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SPACE PROGRAMME IN ROMANIA - SHARING BETWEEN NATIONAL AND INTERNATIONAL ACTIVITIES

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ABSTRACT

Romania is continuing to support its space development at the national level and together with the international space community. As an ESA co-operating State and an European Union Member state, Romania is participating to the common European space research and development activities, but is also keeping and developing it's own National Space Programme.
Romania will continue to develop its own space programme: first, by keeping in harmony the participation to European and international space missions and projects; second, by further developing its national space infrastructure and human resources and, third, by investing in some specific areas of science, space technology and industry core competencies.
After a brief description of the national background in the first part, the paper presents the Romanian national space policy and the space programme, in correlation with the evolving international framework. Conclusions and trends are given.

BACKGROUND

The following developments testifies that Romania is recognized as a country with aerospace tradition and represents the basis for the space enterprise in the future:

- The existence of historical personalities such as Conrad Haas (constructor of the multistage rockets with delta stabilizers, Sibiu . 1529), Aurel Vlaicu (first Romanian aerospace engineer), Traian Vuia (designer and constructor of the first autonomous take-off airplane in 1906), Henri Coanda (designer and constructor of the first jet airplane in 1910), Hermann Oberth (designer of space rockets and space stations), Janos Bolyai (developer of a non-Euclidean geometry), Spiru Haret (precursor of the celestial and orbital mechanics);
- The development of the aerospace industry which included the manufacturing, based on original design or under license, of more than fifty types of transport and combat aircraft and helicopters, ballistic missiles, passenger medium couriers and light airplanes;
- Romanian contributions to more than fifty scientific and technological space missions including the mission of the first Romanian cosmonaut in 1981;
- The experience in the field of space applications; since 1997 the Cheia Intelsat ground station with two 32 m antennas is operational; applications of Earth Observation data and GNSS technology performed for the oil industry, agriculture, environment, cartography, and land use;
- The large sector of commercial space applications, as space communications, applications of satellite remote sensing, geographic informational systems, positioning and navigation, global information systems.

Since the early seventies, space activities in Romania were driven mainly through the INTERKOSMOS Programme: Experiments on satellites since 1972 and the mission of the first Romanian cosmonaut on Salyut 6 in 1981. Romania contributed to the establishment and operation of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) since 1958. The Romanian Space Agency (ROSA) was established in 1991. The first cooperation agreement with ESA was signed in 1992, followed

by bilateral co-operations with NASA, CNES and other national agencies. Romania signed the European Cooperating State Agreement with ESA in February 2006 and joined the Agency's ECS programme in February 2007.

Romanian Space Agency

The national authority for space activities is the Romanian Space Agency.

Established in 1991, ROSA becomes in 1995 an independent public institution under the authority of the Ministry of Education and Research (MER). The Romanian Parliament established in 2007 the Sub-committee for Space, having ROSA as the rapporteur.

The mission of ROSA, by the establishment act, included:

- Coordination of the national space research and applications programs
- Promotion of space development
- Be the Government representative for international space cooperation
- Development of specific project oriented research through its own centers

ROSA promotes and coordinates national efforts in space (including Institutional relations with ESA) and sustains international cooperation in line with the Romanian Space Program.

Furthermore, the Ministry of Environment and Water Management controls the budget for EUMETSAT, the Ministry of Communications and Information Technology is responsible for relations with Intelsat and other telecommunications organizations, and the Ministry of Defense and the Ministry of Interior for their own satellite services.

Since 2004, ROSA became the Executive chairman for the Inter-Ministerial Board on Security Research and acted as component of the National Emergencies Council.

ROSA stands as the contracting authority and programme management unit for the national RTD Programs on Space, Aeronautics, Security (1995-2008).

Most of the organizational functions are developed by interagency cooperation, as with the Ministries of Defense, Foreign Affairs, Agriculture and Environment, Interior, Telecommunications and Information Technology, Romanian Intelligence Services, Romanian Academy.

ROSA is a public medium-sized organization, however it is financed integrally by its own contracts with public or private bodies, national or international. The services offered are based on research, technology, consultancy, international cooperation, and management. ROSA was authorized by the government to establish research and development Centers oriented on specific objectives of the Romanian Research and Technology Development (RTD) Plan.

The quality management system of ROSA has been approved by the Lloyd's Register to the ISO 9001 standards, applicable to national programme management, space development and policy, space research and technology development.

ROSA is the appointed as the national representative for:

- European Space Agency (ESA) – by Laws 40/1993 and 01/2007 (1992 – p)
- United Nations – Committee on the Peaceful uses of Outer Space (COPUOS) – by mandate from the Foreign Ministry (1994 – p)
- Rapporteur for the European Union (EU) Space Council / European Space Policy
- EU – Framework RTD Programme 6 – AEROSPACE Programme Committee (PC) (2001-2006)
- EU – Framework RTD Programme 7 – SPACE PC, SECURITY RESEARCH PC, TRANSPORTS PC (Aeronautics and Galileo)
- EU – GNSS Supervisory Authority (GSA), GMES Advisory Council (GAC) (2007)
- INSPIRE – by mandate from the Ministry of Education and Research (2005 – p)
- COSPAR – ICSU – National secretariat (1994 -)
- Group on Earth Observations (GEO) – Principal representative
- NATO – Scientific Committee "Science for Peace and Security" (2004 – p)
- NATO - RTO – Space ST Advisory Group (SSTAG) (2005 – p)

NATIONAL SPACE PROGRAMME

Program

Most of the Romanian national efforts in space were and still are publicly financed from the research and technology development budget. The evolution of the space programme was clearly related with the evolution of the RTD system.

In the early '90s, after the major political changes occurred in Eastern Europe, the RTD system suffered dramatic changes, in terms of budget decrease and shorter-term planning. The first dedicated funds for space were attributed by

means of a Space and Aeronautics Committee, having ROSA as secretariat, under the authority of the Ministry of Research and Technology. Since 1995, by government decision, a national programme – called HORIZON 2000 – included Space and Aeronautics as a one of the 17 fields of financing. The program, on a yearly basis, included a wide-range of objectives. By consensus, space research received 2 – 2.5% from the overall RTD budget.

Since 1998, ROSA drafted the first multi-annual space programme, in order to be included in the next National RTD Plan. This plan was approved by the Government in 1999, but entered financially into force in 2002. The goals of the national space programme for 2001-2006 were to:

- Contribute to the national and global scientific development by participation to international space missions and development of new projects
- Improve the national and regional security by means of peaceful space applications (2001)
- Contribute to the infrastructure of the information society
- Develop new space technologies, space spin-offs and commercial space applications
- Human resources building to meet the space science and technology development for the 21st Century
- Give a model of capacity building and support the national effort to continental and international integration

The Space Programme was divided into five subprograms and two special objectives (Fig. 1):

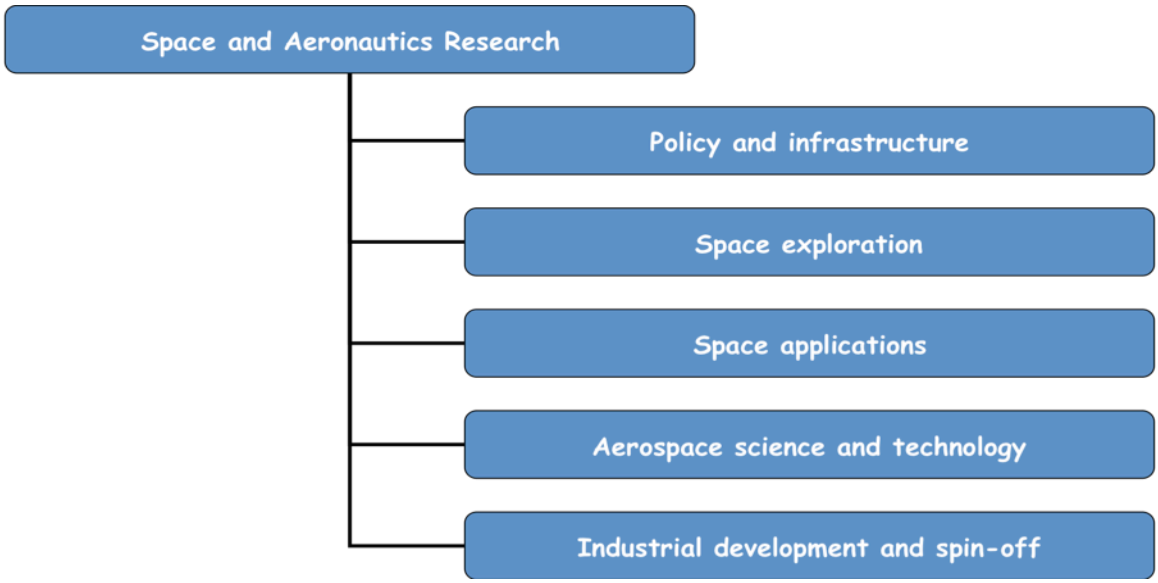

Figure 1. Specific subprogrammes of the National Space and Aeronautics Programme during 2001-2006

Synthetic figures:

- Number of projects 2001-2006:
- 171 (39 – 2001, 40 – 2002, 20 – 2003, 72 - 2004)
- Participant organizations (Romanian): 121
- Professional staff involved: 680 full time equivalent
- Funding:
- Budget engagement limit 2001 – 2006 – 31,25 Meuro
- Budget engagement (present) 28,75 Meuro (2001-2006)
- Co-financing: 31% - private and public partners
- Actors: R&D institutes, universities, companies, NGO's, SME's – public and private, most of them in consortia

ROSA managed the programme. Since 2004, a new programme on Security Research was added to this portfolio.

Since 2006, a new multiannual national RTD Plan entered into force. Romania became one of the countries that took a major political decision - to grow with a factor of 3 the RTD public expenses between 2007 and 2010.

The new programme was defined for 2007 – 2013. The Romanian Space Program is presently defined, through ROSA, under the responsibility of the Ministry of Education and Research (MEC). The

program is included in the new National RTD Plan 2007-2013 as "Space and Security" thematic area and provided with 8% of the RTD public expenses.

The proportional contribution for space activities is to increase from 3 to almost 6 percents of the public research and technology budget.

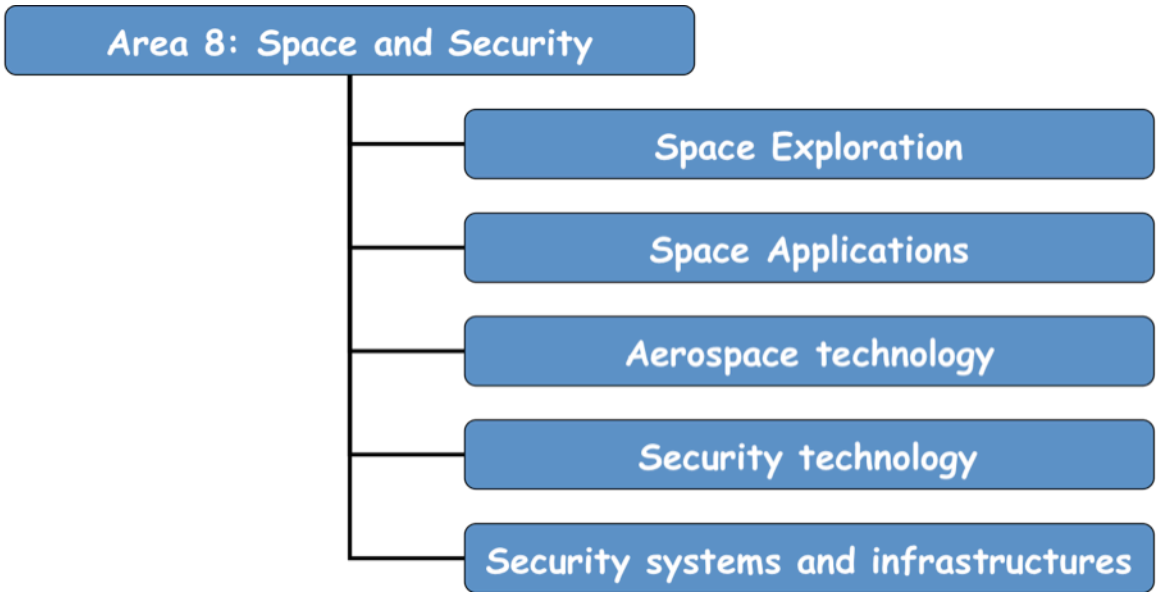

Figure 2. Specific subprogrammes of the National Space and Security Research Programme during 2007-2013

The Romanian Space Programme is further developing under the technical authority of the Romanian Space Agency and presently involving more than one hundred organizations with research, academic and industrial profiles.
Three main subprograms: space exploration, space applications and space technology are included, with specific objectives established for 2007 - 2013. Running presently a number of 94 projects involving several hundreds full-time equivalent professionals, the program recorded a substantial growth during the last year.

Actors
The Romanian Space Programme (RSP) is implemented by more than 100 research, academic and industrial organizations. Currently, 94 projects are running involving more than 830 professionals. Public-private partnership is encouraged. Most projects are carried out under international cooperation. A number of 11 projects are developed with ESA in the ECS programme.

Budget
The evolution of the national expenditures for space (in Meuros) is given in Fig. 3.

	2005		2006		2007		2008 (planned)	
	Tech	Total	Tech	Total	Tech	Total	Tech	Total
National	2	12	3	12	3	12	4	14
To ESA						2		2
Others	3	4		4	3	5	4	6
Total	*5*	*16*	*3*	*16*	*6*	*19*	*8*	*22*

Figure 3 The national expenditures for space 2005 - 2008

INTERNATIONAL COOPERATION

Romania is continuing to strengthen the cooperation in the frame of the European Space Agency towards a better integration of its space research and industry capabilities in European programmes, namely in space science, microgravity, Earth observation, telecommunications, navigation and positioning, and space engineering. Technical co-operation is also being pursued with NASA and CNES, in projects targeted to science and applications of space technology, such as precision agriculture, environmental monitoring and telemedicine.
ROSA concluded agreements with other agencies, as the Hungarian and Bulgarian space offices, and is presently negotiating the agreement with Russia. Romania offered technical assistance for developing states, as Azerbaijan and Moldova, in the field of space applications.

European Space Agency

ESA and Romania signed two agreements – in 1992 and 1999. On 17 February 2006 Romania strengthened its relations with ESA by signing the European Cooperating State Agreement, becoming the third European country to join this status. Hungary was the first in April 2003 followed by the Czech Republic in November of the same year. During the coming months Romania defined with ESA the specific areas and projects for cooperation, and the budget for the next five years. Presently, the Romanian government is preparing the request for ESA full membership in the next couple of years. The contribution to ESA for 2007-2011 has been established by the RO Law no. 1/2007 (1).

The eleven projects component of the RO – ECS Programme are included in the ESA science programme, in the Earth observation and one project for the International Space Station. Most of the science projects represent national participation to ESA science missions. In the area of Earth observation, projects are related to data technology. Next set of projects is prepared in the technology area, in particular for small satellite components.

European Union

Within the Framework Programme 7, the major areas of participation with space-related topics are: Space, Security research, Transports (Aeronautics and Galileo), Environment and ICT. Most of the projects are related to the Global Monitoring for Environment and Security (GMES) and Galileo.

The cooperation with the EU Commission is also on political levels. ROSA is nominating the RO representatives in the appropriate Programme committees and is representing Romania for space policy issues. Experts from ROSA participate to the activities of the EUSC – European Union Satellite Center.

NATO

The North Atlantic Treaty Organization (NATO) established during 2005, in the frame of its Research and Technology Organization (RTO), the Space Science and Technology Advisory Group (SSTAG), and Romania was one of the nine founding countries. The first conference of the national experts took place in Bucharest, Romania, in September 2005, co-organized by ROSA. ROSA is not allocating funding for the NATO programmes, except for the Science for Peace and Security Committee.

UN – COPUOS

Romania was one of the founding members of UN – COPUOS and was in charge with the vice-chairmanship of the Committee since 1996. During 2003-2006, Romania was the chairman of the Scientific and Technical Subcommittee of COPUOS.

The cooperation with the UN-COPUOS and the Office for Outer Space Affairs is long lasting and related to some agenda items and programmes as: disaster management – presently SPIDER; Near Earth Objects (NEO), regional centers for space science and technology.

In preparation for UNISPACE III Global Conference (1999), Romania organized, together with the United Nations Office for Outer Space Affairs, and hosted the Regional preparatory Conference for Eastern Europe.

NATIONAL SPACE POLICY

Romania is continuing the development of space activities at the national level and together with the international space community. The five pillars of the national programme are: Science, Technology, Enterprise, Capacity building, Security.

The space policy is oriented towards:

- A national space programme (for specific development of science, technology, industry and for capacity building);
- Integration within the European Space Agency, also in compliance with the EU present and future space policy;
- International cooperation: regional (to improve the space capacity) and global (to act as a partner of major space agencies and as advisor for developing countries):

The national space policy is defined presently by a set of principles generated by RTD, applications and industrial development, legal instruments and international collaborations co-authored by ROSA or managed on behalf of the government.

- RO national RTD strategy. The current one has been approved by the Government in 2007 and included Space as one of the eight major RTD fields.
- Agreement between Romania and ESA and the Program for European Cooperating State, ratified by the RO Law no. 1/2007;

- European Space Policy and EU Treaty establishing the EU Draft Space Programme
- Participation to the RTD Framework Programmes 6 and 7 of the EU – AEROSPACE, SPACE and SECURITY
- General legal instruments and directions of the United Nations Committee on the Peaceful Uses of Outer Space (UN-COPUOS)
- User and industry directed applications and services: agriculture, environment, disaster management, meteorology, security and defense, satcom, GNSS, emerging space industry

CONCLUSIONS AND TRENDS

Romania space activities were significant extending during the next decade. The development was supported by a consistent scientific and industrial capability existent, in particular, in the space science and technology and in the aerospace industry. The management was directed by establishing a national space agency as a public governmental organization, organized on a contract base and this allowing the efficient organizational evolution and management capabilities. The development of the Romanian Space Programme was also strongly supported by the research, academic and industrial organizations. A strength was the wider extension of international cooperation. A specific feature was the integration of Space with Security Research at the levels of programme and organizational, with a clear distinction between civil and defense related activities.

As an ESA co-operating State and future Member, and a European Union Member State, Romania is participating to the common European space research and development activities. The participation to the ESA space missions and projects, including technology, is directed with a view to ESA membership during 2010.

Romania is also developing it's own National Space Programme by keeping the substance objectives lead by the National RTD Plan, as to further developing its national space infrastructure and human resources to reach the European average level, and investing in its own areas of core competencies.

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