



Centre for  
Polar Observation  
and Modelling  
Natural Environment Research Council



# → 1st ESA ADVANCED TRAINING COURSE ON REMOTE SENSING OF THE CRYOSPHERE

Welcome from the UK Space Agency

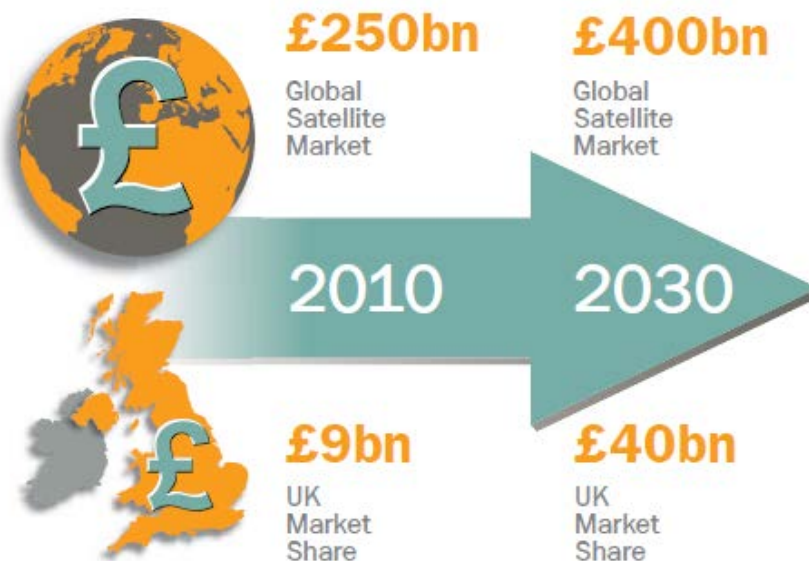
Beth Greenaway  
Head of Earth Observations

12–16 September 2016 | University of Leeds | Leeds, UK

- Part of UK Government – an Executive Agency of Department of Business Energy and Industrial Strategy
- Strategic leadership for the policy, regulation and programme delivery necessary to keep the UK's £11.8b space sector growing and innovating.
- Working with industry, academia and international partners to realise the government's ambition of capturing 10% of the global space market by 2030.
- It provides a stable regulatory framework for industry – an essential element of continued growth in the sector, helping to attract inward investment and secure export deals for UK space businesses.
- 2016 will see a major European Space Agency (ESA) Council of Ministers meeting in December where we hope to sustain UK involvement in world class science and innovation projects essential to understanding our changing planet, exploring our Solar system, and keeping UK industry competitive in a rapidly changing global space economy.

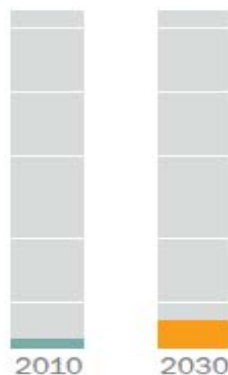


# UK Space – Growth



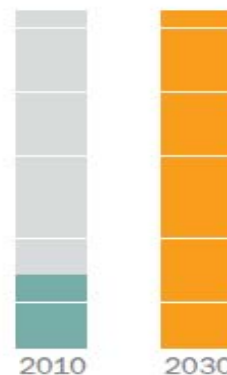
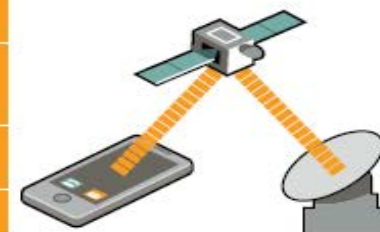
Satellite Applications Catapult

## MANUFACTURE AND INSTRUMENTS



£1bn £3bn

## SERVICES AND APPLICATIONS



£8bn £37bn

Satellite Applications Catapult



EO applications and services predicted to be central to space enabled economic growth aiming for a 10% UK share of the expected £400 billion global space-enabled market 2030.

# DATA is the new resource



2003

5 exabytes of  
data






2011

In 2011, the same amount  
was created **every two days**



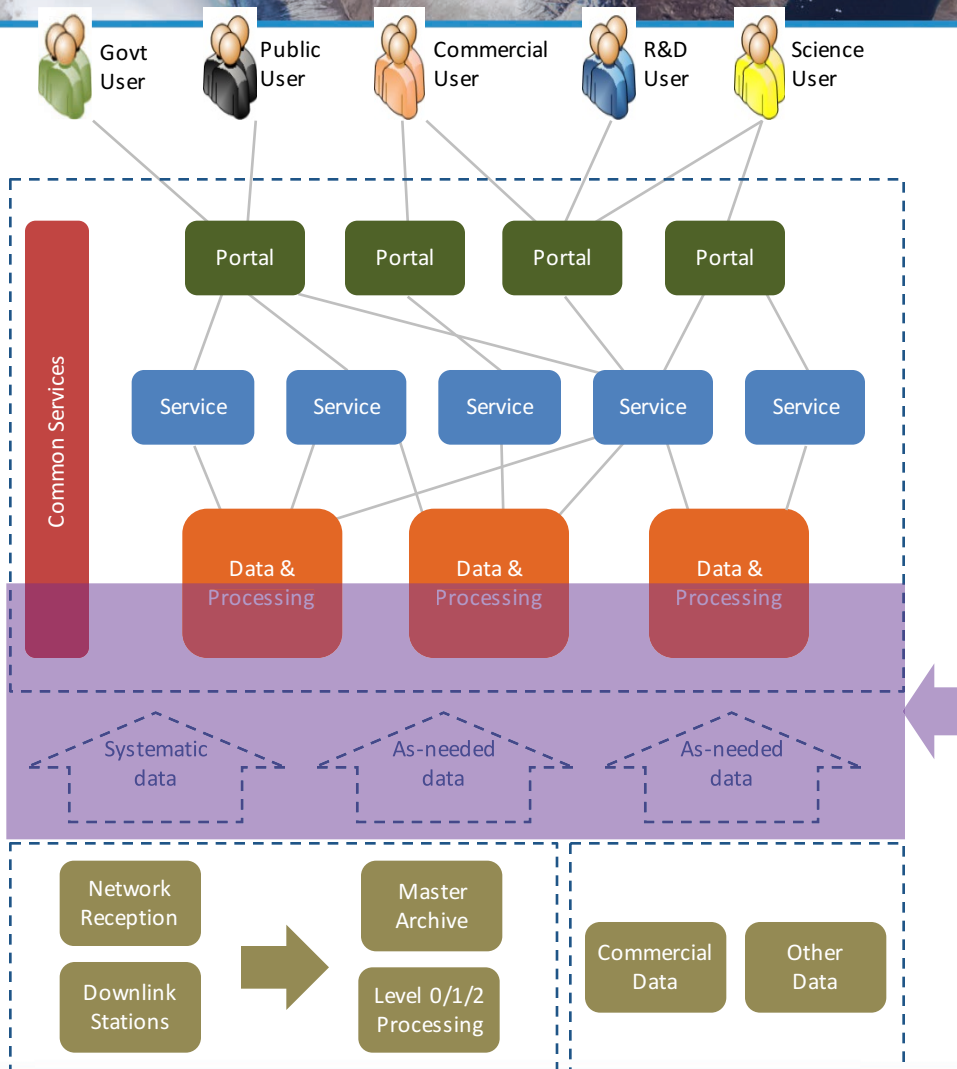
2013

Today, that time has shrunk  
to **every 10 minutes**



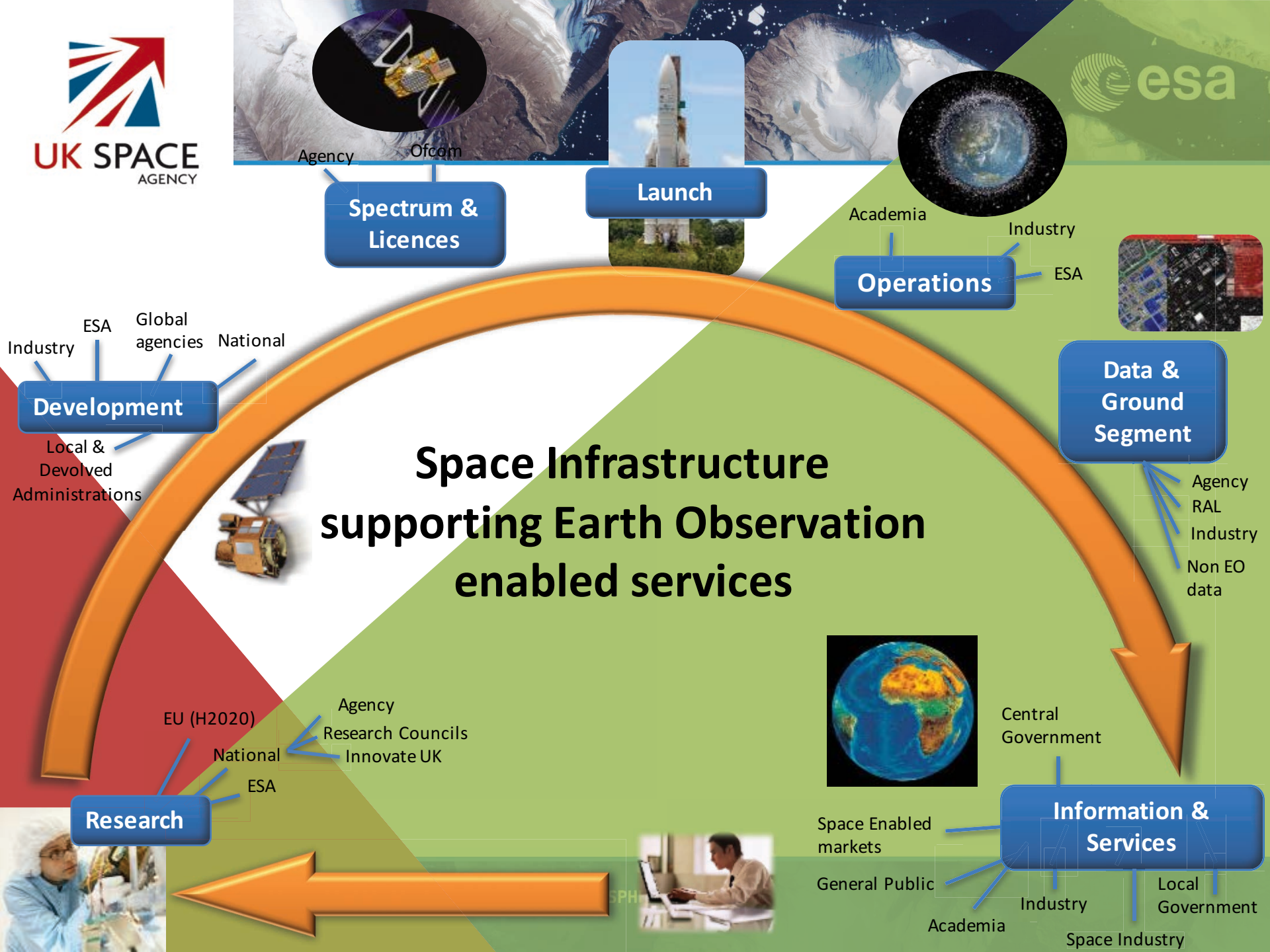
When fully operational **eight terabytes of new data per day will be available from Copernicus** for people to access, equivalent to eight computer hard drives worth, and all of it free to all for download.





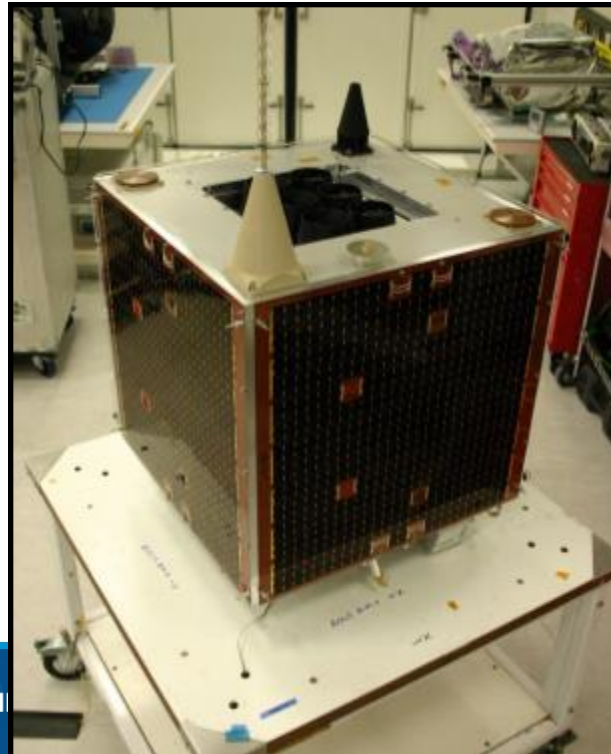
# Earth Observation Data Access and Exploitation:

## A Vision for the UK





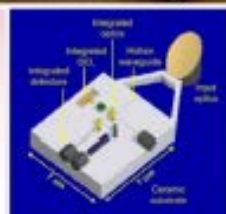
## Satellite Manufacture





# Example EO technology developments

## LIDAR & Laser Heterodyne Radiometry (LHR)



*Hollow waveguide implementations*  
*QinetiQ, Hollow Guide Ltd & RAL Space*

## Sub-millimetre wave technology



*320-360 GHz sideband separating mixer showing (above left) the STEAM-R radiometer (SSC)*  
*RAL Space, Airbus DS & QUB*



*Frequency Selective Surface*  
*QUB*



*Wide-band spectrometer*  
*STAR-Dundee*



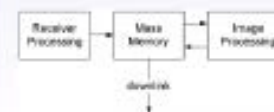
*Meta-materials devices*  
*Airbus DS, QMC*

## Microwave technologies

### GNSS Reflectometry



*SSTL + NOC, Universities of Surrey & Bath*



*On-Board SAR Processing*  
*Airbus DS/BAE Systems*

## Thermal Infrared instrumentation

*Fourier Transform Spectroscopy with 2D TIR detectors*  
*Airbus DS, SELEX & RAL Space*



*TIR Imaging for clouds*  
*UCL*

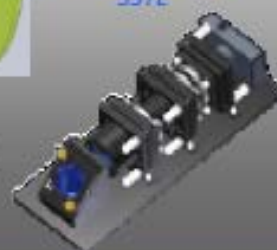


## Optical instrumentation

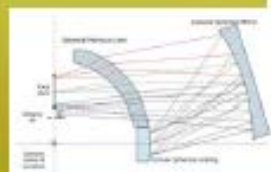


*Lightweight mirror technologies*  
*Gooch & Housego + SSTL*

*Microslice hyperspectral imager*  
*U of Durham*



*Compact concentric spectrometer for space and terrestrial use*  
*U of Leicester & SSTL*





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# UK Strengths



**Satellite  
Manufacture**

**Data Handling  
&  
Cal/Val**







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# UK Strengths



## Satellite Manufacture

## Data Handling & Cal/Val

## Applications



- A. Define and Lead EO strategy and policy development
- B. Enable growth of the EO and related sectors
- C. Position UK as a global leader in use of EO in applications and services
- D. Sector sponsor for the EO community (nationally and internationally)







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# UK Space Agency – Our EO Roles



## Leadership

3 staff  
£75m/yr

## Policy & Regulation

Copernicus  
GEO, CEOS,  
EUMETSAT  
ESA

## Education & Training

Climate  
markets,  
ESA  
Summer  
School

## Programmes

EOEP, CCI,  
Incubed,  
SWOT etc

## Science & Technology

EOEP, CEOI  
CDSSG

## Innovation & Investment

Video from  
space,  
Exploitation

## Business Growth

EO based  
growth  
£37billion  
by 2030

## Partnership

X- Gov, ESA,  
EU, Industry  
,academia,  
global



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# National and International

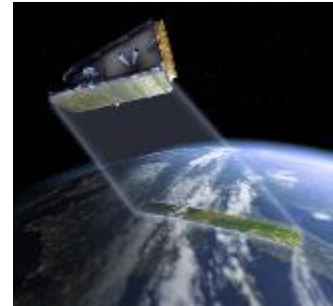


## National Initiatives

SSGP



EOWG



## European Space Agency & European Union



## International Space Partnerships

**Emerging SPACE economies**  
**“Newton”-like**  
**CEOS GEO**  
**Disaster Charter**



- We remain a full member of the EU – until the process for leaving is concluded there is no change in the legal framework (i.e. EU space programmes)
- The Government's policy to leave has no immediate effect on those applying for or participating in EU programmes - the UK is still an EU Member State
- UK participants can continue to apply for H2020/Galileo/Copernicus/other contracts in the usual way
- EEA nationals are welcome to live and work in the UK
- ESA is not part of the EU. Our membership of ESA does not change in any way.
- Part of



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# Finally



@spacegovuk

EO is an essential component of the infrastructure and contributor of economic growth, data and science.

Success for UKSA requires growing existing UK strengths, seizing new markets and engaging the public sector as operational users.

Technology and business models are changing. Skills development is essential to deliver operational services to realise the benefits of EO.





[Beth.Greenaway@ukspaceagency.bis.gsi.gov.uk](mailto:Beth.Greenaway@ukspaceagency.bis.gsi.gov.uk)  
[eoteam@ukspaceagency.bis.gsi.gov.uk](mailto:eoteam@ukspaceagency.bis.gsi.gov.uk)  
[@spacegovuk](http://www.gov.uk/ukspaceagency)

Any questions?

**ENJOY THE COURSE**