Doing Business In Space

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Astrium Earth Observation Navigation and Science

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astrium

Introduction

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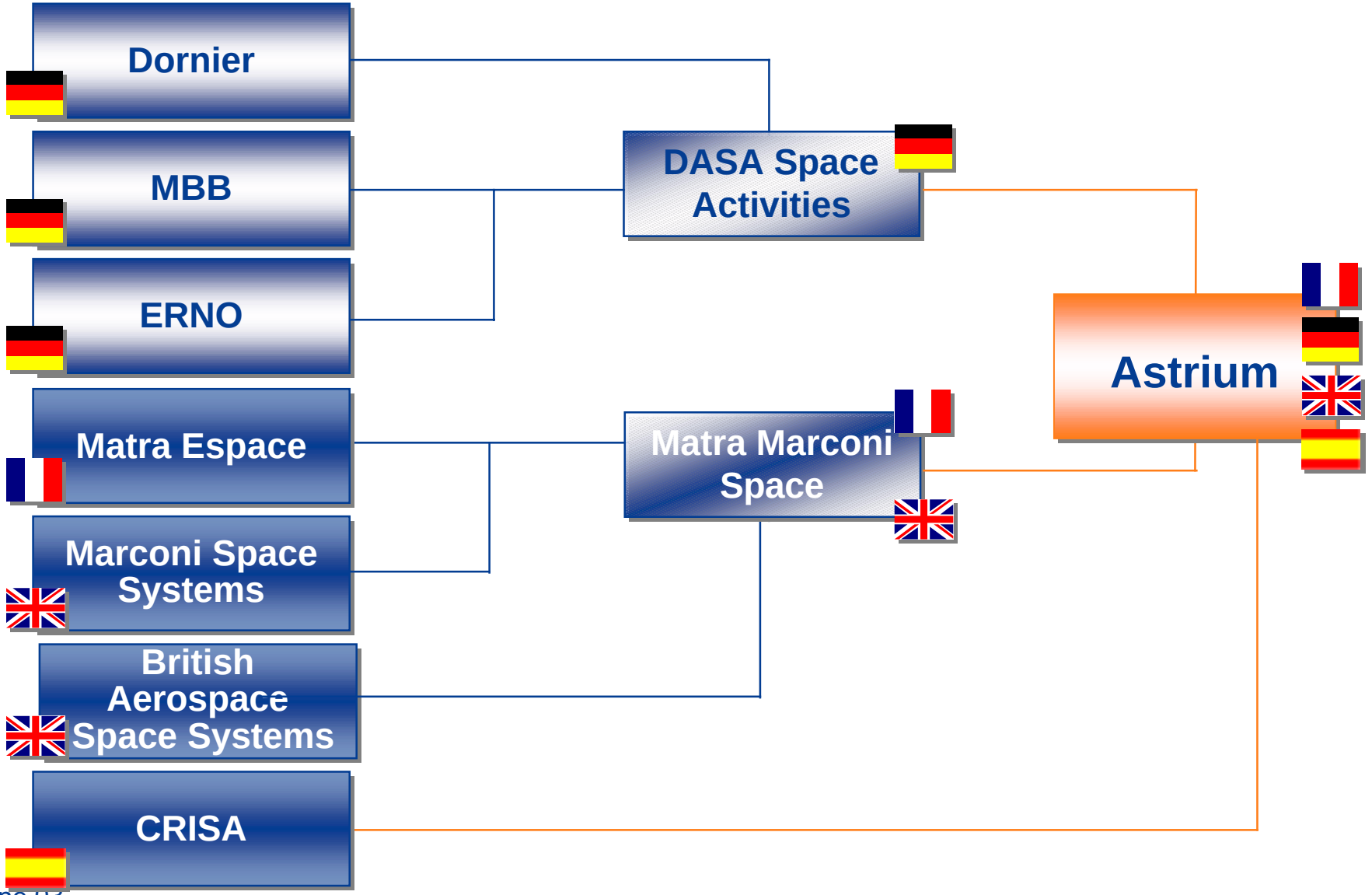
What is this talk about ?

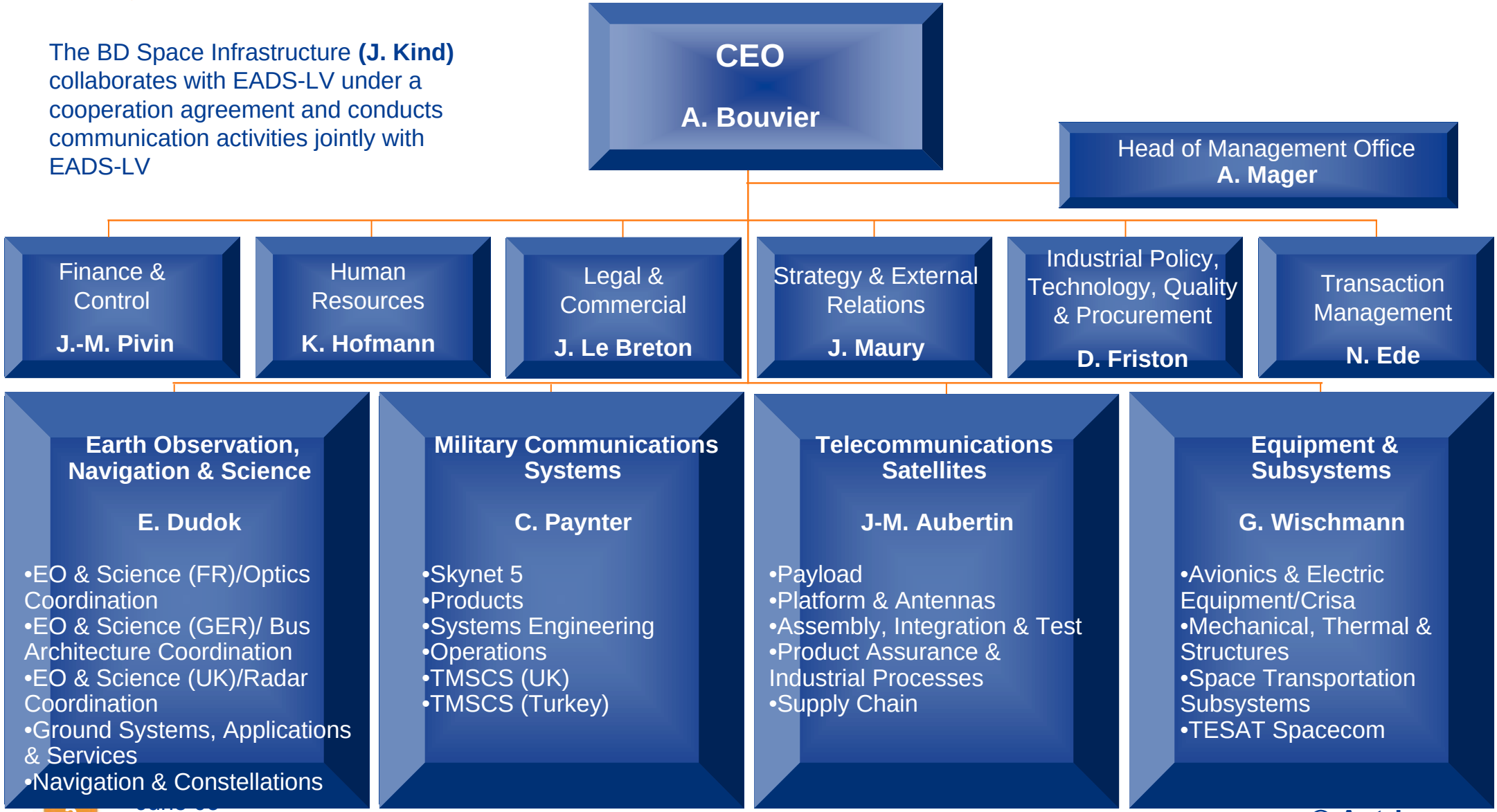
- Something about Astrium
- An overview of the UK Space Industry
- What we mean by ‘Institutional Business‘
- Words about the European Space Agency
- Some details on ESA programmes and budgets
- Some hints as to how to do business in the space industry.

Astrium Company history in brief

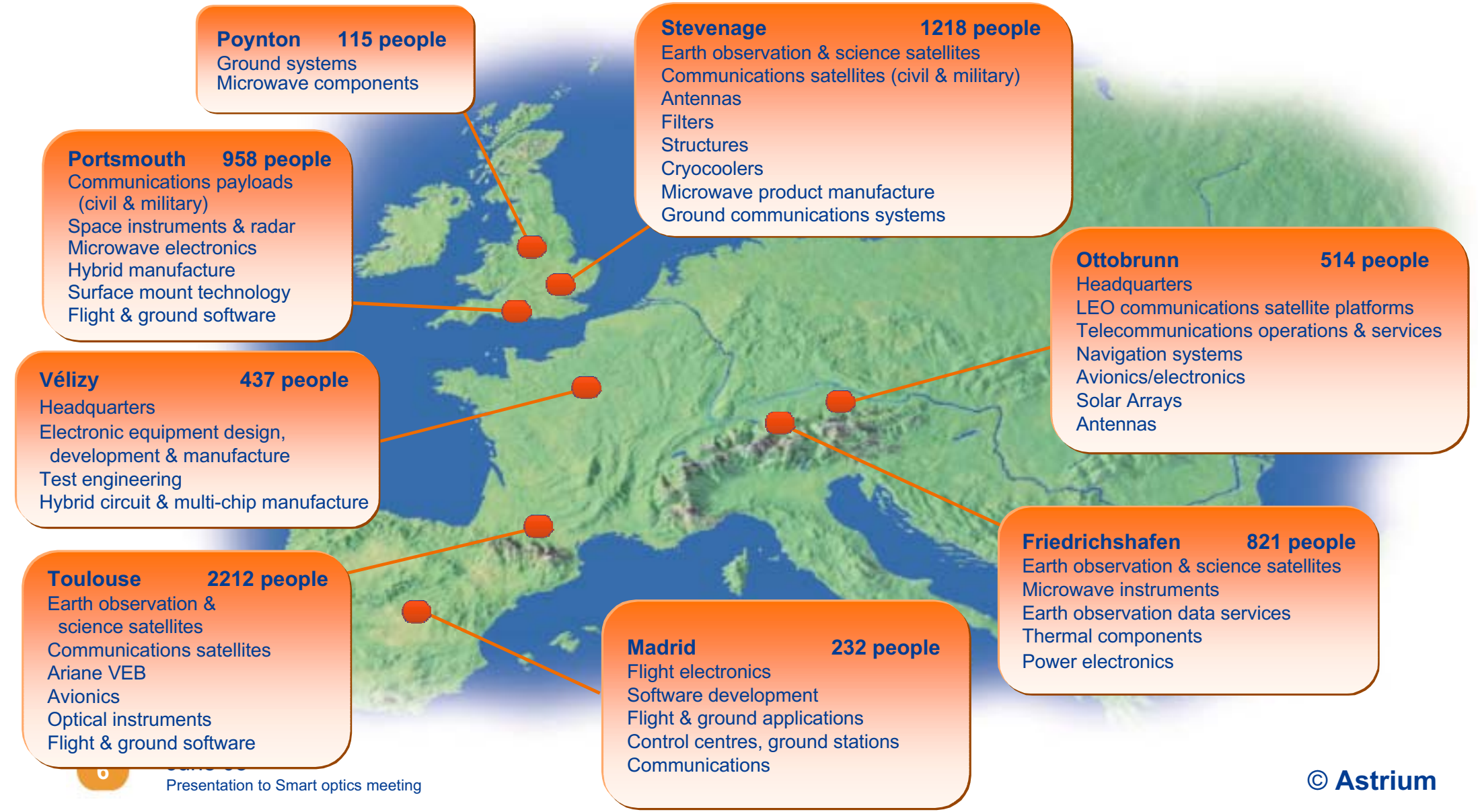


Top level organisation

The BD Space Infrastructure **(J. Kind)** collaborates with EADS-LV under a cooperation agreement and conducts communication activities jointly with EADS-LV



Sites: Headcount & Activities, November 2002



Poynton **115 people**
Ground systems
Microwave components

Portsmouth **958 people**
Communications payloads (civil & military)
Space instruments & radar
Microwave electronics
Hybrid manufacture
Surface mount technology
Flight & ground software

Vélizy **437 people**
Headquarters
Electronic equipment design, development & manufacture
Test engineering
Hybrid circuit & multi-chip manufacture

Toulouse **2212 people**
Earth observation & science satellites
Communications satellites
Ariane VEB
Avionics
Optical instruments
Flight & ground software

Stevenage **1218 people**
Earth observation & science satellites
Communications satellites (civil & military)
Antennas
Filters
Structures
Cryocoolers
Microwave product manufacture
Ground communications systems

Ottobrunn **514 people**
Headquarters
LEO communications satellite platforms
Telecommunications operations & services
Navigation systems
Avionics/electronics
Solar Arrays
Antennas

Friedrichshafen **821 people**
Earth observation & science satellites
Microwave instruments
Earth observation data services
Thermal components
Power electronics

Madrid **232 people**
Flight electronics
Software development
Flight & ground applications
Control centres, ground stations
Communications

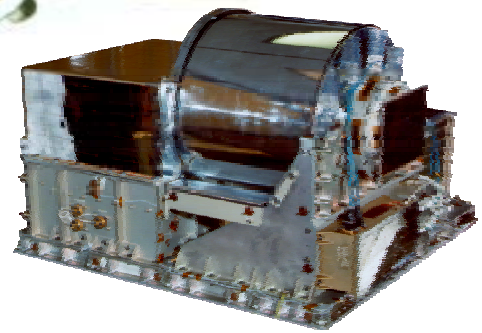
ENS (UK) IN BRIEF

- **The UK arm of the Earth Observation,Science and Navigation Business Division of Astrium**
- **About 250 people, with:**
  - 100 Portsmouth
  - 150 Stevenage
- **Turnover 1999 : 160 Million Euro**
- **Markets are predominantly institutional but commercial markets are also being addressed**
- **A heritage stretching back to the earliest days of space science in the UK, including the still-continuing Skylark sounding rocket programme, the first all-UK built spacecraft (Ariel IV) and early European missions (e.g. HEOS)**

HERITAGE

HUBBLE SPACE TELESCOPE

ATSR
(Along Track Scanning Radiometer)



AMSU-B
(Advanced Microwave Sounding Unit-B)

POLAR PLATFORM (ENVISAT-1)

MISSION:

- Environmental (Earth science)

LAUNCH DATE:

- February 2002

PRIME:

- Astrium Limited

EOS(UK) ROLE:

- Prime Contractor for Design, Development & Manufacture of the European Polar Platform
- Prime contract for the ENVISAT-1 mission
- Payload Contractor for ASAR & AATSR Instruments

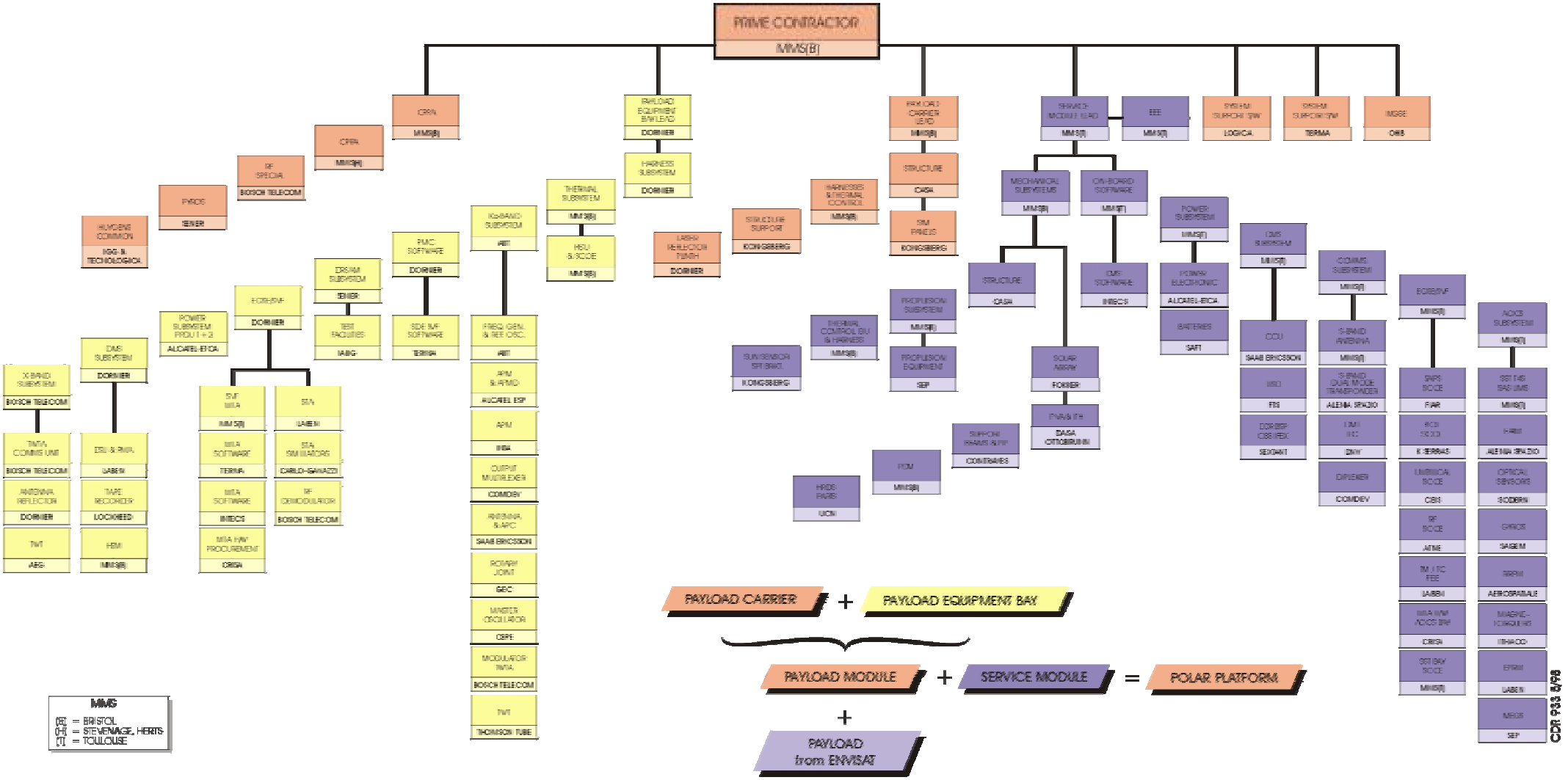
General:

- LEO: 800km
- Solar Array: 14m x 5m
- Mass: 8500kg (Launch)
- Size:

	STOWED	DEPLOYED
H:	10m	25m
D:	4m	7m
W:	4m	10m

- Design Life: 5 years

POLAR PLATFORM FUNCTIONAL BREAKDOWN & INDUSTRIAL STRUCTURE

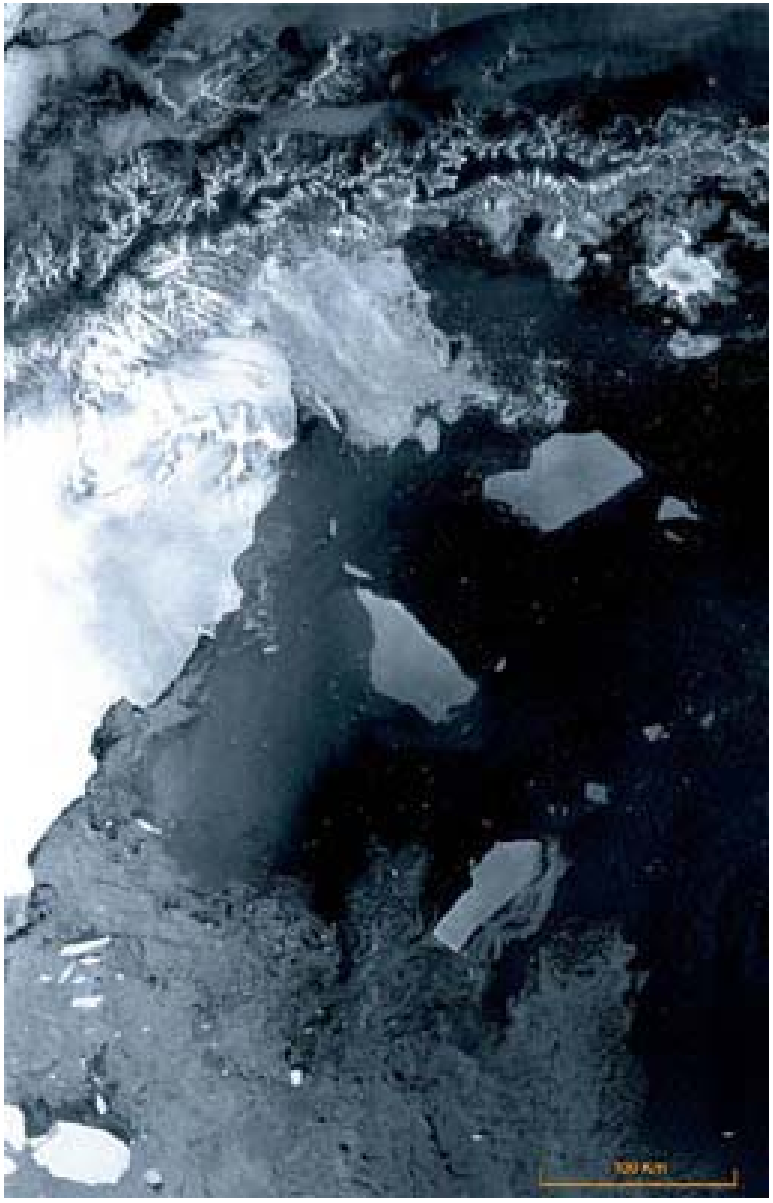


ENVISAT – FIRST RESULTS

- **ASAR (at right) and MERIS (below) images**

Phytoplankton off South-West Africa and

the disintegration of the Larsen ice shelf off Antarctica



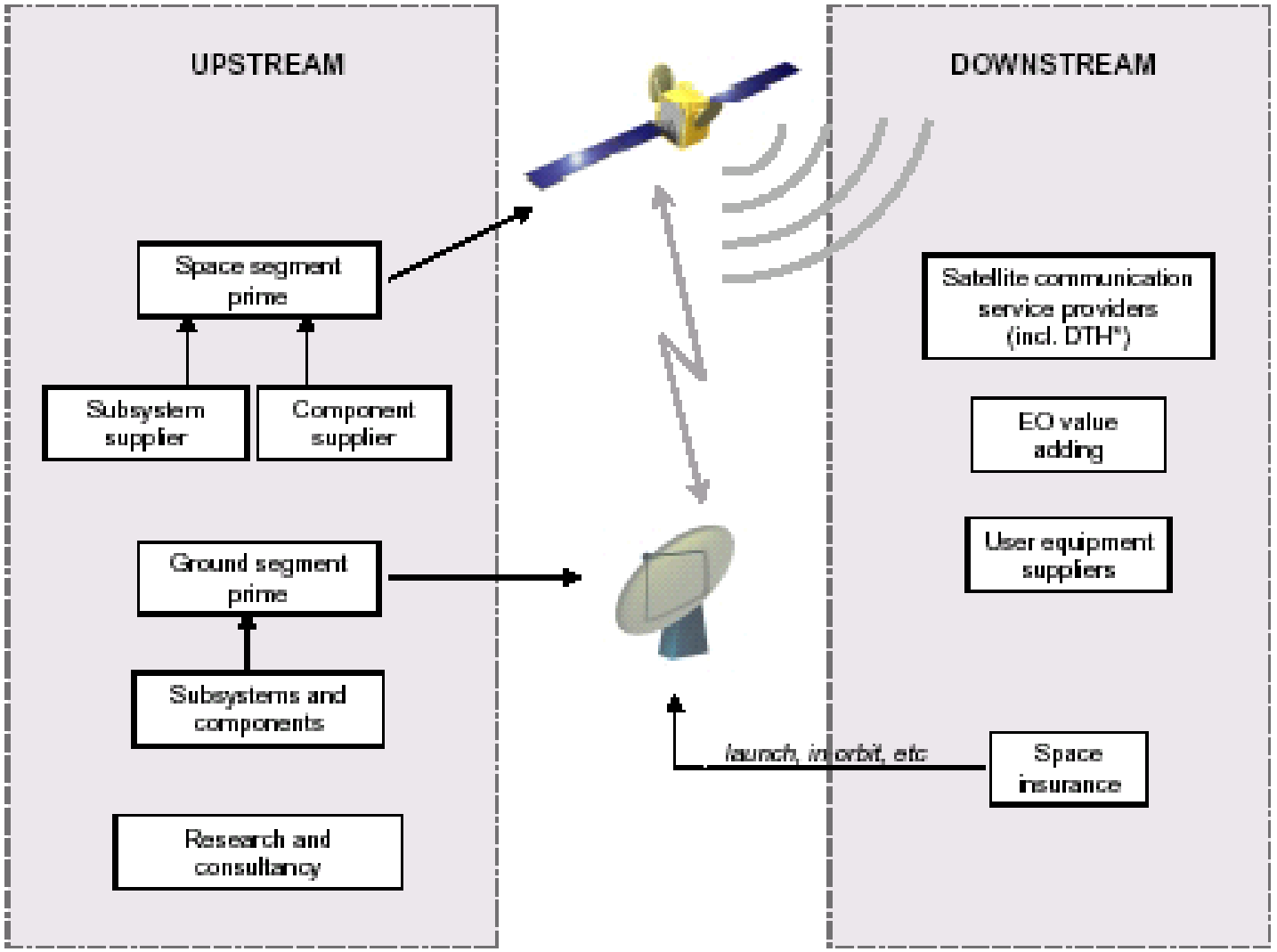
The UK Space Industry

2

The Size and Shape of the UK Space Industry

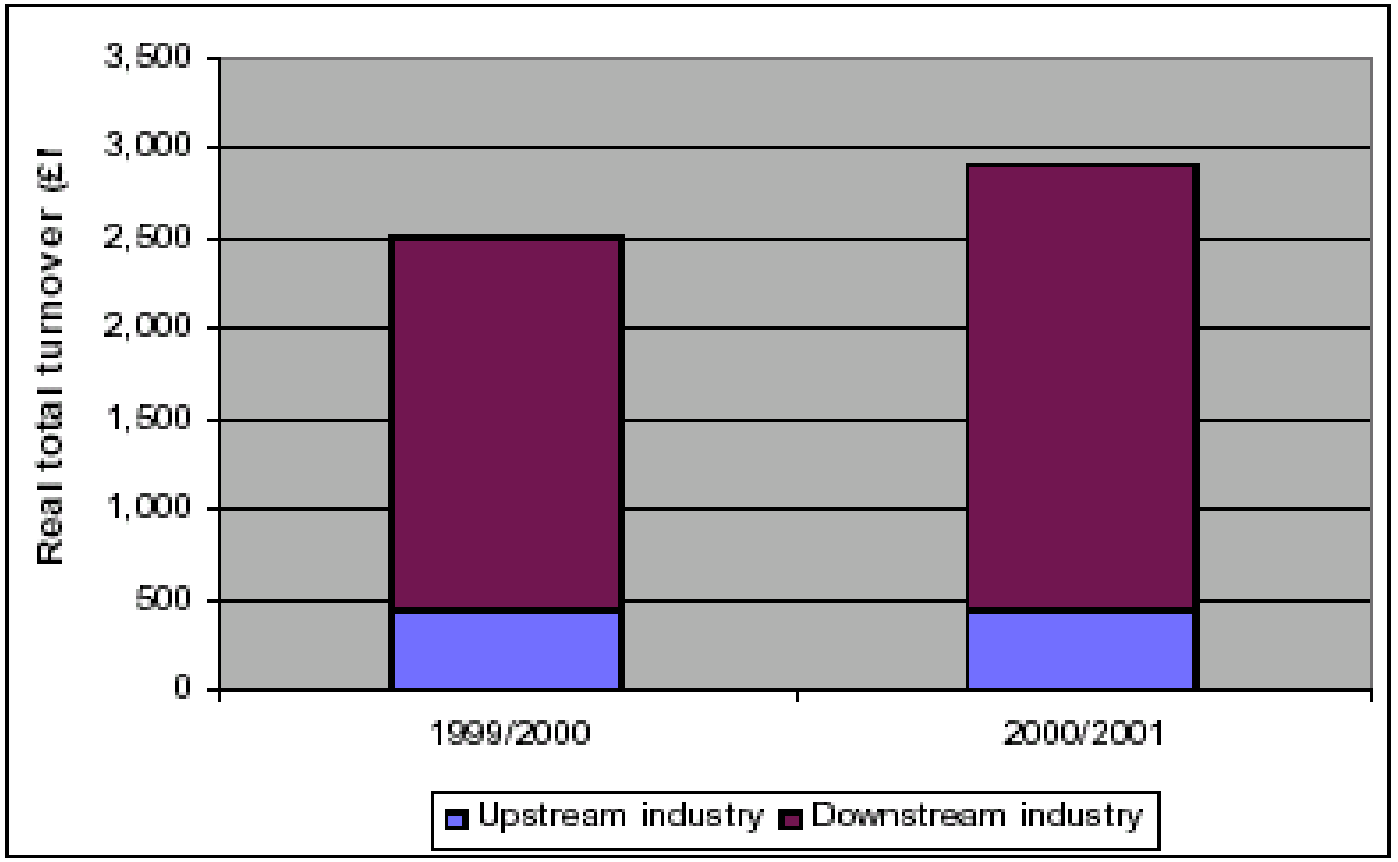
Reported by BNSC on a regular basis

- **2002 report carried out by ESYS Ltd. surveyed 230 companies**
- **Most of the space-related business is in down-stream services and applications**



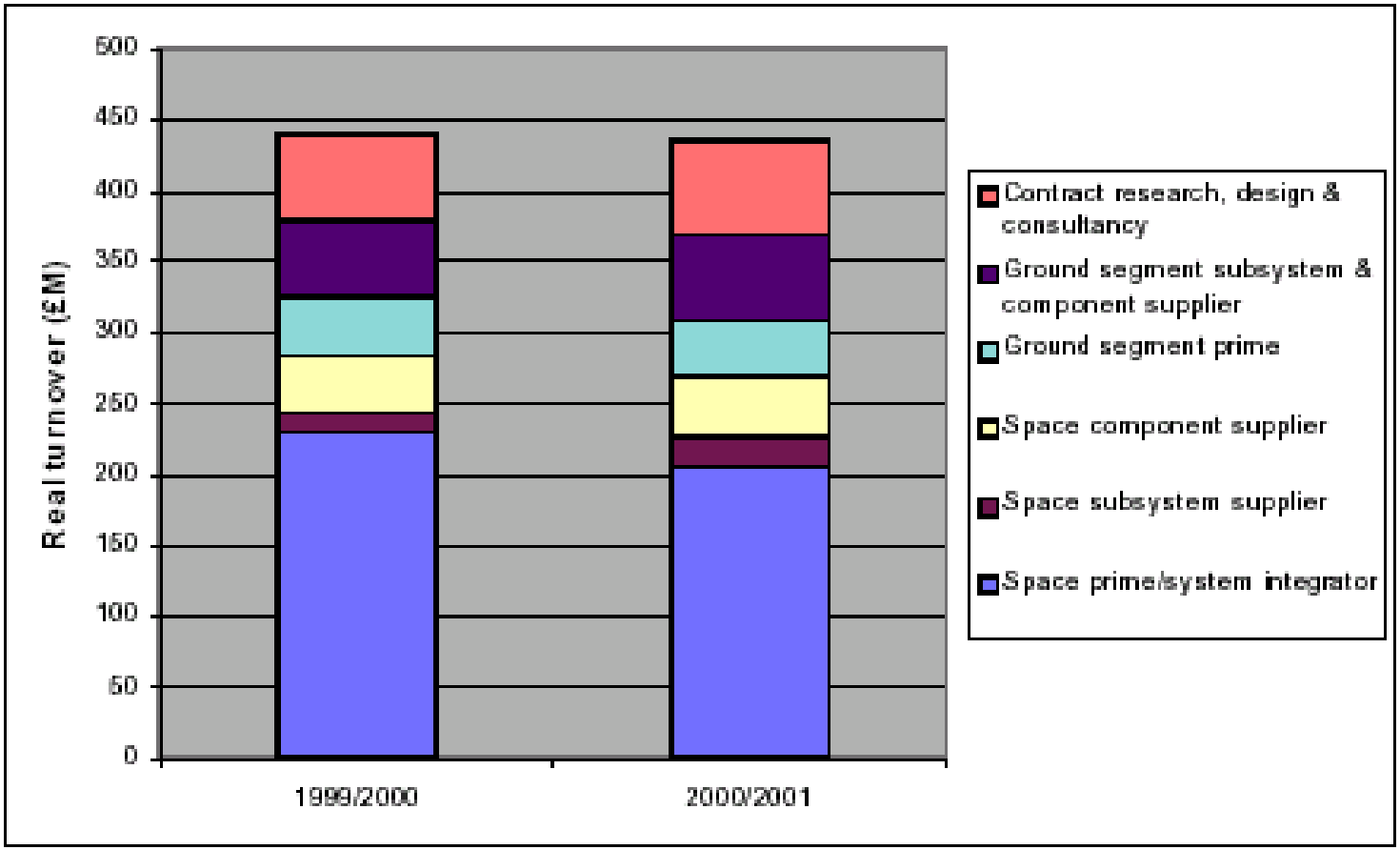
The Size and Shape of the UK Space Industry

Split between upstream and downstream industry



The Size and Shape of the UK Space Industry

- **From within the upstream sector,** Growth sectors since 1999/2000 include space subsystem suppliers (+51.4%), space component suppliers (+5.9%), ground subsystem and component suppliers (+10.2%) and the contract research, design and consultancy sector (+7.3%).



The Size and Shape of the UK Space Industry

	1999/2000	2000/2001	Change
Upstream	5,008	5,162	+3%
Downstream	8,781	10,539	+21%
Total all employees	13,789	15,701	+14%

Employment in the UK space industry

Institutional Customers

3

What are Institutional Customers?

In the following, I am assuming that the technical interests of this audience will mostly find commercial application within Institutional Customers

Space science is a ‘luxury item’ for Governments and their agencies

There are several types of institutional customer in the space world

- A government user agency (e.g. a defence ministry)
- A dedicated national space agency (e.g. NASA; CNES)
- An international entity established by treaty between governments (e.g. ESA; EUMETSAT)

Features of Institutional Customers

- **They are spending taxpayers' money, and are accountable to national parliaments**
- **They are not motivated by profit but 'PUBLIC GOOD'**
- **Value for money is crucial**
- **Non-commercial objectives include:**
  - National pride
  - Scientific advancement (knowledge)
  - Technological advancement (capability)
  - Growing or maintaining employment within the national industry
  - National or Foreign policy (e.g. comparisons with other countries; access to strategically important information)
- **For international entities, the issue of 'geographical return' may arise.**

Features of Institutional Business

- **Quite structured programmes, often well-defined several years ahead**
  - ⇨ makes mid-term strategic planning possible
  - ⇨ It takes a long-time to join understand the 'wiring diagram' of the industry
- **The space business runs on slow 5-10 year cycles**
  - ⇨It can take a long time for new companies to establish
- **'expert' customers**
  - ⇨ they know what they want, how much to pay, and sometimes how they want it to be built.
- **Innovation takes a long time**
  - ⇨ New ideas or approaches are appreciated
  - ⇨ But they can be hard to take through to application, because project managers are extremely risk averse
- **May impose non-technical constraints (e.g. geo-return, use of SMEs…)**
  - ⇨ can lead to an over-constrained problem for industry to solve in bidding for work.

The European Space Agency

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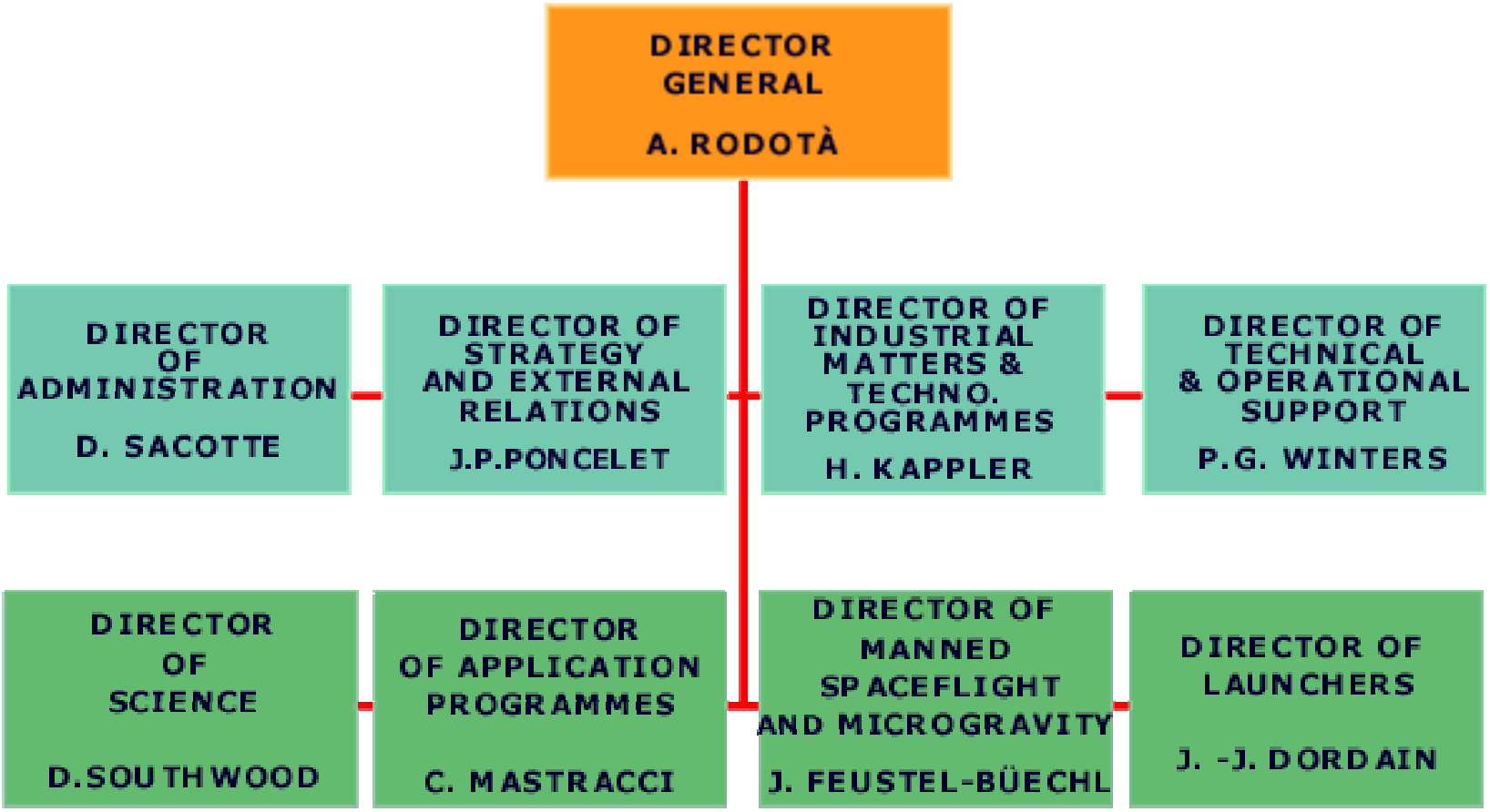
The European Space Agency

- **Founded by international treaty following the collapse of ELDO (European launcher development Organisation) as a means of expanding the successful activities of ESRO (European Space Research Organisation)**
- **The text of the ESA Convention (Ref.CSE CS(73)19,rev.7) was approved by the Conference of Plenipotentiaries held in Paris on 30 May 1975. The European Space Agency functioned de facto from *31 May 1975*. The ESA Convention entered into force on 30 October 1980. Date of deposit of instruments of ratification:**

Member States of ESA	Ratification
Austria	30.12.1986
Belgium	03.10.1978
Denmark	15.09.1977
Finland	01.01.1995
France	30.10.1980
Germany	26.07.1977
Ireland	10.12.1980
Italy	20.02.1978
Netherlands	06.02.1979
Norway	30.12.1986
Spain	07.02.1979
Sweden	06.04.1976
Switzerland	19.11.1976
United Kingdom	28.03.1978

A Cooperative Agreement between ESA and Canada entered into force on 1 January 1989, and Portugal joined ESA in 2000.

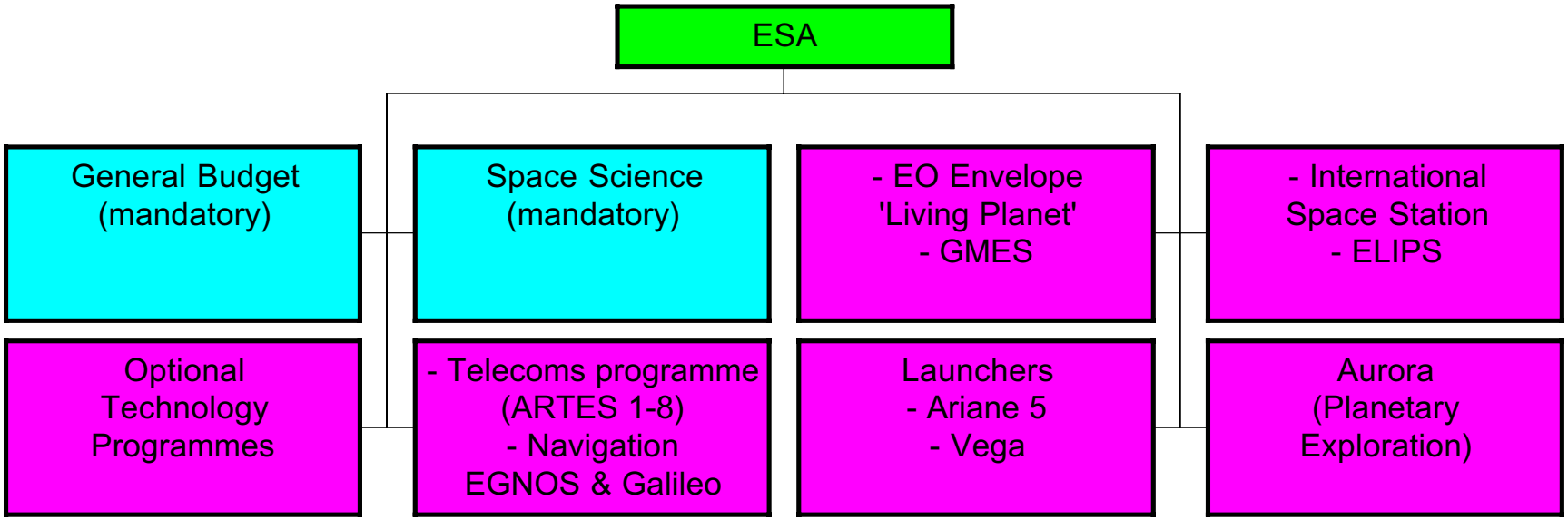
ESA Organisation



ESA Programme Structure

All Member States participate in activities related to space science and in a common set of programmes (mandatory programmes).

They also choose their participation in a set of optional programmes



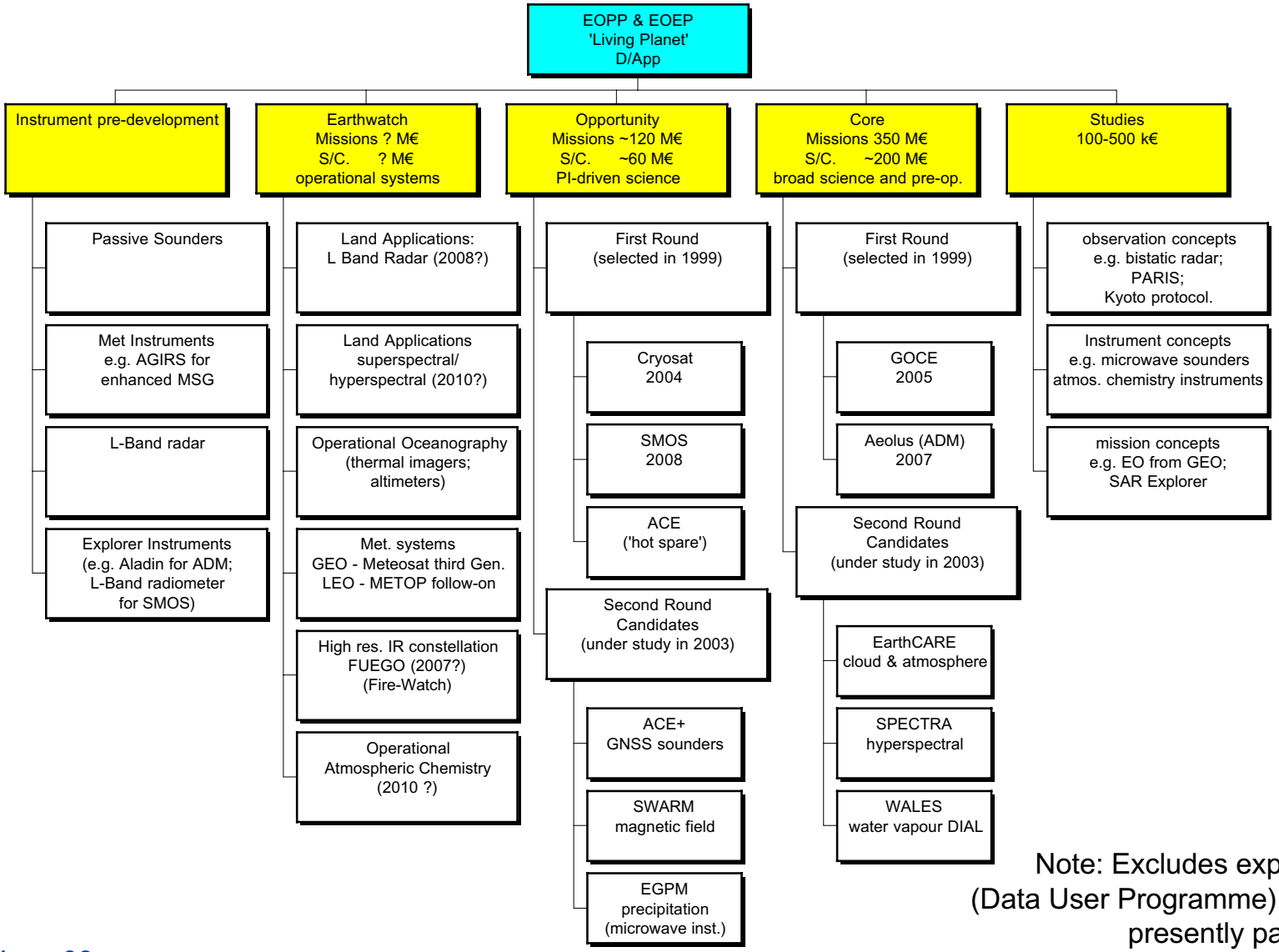
The 2001 ESA Ministerial

- Every 2-3 years the Ministers of the ESA member nations meet to formally discuss and approve the budgets of ESA.
- ESA makes a proposal for funding various programmes
- Member nations discuss these with ESA through working groups with national agencies in the year before the meeting
- The 2001 Ministerial at Edinburgh approved 7.8 billion Euro of expenditure (cf 2 billion at Brussels in 1999)

The 2001 ESA Ministerial

- General budget – 825Meuro 2002-06 (cf 919 Meuro ESA request)
- Ariane 5 Step 3 (699Meuro/102% subscribed)
- Total Ariane 5 commitment - 1256Meuro
- Science budget 259Meuro/yr + 2.5% inflation (less than ESA requested)
- EOEP2 Explorer– only 55% /926Meuro commitment –> major impacts on planned programme
- EarthWatch – initial phase of TerraSAR (30Meuro) was 84 % supported, and so begins
- GMES – 100% /80MEuro – major D/F/UK participation
- Aurora – only 35% (14Meuro) commitment (no D and small I share)
- ARTES 1 – 54% (27Meuro) subscribed
- ARTES 3 – 45% (213 meuro) subscribed
- ARTES 4 – 142% (164meuro) subscribed
- ARTES 5 – 15% (54Meuro) subscribed
- ARTES 8 27% (135Meuro) subscribed – 110 Meuro from France
- ISS inc. ELIPS – 860Meuro (less than planned but meets IGA requirements)

ESA EO Activities

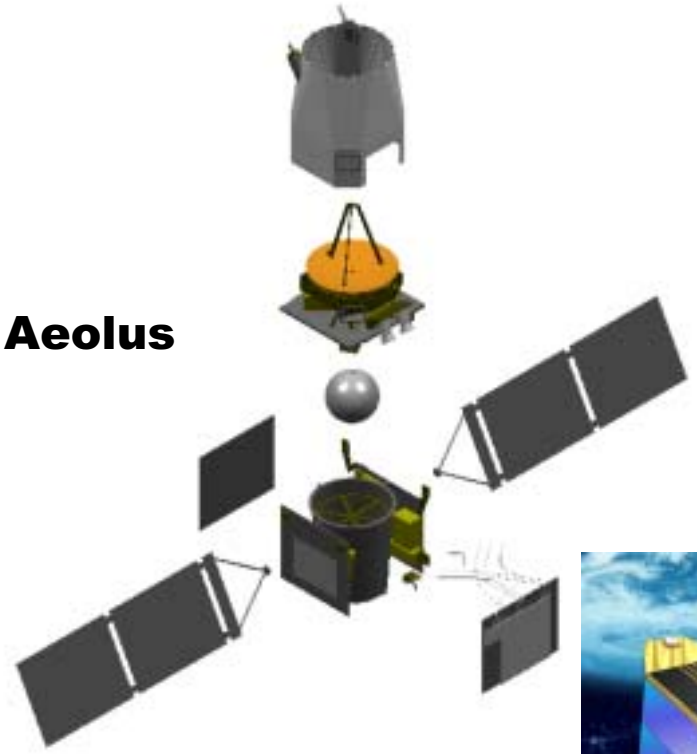


Note: Excludes exploitation activities (Data User Programme) which the UK does not presently participate in

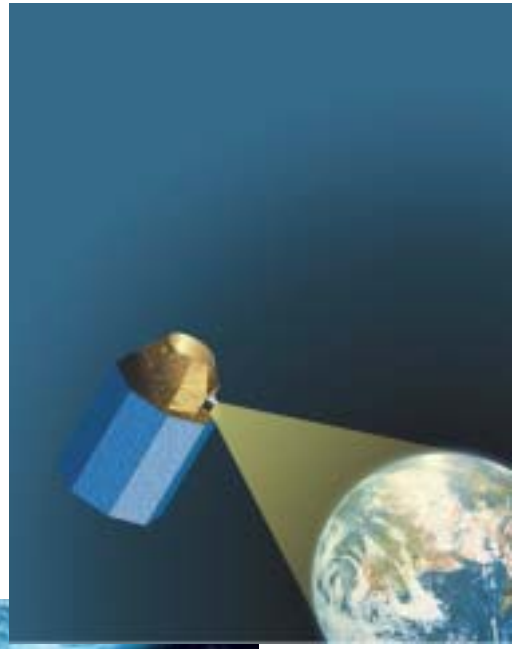
FUTURE EARTH OBSERVATION

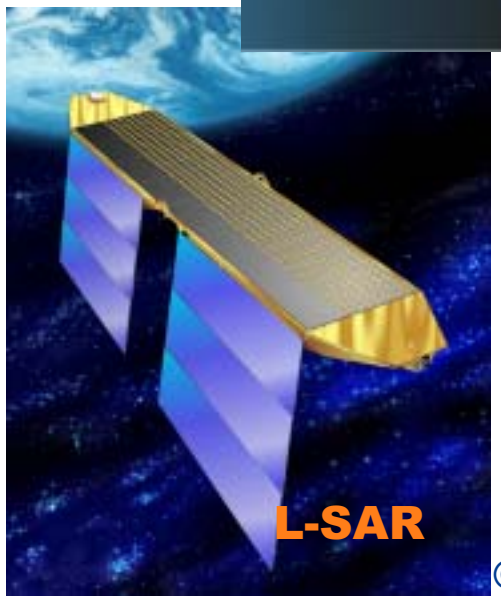
EarthCARE

Aeolus

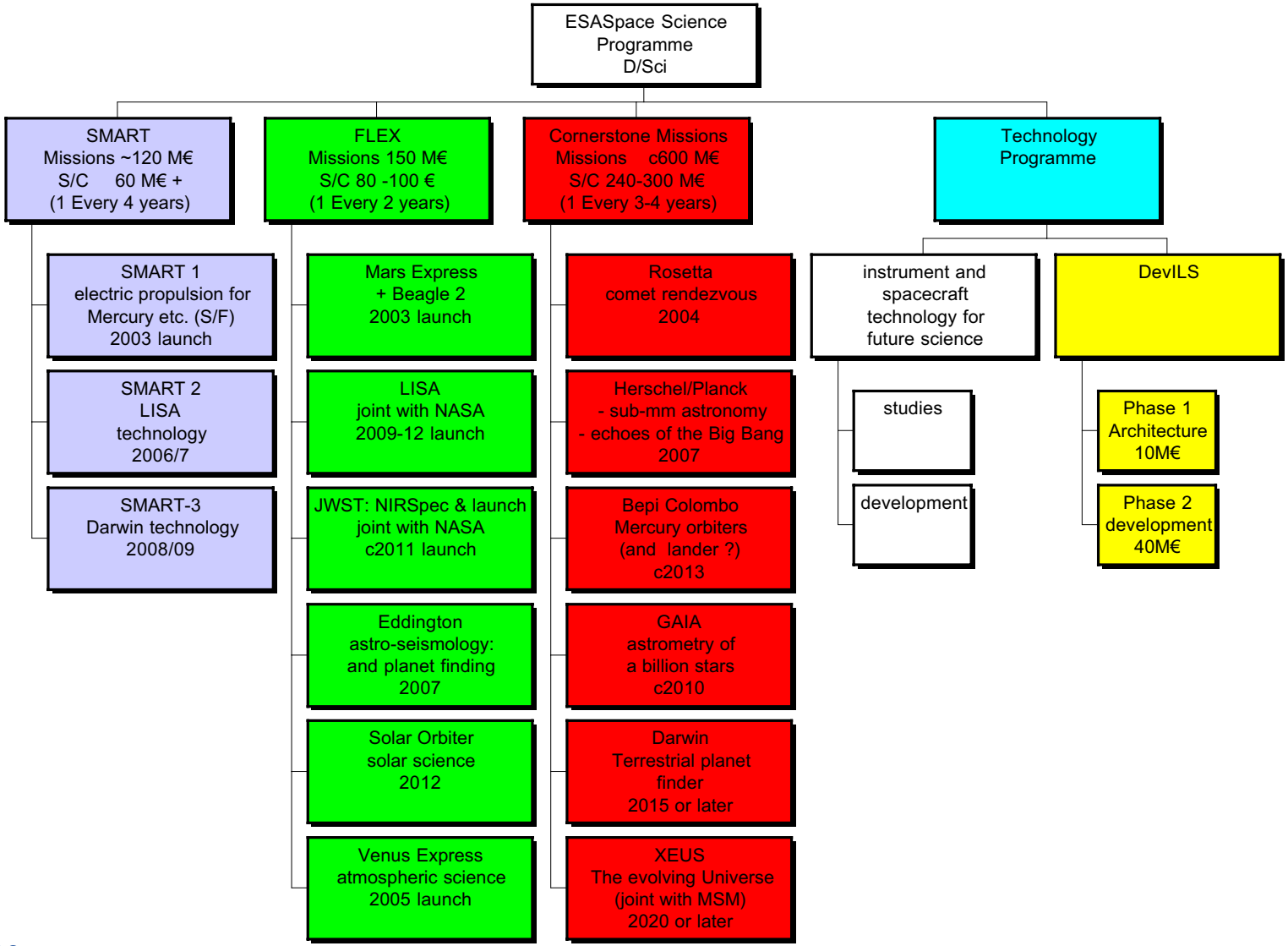


Geoscia



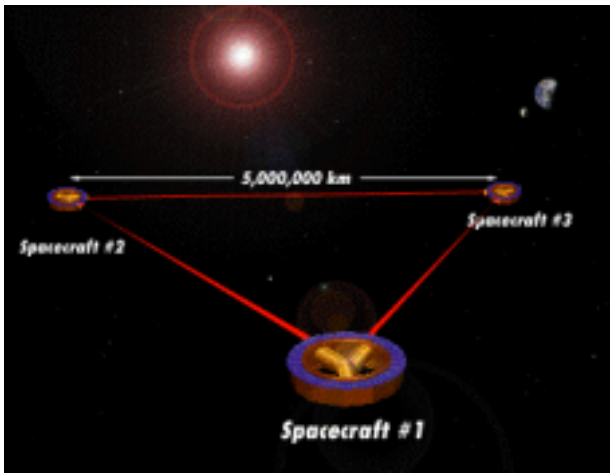


ESA Space Science Activities

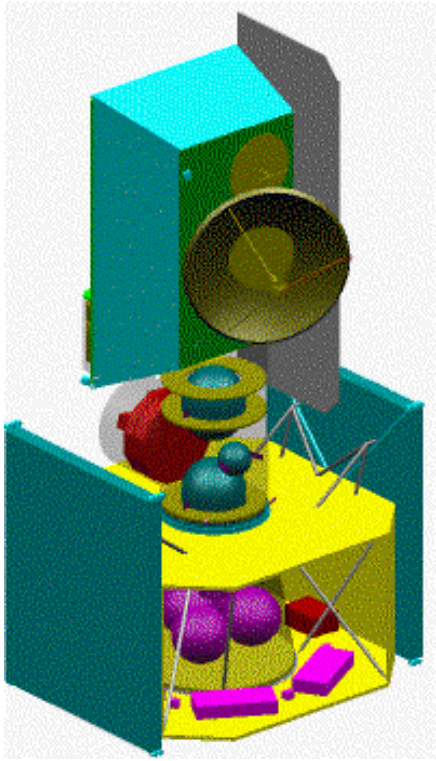


FUTURE SPACE SCIENCE

Darwin

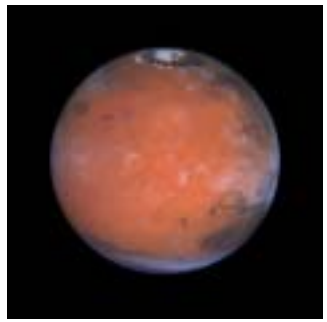


LISA

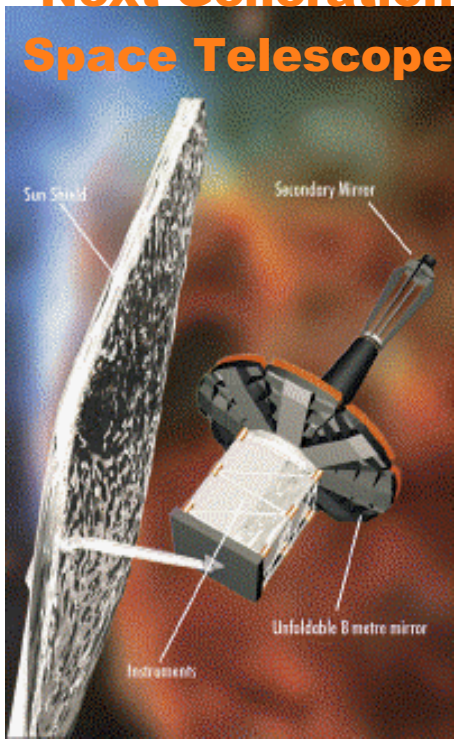


Bepi Colombo

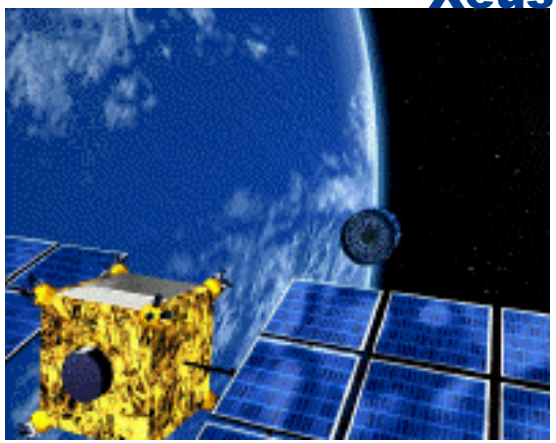
Aurora

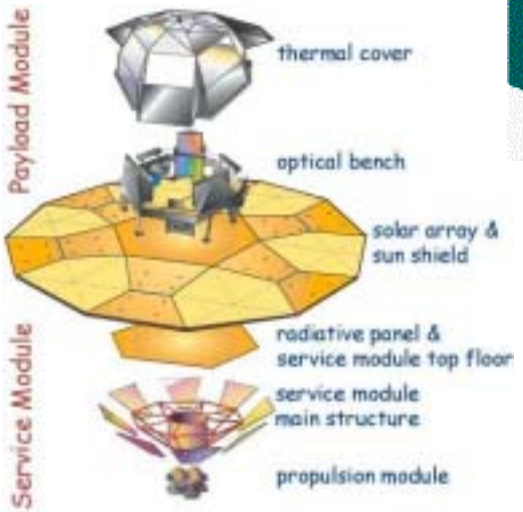


Next Generation Space Telescope

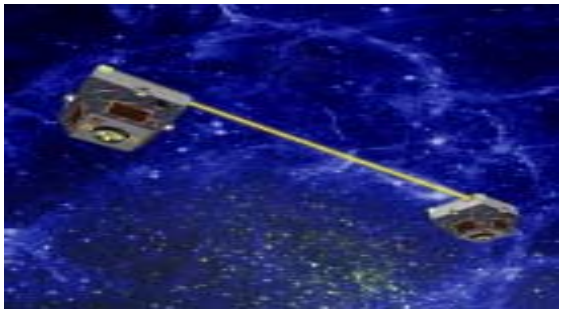


Xeus





GAIA



SMART-2

ESA and Geo-Return

Article IV of Annex VI of ESA's convention contains the famous geo-return requirements:

The geographical distribution of all the Agency's contracts shall be governed by the following general rules:

1 A Member State's overall return coefficient shall be the ratio between its percentage share of the total value of all contracts awarded among all Member States and its total percentage contributions…

3 Ideally the distribution of contracts placed by the Agency should result in all countries having an overall return coefficient of 1.

4 The return coefficients shall be computed quarterly and shown cumulatively for the purpose of the formal reviews referred to in paragraph.

5 Formal reviews of the situation of geographical distribution of contracts shall take place every three years.

6 The distribution of contracts between formal reviews of the situation should be such that, at the time of each formal review, the cumulative overall return coefficient of each Member State does not substantially deviate from the ideal value. For the first three-year period, the lower limit for the cumulative return coefficient is fixed at 0.8. At the time of each formal review, the Council may revise the value of this lower limit for the subsequent three-year period, provided that it shall never be lower than 0.8…

Features of ESA Industrial Policy

- If ESA was an unrestricted open market, large industry (D/F/I/UK) would tend to dominate.
- But participation of the smaller countries in Europe allows involvement in World-class activities, and these countries expect and deserve ‘fair shares’
- In order to achieve value for money, most institutional customers - including ESA - prefer competitive procurements approaches
- But, the absolute size of the ESA business in each country is proportional to the money each country puts in (ESA internal costs absorb about 20%)

Industrial Shape in the ESA market

- **It is widely believed that smaller companies ('SMEs') are a important source of innovation.**
  - National government policies have encouraged consideration of the role of SMEs in ESA industrial policy.
- **Therefore, ESA has introduced various special measures and programmes to support SMEs.**
  - See 'EMITS' for more information
- **Research labs/universities are crucial 'customers' (for scientific data generated by spacecraft) and are also sources of specialised technology to be industrialised (hardware + software)**
  - The 'Big Primes' can't afford to fund all the R&D needed
  - The 'Big Primes' all work closely with a network of smaller organisations for a combination of technical and industrial reasons
  - The simultaneous downturn in the commercial and institutional markets are forcing R&D budgets to be cut – so efficiency and avoidance of duplication is paramount

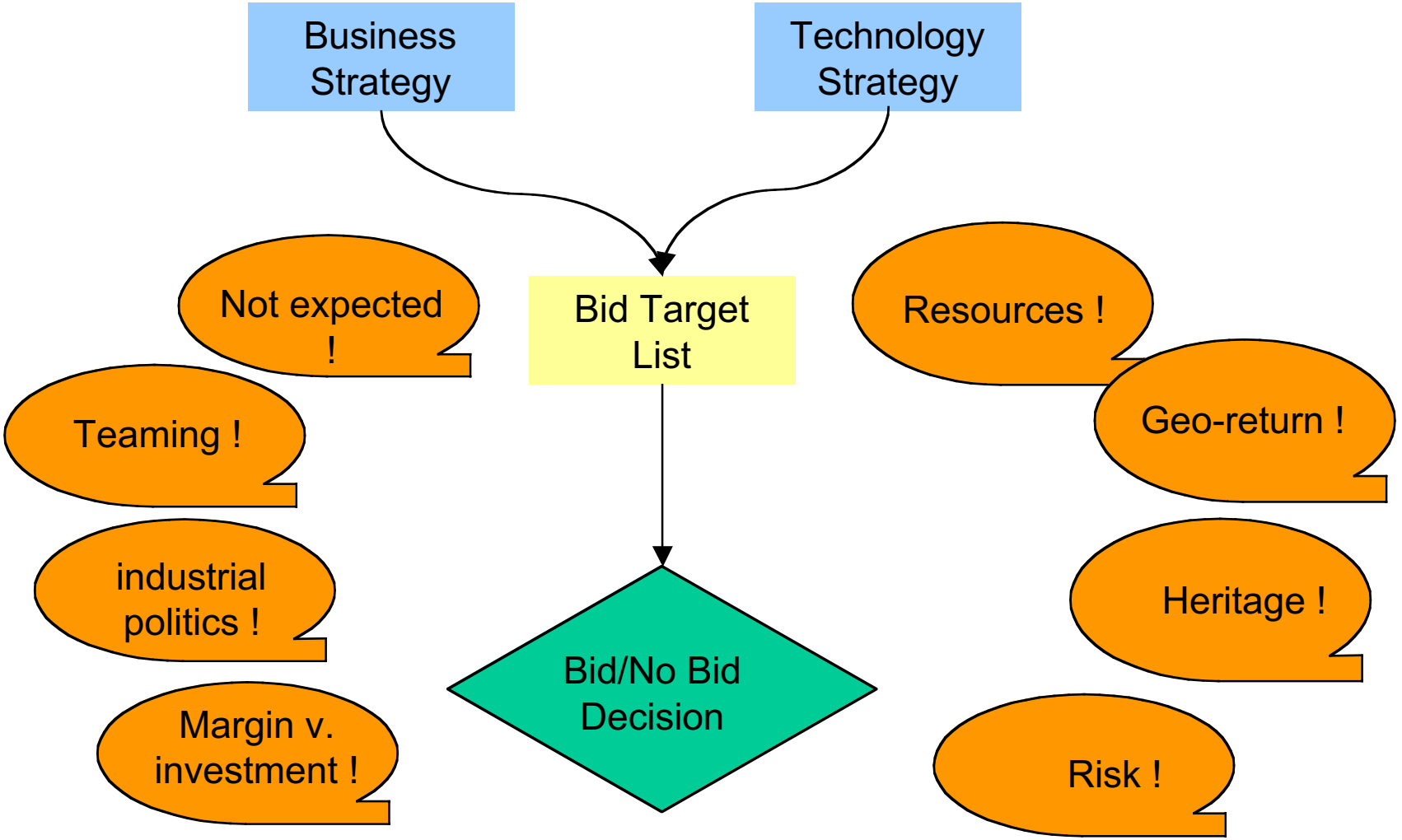
Doing business in space: some observations

5

How to make a living in the space industry…

- It's very hard, especially at the moment
- The Institutional Business, and particularly ESA, involves many types of business opportunities, and more factors than the purely technical or commercial.
- The biggest everyday problem is how to decide what work to bid for, and then bid effectively.

Idealised Process – and what complicates it



Skills to succeed…not exhaustive

- Basic understanding of the political/industrial constraints
- Acquiring information from the customer at the working level
- Making sure the customer understands your capabilities
- Familiarity with bidding process and structure of customer ITTs/AOs/RFQs
- Familiarity with customer contractual conditions
- Awareness of what other companies are doing/available technology
- Recognising ‘strategic’ opportunities from among technically ‘nice-to-do’ work.
- Quick assessments of feasible solutions (-> assist bid/no bid decisions)
- Presenting complex technical information in concise ways
- Realistic assessment of risk (-> bid/no bid decisions)
- Ability to include cost as an engineering variable
- Ability to form international partnerships with Primes/SMEs/non-Primes (industrial politics)

Some Useful Sources of Information

BNSC	www.bnsc.gov.uk
UK space industry	www.ukspace.com
ESA	www.esa.int
ESA business announcements/ITTs	http://emits.esa.int

Good Luck !

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