



# Russian-European Space Cooperation: Results and Perspectives

Space Economy in the Modern World  
September 18<sup>th</sup> Vilnius, Lithuania



## EUROPE-RUSSIA COOPERATION INSTITUTIONAL FRAMEWORK

### § EU-Russia space cooperation - of major importance

- § EU-Russia summit 2012: 2014 is declared EU-Russia Year of Science, Technology and Innovation
- § EU-Russia Dialogue on Space Cooperation as a part of “Partnership for Modernization” initiative
- § Importance of international space cooperation is emphasized in Roscosmos programmatic documents (i.e. Basics of Russian Space Policy and Federal Space Program 2016-2025)





## RUSSIA-EUROPE SPACE COOPERATION: 2013 ACHIEVEMENTS

§ Soyuz at Guiana Space center: operational status

§ International Space Station cooperation continues

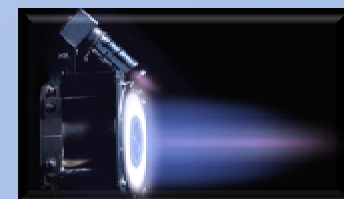
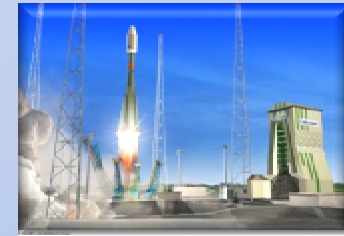
§ Intensification of cooperation in space exploration domain

§ EU-Russia Dialogue on Space Cooperation: successful cooperation framework

§ Space for European and Russian citizens

§ Advanced technologies for space exploration

§ "Horizon 2020": basis to increase cooperation efficiency





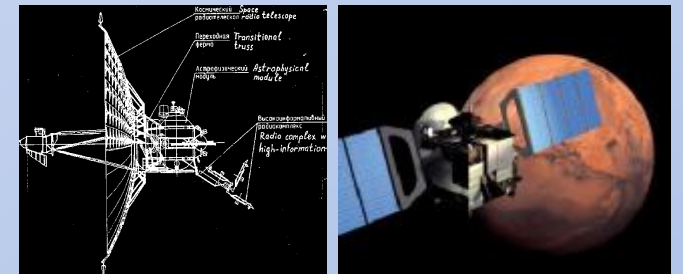
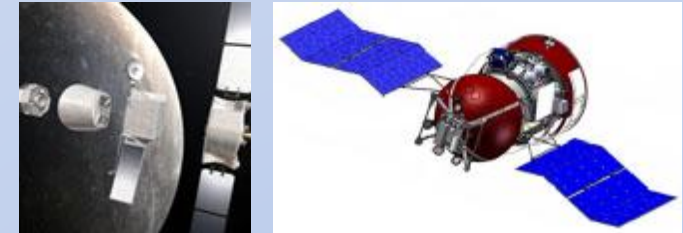
## SPACE EXPLORATION COOPERATIVE PROJECTS

### Implemented

- § Russian scientific participation in European projects (Mars-Express, Venus-Express, Integral)
- § European participation in Radiostereo project
- § European participation in Bion-Mission

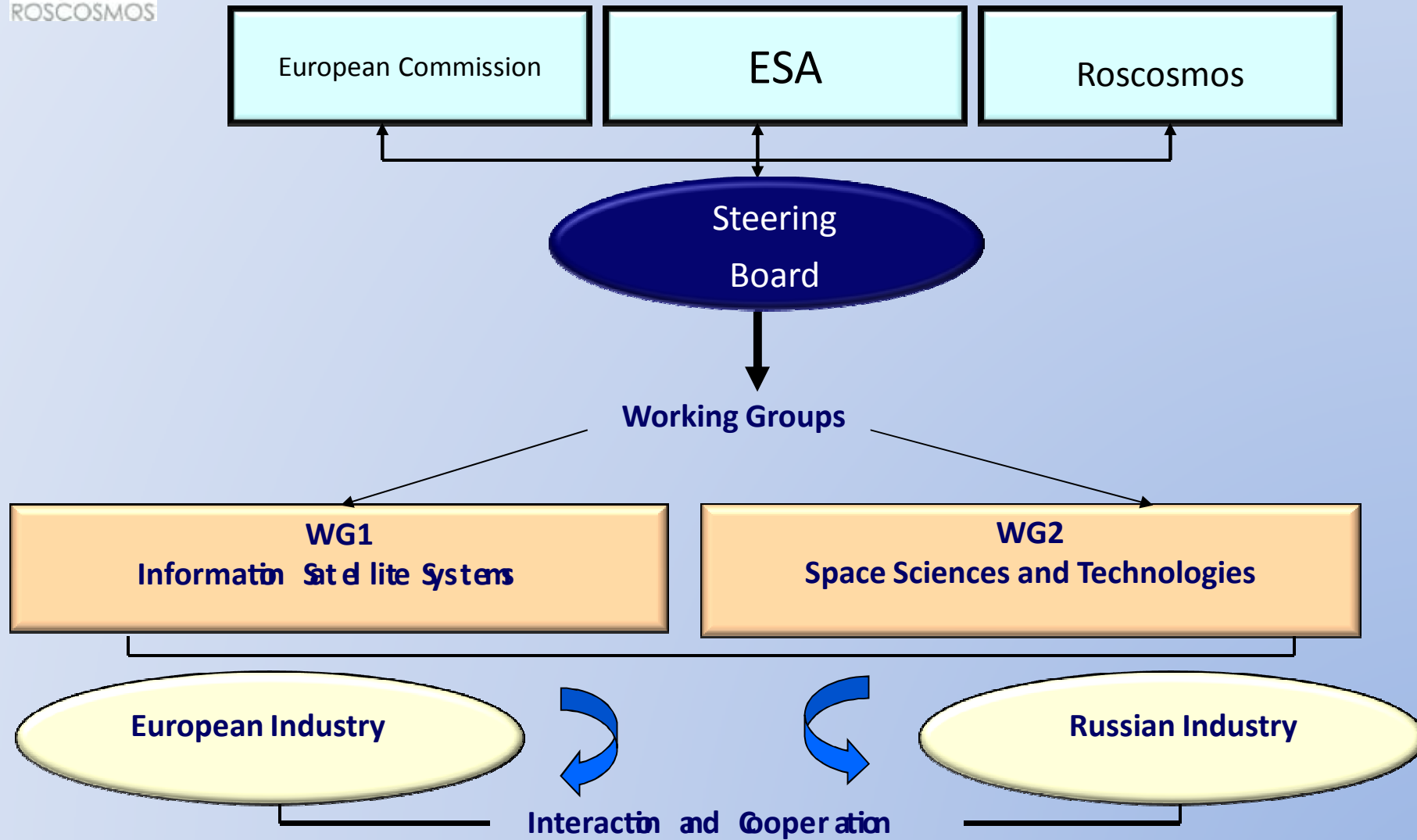
### Planned

- § Cooperation in SABER - Global Orbital Mercury
- § ESA-Roscosmos agreement on the cooperation in the exploration of Mars and other celestial bodies of the Solar System with the robotic overflights:
  - § Complex Mars exploration project ExoMars: 2016 & 2018 missions – work in progress
  - § Laplace-P/JUICE Jupiter system exploration project, including Ganymedes moon
  - § Complex Moon exploration project, including Moon polar region samples return





# EU-RUSSIA DIALOGUE ON SPACE COOPERATION





## WORKING GROUP INFORMATION SATELLITE SYSTEMS

### § Global Navigation Satellite Systems

§ Progress on the negotiations of a Global Navigation Satellite Systems (GNSS) cooperation agreement

§ Compatibility & Interoperability of GNSS/Galileo & services: signal and frequency issues and synergies between regional augmentation systems, EGNOS and SBM

§ COSPAS-SARSAT seamless transition to NISAR, coordination of the engineering activities, the performance validation procedures and the ground segment operations.

### § Earth Observation

§ Use of Russian ground facilities in the framework of COPERNICUS program to be considered

§ 6 projects funded under EU FP7

MEDEO (Dual access of EO databases) – completed	SEMEP (Electro-magnetic earthquake precursors) - completed
PRE-Earthquakes (Processing earthquake precursor studies) – completed	MOCCASIN (Monitoring crops in continental districts) – in progress
ZAPAS (Assessing and monitoring forest resources) – in progress	MAIRES (Monitoring arctic land and sea ice) – in progress



## WORKING GROUP SPACE SCIENCES AND TECHNOLOGIES

### § Enabling space technologies

§9 projects funded under EU FP7

TransHyBerIAN (Wall Temperature Effect during Transition of Hypersonic flow over a cone, experiments and simulations) - final stage	SACOMAR (Technologies for safe and controlled Martian entry) - completed	RITD (Re-entry inflatable technologies) – in progress
LIROC (Laser ignition for rocket engines) – cancelled due to the issues related to export control	BIOSMHARS (Bio-contamination specific modelling in habitats related to space) - completed	SPWRT (Space wire RT, standard network technology) – final stage
ECLAT (European Cluster Assimilation Technology) – in progress	NEOSHIELD (A Global Approach to Near-Earth Object Impact Threat Mitigation) – in progress	MEGAHIT (Megawatt Highly Effective Technologies of Space Power Propulsion Systems with a Purpose of Long Research Missions) – in progress



## PROSPECTIVE TECHNOLOGICAL COOPERATION

**§All in all 52 participations of Russian entities in 32 FP7 “Space” projects with an overall EU funding of €4.8 Mio**

### **§Science & Technologies Working Group Report**

§Catalogue of promising technologies for joint research

§Methodology, instruments and procedures for joint projects selection

§Recommended for dissemination in Russia and Europe

### **§Intensification of search for technological initiatives from the Russian side**

§Utilization of all cooperation mechanisms (EURussia Dialogue on Space Cooperation/National Contact Point “Space”/B2B cooperation)

§Involvement of new entities (SMEs, High Tech Startups, Universities, SkolkovoSpace Cluster Residents)

§Joint technology workshops as proven mechanism fostering collaboration (Can be funded as “Coordination and Support Action”)







## FUTURE THEMES

### § Human exploration

- § Technologies for deploying large habitats in the Earth orbit as well as large space structures involving new materials and techniques like inflatable shells
- § Crew radiation protection for interplanetary missions
- § New generation of space robotics, including regenerative and self-servicing systems
- § Innovative spacecraft control approaches
- § Ground experiments and testing for the future human reentry capsules and planetary probes

### § Space Science and Microgravity

- § Roentgen Microphone
- § Solar Probe.
- § Vozvrat-MKA reusable microgravity research platform

### § Enabling Space Technologies

- § Space EEE design, manufacturing and unified supply system
- § Technologies of the unified satellite bus and payloads, including small-size solutions
- § Reusable launch vehicles
- § New generation of engines for the launch vehicles



## FUTURE THEMES

### § Space Debris

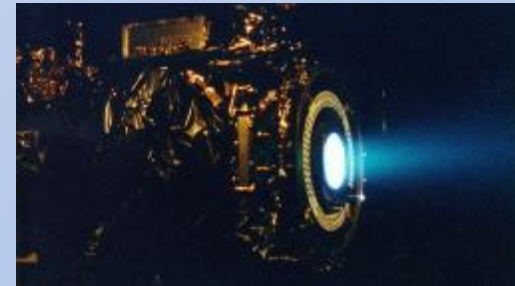
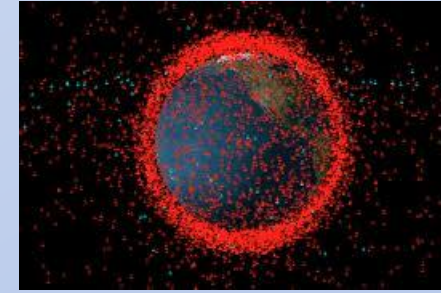
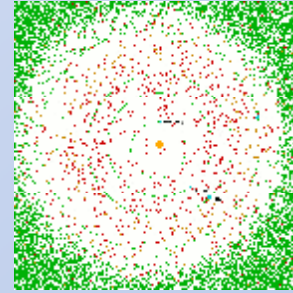
- § Debris modeling
- § Information exchange
- § Mid-size debris monitoring
- § Spacecraft protection analysis and design

### § Space Situational Awareness

- § Network of opto-electronic monitoring facilities
- § Development of common legal framework for space debris mitigation
- § International center for space debris mitigation coordination
- § Development of procedures and principles for interaction between different Space Situational Awareness systems

### § NEO threat

### § Space Power and Propulsion Systems





**Thank you for your attention!**

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