

- Reminder
 - Constant increase of the number of space actors detaining space assets
 - Almost 60 countries with at least one satellite
 - Slower but steady progress in the number of launching countries
 - 11 individual countries + organisation (ESA)

Trends and Perspectives in Space Launch Activities

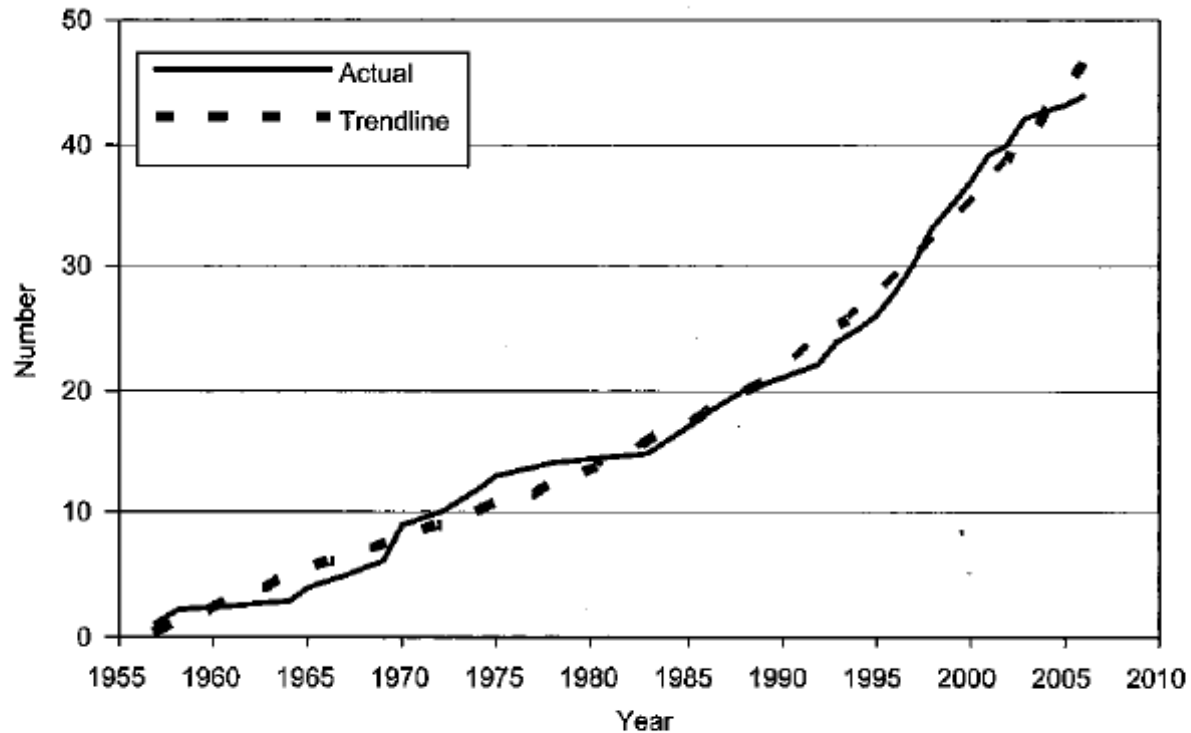


Fig. 1. Number of countries that own or operate satellites.

Source: Larrimore (Scott), *International Space Launch Notification and Data Exchange, Space Policy*, 23 (2007), p.173

Trends and Perspectives in Space Launch Activities

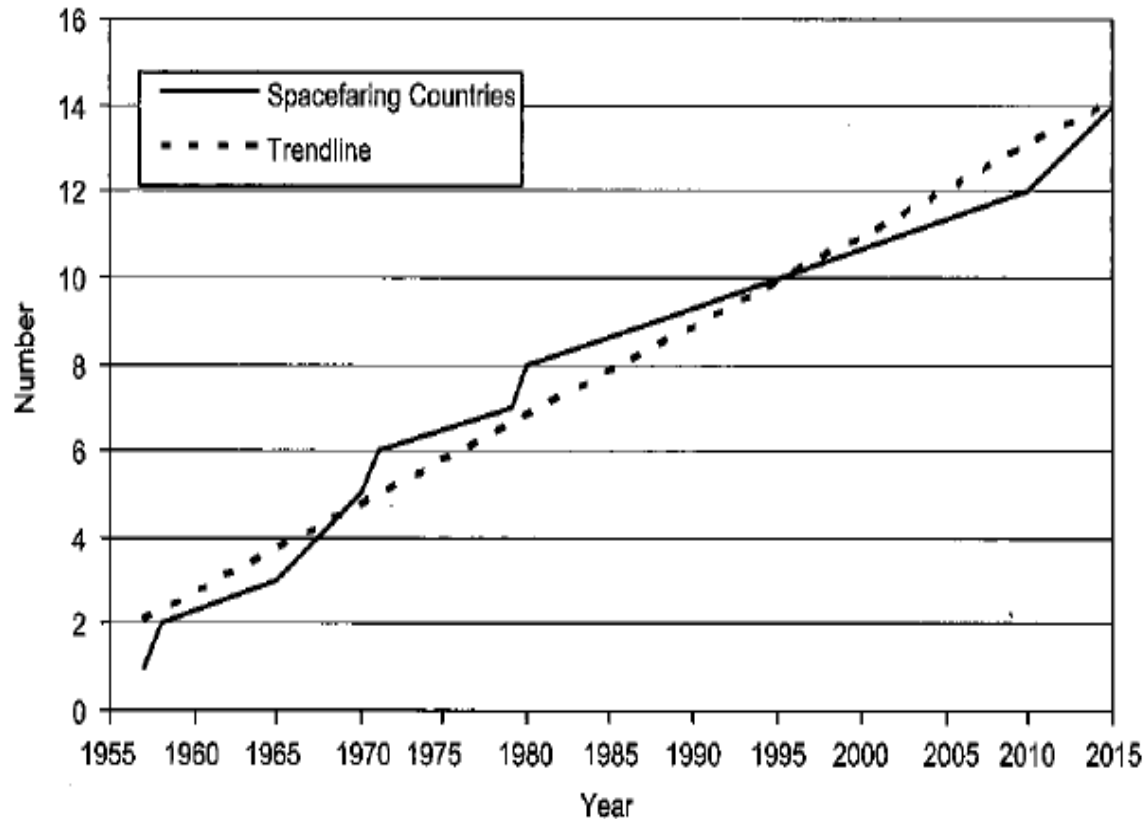
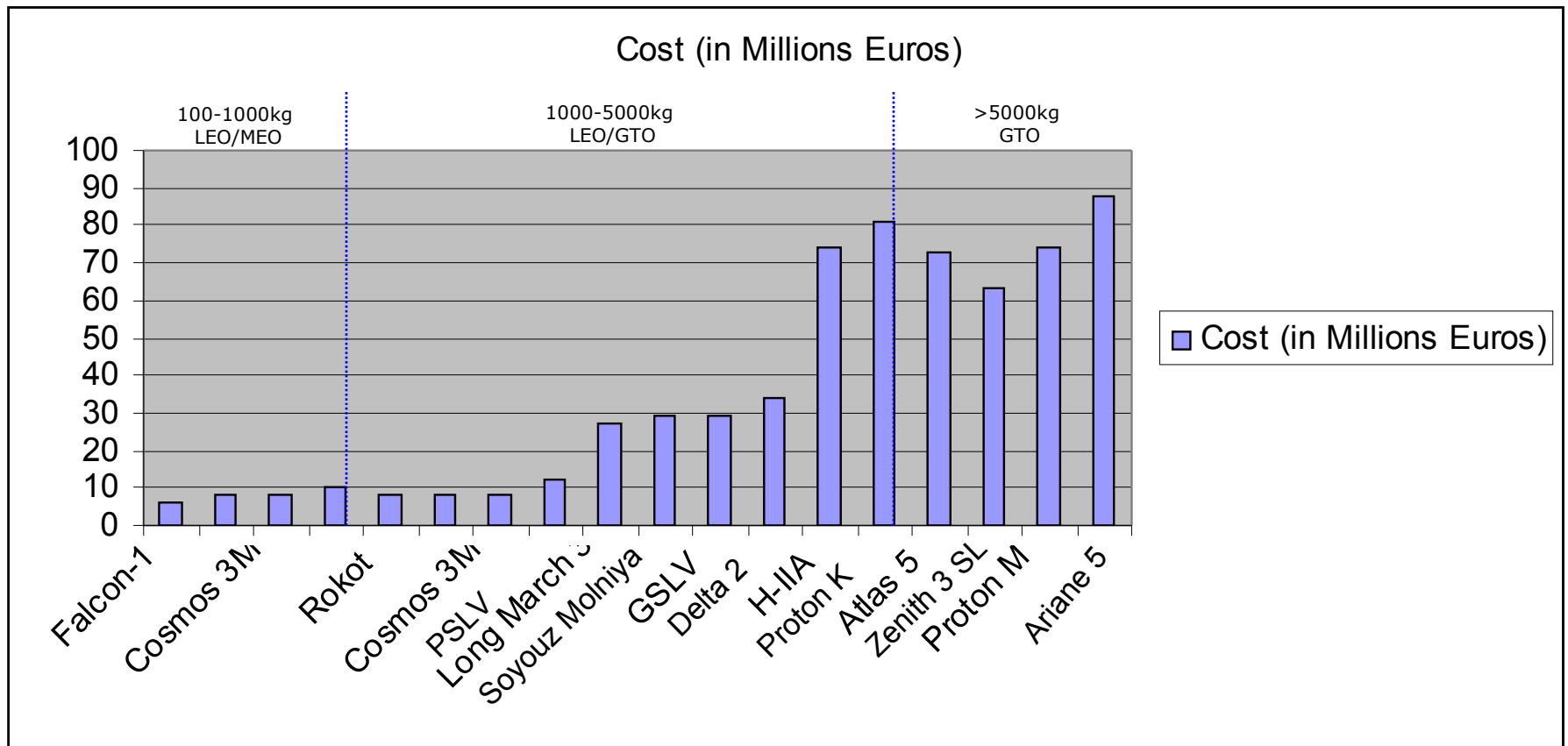


Fig. 2. Number of spacefaring countries.

Source: Larrimore (Scott), *International Space Launch Notification and Data Exchange, Space Policy*, 23 (2007), p.173

- Orbital Launch capabilities



Source: www.spaceandtech.com

Trends and Perspectives in Space Launch Activities

State	Actor in	Cum. Launches (in 2009)
USSR/Russia	1957	2938
USA	1958	1521
<i>France</i>	<i>1965</i>	<i>12</i>
Japan	1970	66
China*	1970	127
<i>UK</i>	<i>1971</i>	<i>2</i>
ESA	1979	191
India*	1980	24
Israel*	1988	7
Ukraine	1999	108
Iran*	2008	2

* Non subscribing states

- A few trends in 2009/10

- Suborbital flights:
 - Importance of suborbital flights
 - About some 72 suborbital flights in 2009 (77 orbital)
 - Latest noticeable suborbital launches:
 - Iran: Feb. 3, 2010: Kavoshgar suborbital flight
 - Iran: Dec. 16, 2009: Seijil 2 suborbital flight
 - Iran: Sept. 27/28, 2009: Shahab + Seijil suborbital flights
 - North Korea: April 5, 2009: Unha-2 Orbital/Suborbital attempt ?

- Suborbital flights (2):
 - High performance sounding rockets: largely spread technology
 - Canada, Brazil, India, Pakistan, UK, Europe, Iran, Russia, USA, Japan, etc.
 - Use of Missiles (Ground based/ SLBMs) or derived technologies:
 - Russia SLBM based experimental rockets
 - Iranian Shahab based technology (Kavoshgar 1-2)
 - European Castor 120 engine based rocket
 - Etc.

- Suborbital flights/others (3):
 - Large uncertainties:
 - Suborbital flights may help test many technologies associated with launchers and/or missiles
 - Case of *missed* orbital flights e.g. Unha-2 (PRK):



- Growing « light launch » technologies:
 - Falcon-1/-9, Minotaur, Taurus
 - Tsiklon, Start, Rockot, Dnepr
 - M5
 - Vega (2011/12)
 - ...
- With increasing incentive for private endeavours
 - Recent US decision for private launch for MSF
 - Commercial space ports (e.g. Virginia space flight center, Alaska Spaceport, Mojave civilian Aerospace test center, New Mexico Spaceport, etc. in the US); projects in Kiruna (Sweden), in Abu Dhabi...
 - X Prize, ...

- Spacefaring countries take into account these growing trends by reinforcing the legal framework
 - Space laws to enforce legal regulation of space activities including the launch activity
 - Ex: French space law (Loi N° 2008-518, June 3, 2008) establishing responsibilities and public rules for private operators

- Trend towards small and medium launch vehicle
 - For emerging actors
= affordable access to space
 - For space faring countries
= Cost benefit and expected responsiveness
 - For new actors
= sub-orbital space flight (symbolic “undefined” technological realizations and “space tourism” – for private actors)

- Push towards small and medium launch vehicle
 - Possible increase in the number of “light launches” drawing benefit from new satellite technology ? An opened question for all spacefaring countries
 - Possible private actor surge with some sort of support from public authorities (e.g. latest incentives in the US for private/commercial access to space)
 - Actual use of suborbital flights for scientific experiments/ atmospheric sounding in an increased number of countries

Create new launch activities to be monitored ?

- Blurring effect of increasingly diversified and wide-ranging launch technologies ?
 - More actors: States, Private
 - More diversified orbital and sub-orbital launch techniques
 - Lighter SLVs getting closer to missile-related technologies

- HCoC will have to deal with these trends in the
space launch area

1. Legitimacy of national scientific and space research (climate, high altitude experiments) associated launch programs
2. Need for a better collective knowledge/understanding/
dissemination of national science-oriented space programmes
3. Probably need for some better Launch « situation awareness »
regarding new SL techniques accessible to many countries
4. Supporting the national « space law » movement for better
national regulations of a blooming « light launch » activity ?