European Space Industry Survey 2003 – 2007

Presentation to the Portuguese industry

Lisboa, 7 December 2010

European Space Agency

www.esa.int

Presentation plan

ESA:

- **Introduction**
- **ESA studies on industry**
- **The space industry in ESA Member States**

Questions by Industry

The need for a permanent / regular dialog with industrial actors

ESA, as mandated by its Convention, monitors the evolution of the European space industry and its markets, in order to adapt to new environments and constraints.

Three surveys completed, and a fourth to be initiated soon.

Results are communicated to industry after every survey (1995-1997, 1999-2001, 2003-2007).

Discussions on strategic issues and sharing of factual information with companies are a must for ESA to better serve the Member States requirements in this changing environment.

To improve the strategic dialog with industry ESA intends to update the reports more frequently.

Information from industry will be collected on a yearly basis.

New studies on industry

Two studies are in preparation, open ITT:

- Analysis of the European Space Industry 2008-2010
- Forecast of the European Space Sector

Objective: gather up to date information on industry and markets,

- in order to better prepare procurement, industrial and programmatic policy proposals for the next ESA Ministerial Council (2012)
- to better negotiate with the EC

Focus is in today's situation, past evolution and causes, scenarios for future developments.

Not only what, also how and why. The space sector in context.

Coverage is the space industry domains of activity, markets, institutional funding and the political, economic, social, technological, environmental and legal conditions under which the space sector develops its activities.

Helping ESA to help industry

New questionnaire for the new studies

- Questionnaire prepared on a **yearly basis**, easier to complete.
- Data collected at the beginning of each year.
- It is expected to facilitate the preparation of future studies and thus an earlier distribution of the results, this increasing their value.
- The questionnaire includes details on products, not available through other sources or in Industry Outlook.
- It has **three parts** (General information, Supply Chain (sales and purchases), Technologies), each a different **excel** file including several worksheets.
- **Only the fields pertinent to the company activities have to be filled (in most cases, these will be few fields)**
- The data will contribute to a better assessment of the **space supply chain**
- The questionnaires for 2008, 2009 and 2010 will be distributed **by ESA**.
- **The quality of the new studies depends on the data provided**

Helping ESA to help industry

Structure of the questionnaire

- Cover page, TOC, short **introduction** (central file only) and list of **definitions**
- General **company activity description**

Space actor

  - Entity description (contact details and main sectors of activity)
  - Entity Turnover, R&D and workload forecast
  - Entity staffing

Legal organisation

  - Company financials and business overview
    - Company equity structure and participations
    - Company financials
    - Company asset overview

Specific files

- Entity space **supply chain** (Sales + Procurement)
- Entity **technological capabilities**

- Comments
  - Specific comments within specific boxes at the bottom of every table
  - Additional comments dedicated to your motivation, perceived threats and recommendations on a specific slide (central file only)

Questionnaire: help functionalities

Functionalities to guide and help users to fill the questionnaire:

- User-friendly interface:
  - Navigation (arrows, table of contents)
  - Lists of options and check button
  - Pre-formatted cells

- Degree of completion indicator

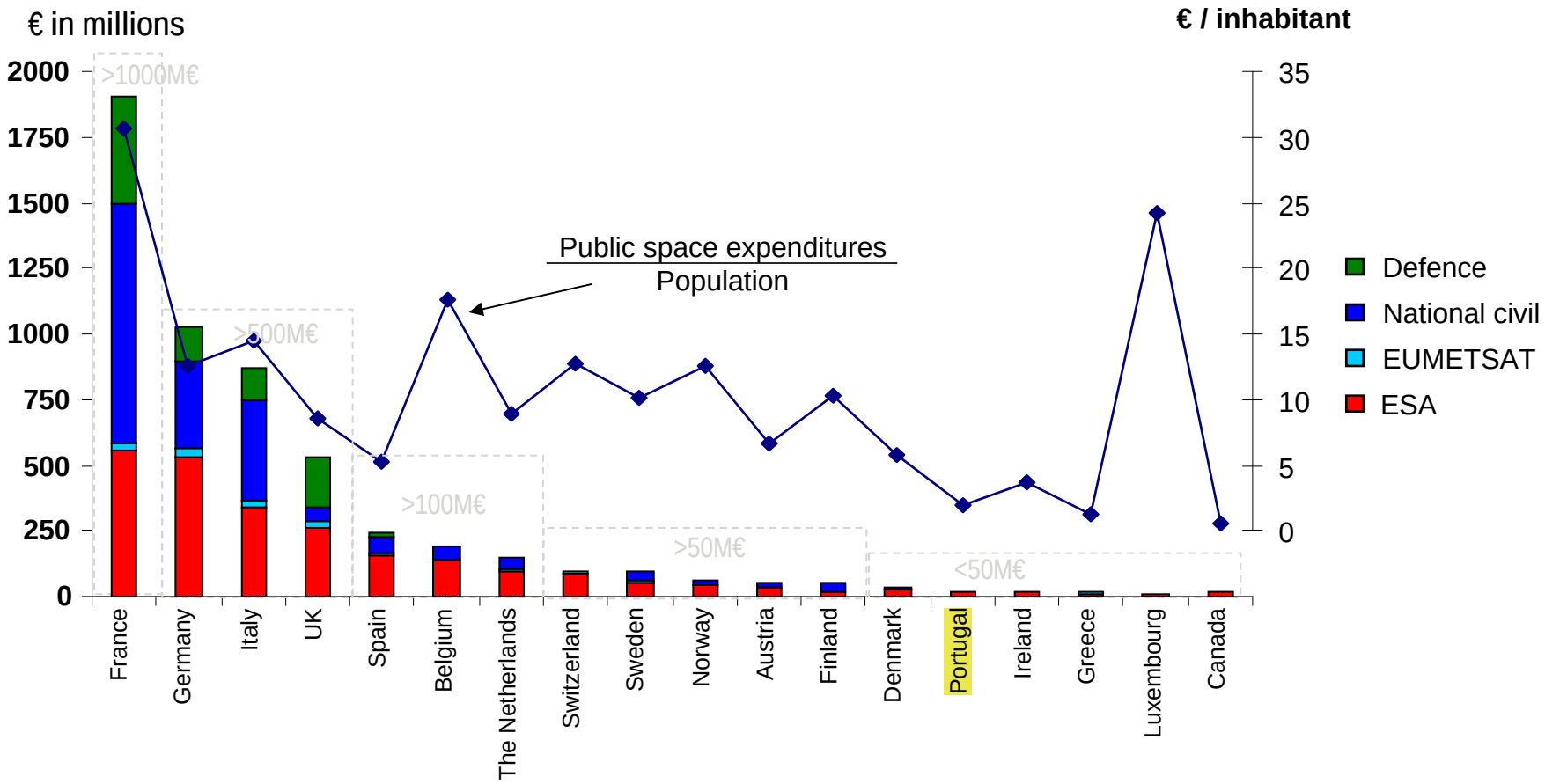
- Errors/Inconsistencies management and help messages display
  - Reminder of main concepts and definitions
  - Input messages
  - Verification tools

Perspective on the European space industry evolution over the past 10 years

ESA Member States have diverse interests and priorities for space

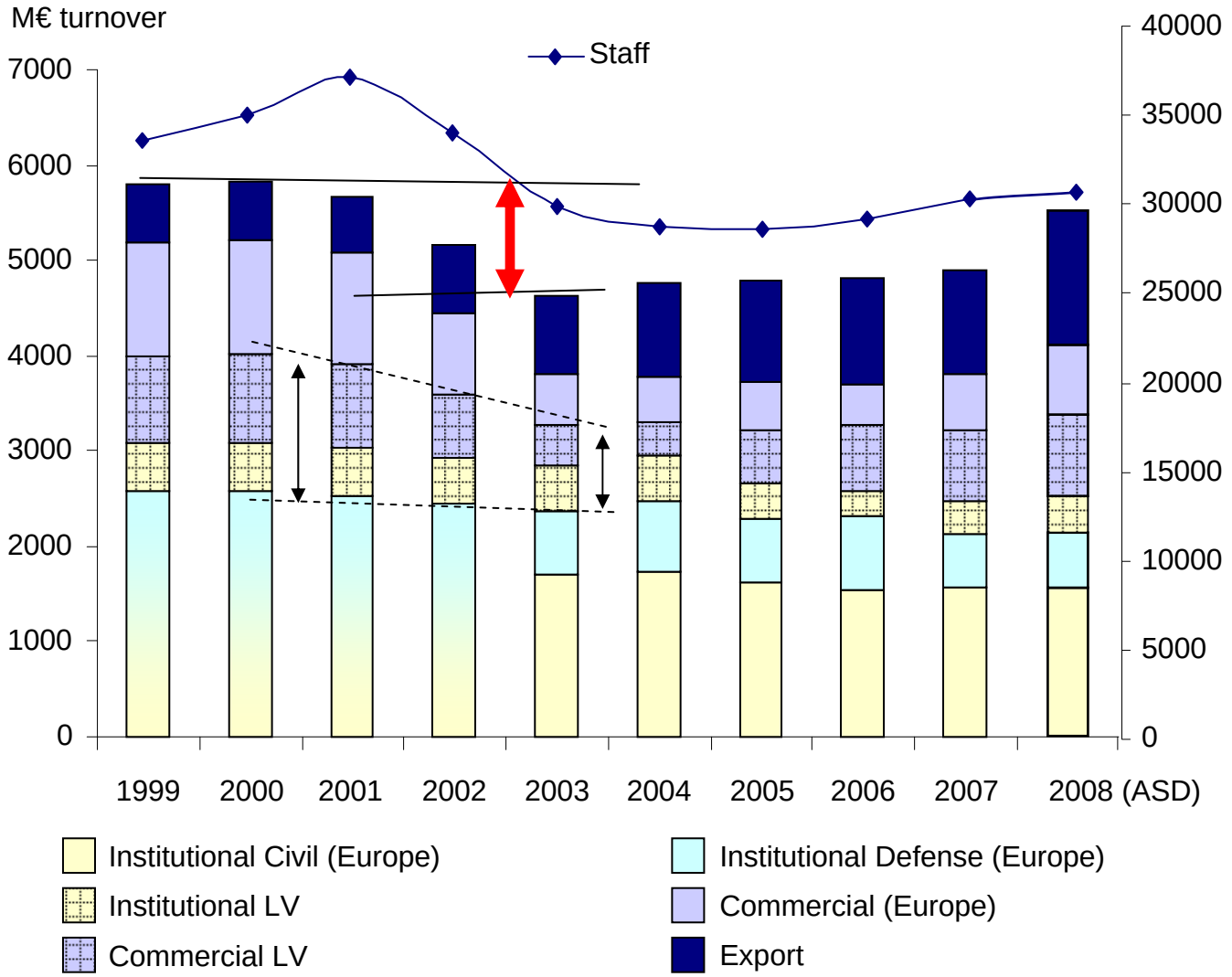
2008 Space Budgets by Country in ESA Member States

(incl. ESA contribution, EUMETSAT contribution, civil domestic programme, defense domestic programme)



Source: *Space Policies, Issues and Trends 2008/2009* - European Space Policy Institute

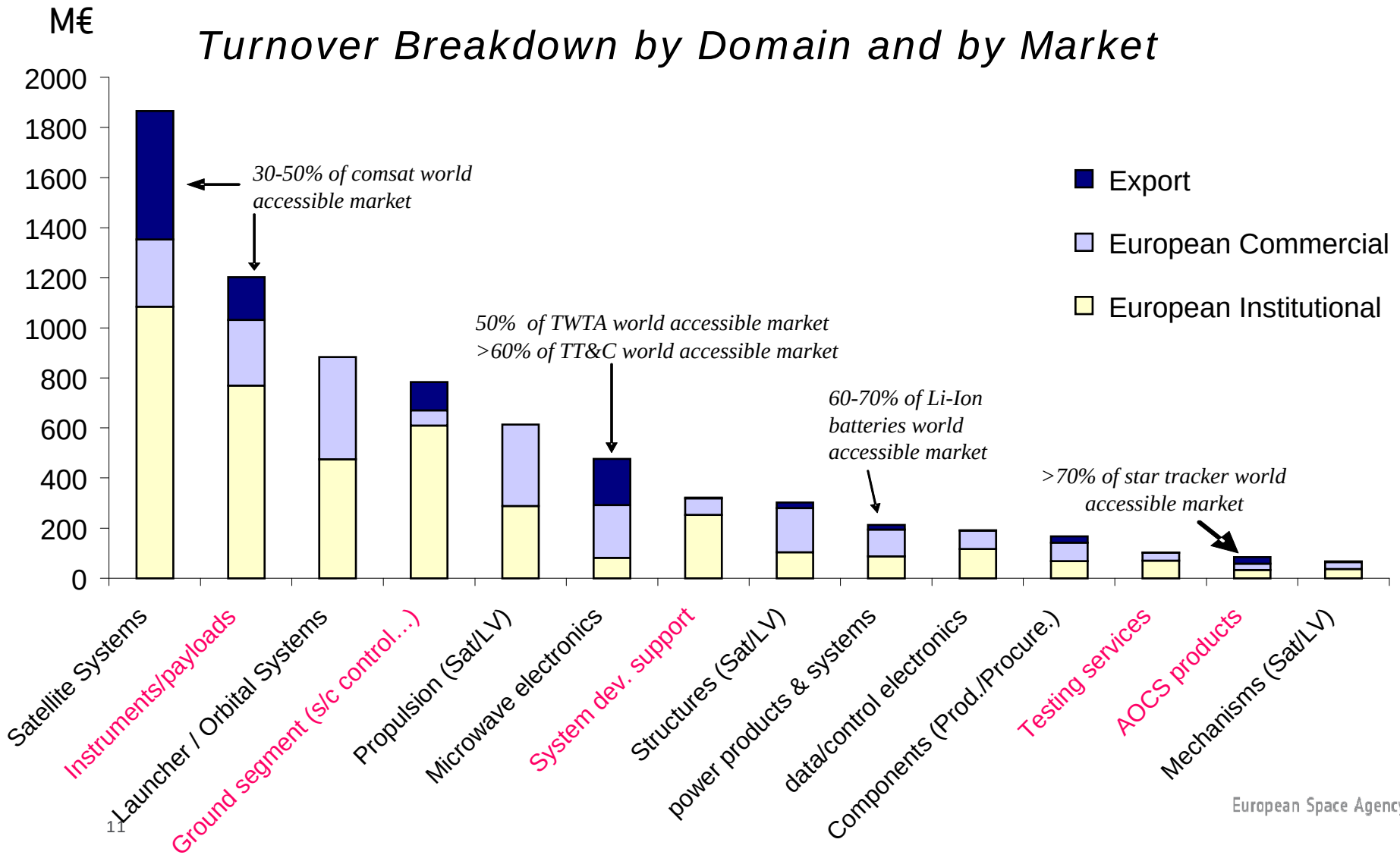
Turnover driven by the commercial market cycles for satellites and launches. Significant progress on the export market



Some highlights:

- Decreased institutional turnover
- Reduction in staff
- Drop in launcher activity
- End of development of Ariane V and flight 501
- Reduction in space infrastructure (ISS/Columbus)
- Cyclic Difference in Turnover: 1200 M€, half due to LV

Europe holds strong market positions for several key satellite equipment



The space industry in ESA member states is active in commercial markets

The European industry captures ~40% of the "commercially accessible space market" (~€2,5b per year). This figure taken often as indication of competitiveness shall be interpreted considering the multiple externalities influencing the space market and the different relation of industry with institutions in different countries

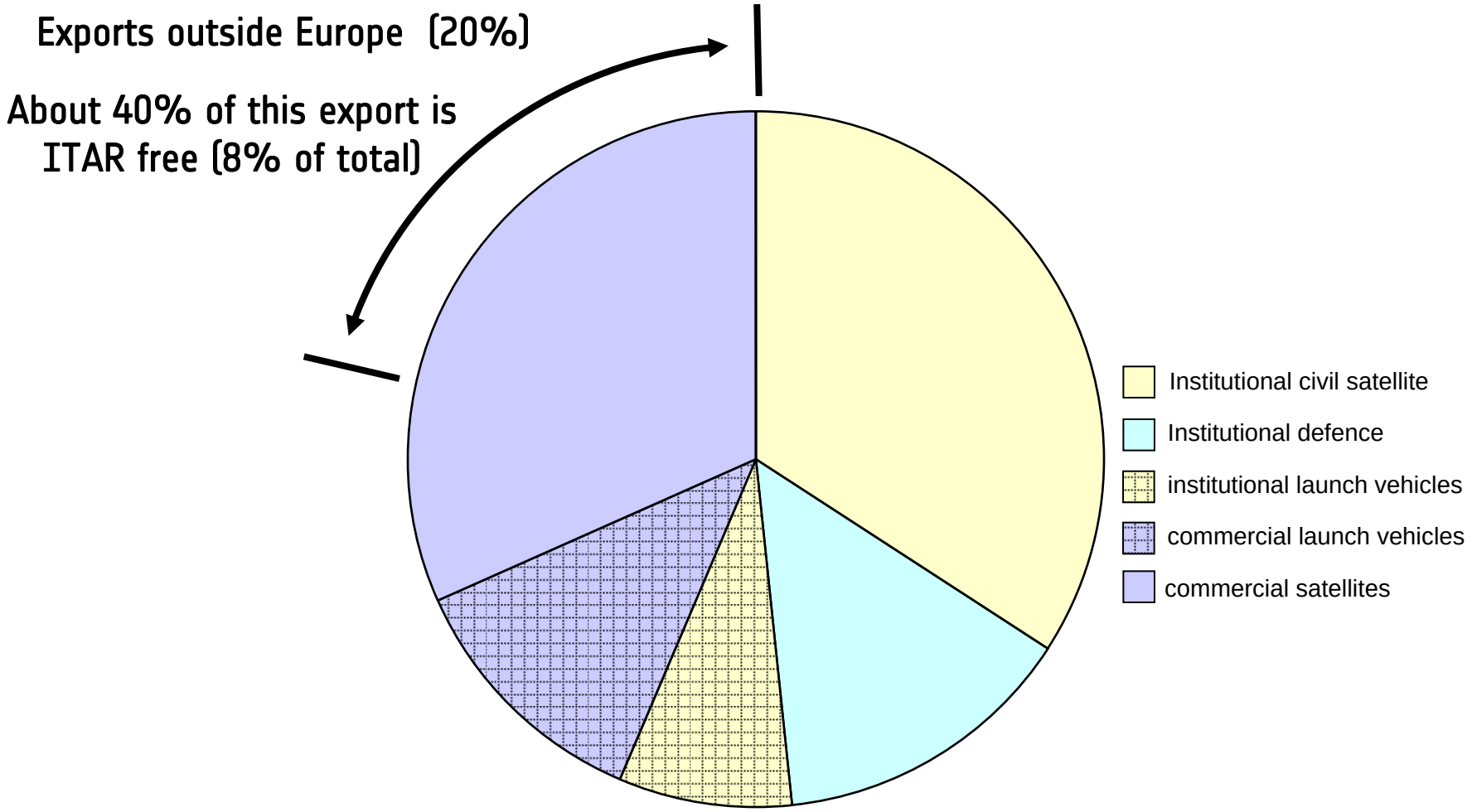
The commercial balance of The European space industry is positive in all world regions (Approx €750 m exports and €400m import per year)

Europe is specially competitive in microwave electronics (TWT, telecommunication payloads) and AOCS products (star trackers, inertia wheels) as well as in launch services and satellite/payload integration

Evolution since 2007 (*source Eurospace – Facts & Figures 2010*):

	2003-07	**2009**
Final Sales	4.6 B€	5.5 B€
Institutional (civil + defence)	3 B€	2.75 B€
Commercial	1.6 B€	2.75 B€ incl. Export = 1.25 B€ (45 %)

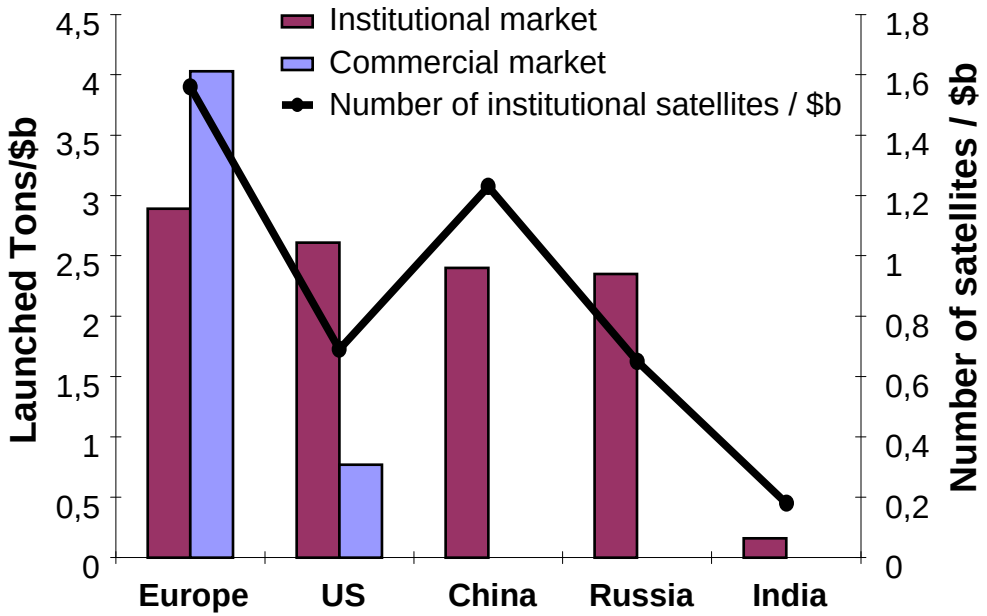
40% industry turnover is commercial (mainly telecom), 20% sales outside Europe: satellites, satellite equipment and launch services



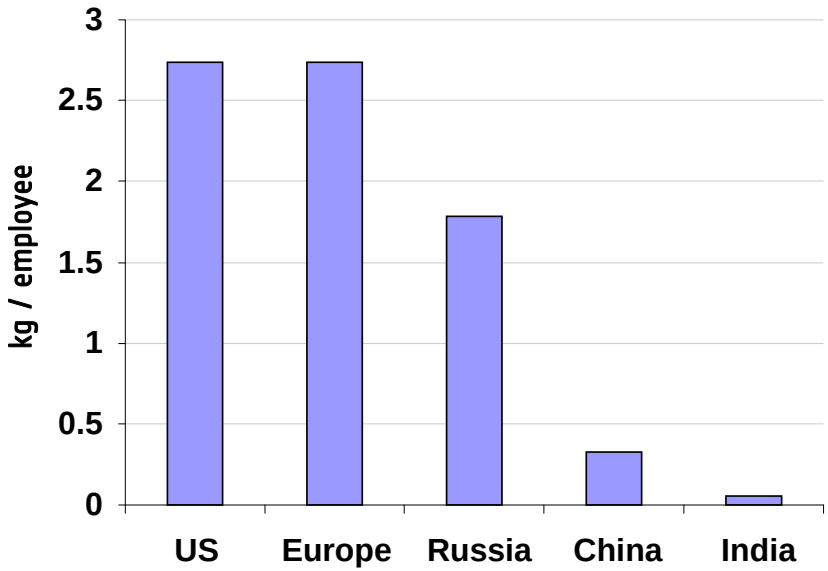
The European space industry is highly competitive

Cumulated launched mass 2005 - 2008

Mass* and number of satellites launched per $b of institutional budget (Civil and Military)**



Kilograms* of Government missions orbited per space industry employee (Civil and Military)

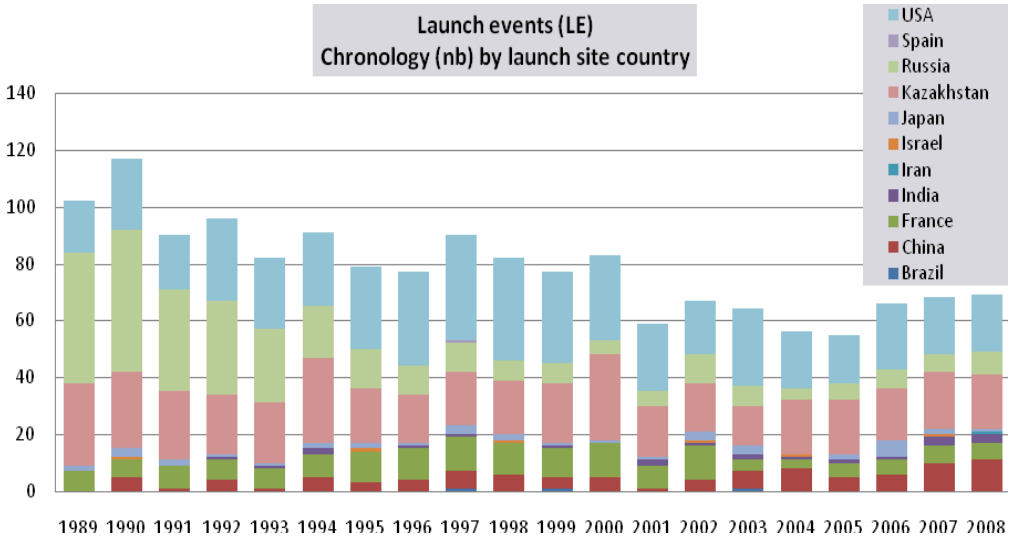


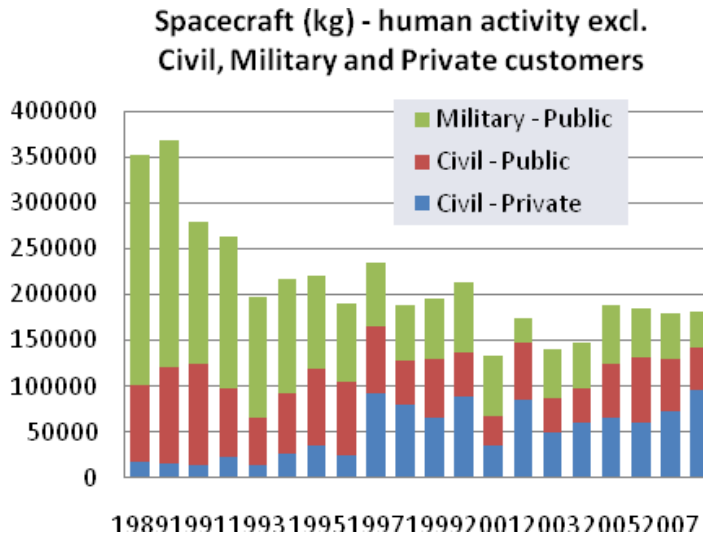
* Including manned missions and ISS servicing
(Shuttle total mass of 120 tons was not considered, only its payload of 25 tons)

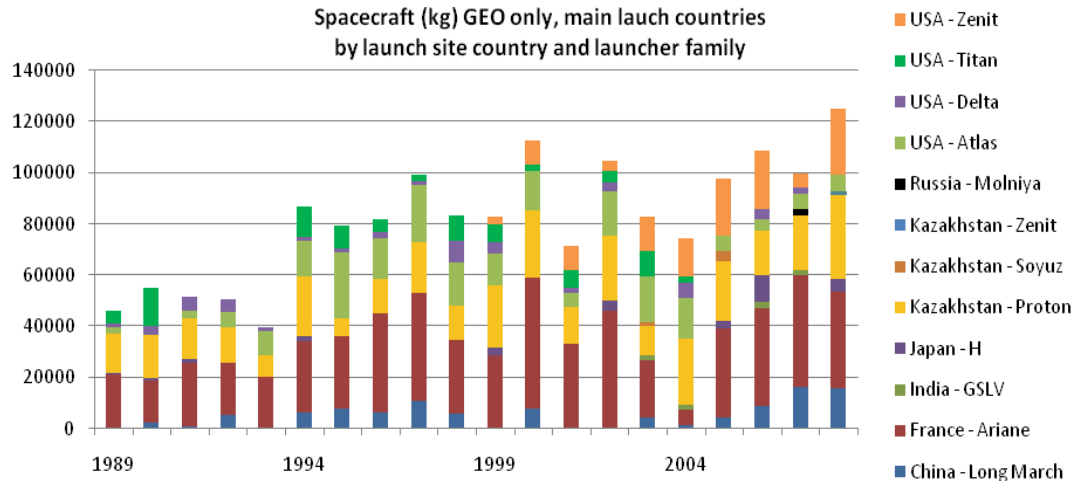
** Corrected using PPP (Purchasing Power Parity)

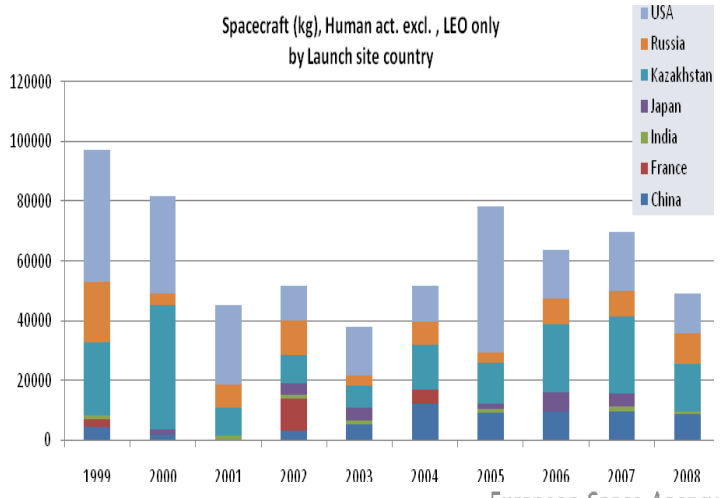
Source: Euroconsult

Sustainability: What is launched ?

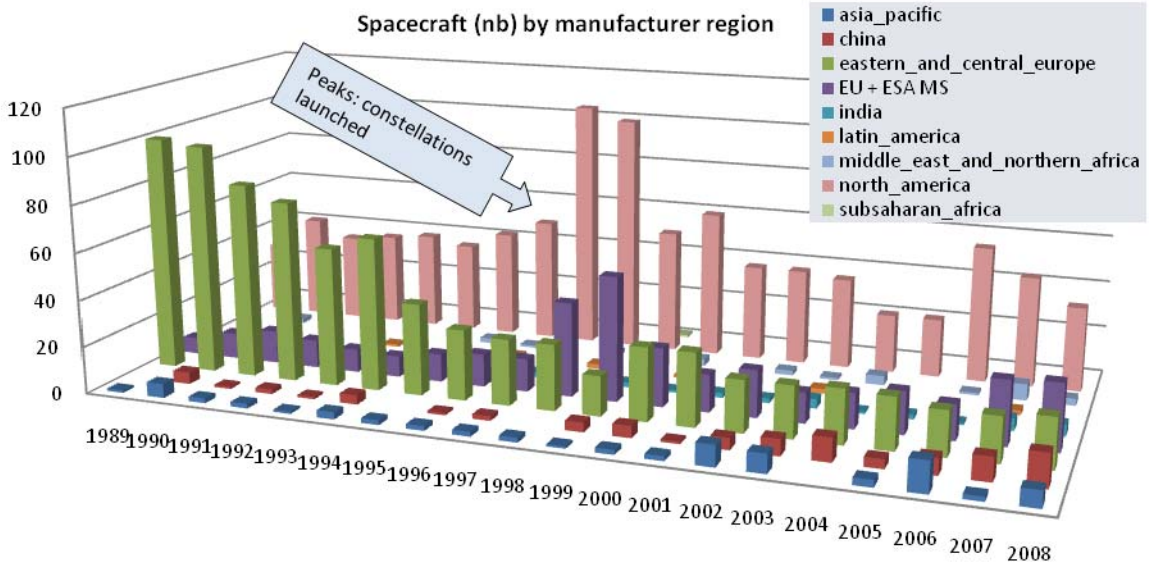


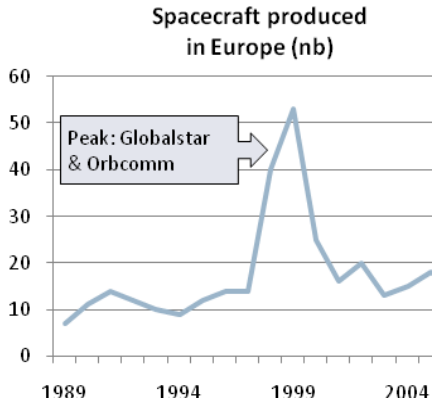


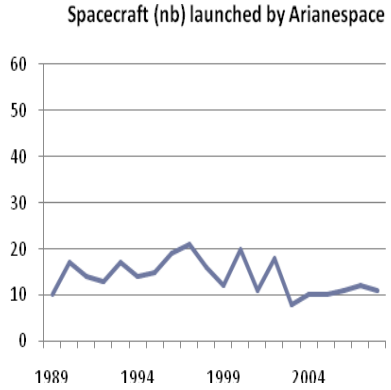


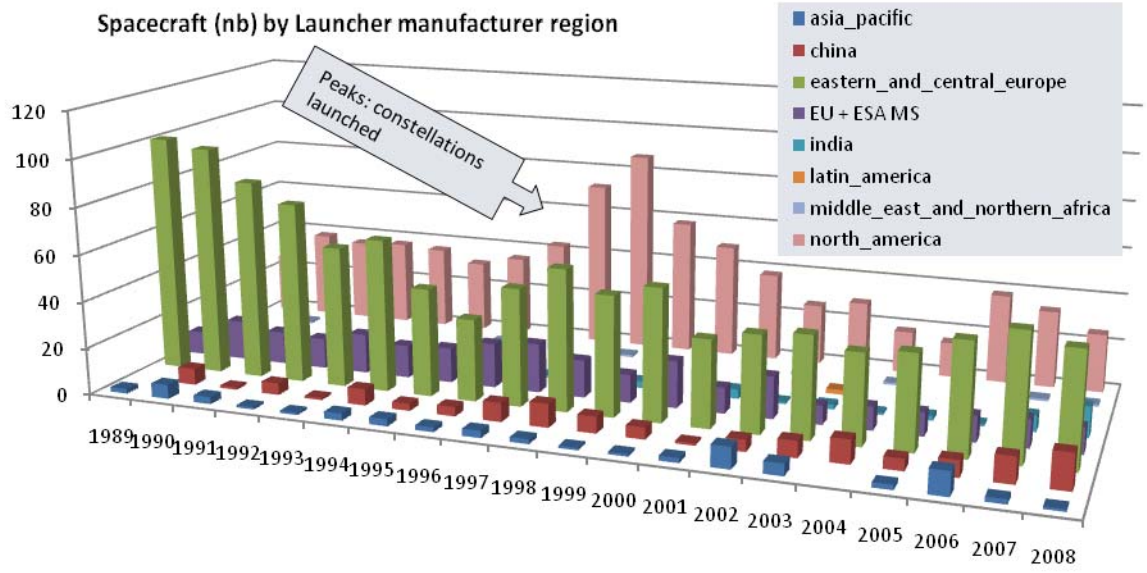


Satellites and Launchers

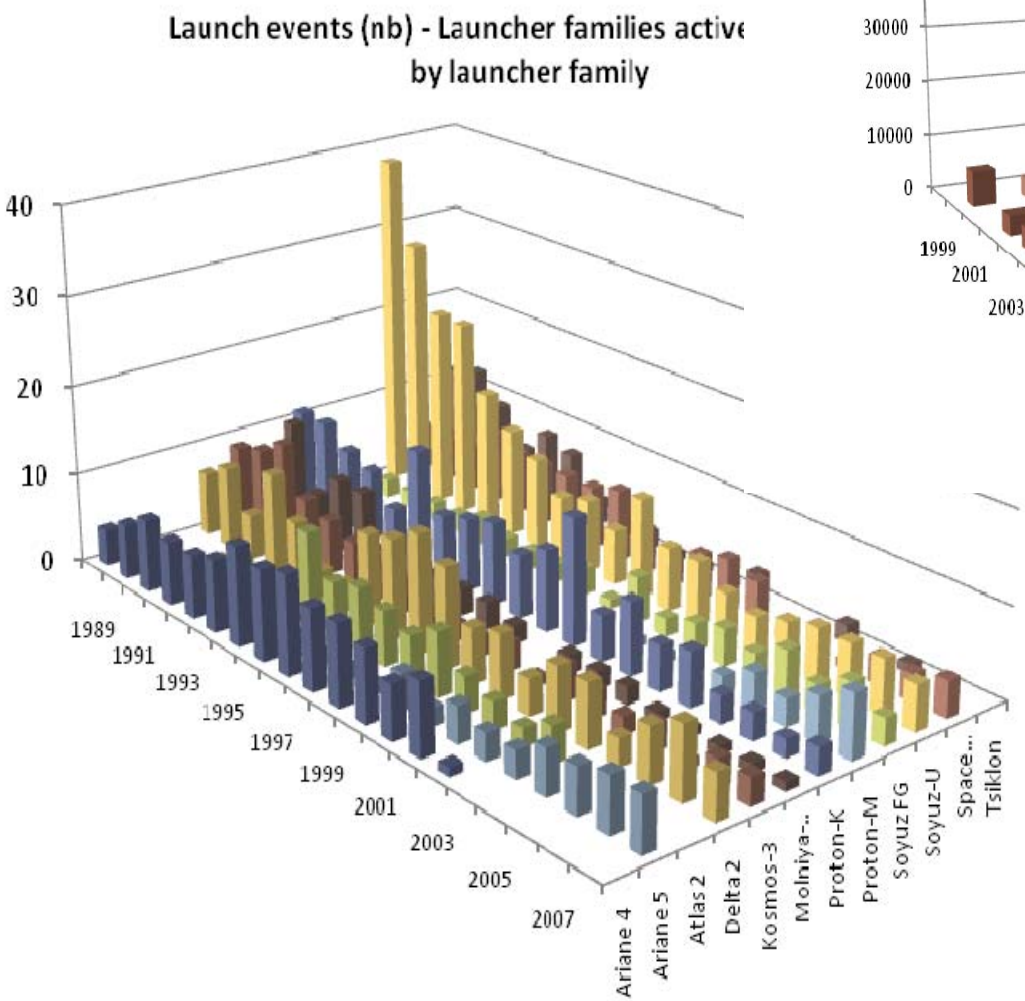


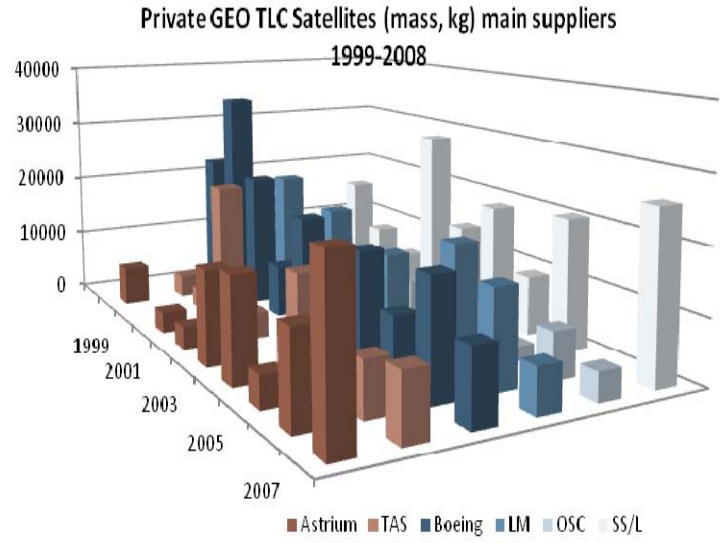


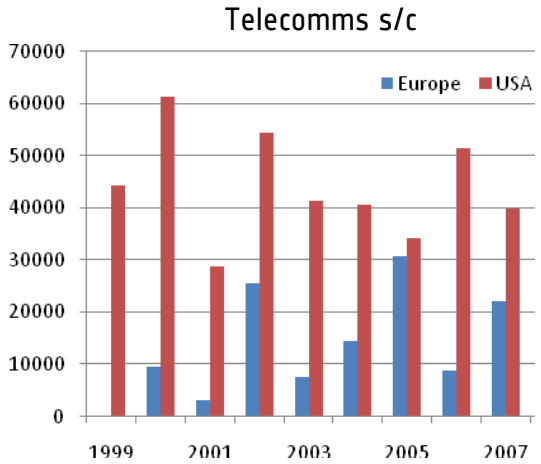




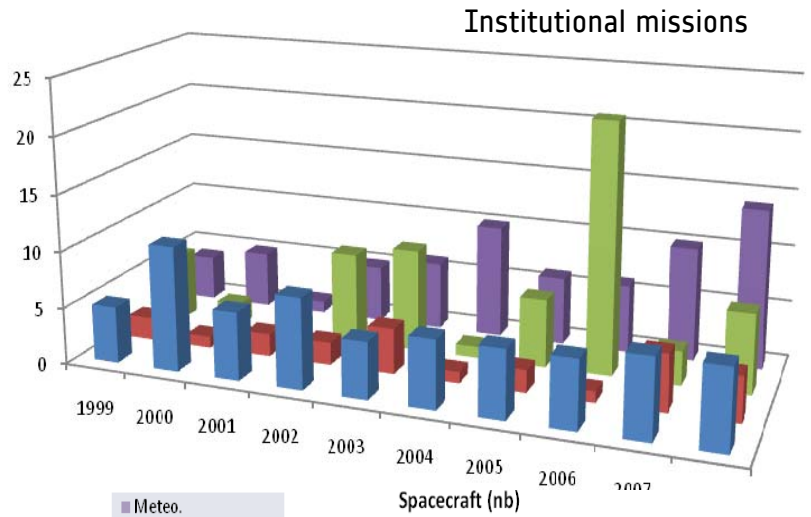
Who builds launchers and s/c?

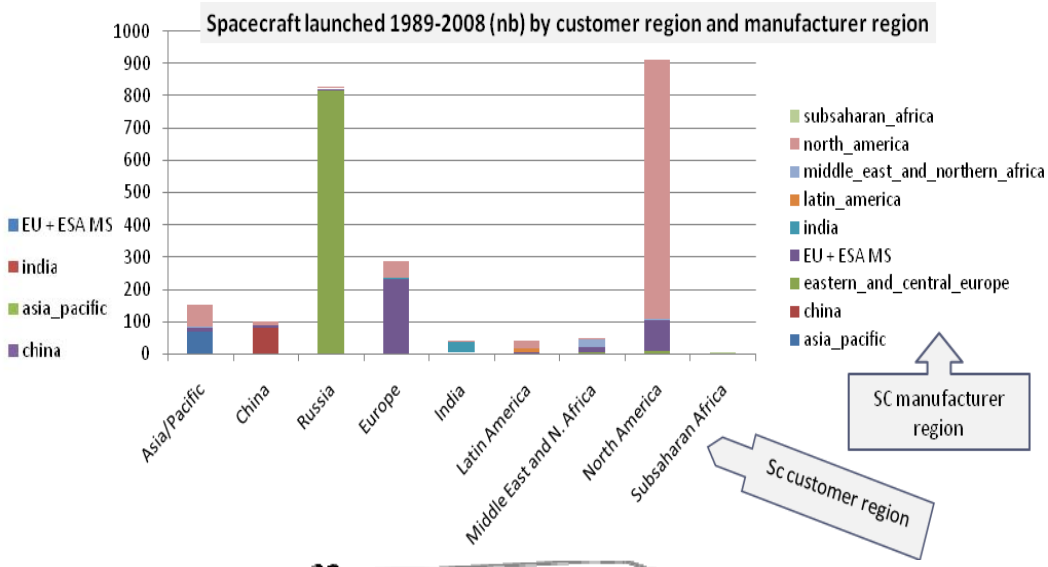


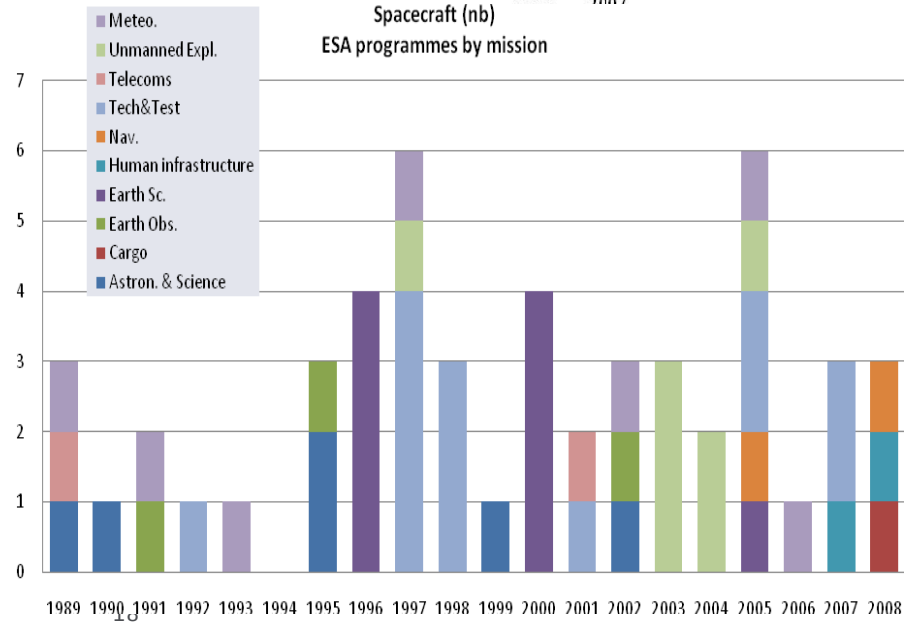


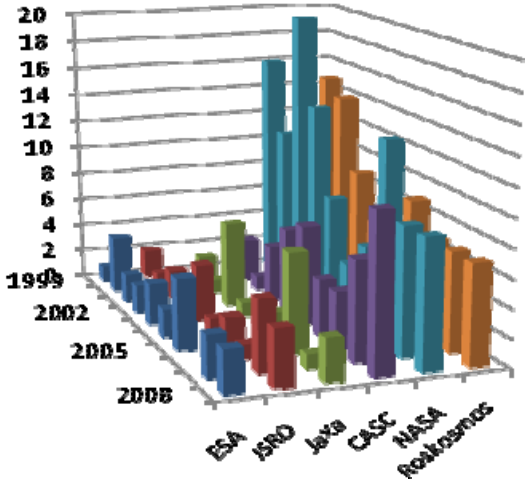


Europe in context

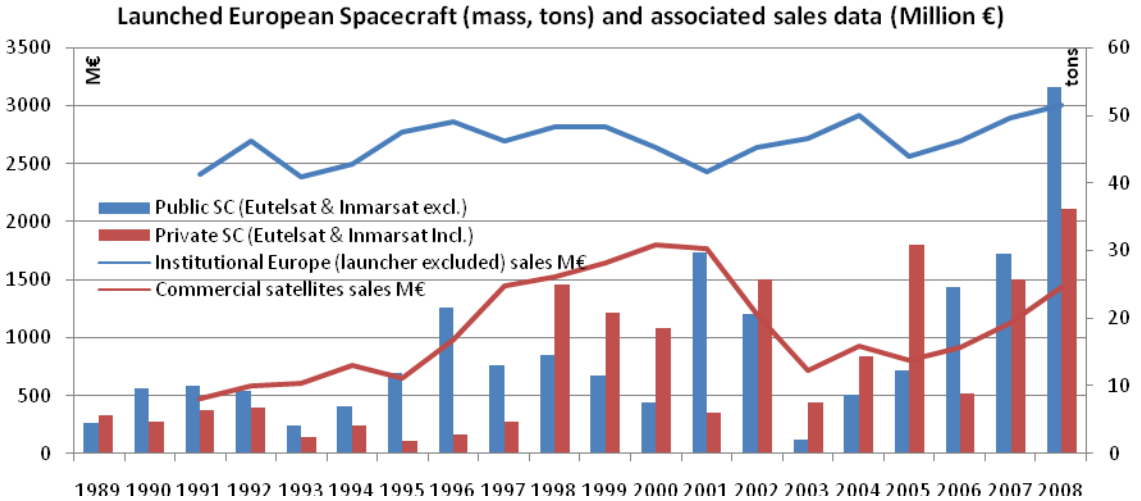


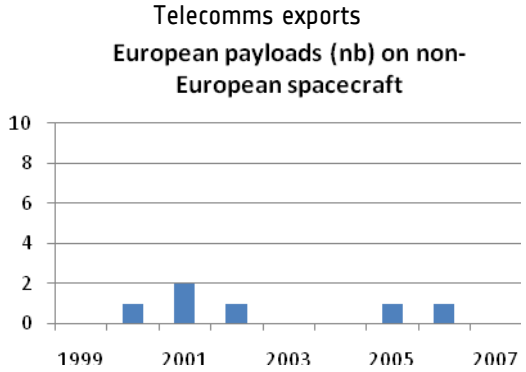


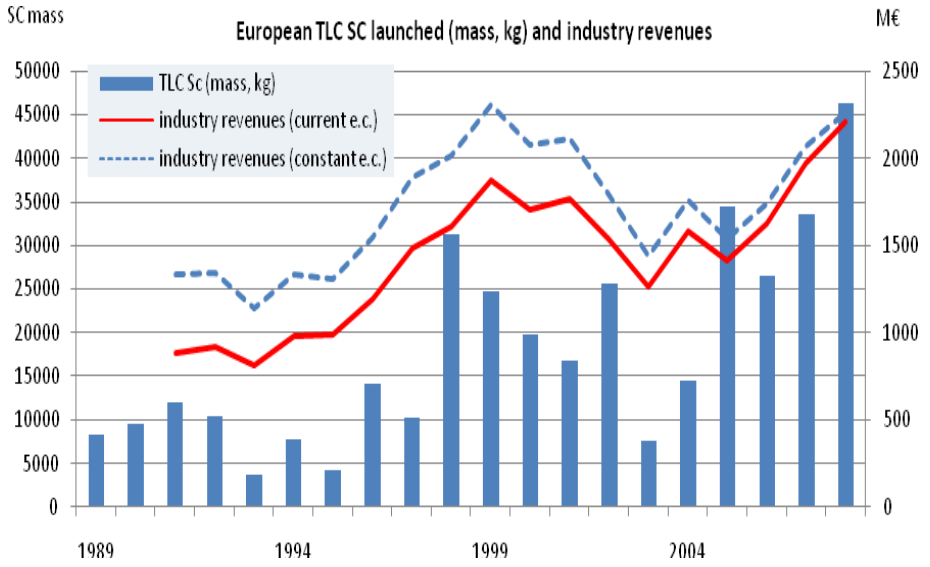


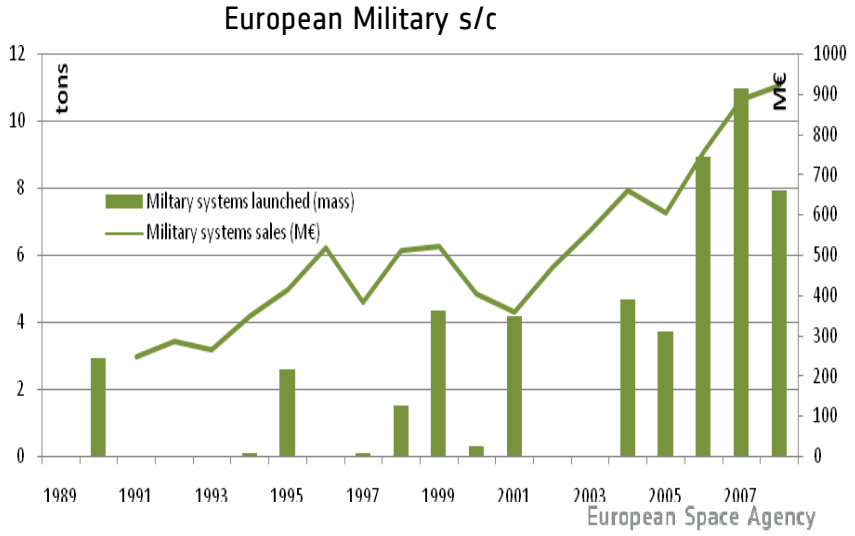


European s/c markets



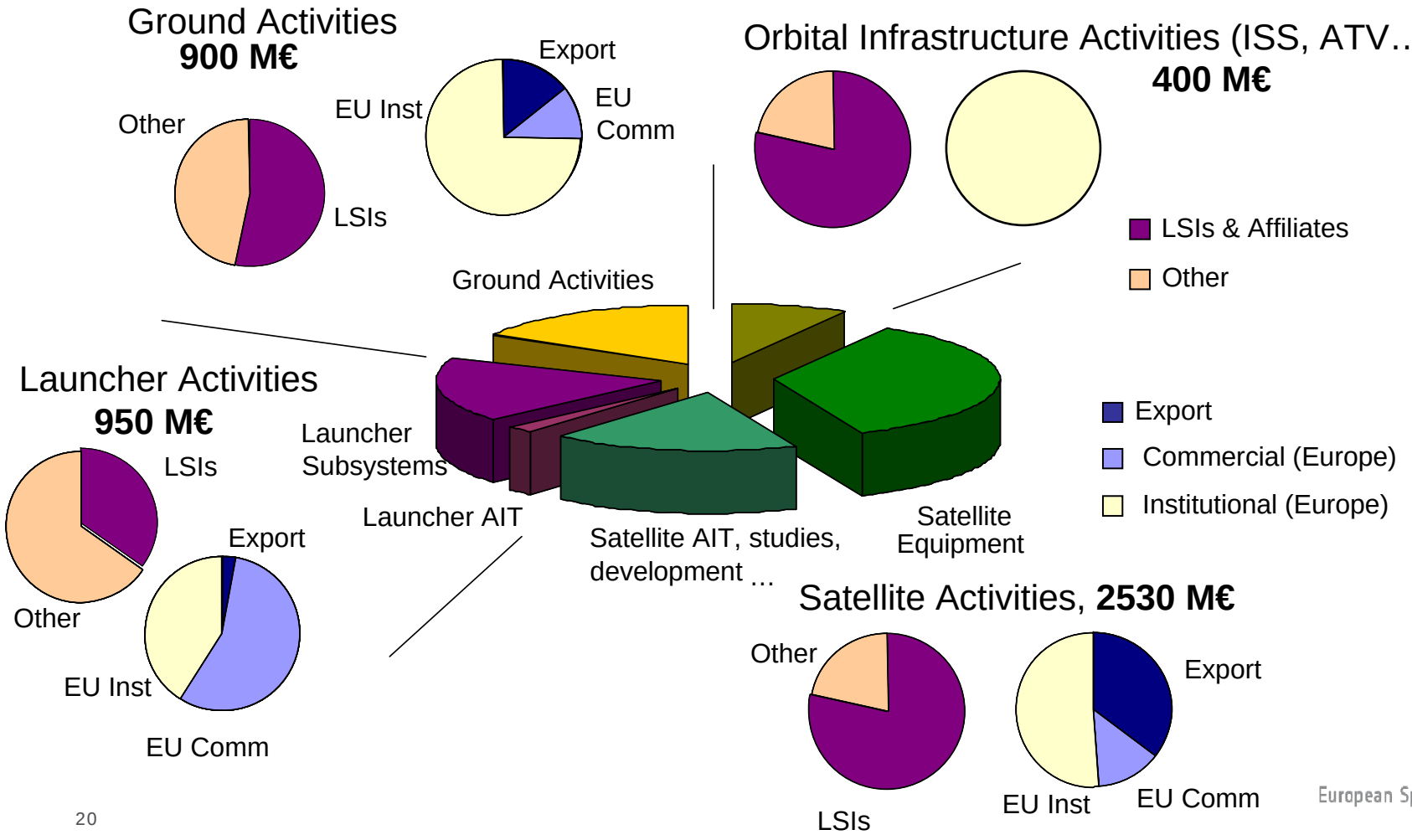






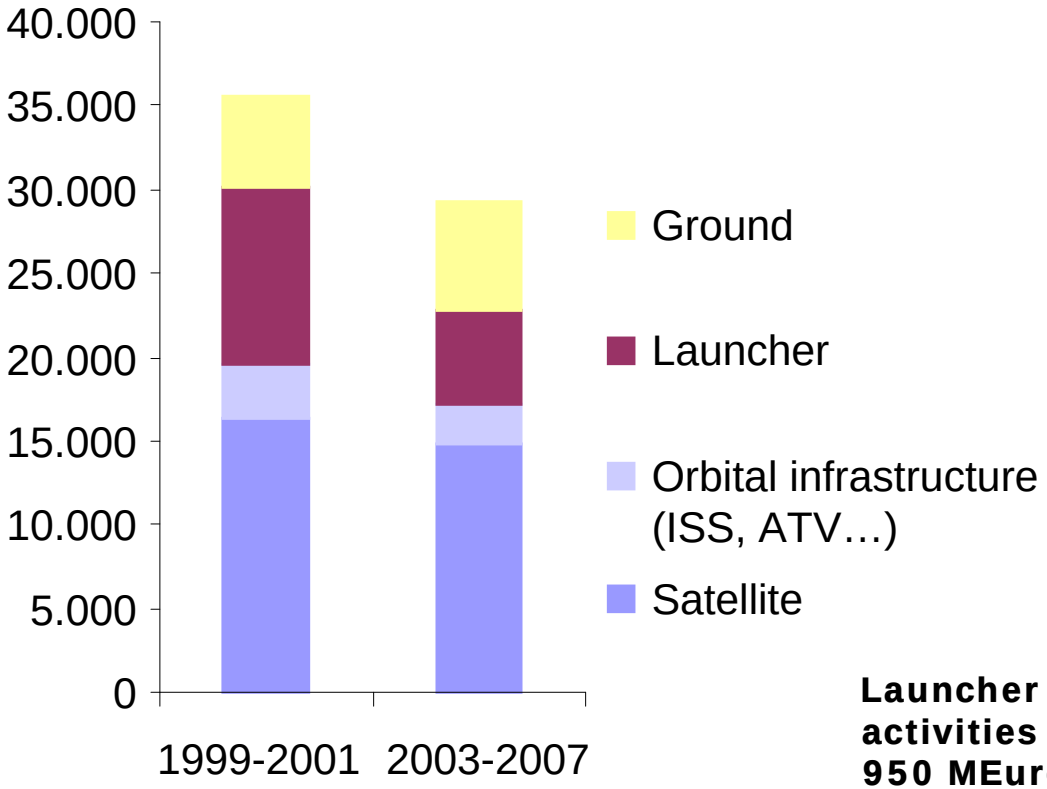
Large systems integrators capture more than half the turnover in all sectors but launchers

Consolidated European industry turnover averaged over 2003-2007
(**Total: 4780 M€ average annual**)



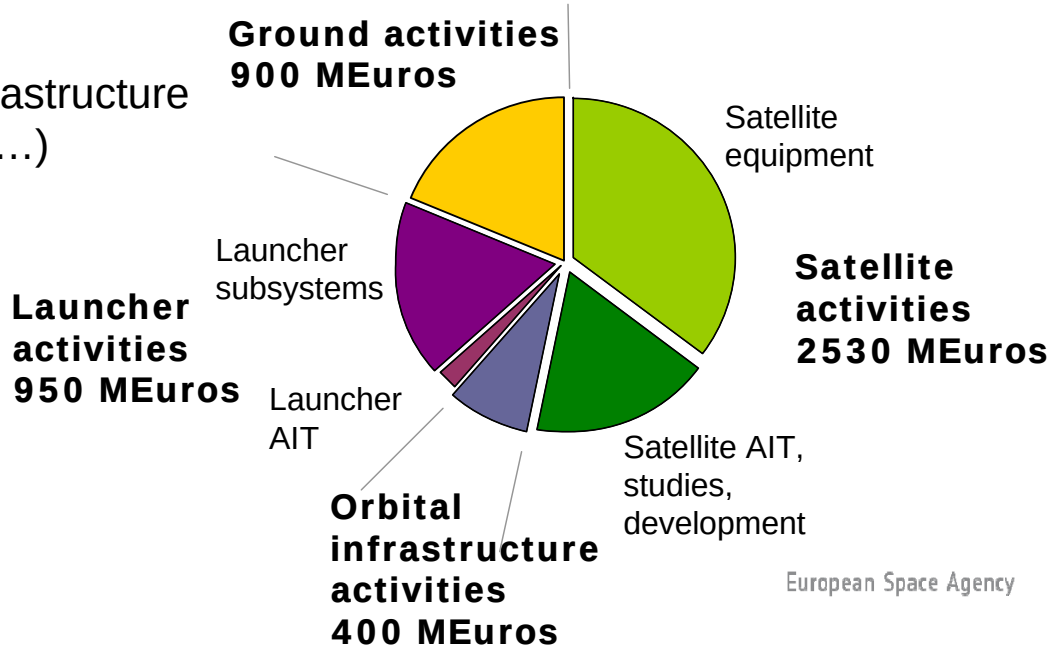
Employment: sharp drop in launchers, growth of ground activities

European space personnel count (full time equivalent)



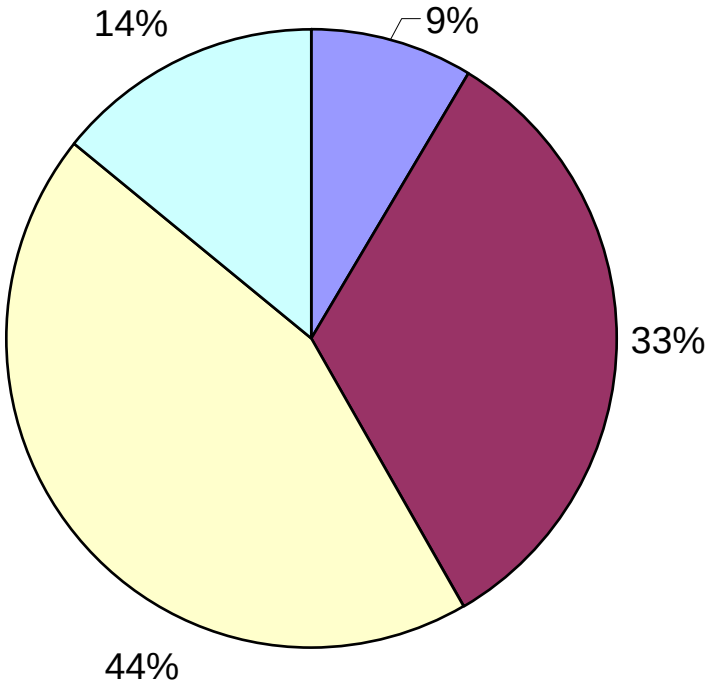
	K€-person year
Launchers	300
Satellite	170
Ground	100

Consolidated European turnover breakdown per type of systems (4780 MEuros annual in total)



European picture for upstream space industry

Space Personnel Breakdown per category of employee in Europe in 2006



29300 Employees
(92% of employees in surveyed companies *)

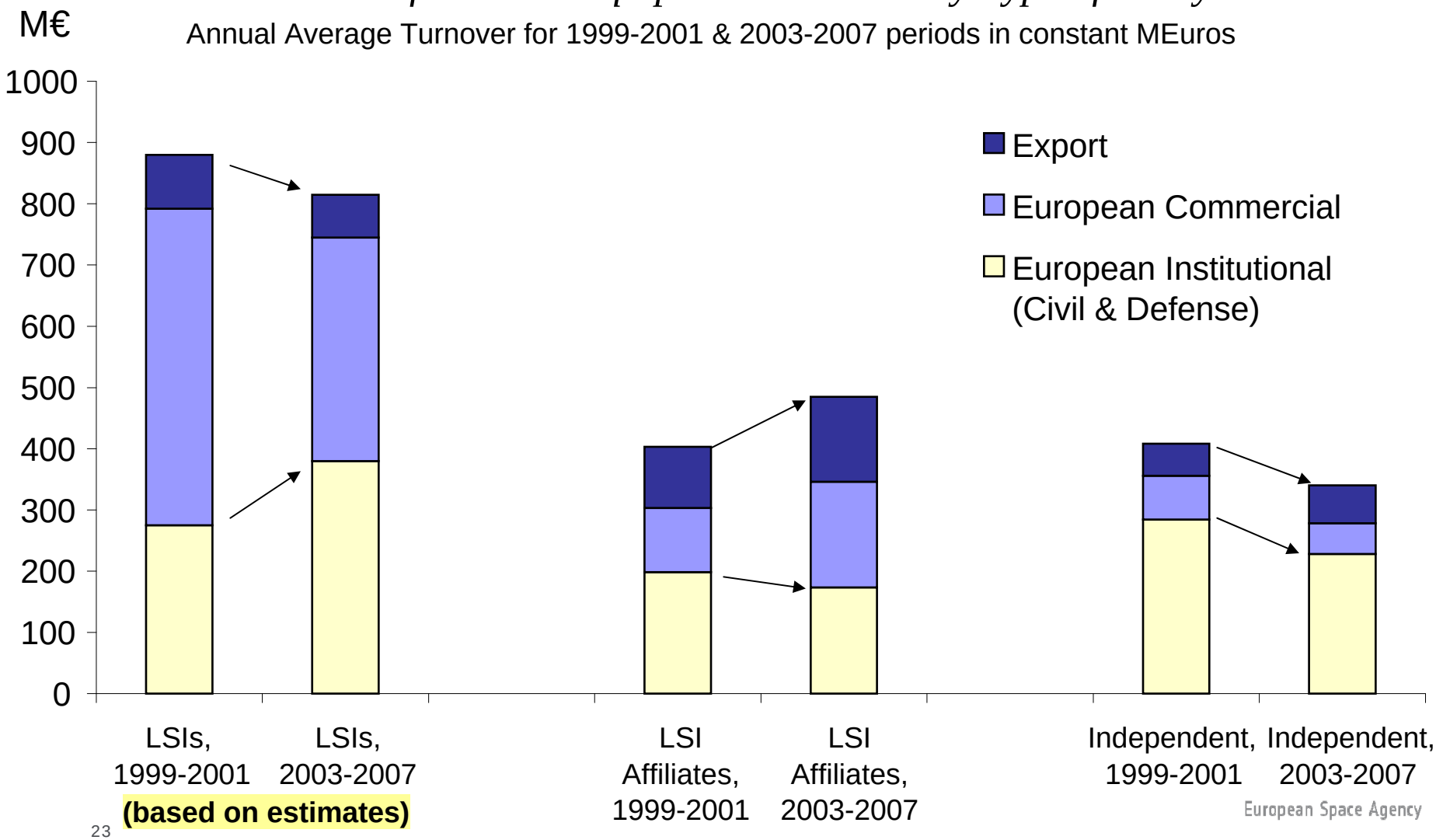
- Software Production & Services
- Hardware Production
- Engineering, R&D, Design
- Administrative support

* Ratio of the number of employees for surveyed companies that have provided their staff breakdown over the number of employees of all surveyed companies

LSIs seem to concentrate institutional activity in their main integration sites and to subcontract commercial equipment to affiliates

Evolution of Satellite Equipment Turnover by Type of Entity

Annual Average Turnover for 1999-2001 & 2003-2007 periods in constant MEuros

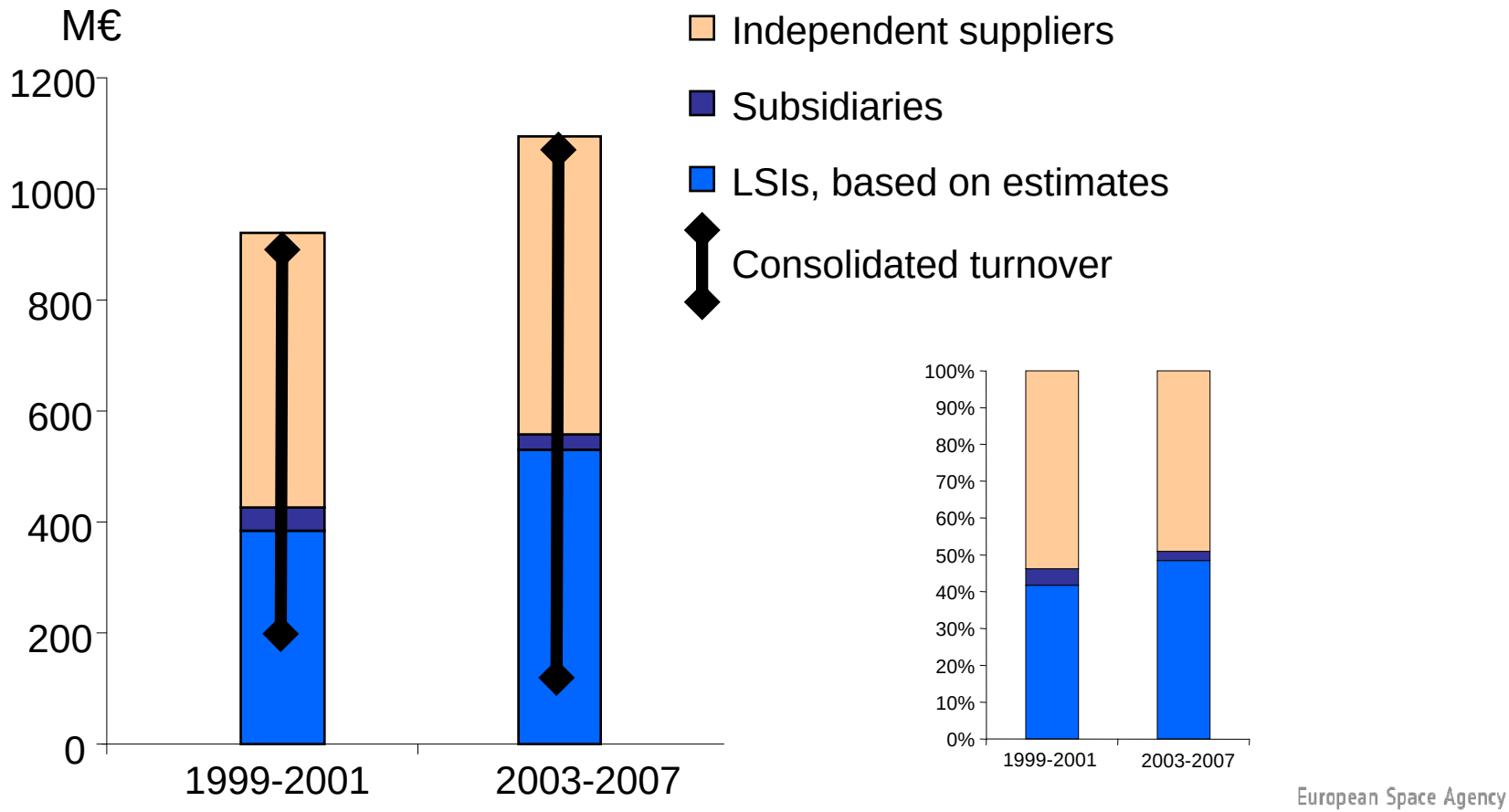


(based on estimates)

Slight turnover increase in ground domains, independent suppliers loose few market shares, LSIs are subcontracting less

Evolution of Ground Activity Turnover, Breakdown by Entity category

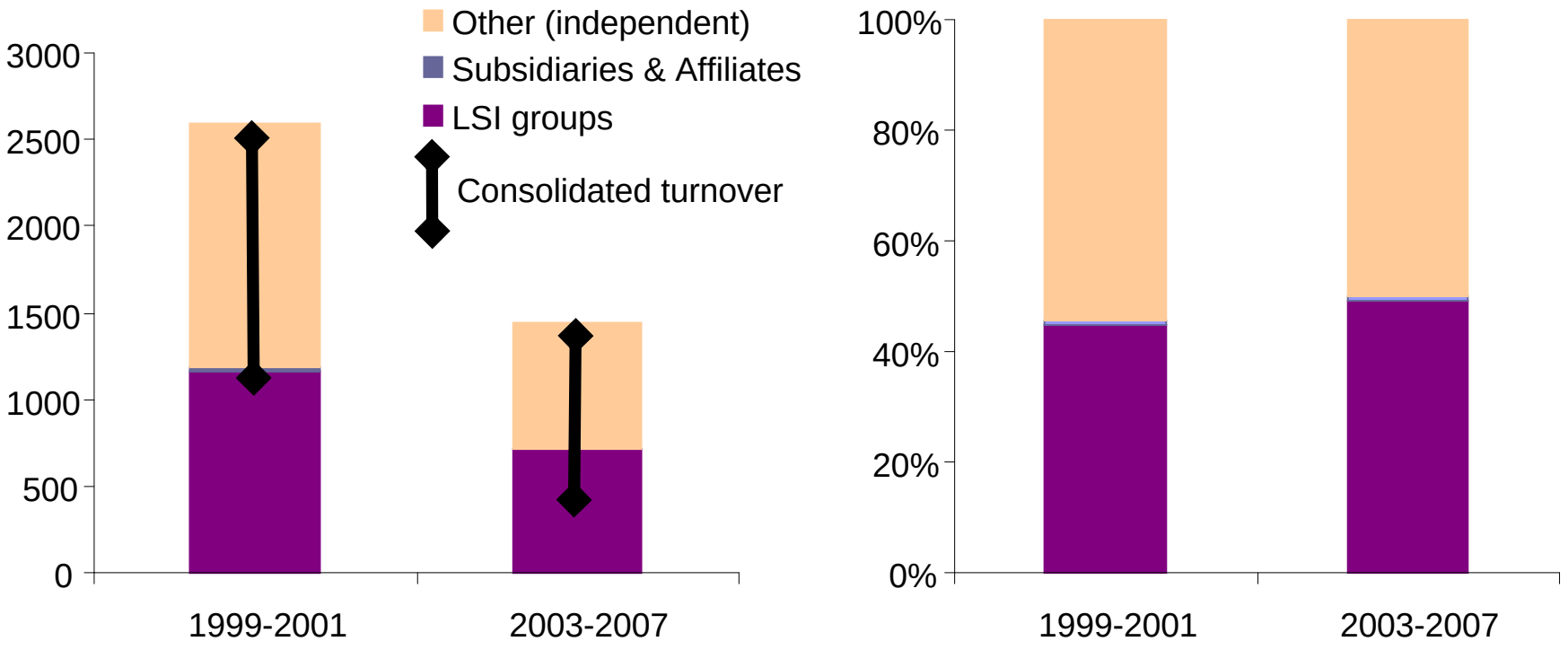
Annual Average Unconsolidated Turnover for 1999-2001 & 2003-2007 periods in constant MEuros



Independent actors more impacted by the launcher turnover reduction than large firms, reduction in subcontracting

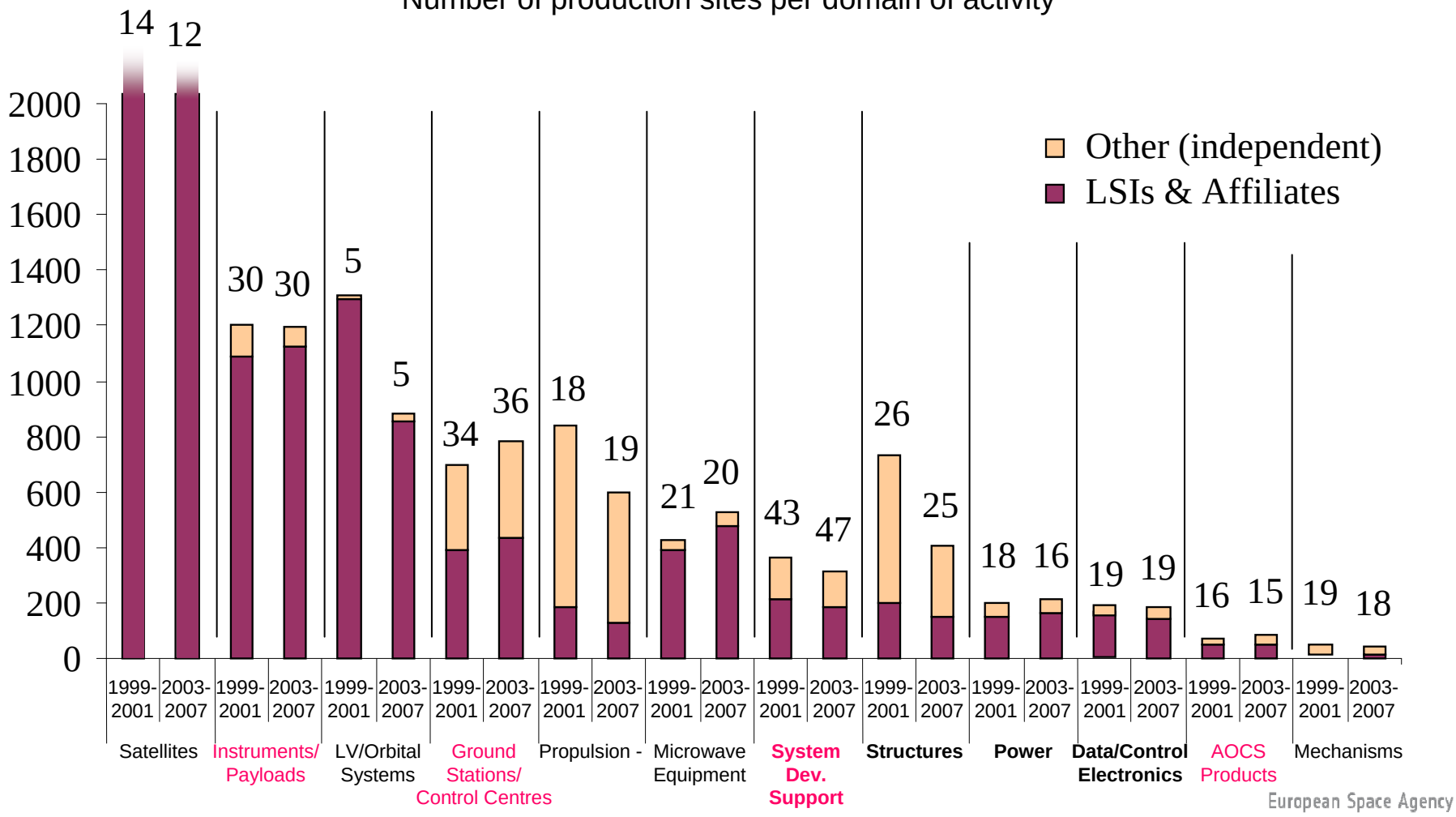
Evolution of launcher activity turnover by entity category

Annual average unconsolidated turnover for 1999-2001 & 2003-2007 in constant MEuros



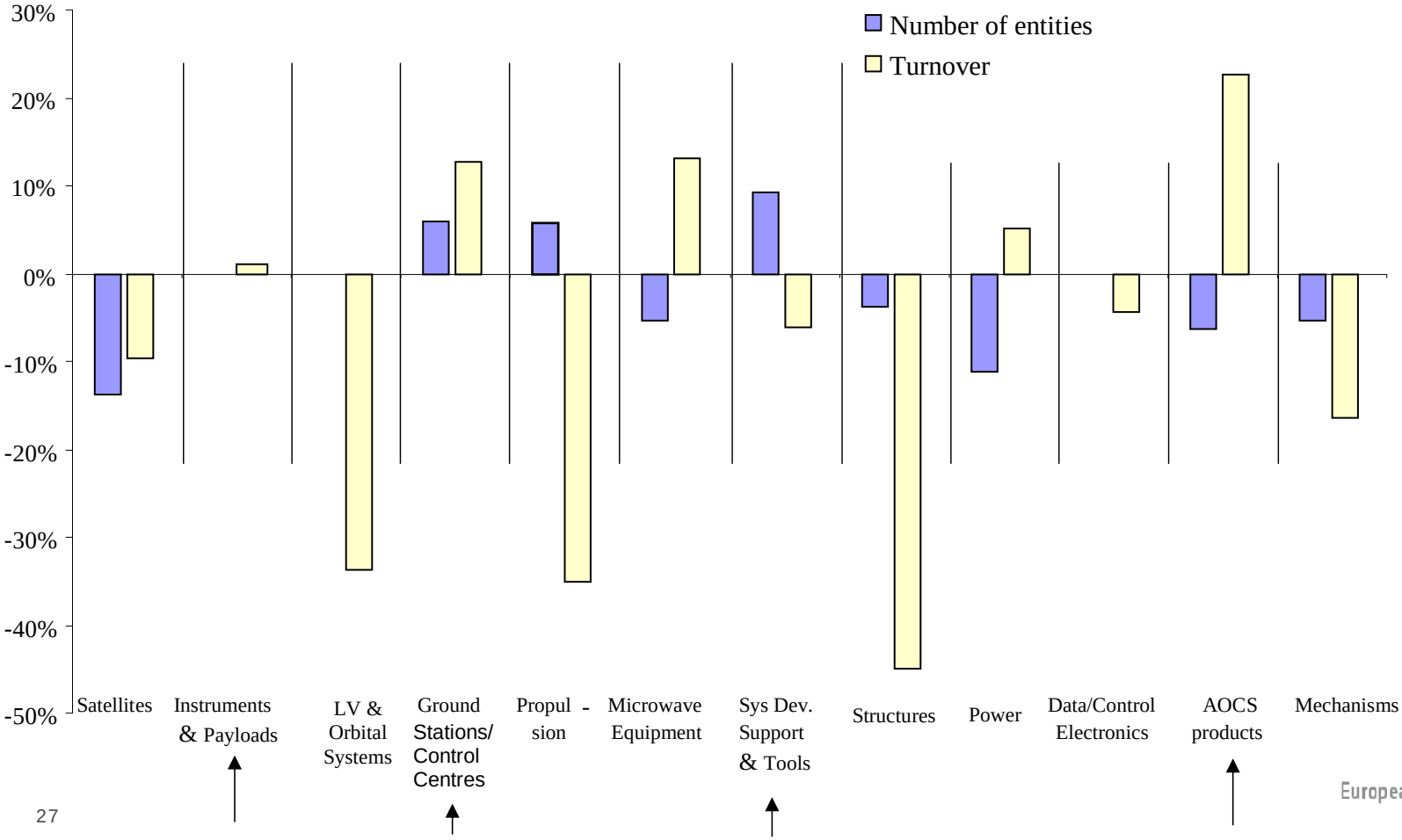
Large satellite integrators have in general increased their market share for most of the activity domains

Annual average un-consolidated turnover for 1999-2001 & 2003-2007 periods in constant MEuros
Number of production sites per domain of activity



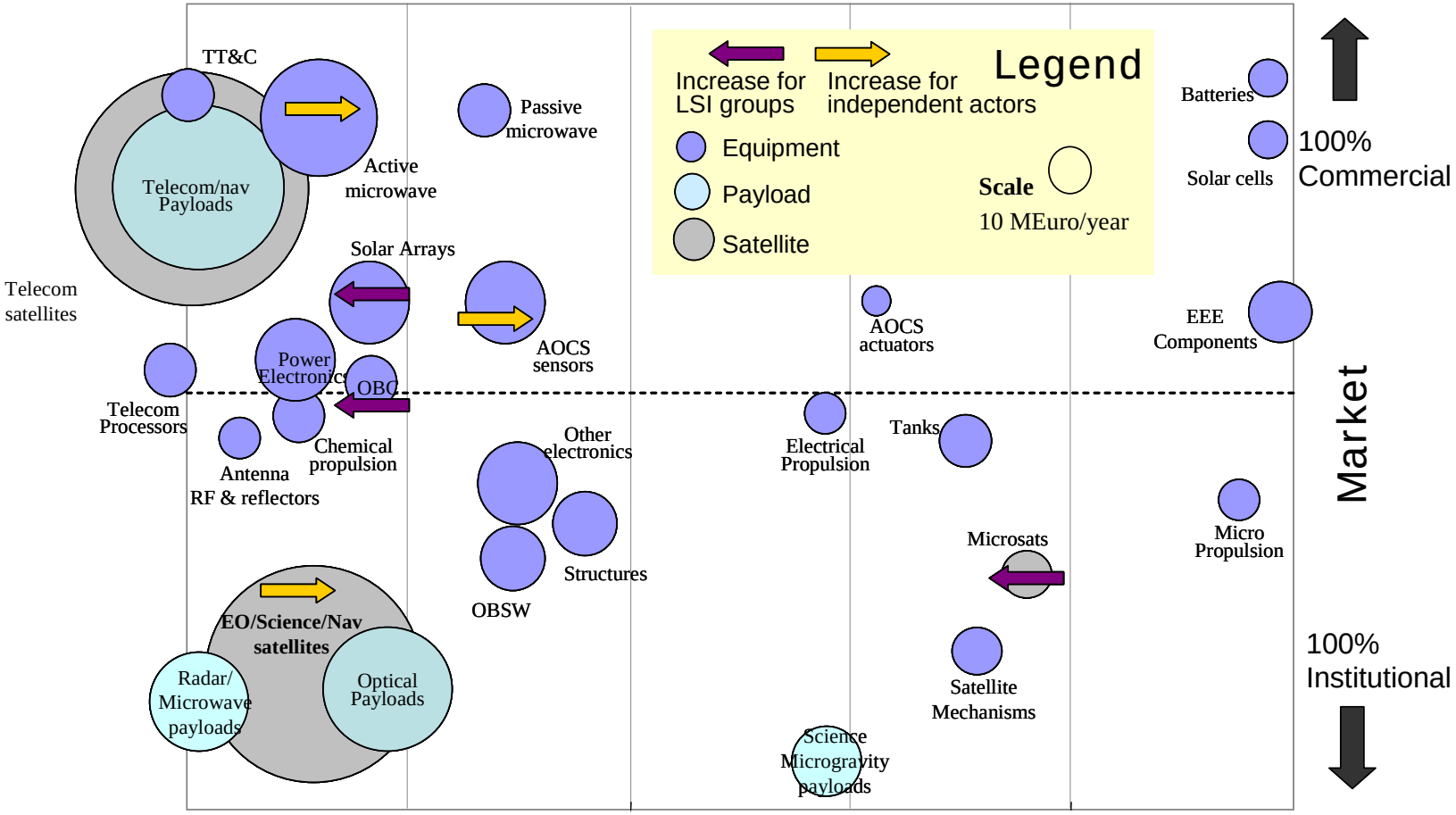
Independent of the evolution of turnover there is a tendency towards reduction of firms in the space segment and increase in service and ground. Propulsion is special case

Evolution per industry sector between periods 1999-2001 and 2003-2007



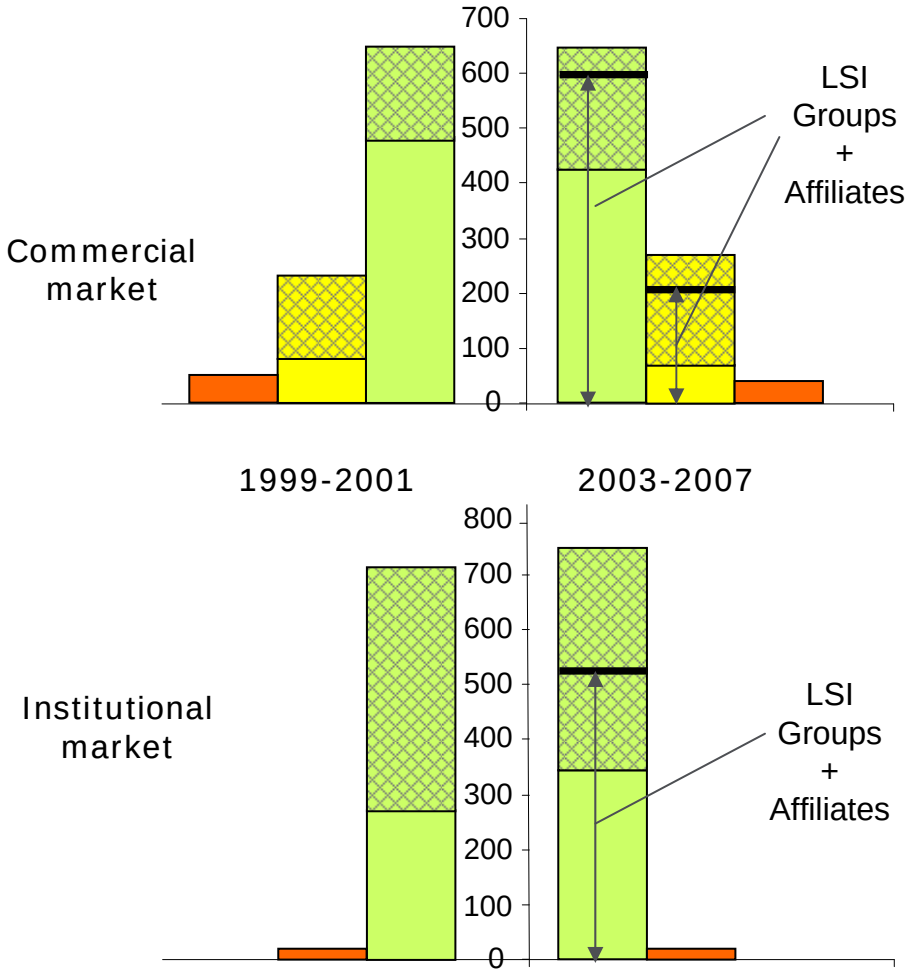
Independent actors have slightly increased their presence for EO / navigation satellites, AOCS sensors & microwave equipment while LSIs are more active for microsats, solar arrays & on-board computers

Production map for satellite systems and equipment (2003-2007 situation and tendency since 1999 -2001)



Different supply chains for Primes between commercial and institutional markets – Independent suppliers turn to equipment export markets

Satellite equipment procurement in Europe
(consolidated annual turnover in M€ averaged over the period)



Produced by LSIs
(830 M€ annual in both periods)

Produced by equipment suppliers
(760 M€ annual over 1999-2001
and 820 M€ over 2003-2007)

Produced for EU market

Exports

Imports

Consolidation movements in the European Space industry

Race for size and worldwide footprint

Company moves	Vertical integration	Horizontal integration
Astrium		
+ EADS Space Transportation	◆	◆
+ Tesat	◆	
+ Dutch Space	◆	◆
+ ISTAR (Infoterra SAS)	◆	◆
+ Intespace	◆	◆
+ Imass (Infoterra Lmtd)	◆	◆
+ Infoterra SGSA (Spain)	◆	◆
+ Spot Image	◆	◆
+ SSTL / SSTL	◆	◆
+ SSTL / + SIRA+SIL	◆	
Astrium Partnership		
Equatirial Systemas (Brazil) 42%		
SYNERTCH J-V with RNIIKP		
Antrix: P/F (TC) + PSLV (EO)		
JSC « Kazakhstan Gharysh Sapary		
Axio-net GmbH JV with Allsat GmbH		
Thales Alenia Space		
Alcatel + Alenia	◆	◆
+ Thales	◆	
TAS Partnership		
NPO-PM		
L-M for SAR worldwide solution		

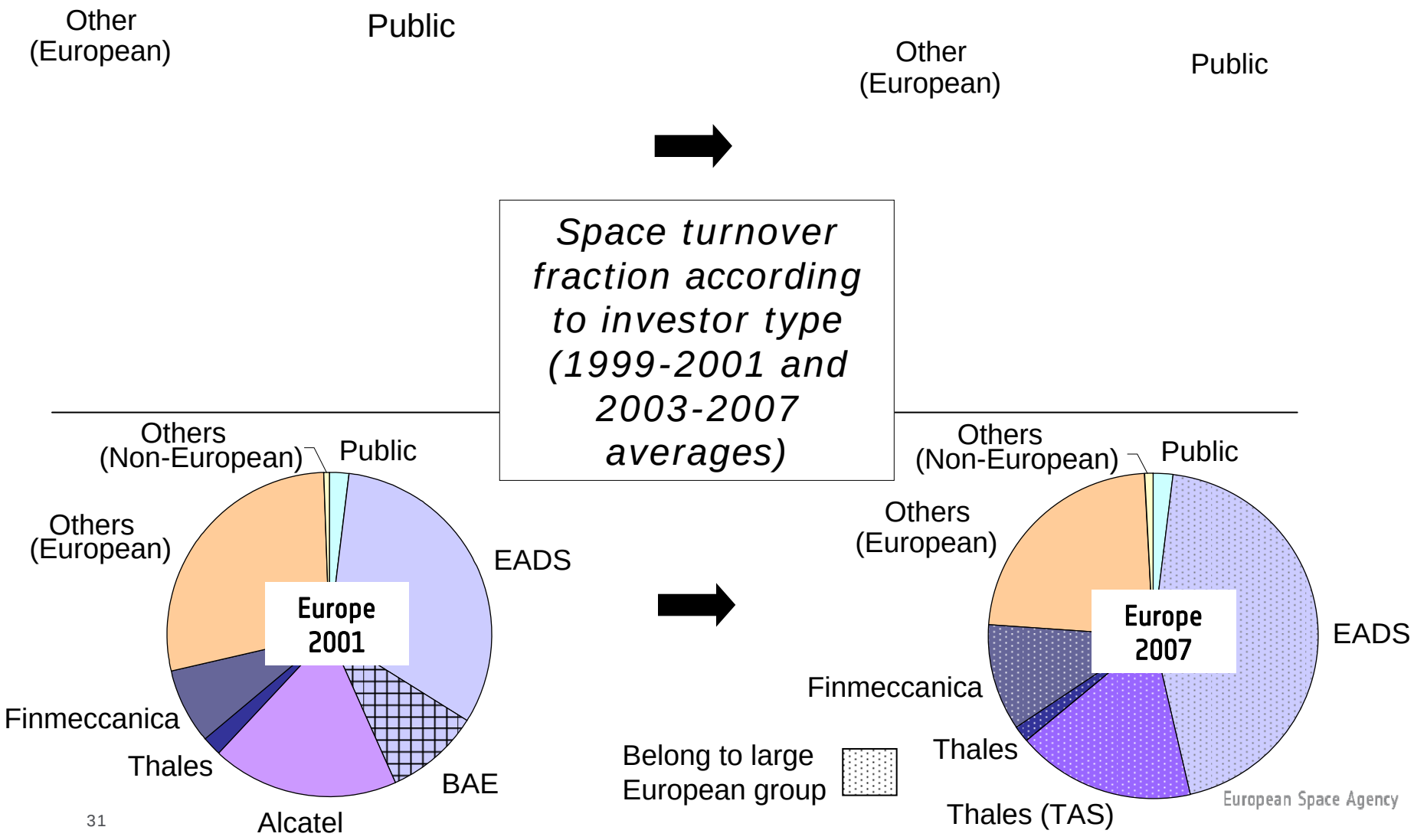
European consolidations

Company moves	Vertical integration	Horizontal integration
OHB		
+ Elta (F)		◆
+ MT Aerospace		◆
+ Luxspace	◆	
+ Kayser Threde		◆
+ RST Raumfart		◆
QinetiQ		
+ Verhaert		◆
Alter (Tecnologica + IGG + Hirel)		◆
SciSys		
+ VCS		◆
Ruag		
+ HTS		◆
+ Mecanex		◆
+ SAAB Space & Austrian Aerospace	◆	◆
+ Oerlikon Space	◆	◆
Finmeccanica		
+ Datamat	◆	
+ Selex		◆
+ Vega / Vega		◆
+ Vega / + Anite		◆
+ Aurensis	◆	

2008/09 evolution

Overall 45 ownership changes from 2007 to 2009

Increased concentration of space actors in Europe



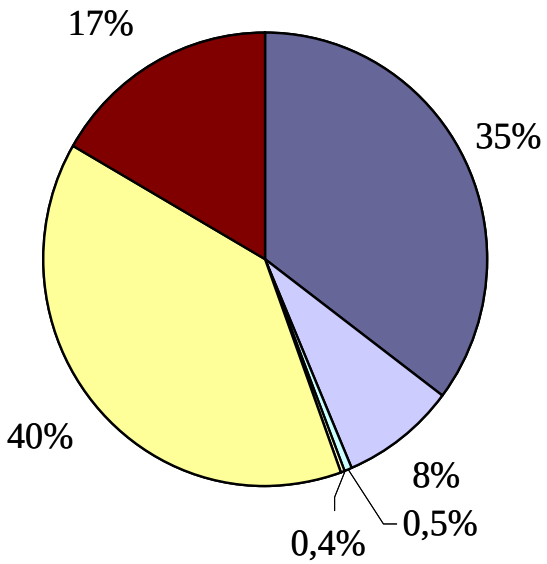
An increasing competition for satellite manufacturing

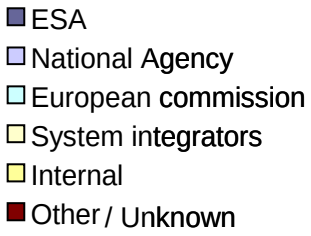
Current (2008) strategic positioning and expected evolutions of worldwide satellite manufacturers

	GEO orbit (also non-GEO capable)	Exclusively non GEO orbits
Satellite manufacturers **competing domestically & internationally**	**Boeing Satellite Systems (USA)** **Lockheed Martin (USA)** **Space Systems/Loral (USA)** **Orbital Sciences Corp. (USA)** **Astrium Satellites (Europe)** **Thales Alenia Space (Europe)**	**SSTL (UK)** **OHB System (Germany)**
Satellite manufacturers **competing domestically only**	**Northrop Grumman (USA)** **NPO-PM (Russia)** **RKK Energia (Russia)** **Krunichev (Russia)** **NPO Yuzhnoe (Ukraine)** **NTSpace (Japan)** **Mitsubishi Electric (Japan)** **Israel Aircraft Industry (Israel)** **CAST (China)** **ISRO (India)**	**Ball Aerospace (USA)** **General Dynamics/Spectrum Astro (USA) Microsat System (USA)** **Swales Aero/ATK (USA)** **AeroAstro/Radyne (USA)** **SpaceDev (USA)** **MDA Corp. (Canada)** **Polyot (Russie)** **Korea Aerospace industries** **INPE (Brazil)** **Invap (Argentina)**

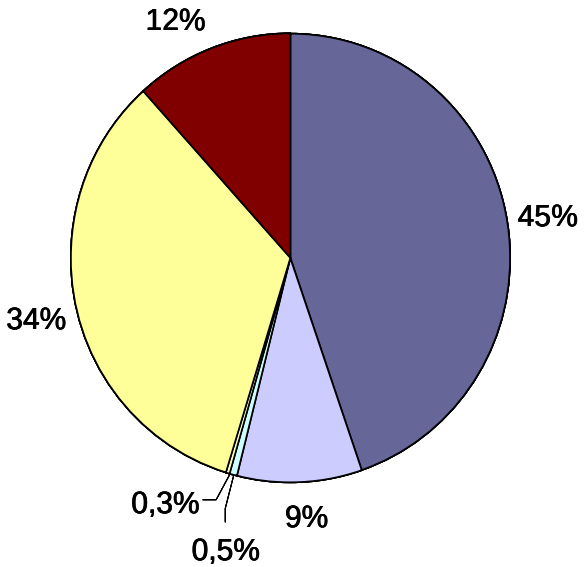
Important share of private R&D funding

Excluding launchers R&D





Including launchers R&D



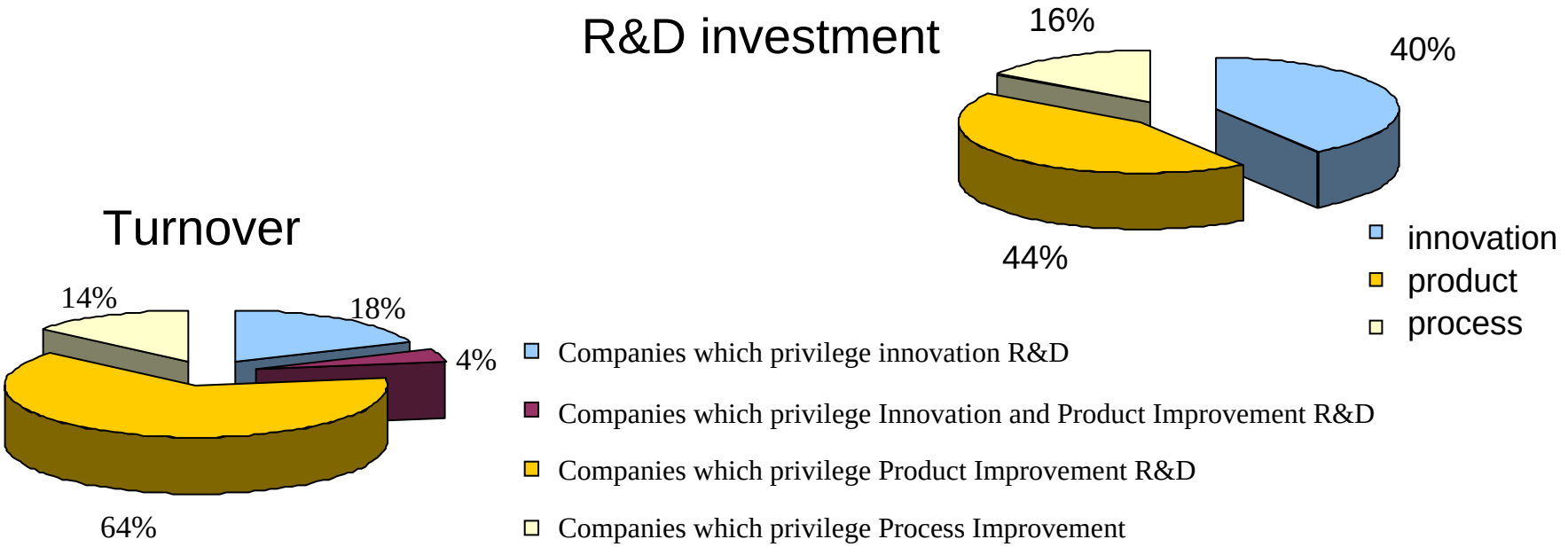
R&D accounts for approximately 700 M€, 10% of the unconsolidated European space turnover

Source: Industry (Survey 2003-07).
Assumptions regarding R&D spending have been made for several entities (mainly based on participations to ESA R&D programmes (TRP, GSTP…) and on data from the 1999-2001 period), in particular for LSIs

Institutions support R&D and one-shot developments, industry own investment focused on products

The European companies investing in product and process R&D achieve most of the space turnover, this investment is largely internal from companies.

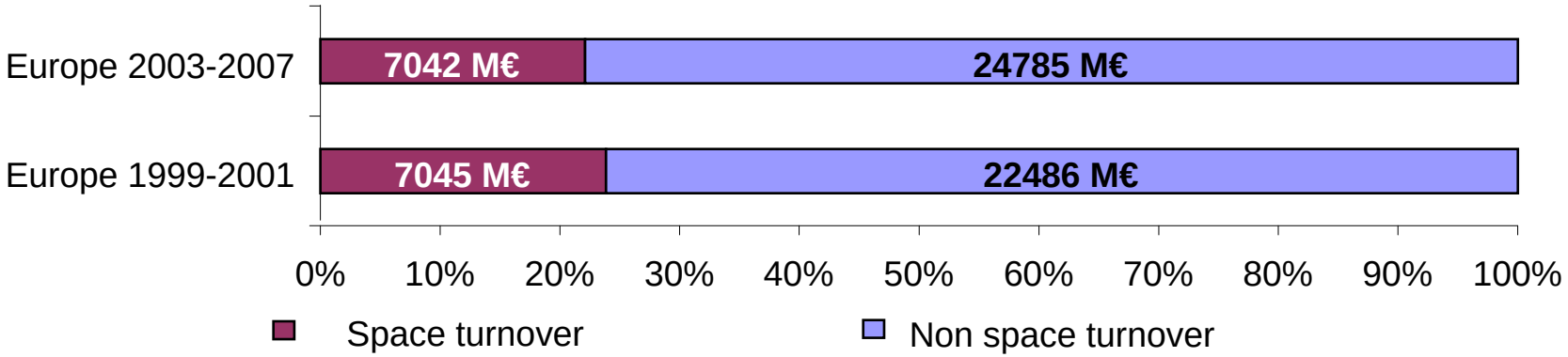
On the other side ESA is supporting industry by procuring innovation research projects.

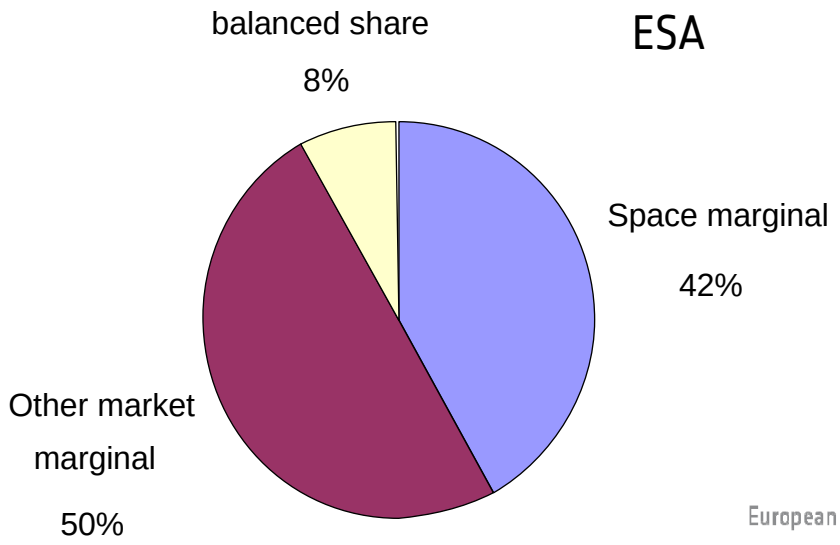


➔ ESA = Main support for innovation?

The average fraction of space turnover in overall Europe is 22 %

Evolution of space vs. non-space turnover ratios for Europe





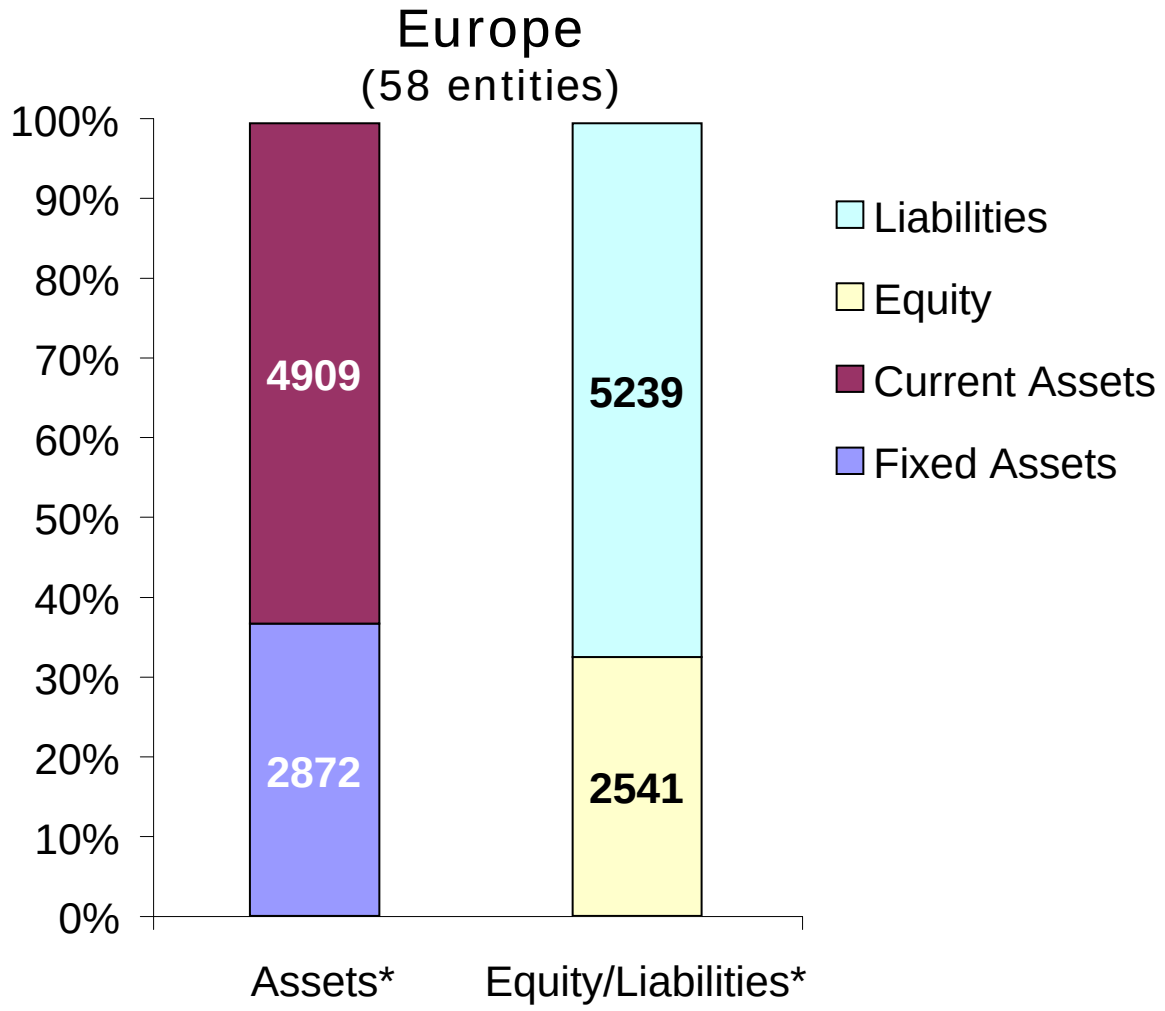
Economic benchmarks of the European upstream space industry

Indicator	EUROPE
Space turnover (M€ per year current)	6.806 M€ (for 94 entities, 90% of the unconsolidated turnover)
Profit level (% of turnover)	3 %
Order book (in times the annual turnover)	x 1.5
Company added value* (% of turnover)	48 %
Estimated space worker added value** (K€ per year per person)	110-120

* (Company turnover – procurement)*100/company turnover

** (Company turnover – procurement)/staff number

Typical European balance sheet for upstream space industry



* Estimated balance sheets for space activities end of year 2006

Industrial trends observed during the surveyed period

- Monopolistic attitudes and industrial verticalisation
- Consolidation of the systems and subsystems industry
- European critical dependences on parts and materials, affected by export controls (ITAR)
- Increased globalisation of space markets
- Increasing number of competitors in commercial markets
- Specialisation of the competitors
- PPP
- Standardisation of solutions and products
- The European defence industry is taking increased interest in space, targeting end to end governmental services
- Take-over by US capital of some European components firms (not a space specific problem, but may affect space activities)

Main conclusions

- The European space industry is very active in accessible commercial markets: it is competitive and holds a few strong market positions.
- European firms are competitive system integrators.
- Independent equipment suppliers have increased significantly their exports (as reaction to the systems integrators verticalization and non-European purchases)
- Unique low-tiers capacities may be an important risk factor for European competitiveness
- The industrial base providing components and materials is fragile
- Significant progress towards commoditisation of spacecraft design
- The space industry achieves low profitability.

SWOT for the support services domain

Strengths

- Expertise, tools built on non space activities (DNV, INTECS, …)
- Recognised leaders (Ticra, SSC, ..)

Weaknesses

- Low entry barriers in many cases

Opportunities

- Space agencies and Primes are increasing the demand for services

Threats

- Body shopping approach

SWOT for the payloads and instruments domain

Strengths

- Coverage of all domains: TC, Nav, Science, µG, Optical, Radar and microwave
- Europe has a significant share of commercial TC market
- Actors present in commercial TC P/L are present in radar/ microwave and in military P/L: synergies

Weaknesses

- Performances of key technologies make the P/L performances;
  Some critical advanced/high performance technologies are not readily available in Europe:
  shottky devices, sub-millimetre local oscillators, solid state laser source, large detector arrays from X to IR, optical clock for science, nav, EO, MMIC, GaN for UHF, SSPA, low noise amplifier, ASICs
- A limited R/D capacity at a moment, dispersion of TC P/L commercial applications requires new developments, and ITAR-free developments are needed to export

Opportunities

- New EO export government demands for optical (established) or radar (developing)
- ISL niche to develop
- Constellation activities may strengthen few players (mass production)

Threats

- Issues wrt maintenance of the range of system competencies spread out through Europe today
- (e.g. optical domain) on different sites (gaps between project developments)
- On commercial (e.g. Earth Observation export) markets, new comers (China, India, Russia…) and €/$ ratio

SWOT for the AOCS/GNC equipment domain

Strengths

- World-leading suppliers with capacity for recurrent production (star trackers, wheels…)
- Balanced footprint in Europe covering all the AOCS/GNC alternative solutions
- Synergies and non-dependence on space for many suppliers
- Actors in all along the product life cycle
- Europe is independent (Europe masters core technologies)
- Spread system capabilities

Weaknesses

- Euro/$ exchange rate
- Weak profitability (due to several factors: production level, price pressure)
- Low entry barrier & market volume for certain sensors
- Georeturn limits access of leading suppliers to ESA markets
- Dependence on single sources for products components that may become key for competitiveness (ex. Inertia wheels, APS)

Opportunities

Continued access to a export markets, due to strong positions and helped by ITAR (star trackers, sun sensors, wheels…)

- Standard use of star trackers on GEO telecom satellites
- Lead technological breakthrough (ex. MEMS, formation flying…)

Threats

Strong competitors in the US due to heritage and volume (if ITAR is relaxed)

- Loss of competitiveness due to breakthrough outside of Europe (ex. MEMS)
- Competition from low cost countries

Thank you

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European Space Agency