

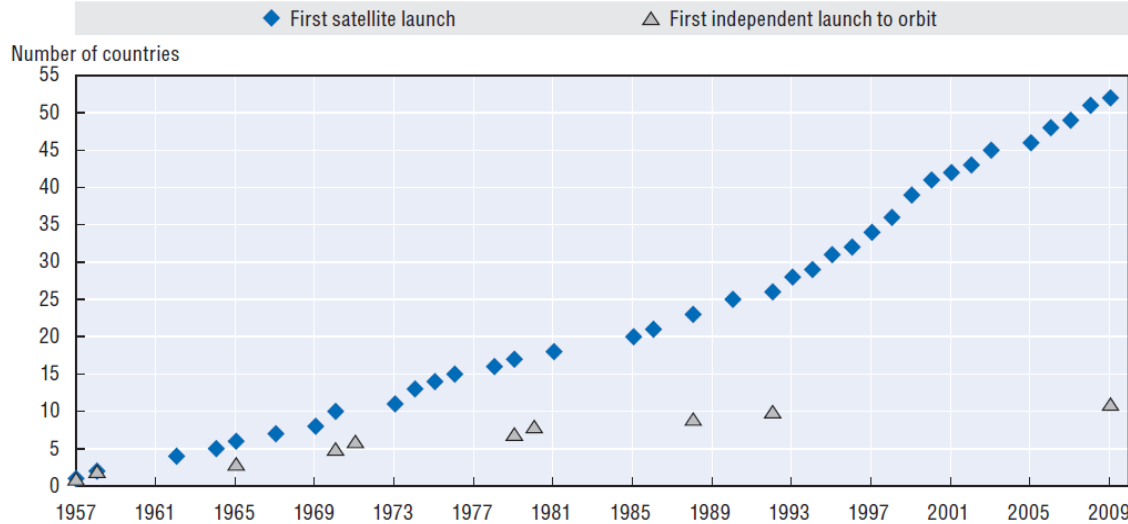
Satellite application development trends and business models

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Outline

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 - SMEs on Satellite Applications Market
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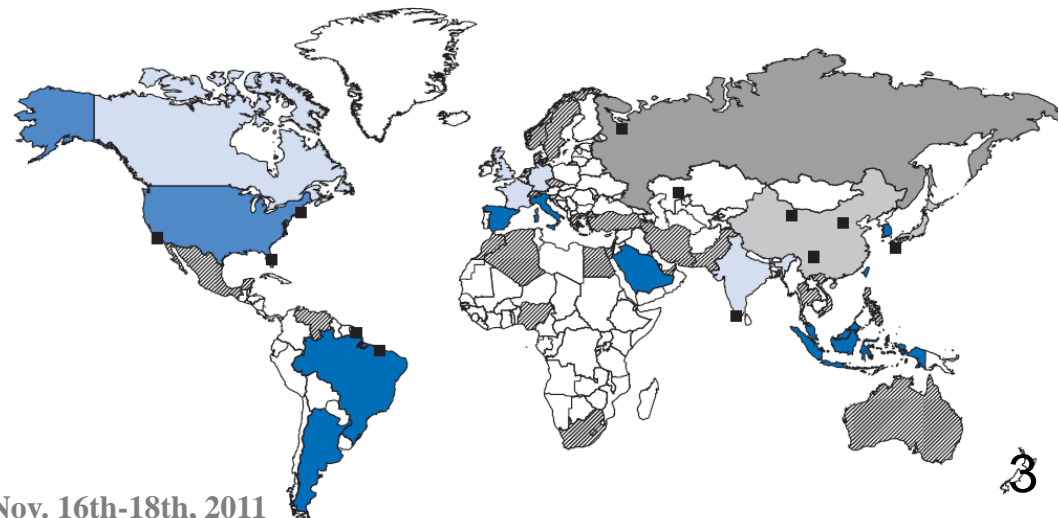
Satellite Market is Growing Across the Globe



Number of countries with satellites in the orbit increased up to more than 50 in last year

Countries with operational satellites in orbit, 2010

Number of satellites and main space launch sites



By 2010:

- 10 countries have demonstrated independent orbital launch capabilities
- 7 countries have operational launchers

(Jaramillo, 2010)

Images: OECD, *The Space Economy at a Glance 2011*

Space Market Overview

- Overall revenues from space activities (by OECD)
 - 150-165 bln USD in 2009
- Satellite telecommunication
 - Satellite broadcasting 65-72 bln USD in 2009
 - Transponder lease 11-12 bln USD in 2009
- Satellite geopositioning & navigation
 - 15 bln USD in 2009
- Satellite Earth observation
 - 0.9-1.2 bln USD in 2009
- Launch services
 - 2.45 bln. USD in 2009

Source: OECD, *The Space Economy at a Glance 2011*

Trends in Satellite Business



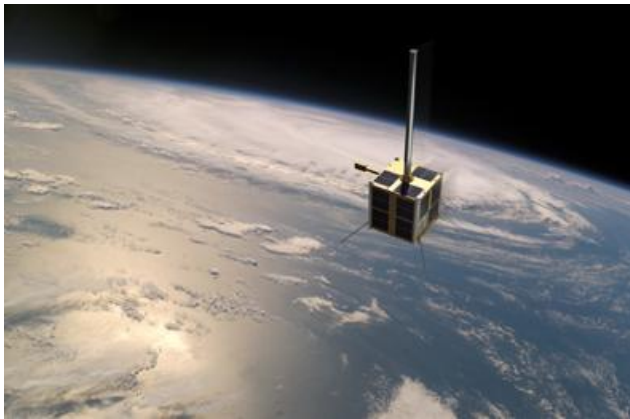
- Satellite manufacturing in developing countries:
 - shift from imitation to innovation
- Increasing use of small satellites
- Increased attractiveness of space applications market for Small and Medium Enterprises (SME)
- Fast growing market for Earth observations and geopositioning (navigation, identification, etc.)
- Emerging importance of disaster management
- Telecommunications:
 - growing demand for mobile broadband services

New Business Model for Commercial Satellite Manufacturers

- For each new satellite program, the unique customer needs are matched to the product portfolio that the company can offer
 - the best-value approach: offer alternate proposals that present different capability-price-risk-schedule combinations
- Most equipment consists of established building blocks
 - evolutionary insertion of the new products: “routine” equipment is combined with newly developed – reduces risk of failure, better cost/risk balance
- Customer is integrated into the satellite building process
 - easier interaction of the customer with the program team allows for rapid decision making and avoidance of surprises

Getting Smaller

- Reduced cost in production and launch allows commercial companies to survive without government funding support
- Opens new possibilities for SMEs to enter commercial satellite market



Norway's first nano satellite, AISSat-1, keeps watch on maritime activities in the High North

Photo: Norwegian Space Centre (NSC)

Near term small satellite applications

- Satellite telecommunication
 - Remote site communications
 - Polling of unattended sensors
- Earth observations
 - High resolution Earth observation
 - Landsat class data for environmental monitoring

SMEs on Satellite Applications Market

- SMEs - “the backbone of the European economy”:
convert research & innovation ideas into successful commercial products
- Space market becoming increasingly attractive for SMEs



European SMEs in Space-related activities:

Registered SMEs per Country

Austria	0.94 %	4
Belgium	2.82 %	12
Canada	2.82 %	12
Czech Republic	2.35 %	10
Denmark	1.65 %	7
Estonia	0.71 %	3
Finland	0.94 %	4
France	16.24 %	69
Germany	11.76 %	50
Greece	4.71 %	20
Hungary	0.47 %	2
Ireland	1.41 %	6
Italy	15.29 %	65
Luxembourg	0.94 %	4
Norway	1.41 %	6
Poland	0.47 %	2
Portugal	2.82 %	12
Spain	8.71 %	37
Sweden	1.41 %	6
Switzerland	4 %	17
The Netherlands	6.35 %	27
United Kingdom	11.76 %	50

European Support of SMEs on Satellite Applications Market

- INVESaT:

European initiative to help bring together financial investors and start-up SMEs in the emerging markets of satellite applications

- ESINET – European Space Incubators Network:
(4 partners: ESA, EBN, WSL and D'Appolonia)

supporting SMEs in developing of space related technologies

Earth Observations

- Increasing need for high-precision data for agriculture, meteorology, navigation
 - Remote sensing
 - Meteorological observations
 - Earth exploration
 - Climate change initiative
 - Providing high-resolution geospatial information
 - DigitalGlobe and GeoEye - US*
 - RapidEye – new public-private partnership with the Space Agency of the German Aerospace Center (DLR)*

Rapid Eye – Business Model

- Infrastructure:

- Space component:

small low-cost satellites – build by SSTL (commercial spin-off of Surrey University) using off-the-shelf components

5 satellites form constellation – able to obtain multi-spectral images of wide areas with high resolution

- Ground component:

processing systems to handle customer orders: image data correction, generate standard and customized products and services

Satellites constellation :



SVALSAT SATELLITE STATION (SVALSAT)
IMAGE: KONGSBERG SATELLITE SERVICES AS



RAPIDEYE'S S-BAND ANTENNA ON TOP OF HEADQUARTERS

Part of ground component:
Control station and data reception :

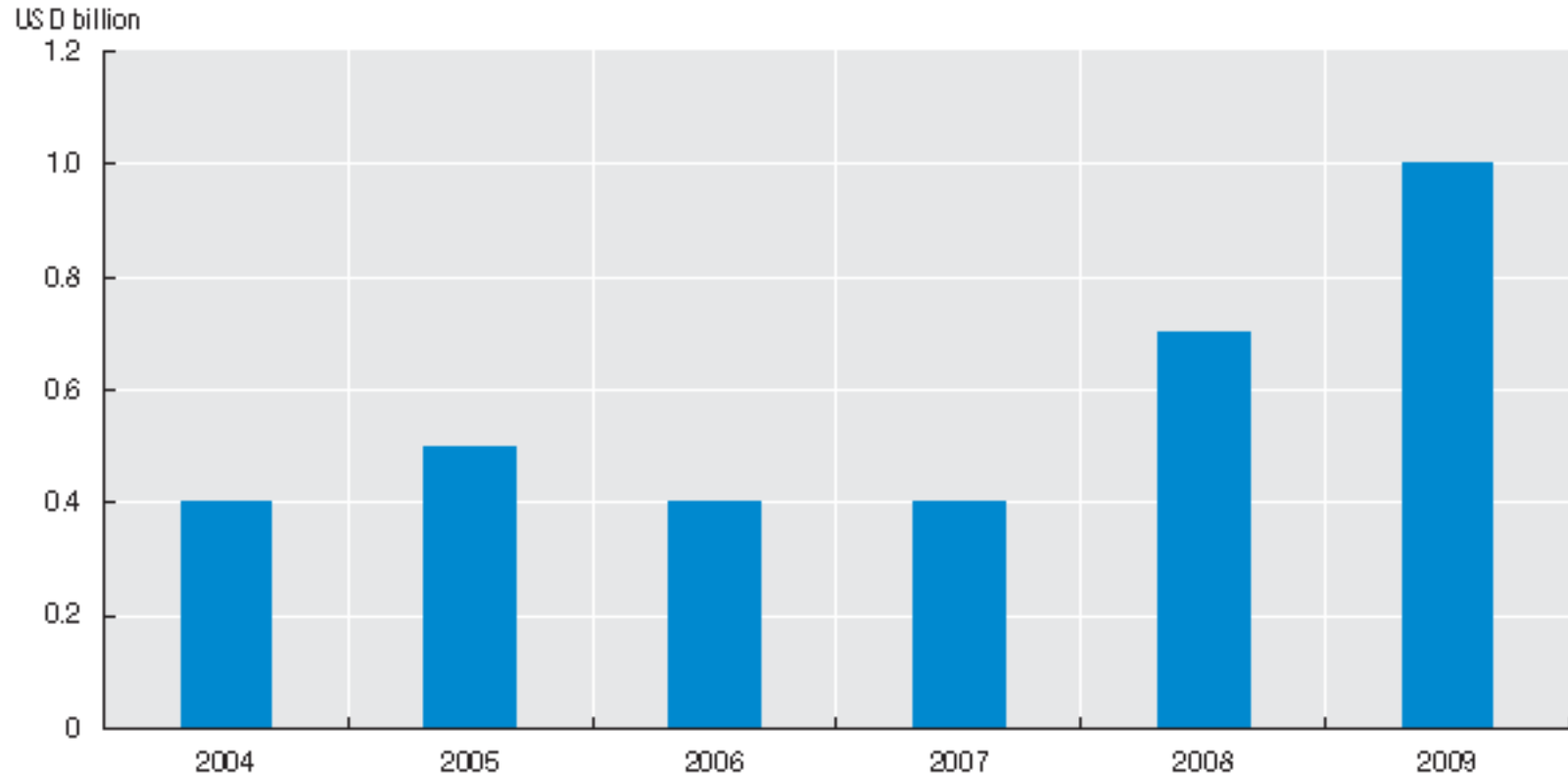
Rapid Eye – Business Model

- Offer:
 - high-resolution, multi-spectral, large-area image data acquired on a daily basis (nearly real-time)
- Target Customers:
 - Governments (military)
 - Commercial customers (businesses)
- High revenues are expected: following experience of GeoEye and DigitalGlobe in the USA

Earth Observations sector – revenues

6.1 Estimates of commercial remote sensing revenues, 2004-09

USD billion



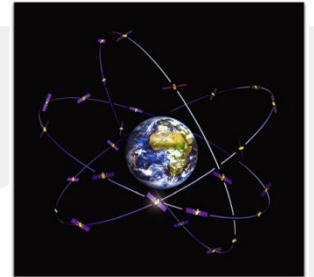
Source: Satellite Industry Association (2010).

Geopositioning and Navigation

- Growing market for geo-positioning and navigation

- *GALILEO*

2 satellites launched on Soyuz rocket from French Guiana on 21 October 2011



- New space systems are expected to move from demonstrations to routine:
 - Automatic Identification System (AIS) via satellite
 - Space Situational Awareness (SSA)

Disaster Management

- Increasingly growing need for effective systems for Disaster Managing and Emergency Telecommunications via Satellites
 - **Global Monitoring for Environment and Security (GMES):** ESA program
 - **Disaster Monitoring Constellation (DMC):** a partnership includes Algeria, Nigeria, China, Turkey, the UK and Spain *provides daily imaging capability – sold commercially, and distributed freely in times of natural disasters*
 - **WISECOM:** A rapidly deployable satellite backhauling system for emergency situations

Telecom

- Managed networks: telecommunications capability for business-to-business markets and institutional users
 - New possibilities in developing regions where is unfilled demand
- Growing mass markets:
 - high definition and 3D television
 - Broadband internet on mobile devices and in rural areas
 - Other satellite-based broadband data-based services
- Societal Services:
 - Tele-education (Indonesia, India, Thailand)
 - Telemedicine (India)
 - Insat network: 382 medical facilities connected in June 2010 (306 district/rural hospitals, 60 specialty hospitals, 16 mobile units)

Managed Networks Business Model

Technologies that allow various forms of content to be delivered over the satellite to any size of audience are now affordable for small operators. Those operators can target specific groups of users in the areas not well served by terrestrial operators

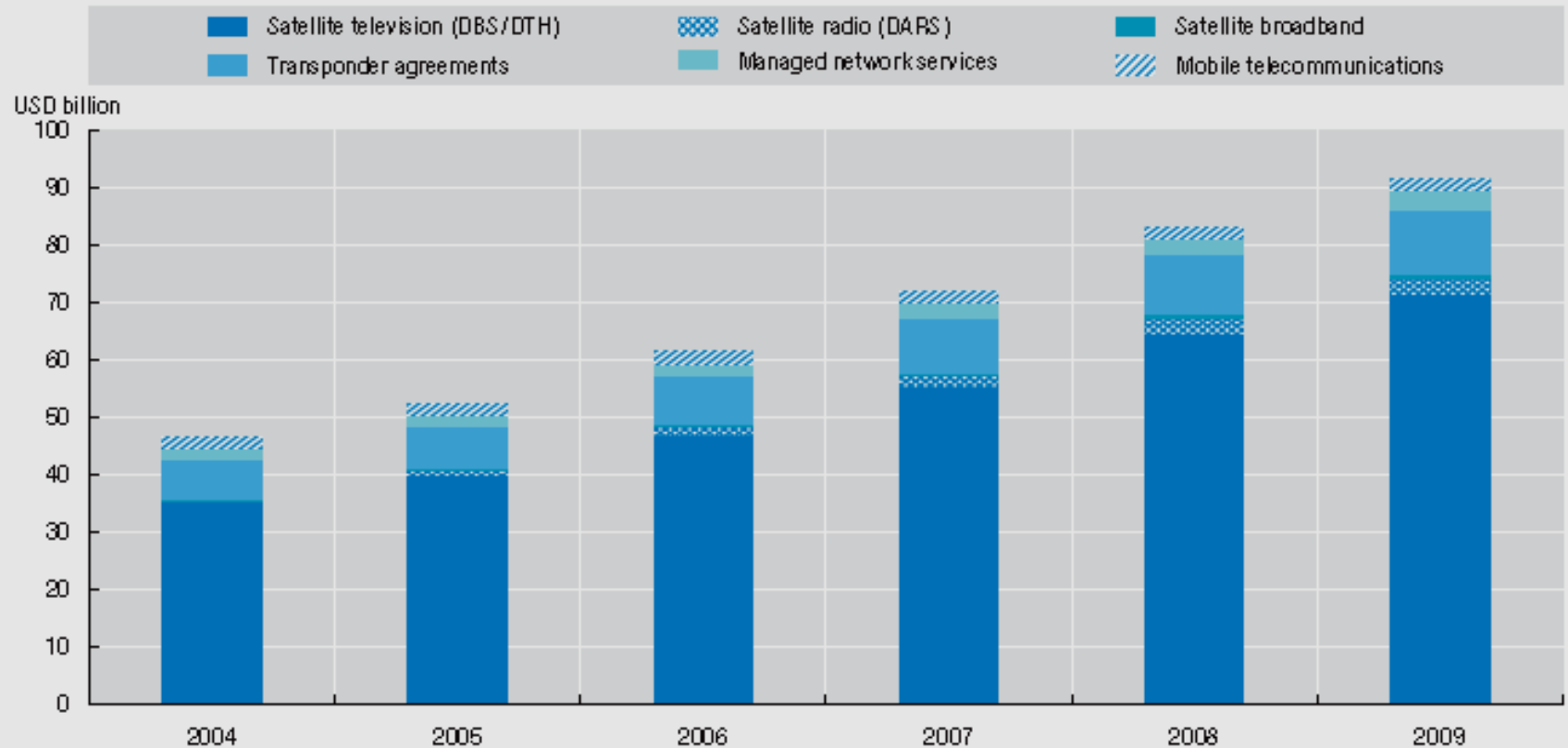
- Infrastructure:
 - satellite network assembled from standardized components and managed through a teleport and even over the Internet
- Offer:
 - Providing telecommunication services to the remote user
Simple to configure terminal device could be installed and maintained by or for the user
- Customer:
 - Businesses and institutions (enterprises and government agencies, not consumers)

Guidelines for Managed Networks Business Models

- Managed networks market is very competitive:
solutions offered for the client should cost less than the best alternative
- Most promising markets:
developing regions where is unfilled demand for telecommunication services

Telecommunication sector – revenues

5.2 Estimates of satellite communications and broadcasting revenues (2004-09)



Source: Satellite Industry Association (2010).

Legal Barriers on the Satellite Applications Market

- Legal (copyright) regulations should be revised and adapted for the satellite applications market to boost its development:
- Existing copyright regulations regarding use of satellite-collected information and its derivatives don't allow commercial companies to sell products, which use satellite-acquired data (subject of the copyright)
- Clear and coherent regulations are needed for use of data of foreign jurisdictions by commercial data providers and product developers

Conclusions

- Market of satellite applications is increasingly growing
- Use of small satellites is a growing trend – helping to reduce cost of manufacturing and launching
- Satellite Applications Market becomes more attractive for Small and Medium Enterprises
- On the space applications market is growing demand for:
 - Earth Observations
 - Geopositioning and Navigation
 - Disaster Managing
- There is increasing need for satellite-based broadband data services within traditional Satellite Telecommunication industry
- New opportunities exist for Managed Networks in developing, remote regions

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