

# ESA's Optional Programs

**Selected Ideas for the preparation  
of a national strategy for C-Min 2008**

Prague, 29th of July 2008

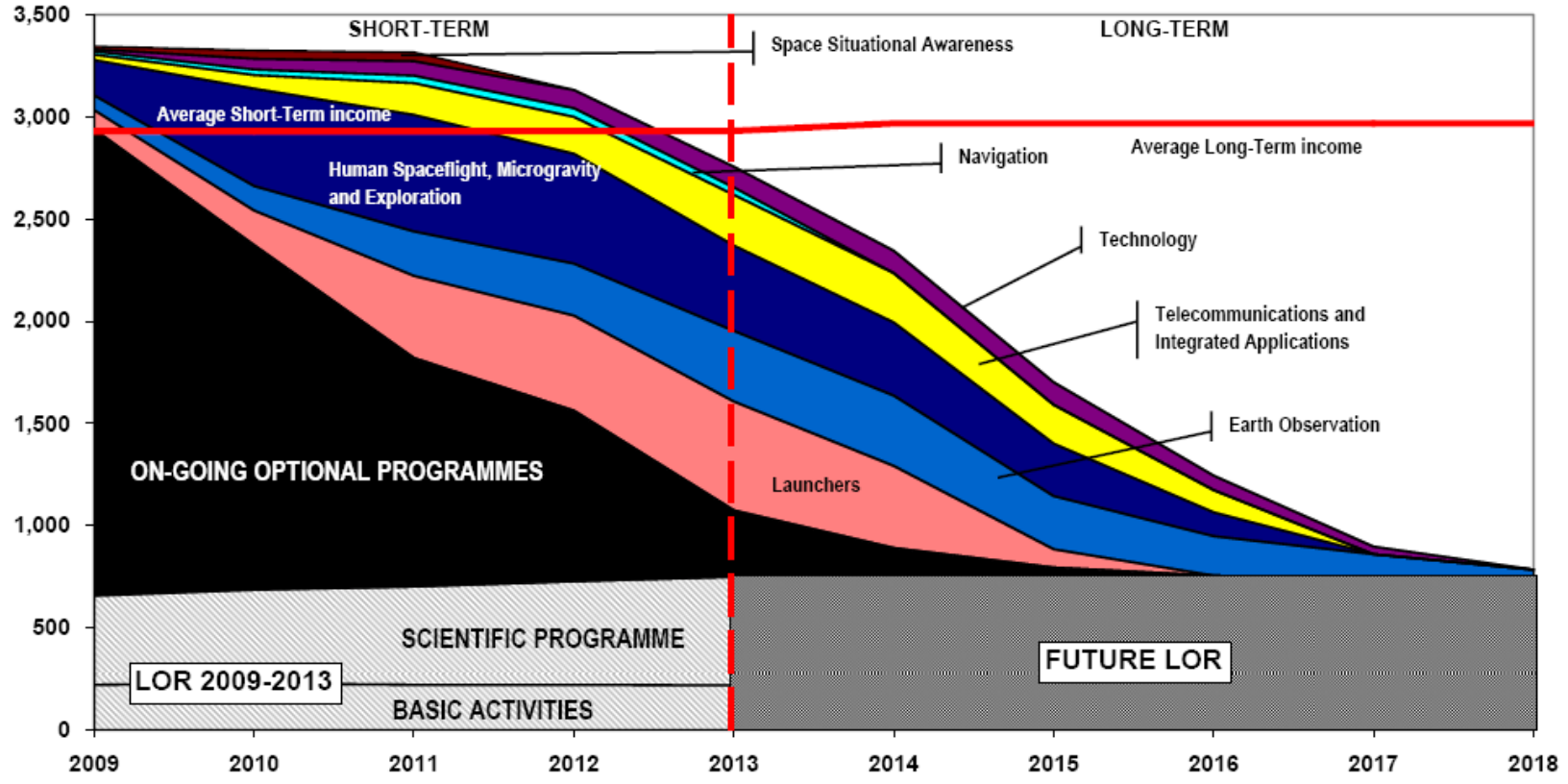
All the space you need



# ESA Council on Ministerial Level

## ESA Ministerial Council 2008

Proposed Overall Payment Appropriation Requirements and Average Income in M€, 2008 economic conditions



Source ESA



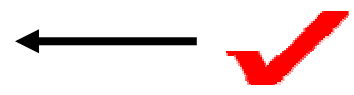
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# Optional Programs

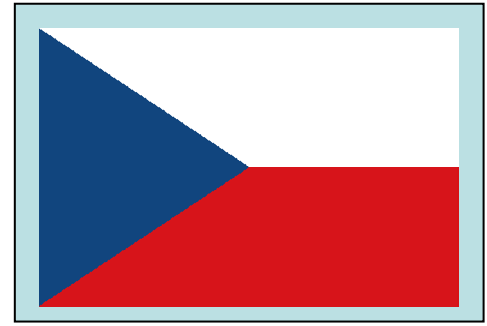
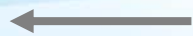
## ■ Process:

1. Council Chairman to communicate Proposal to all Member states
2. Member states to analyze proposal and to proof participation
3. Council to accept optional program by “double 2/3” vote
4. Formal declaration of “not being interested” within 3 month
5. Participating States to set up
  1. Program Declaration and
  2. Implementation Rules
6. Council to decide on Program Declaration (“double 2/3”)
  1. Progr. Phases, Schedule, etc.
  2. Budget shares: min. 25% of GDP-Key, nominal GDP, max. open(!)
  3. Possibility to step out → (20% rule)

ESA	C-MIN Progr.- Prop. / M€
MAN	SCI, Science, mandatory, 5 %/y → ~426/y GB, General Budget, 2,5 %/y → ~ 204/y
LAU	LAU, CSG funding → ~ 82/y
	LAU, AR 5 ARTA → 720 total 1. slice → 302
	LAU, AR 5 Post ECA → 1550 total (?) first period → 340
	LAU, VEPP Vega evo. → 90 (total 160)
	LAU, VERTA → 91 (total 226)
	LAU, FLPP periode 2, step 2 → 110 (total 316)
EOP	EO, GMES segment 2 → 383 (total 987)
	EO, Meteosat MTG ph. C/D → 826 (was 1170) Compl Progr +G/S+Ops+launch → 3,1 B€
	EO, Climate Change CCI → 80 (total 170)
HME HSF	HSF, ISS Exploitation period 3 → 1612
	HSF, ISS ELIPS period 3 → 319
	HSF, ISS APAP (ATV prod. acc.) → 118
	HSF, CSTS → 140
	HSF, ISS Extension & Evo. → 165
HME SRE	SRE, Rob. Expl. Exomars → 626 on top
	SRE, Rob. Expl. MSR NET → 65
	SRE, Rob. Expl. Aurora Core → 100 (was 140)
TIA	ARTES, No. 10, ATM, phase 2 → 70 (was 195)
	ARTES, No. 07, EDRS → 170 (total 300)
	ARTES, No. 20, IAP → 70 (total 160)
	ARTES, core (1,3,4,5,8,11) → 124 (total 610)
GAL	NAV, EGEP, period 2 → 120 (was 150)
SSA	SSA → 270 planned / → 100 reduced
TEC	Technology, NewPro, GSTP → 223 (was 423)



Potential  
Participation of  
Czech Republic



# Example: ELIPS III

## ■ MIS Mice in Space

- Study bone & muscle loss & neurological control capabilities of mice
- Astrium's resp: life support & thermal control
- Potential Czech part: **Photocatalysator**
  - Air purification & trace contamination removal
- Approx. 0,75 – 1,5 Mio € for Phase C/D

## ■ Material Science

- High temperature furnace for material science experiments on ISS
- E.g. cartridge technology → diffusion insert for MLS
- Approx. 1,5 – 2,5 Mio € required



# Example: ELIPS IV

- Biotech. Mammalian Tissue Cultivation
  - Diagnostic device for tissue cultivation
  - Astrium responsible for experiment dedicated equipment
  - Already Czech participation via Cytoscience/CH
    - fluorescence microscope f. cell observation
    - new could be : participation in stimulator f. living cells samples → **e.g. precision mechanics.**
  - **On-line S/W control...**
    - **Fast& accurate measurement of micro-m displacements under high forces**
  - approx. 1,5 – 2,5 Mio € to cover space developm.



# Earth Observation (EO) Program Overview

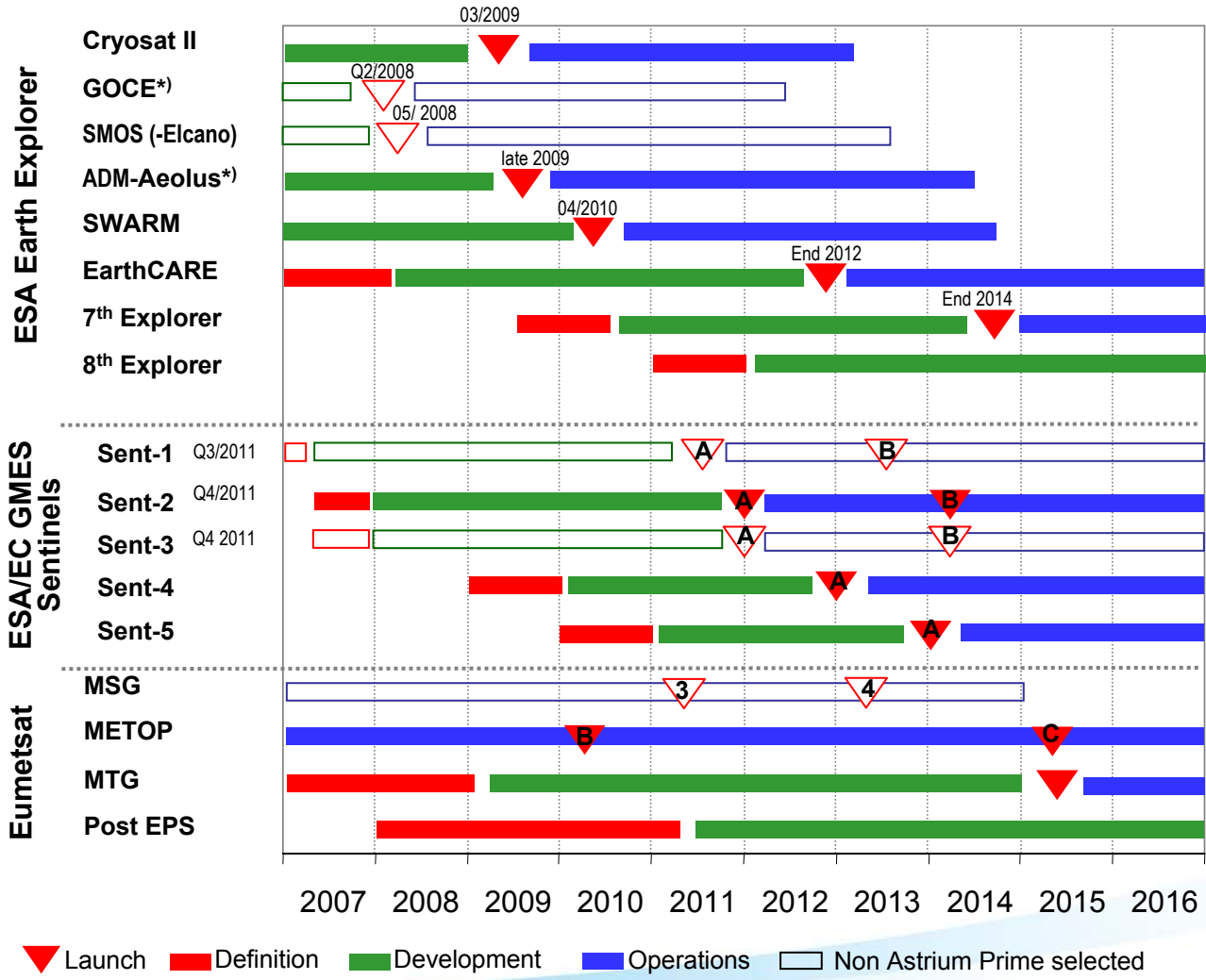
## Three Program main program lines in Earth Observation

- ESA Earth Observation Envelope Program (EOEP)
- EC/ESA Global Monitoring for Environment and Security (GMES)
- Eumetsat/ESA Meteorological Programs (Meteosat & Metop)

→ Astrium is a key player in all main EO program lines

→ We are seeking partners and providers for equipment & subsystems

# Earth Observation Road-Map



Ongoing Projects

- Under Negotiation
- Phase 0 running
- Still to come

Phase B/CD/E1 started in 2007

- Phase A start end 08
- tbc, C-Min (Nov 2008)

- Phase A ongoing
- Phase 0 ongoing

▼ Launch    ■ Definition    ■ Development    ■ Operations    □ Non Astrium Prime selected

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# Earth Observation Envelope Program (EOEP)

## ■ EOEP is an ESA 'Optional Program'

- ESA member-states (MS) have the choice to participate in this program.
- Participating MS can decide on their contribution and are not bound to GNP
- Geo-return rules are applicable at EOEP-program level (i.e. across all slices)
- EOEP program proposal is endorsed at ESA Ministerial Conferences (C-Min)

**→ The main element of EOEP are the ESA Earth Explorer Missions**

## ■ EOEP is subdivided into slices of 5 years

- |             |             |   |
|-------------|-------------|---|
| ▪ EOPP-ext. | 1999 – 2000 | EO Prep. Program Extensions (2 years)             |
| ▪ EOEP-1    | 2000 – 2002 | (3 years)   |
| ▪ EOEP-2    | 2003 – 2007 | (5 years), endorsed in C-Min 2001                 |
| ▪ EOEP-3    | 2008 – 2012 | (5 years), endorsed in C-Min 2005                 |
| ▪ EOEP-4    | 2013 – 2017 | (5 years), <u>to be endorsed in C-Min 2010/11</u> |

## ■ EOEP Participating States

- Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, The United Kingdom, Greece, Ireland, Luxembourg and Portugal.

**→ Czech Republic contributes Accelerometer to SWARM-Mission**



# EOEP / Earth Explorer Missions Overview

## → 3 'Core' Mission & 3 'Opportunity' Missions

### GOCE TAS

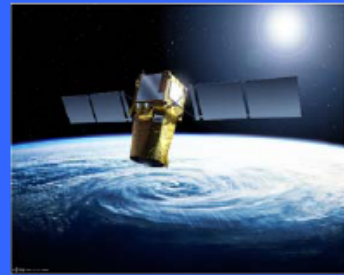
Astrium for Platform

Gravity Field and Steady State Ocean Circulation Explorer



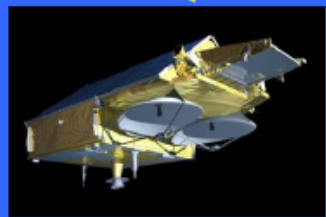
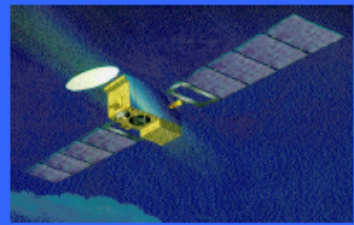
### ADM-Aeolus Astrium

Atmospheric Dynamics Mission



### EarthCARE Astrium

Cloud, Aerosols & Radiation Explorer



### Cryosat 1 & 2 Astrium

Sea Ice thickness and Ice sheet topography



### SMOS Astrium, CESA

Soil Moisture and Ocean Salinity



### Swarm Astrium

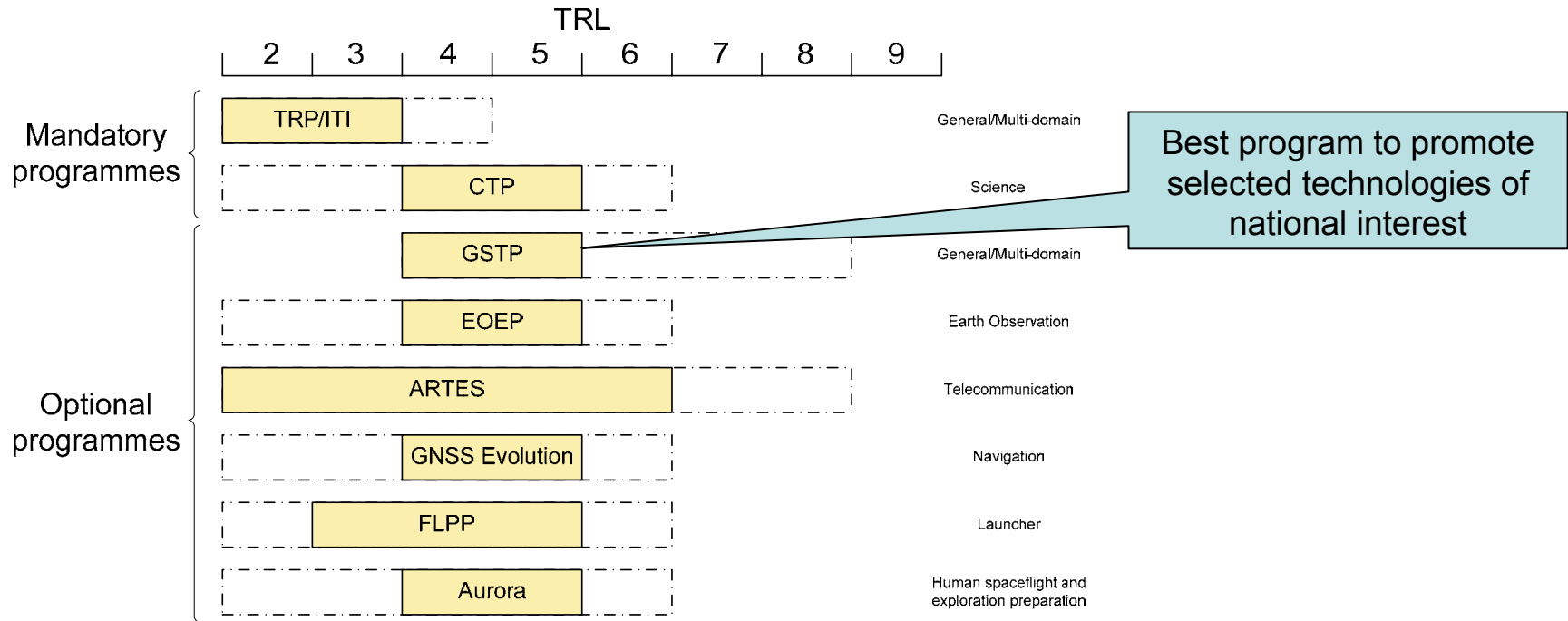
Geomagnetic field survey

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# Technology opportunities for Czech industry

- European space industry has overcapacities for many low investment commodities like GSE, software, standard electronics or structures, etc. → no further investment useful
- Limited European capacities offer opportunities for emerging countries in design, manufacturing and testing of space-proven
  - RF components for UHF – Ka band telecom equipment
  - Travelling wave tubes
  - **ITAR** restricted electronic devices
  - Reaction wheels
  - Thermal coatings
  - Fuel cells
  - High precision optical components (mirrors)
  - Micro Electrical Mechanical Systems (MEMS)
  - Low cost carbon fibre reinforced plastics CFRP manufacturing
- Information of Czech references in these areas are welcome.

# ESA Technology Programmes



- Optional programs allow selective participation to certain technology domains
- GSTP will include „General activities“, „Building Blocks & Components Development to High Technology Readiness Level“, „Security for the Citizens“ and „In-Orbit Demonstration“.

# ESA has taken actions to free itself of some limitations of the current US regime

- **European Component Initiative (ECI)**
  - To reduce substantially the dependence of European space programmes on the supply of EEE components from sources subject to export restrictions
  - Need for non-dependence was stated in ESA 2005 Council at Ministerial level
  - Careful selection of strategic European component technologies allows to mitigate major risks exposure for ESA and its Member States as a result of US ITAR restrictions or End User Certificates
  - ECI is an open cooperative programme where the Agency and National Space Agencies may participate each and contribute to the programme objectives without exchange of funds.
  - The European Space Components Coordination (ESCC) is in charge of the overall strategy for European EEE space components and the required technology.

- **European Component Initiative (ECI) – cont'd**
  - Selection of components/devices for ECI phase 1 based on Galileosat and other ESA projects and programme needs
    - 20 items selected for development in ECI by ESA and 11 by CNES and DLR
  - ECI phase 1 until end of 2007
    - ESA budget = 15M€
    - F and D funding 4M€ and 2M€ respectively through their national space agencies
  - ECI phase 2
    - ESA budget = 21M€
      - ESA Program funded activities, nationally funded activities and NewPro funded activities
    - Objectives:
      - Target by 2011: average > 50% in European spacecraft in terms of the value of EEE component procurement secured by European or ECI global partnership sources
      - Target: > 50% European market share of each ECI developed component three years after the qualification
    - Phase 2 complemented with cooperation with non-European space agencies (JAXA and ISRO)

# New Optional Programms (1)

PROGRAMME	TOPIC	OBJECTIVES	Budget
<b>SSA- SPACE SITUATION AWARENESS</b>	Comprehensive know-ledge, understanding and maintained awareness of the population of space objects, of the space environment, and of the existing threats/risks.	Support of the European independent utilisation and access to space for research or services, through providing timely and quality data, information, services and knowledge regarding the environment, the threats and the sustainable exploitation of the outer space	SSA PERIOD 1
			<b>For 2009-2011: Funding of Service Elements 100 ME</b>
			SSA PERIOD 2
			For 2012-2018: <ul style="list-style-type: none"> <li>▪ Finalisation of the procurements and further improvements of the groundbased Facilities deployed under SSA-Period 1</li> <li>▪ Development and Launch of an initial space-based infrastructure Approx. volume: 450ME</li> </ul>
SERVICE ELEMENTS			
		<ul style="list-style-type: none"> <li>▪ Surveillance and Tracking of man-made space objects</li> <li>▪ Man-made Space Objects Imaging</li> <li>▪ Space weather monitoring and forecast</li> <li>▪ Near-Earth Objects Surveillance and Tracking</li> </ul>	
IAP		Promote the development of integrated applications using space assets in a system of systems approach, which will bring benefits to the European society	
CCI			

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# New Optional Programms (2)

PROGRAMME	TOPIC	OBJECTIVES	Budget
SSA- SPACE SITUATION AWARENESS	Comprehensive know-ledge, understanding and maintained awareness of the population of space objects, of the space environment, and of the existing threats/risks.	Support of the European independent utilisation and access to space for research or services, through providing timely and quality data, information, services and knowledge regarding the environment, the threats and the sustainable exploitation of the outer space	SSA PERIOD 1
			<b>For 2009-2011: Funding of Service Elements 100 ME</b>
			SSA PERIOD 2
			For 2012-2018: <ul style="list-style-type: none"> <li>▪Finalisation of the procurements and further improvements of the groundbased Facilities deployed under SSA-Period 1</li> <li>▪Development and Launch of an initial space-based infrastructure</li> </ul> Approx. volume: 450ME
SERVICE ELEMENTS			
	<ul style="list-style-type: none"> <li>▪Surveillance and Tracking of man-made space objects</li> <li>▪Man-made Space Objects Imaging</li> <li>▪Space weather monitoring and forecast</li> <li>▪Near-Earth Objects Surveillance and Tracking</li> </ul>		
<b>IAP</b>	<b>integrated applications using space services etc like Earth observation, Telecom, navigation and meteorology</b>	<b>Promote the development of integrated applications using space assets in a system of systems approach, which will bring benefits to the European society</b>	70 Mio € in a first phase (in total 160 Mio €)
CCI			



# New Program Initiatives...



- E.g. ATV ...return capability, man tended,...

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