science

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*Space in support of understanding our  
changing planet*

## **GMES: space applied to long term environmental monitoring**

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The ESA/EU Global Monitoring for Environment and Security programme will deliver improved climate change, environment and civil security monitoring and services to meet the needs of European users.

ESA is responsible for the **satellite infrastructure** - the 'Sentinels'.  
The UK committed 87.5M€ to ESA in 2008

The new Climate Change programme will ensure that existing and new European satellites are used in an optimum way to turn data into information.

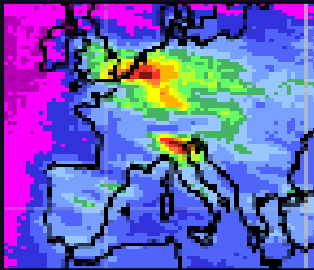
In particular to derive Essential Climate Variables for international climate change scientific assessment and policy

The UK committed 15M€ to ESA in 2008

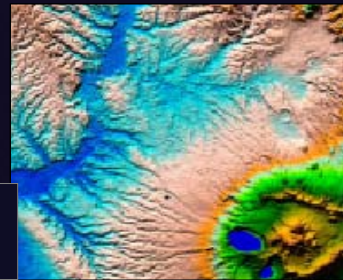
**UK also funds the EU GMES programme**



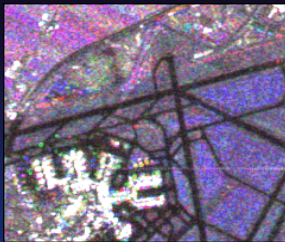
## **GMES will stimulate use of space-based data in areas such as ...**



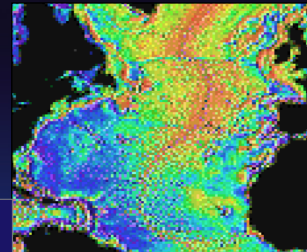
**Air quality**



**Disasters**



**Land Management**



**Marine services**



## **Meteorology and Disaster Monitoring**

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*Space assets are essential for a service used everyday  
by both the public, commerce and government*



## The Value of Forecasting Severe Weather

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**WMO estimate 80% of all disasters are weather related**

- **1999 storm in France cost €6.7 B**
- **Floods across Europe in 2002 cost in the region of €20B;**
- **Four major hurricanes struck the US between 13 August and 26 September 2004 killing more than 150 people and causing more than \$40B damage**

**The UK contributes to EUMETSAT for operation of its fleet of satellites**

## A unique UK success story

The UK-led Disaster Monitoring Constellation has 7 satellites in orbit  
BNSC funded the first UK DMC satellite  
Two more under construction by Surrey Satellite Technology Ltd.



## **Education and Awareness-raising**

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*space for education and education for space*



## Education

### **The BNSC partnership:**

**trains scientists through studentship and fellowship schemes**

**communicates the benefits of the UK space programme to the general public**

**uses the excitement of space to encourage young people to take up careers in science and engineering**



## Inspiring and Informing

### Telling the story of the UK in space...

BNSC now delivers its Space:UK magazine to every UK secondary school

BNSC is working with ESA and the UK's education department to establish a 'space education resources office' offering expertise and advice for schools in using space in education

BNSC is developing a comprehensive education programme



# **ESA at the Harwell Campus**

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*The new centre of UK space activities*



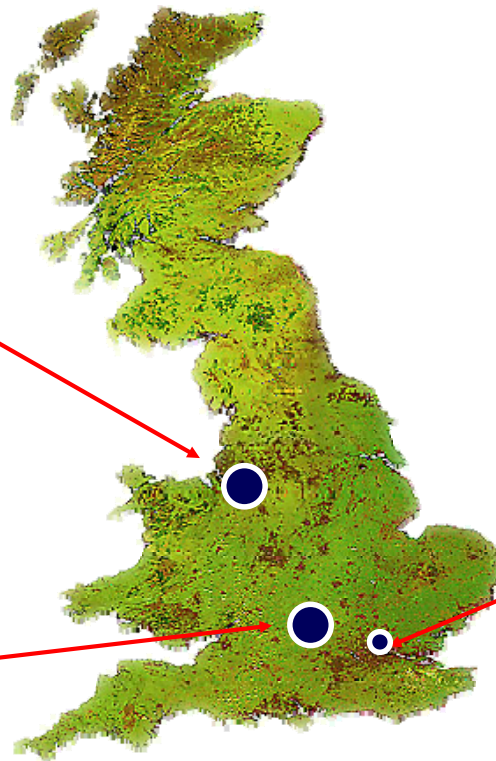
# National Science and Innovation Campuses



Daresbury Campus



Harwell Campus & RAL



London





## ESA Facility at Harwell

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Agreement in November 2008 to establish an ESA presence at the Harwell Science & Innovation Campus  
Focus on innovation and new ways of working

### Scope

- **Climate data assimilation & modelling**
- **Integrated Applications Promotion (IAP) Programme**
  - New public and commercial services using space data
- **Space Exploration**

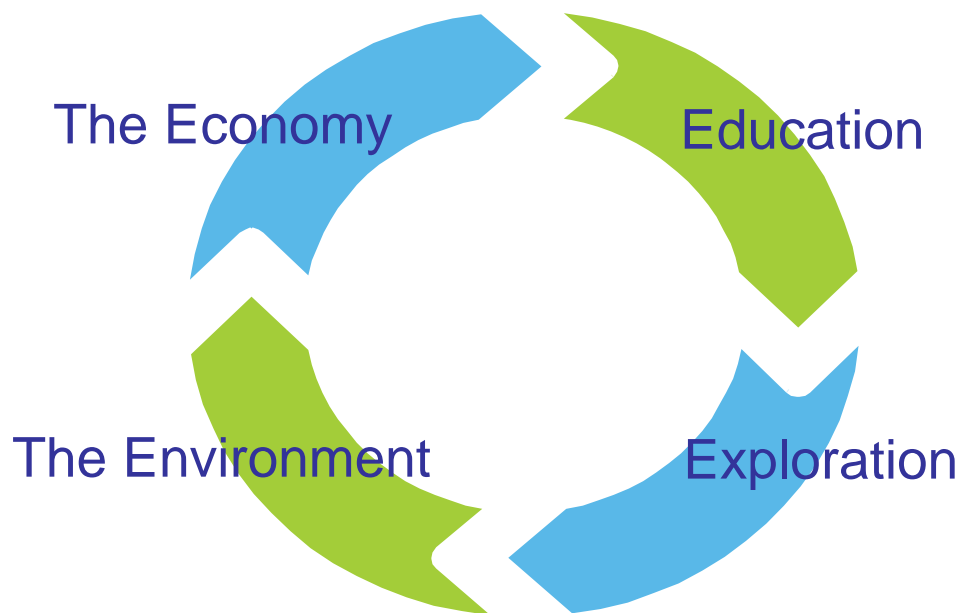
May be expanded to address other activities as demand justifies



## ESA at Harwell opened on July 22<sup>nd</sup> 2009



## In summary – strategy that delivers impact





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