BR-268
September 2007

AGENDA 2011

A Document by the ESA Director General and the ESA Directors – October 2006

BR-268, September 2007

Published by:	ESA Communications ESTEC, PO Box 299 2200 AG Noordwijk The Netherlands
Editor:	Dorothea Danesy
Design & Layout:	Eva Ekstrand
Copyright:	© 2007 European Space Agency
ISSN:	0250-1589
ISBN:	987-92-9221-004-5
	Printed in the Netherlands

Agenda 2011 aims at defining a common framework of strategic action for achieving wide-ranging objectives of ESA Member States and for adapting the Agency to a changing environment. It establishes an overall coherent roadmap for all ESA stakeholders, including staff.

Agenda 2007, which was elaborated in mid-2003, has been useful in providing such a common framework to space stakeholders, leading to significant steps forward in less than 3 years, including a successful Ministerial Council at the end of 2005. However some objectives of Agenda 2007 have not been reached, even though important and urgent, in particular in the human resources field, which affects primarily ESA staff, and in the efficiency of doing business, which affects primarily the ESA system.

Agenda 2011 pursues the same overall objective to provide a common framework for space stakeholders. This is an informal document to which only the ESA Executive management is committed. All objectives and all actions defined in Agenda 2011 will be implemented according to formal procedures in force.

The plan of actions associated with Agenda 2011 is detailed and formalised in the ESA Long Term Plan 2007-2016. The LTP will be the implementing instrument of Agenda 2011, updated and endorsed by Council on a yearly basis.

Agenda 2011 is being developed in parallel to the European Space Policy. Agenda 2011 will constitute an important input to the ESP and, in turn, its implementation will take into account the ESP as it will be endorsed mid-2007.

Contents

1

Overall Objectives and Priorities

The European Space Policy is under development, providing an EU dimension to the space policy developed and implemented over the last 30 years by ESA Member States. This new policy is in turn introducing a space dimension into the political ambitions of Europe as a global actor.

The overall objectives of the next five years will serve these new dimensions and must therefore consolidate
"ESA as a global space agency, instrumental for Europe in serving the policies of its Member States and the EU, developing a competitive economy, and indispensable to the world in contributing to global policies and to the increase of knowledge".

ESA is recognised as a global agency in its core activities of science and exploration, human spaceflight and partnership in the ISS, and launchers. It has already developed important operational capability in meteorology and climate monitoring, has been the basis for European space telecommunications development and is established as the leader in Europe for the joint development of new applications (Galileo and GMES) with the European Union. The objective now is to develop beyond this, to make ESA a model for underpinning the use of space in the world today and specifically in the context of Europe's growing needs.

In order to reach this overall objective, three key priorities will drive the action of ESA:

1.1 Consolidation of steps taken at the 2005 Ministerial Council towards new discoveries and competitiveness

The absolute priority in the next years is to consolidate the capabilities and competitiveness of European industry: space manufacturers and service providers, without which Europe cannot serve any of its ambitions. Significant investments in new and advanced technologies have to be made urgently.

1.2 Development and promotion of integrated applications (space and non-space) and integration of the security dimension in the European Space Policy

New concepts, new capabilities and a new culture will have to be developed in order to respond to a multitude of needs from users so far not familiar with space systems. A strong coordination and efficient exploitation of synergies will have to be organised between national, intergovernmental and communitarian resources and capabilities as well as between civilian, security and defence applications.

1.3 Evolution of ESA

The evolution of ESA must be accelerated in order to improve global effectiveness, enhance coherence and consensus among actors, reinforce motivations for Member States to invest in space, in particular at ESA, and prepare ESA for new membership and for an evolved institutional relationship with the EU. The first step of such an evolution should be made rapidly, within two years, to improve industrial policy's rules and procedures, decision-making process, funding mechanisms and coordination between ESA and national programmes, resources and industrial policy.

The following chapters develop detailed objectives and implementation plans along these three above priorities.

2

The Context of Agenda 2011

The space activities of ESA have been, and will continue to be closely interlinked with developments in Europe and worldwide, be it in space or other domains. The Agenda 2011 has therefore to be based on the careful analysis of changes in the recent past and projected evolutions in the medium term.

2.1 General worldwide trends

- Economy: further globalisation, strong growth of new economies in particular in China and India, delocalisation towards low-salary economies.

- Energy: growing energy prices, future of nuclear plants and new alternative energy sources.

- Security: local conflicts, global terrorism, population movements, pandemic, interrelation between economy/energy and local conflicts.

- Environment: natural disasters, climate change, water resources depletion, interrelation between natural disasters and local conflicts.

- Ageing population, especially in western societies: development of e-health, long-life learning, e-work, mobility and autonomy.

- Information society and knowledge economy: rapid growth, with increasing information flows from very diverse sources, to be merged, processed and disseminated, bearing in mind aspects of information security and data access, as well as risks of knowledge divide and network saturation.

2.2 Developments in Europe

- Change in dynamics of European Union construction: delays in institutional changes, EU scepticism, consequences of the changes on anticipated schedule and budgets for space (200 M€/year instead of expected 1 B€/year), revision of budgets planned in 2009.

- Enlargement of the EU: increase from 25 Member States now, to 27 Member States in 2007, negotiations started with several other countries.

- Creation of European Defence Agency (EDA) and discussions on European Security and Defence Policy (ESDP) are progressing, with a roadmap under development (goal for civilian part is 2008, for military 2010 and global 2011).

- Interest in pursuing intergovernmental approaches, as demonstrated e.g. by the success of ESA's 2005 Ministerial Council and the proposal to create a European force for civil protection.

- New Commission in 2009.

- Emphasis on education and technology in European countries: objective of 3% of GNP (Gross National Product) dedicated to Research & Technology as per Lisbon agenda. First steps with an increase of 60% of the 7th Framework Programme as compared to the 6th Framework Programme, and growth of some national budgets dedicated to R&T.

2.3 Worldwide space developments

- New big space powers (China, India). Competition US-China; cooperation US-India. Russia space programme growing again.
- Space Shuttle back on track, ISS assembly restarted.
- Exploration initiative from the US.
- New "National Space Policy" in the US, focusing on the principle of "US freedom of action in space" and providing a new definition of "peaceful purpose" allowing for defence and intelligence space activities.
- GEOSS (Global Earth Observation System of Systems).
- Globalisation starting to reach the space sector (industry, operators).
- More and more countries in Africa, Asia and the Middle East involved in space activities.
- Operational demonstration of the role of systems of systems (integrated applications) in security interventions, and to a lesser extent, in the management of natural disasters; unequal level of awareness of space informational assets for global challenges (space for society, for safety, for development, for knowledge…).
- Private initiatives: demonstration of privately funded sub-orbital crew vehicles and development of privately funded launch vehicles (no successful launch yet).

2.4 Developments in European space sector

- Transfer of space from EC Research Commissioner to EC Enterprise Commissioner, significant increase of EC budgets for space for 2007-2013.
- Creation of Space Council, elaboration of European Space Policy progressing with endorsement by Space Council planned in 2007.
- Implementation of Agenda 2007 – Success of 2005 ESA's Ministerial Council.
- Success of scientific missions (Huygens, SMART-1, Mars Express, Venus Express).
- Ariane 5 back on track, importance of 2005 Ministerial Council political resolutions.
- Development of new applications programmes (Galileo, GMES) driven by the EC and co-funded by ESA and the EC.
- ESA participation in the development of new competitive products for the commercial market (Alphabus, Hylas, small GEO).
- Successes of new types of ESA satellites (Giove-A, SMART-1, PROBA-1).
- Difficulties in building-up consensus and in the decision-making process among ESA Member States.
- Enlargement of ESA to 17 Member States in 2005, with five more countries candidate or likely to request accession.

- New military/dual projects developed at national level (Pléiades, Cosmo, SarLupe, Syracuse 3, etc.).

- Paradigm procurement of military telecom satellite services through PPP in the UK and Germany.

- Difficulties in the profitability of European space industry, in spite of significant restructuring, likely to continue, including globalisation beyond Europe's borders. Sustainability of European industry at stake.

3

Programmes and Budgets

In view of the trends described above and decisions taken at the 2005 Ministerial Council, the Agency will put emphasis on the implementation of the decided programmes and activities, and prepare orientations and decisions for future programmes and activities which will be submitted for decisions at the next Ministerial Council in 2008. In particular, the Agency will put major emphasis on the preparation of new integrated applications programmes, based on a multi-disciplinary approach, paving the way for the development of security related programmes.

3.1 Consolidation of steps taken at the 2005 Ministerial Council towards new discoveries and competitiveness

3.1.1. Technology policy and plans, as a factor of competitiveness

a) Objectives

The key objectives of a technology policy are:

- Providing the enabling technology for European space research missions;
- Assuring the technological capabilities required to develop and efficiently sustain European space-based solutions (operational systems);
- Giving European industry a technology advantage in worldwide competition.

b) Elements of a space technology policy

To address the anticipated needs and issues, the technology policy should include:

- An end-to-end long-term plan which considers all European needs, aggregates markets across sectors and domains research/development / exploitation;
- An agreed high level policy on key issues (consistent with the evolution of industrial policy addressed below in section 5.1), covering single market, scope of programmes, non-dependence, single or multiple source, evolution or rupture, specialisation, standardisation to frame new technology, PPP, etc.;
- The establishment of dossiers for key, especially disruptive, technologies and of a strategy for in-orbit demonstration aimed at completing the development cycle;
- A strengthened harmonisation process at ESA level that can be used as the link between long-term plan and individual programme implementation. The process shall start with requirements to contribute to the LTP and market aggregation, include the commitment of partners to sustain coordinated efforts in the ESA and respective development programmes and to utilisation of results in projects. The latter shall involve primes;
- A strengthened harmonisation process among ESA, national and EC technology programmes, aiming at reinforcing coherence at global European level;
- A strengthened internal ESA coordination, already initiated with the setting up of a Directors' subcommittee for technology, which guarantees the consistency between programmes and with projects, and allocates resources also in the mid- long-term.

- The maintenance of consistency between mission/system and technology by involvement of users and tailored technology reference and impact studies;

- Setting NewPro with the EC to respond to the new needs and to overcome current operational problems (dispersion, lack of continuity), while maintaining an element of serendipity in the more coordinated context to be achieved.

3.1.2. Science policy and plans, as a factor of inspiration and innovation

Scientific advancement has played an important part in sustaining societal development in nearly all eras of human history. Moreover, scientific advances and the resulting allied technical advances have often been the engine of major political and economic changes. Science policy thus needs to be a strategic element in any consideration of technology and its uses by society.

Science is also a technology driver with a technology literate user community which can be used as a spur for new development. Science has not only technology spin-off but, most evidently in Earth science, direct feed-through to first market demonstration and then day-to-day application.

The recent successes of the ESA Science Programme have been important not only in bringing ESA's name to the European public, they have also had a communications "spin-off" in bringing large interest from senior politicians.

The backbone of ESA's mandatory activities, Space Science is only a fraction of the real science effort of ESA. Earth science in Europe has made major strides through the Earth observation programmes of ESA. The Earth Observation Envelope Programme is now established as a major science-driven element of the ESA EO programme. Similarly, space life and physical sciences are an important element of the European plans for exploitation of the ISS. Furthermore, the primary beneficiaries of the newly created exploration programme will be the planetary and lunar science communities in the immediate term.

In order to organise a much stronger synergy among ESA scientific activities, between science and technology and between science and applications, the following actions will be implemented:

- An overall ESA Science Policy will be developed, encompassing common themes among ESA scientific activities such as water in the Universe. A High-level Scientific Advisory Committee will be created to advise the DG on such policy;

- The above-mentioned technology policy and plans will support a stronger synergy between science and technology;

- Stronger links between scientific communities and European industry will be promoted, in order to shorten the transfer of scientific progress to applications.

3.1.3. Consolidation of ESA core activities

a) Implementation of approved programmes

The Council at Ministerial level 2005 has taken major decisions regarding ESA core activities related to space-, Earth- and space life- and physical-sciences, the continuation of activities in the fields of launchers and human spaceflight, has introduced new activities for exploration and has given new orientations towards advanced technologies for new space systems and

reinforcement of competitiveness of European industry. The successful implementation of these core activities will be the basis for ESA's activities in the coming years.

b) Evolution of scenarios for sciences, exploration, human spaceflight and launchers

The implementation of approved core activities, together with identified drivers for space activities, provide the basis for the evolution of future core activities to be proposed to the 2008 Ministerial Council, in the following areas:

- Space science: opening doors to new missions now by introducing flexibility in a fully booked programme; evolution of astronomy missions leading to deep space orbits; evolution of ground segment requirements; synergies of solar system missions with exploration, and fundamental physics missions with utilisation of the ISS, to be exploited;

- Earth science: focus on global change; objective of one mission per year to be consolidated; increase cooperation with technology programmes and international partners; preparation of application programmes;

- Exploration: start development of ExoMars follow-on mission; choice of scenario to make Europe an indispensable partner: Moon orbit infrastructure (telecoms, navigation), participation in human transportation (coherence with launcher programmes), synergy with space science missions; stimulate concepts and mechanisms for international cooperation taking into account the lessons learned from the partnership on the ISS;

- Human spaceflight: based on the exploitation of the ISS, optimising the benefit for Member States through efficient utilisation of research activities and applications;

- Space life and physical sciences: focus on basic and applied research in life and physical sciences utilising the ISS as well as sounding rockets and other opportunities; support future exploration initiatives;

- Launchers: consolidate the exploitation of Ariane 5 and start the exploitation of Soyuz and Vega; adapt Ariane 5 and Vega to the evolution of requirements in organising modularity within the family; prepare technologies for next generation launchers; in all actions, international cooperation based on mutual dependence will be investigated, to be coherent with a guarantee of access to space.

For all these core activities, scenarios for the future will be developed by stimulating discussions among Member States. Relevant scenarios should be endorsed by the end of 2007 in order to provide the ground for the preparation of relevant programme proposals and decisions at the Ministerial Council in 2008.

Scenarios for the future will have to evolve consistently, e.g. evolutions of satellites and evolutions of launchers, evolution of exploration and evolutions of launchers, etc. A strong coordination between the relevant discussions fora and/or Programme Boards will be set up.

Evolutions of scenarios will require new competencies and new infrastructures to be developed as part of the evolution of ESA, in close coordination with other agencies (e.g. national and Eumetsat) in Europe.

3.1.4. Current application programmes

The implementation of the current application programmes, together with the requirements to be defined by third parties (e.g. EC, GSA, Eumetsat, telecom operators) will determine the orientations for the continuation of these activities with the following main emphasis:

a) Galileo

After the operational start of EGNOS, the initial development of Galileo, and the successful validation of the system, it is expected that the full constellation of 30 satellites in total shall be deployed. The challenge will be to succeed in making the transition between in-orbit validation and the full operational capability, encompassing in particular the setting-up of the concession scheme, the development of services, the certification of systems and the setting-up of exploitation structures. Another upcoming challenge is the preparation of the future and of the second generation of Galileo. A significant R&T effort is required to sustain the scientific and industrial teams allowing Europe to maintain its position worldwide in navigation.

b) Global Monitoring for Environment and Security

GMES services require the collection of data coming from space (Earth observation, navigation) and from other information sources (in-situ, socio-economic), as well as the distribution of these data using space and ground systems in order to produce policy-relevant services in an operational manner. As such, GMES will be the ideal case to realise the integrated applications approach required in a continuously evolving information technology environment and to demonstrate operational services based on a guarantee of data continuity and reliability.

GMES services will gradually become operational as space assets are integrated into the coordinated data stream. First fast-track services will start the pre-operational stage from 2008 onwards, while full operational capacity will emerge as from 2012 when dedicated GMES missions are launched.

Finally, a further challenge will be to consolidate Europe's contribution to GEOSS.

c) Meteorology

The follow-on to current MSG operational satellites, Meteosat Third Generation (MTG) will be developed to be operational from 2015 onwards. The successor of EPS will be developed to be operational from 2019.

d) Telecommunications

The development of European space products capable to strengthen the European industry competitiveness and decrease its vulnerability with respect to the new space actors is crucial. The strategy is twofold: one on the low range of the geostationary platform (i.e. the small GEO initiative) and a second one on the high range of the geostationary platform (i.e. AlphaSat), both being developed in partnership with space industry and telecom operators. The planned activities in this field will complement the already well-established European industry market position in the geostationary platform middle class range so as to ensure increased commercial opportunities for the European space stakeholders.

3.2. Development of integrated applications

3.2.1. A new culture

Operational space systems, e.g. for telecom, navigation, meteorology, mapping, etc. are part of daily life. These systems integrate space and ground elements, but are based on mainly a single type of system.

The next step is to enable new services based on exploiting several systems, space and non-space, acting in concert as a system of systems. This will widen existing application areas and open new domains. The potential is immense in many new areas of high strategic importance, economic value and societal relevance, e.g. for civil security, air traffic management, maritime surveillance, health early warning, etc. This will make of space an indispensable tool for European policies (knowledge, development, safety, mobility, etc).

The challenges are threefold:

- Strategic: definition of objectives, relevant policies, implementing rules;

- Organisational: role of ESA with users, with partners, in particular the EC, national space agencies, etc.;

- Technical: inter-operability, complex architecture engineering, field validation, etc.

Overcoming these challenges requires a change, from the single system, often satellite centred approach, to a user centred approach exploiting a network of capabilities.

This requires a new ESA culture and new competencies, in establishing dialogue with diverse users and partners, including international partners, in identifying new partnership schemes, in developing new system engineering, multi-domain modelling and simulation skills (see section 6.1). Nevertheless, because of its experience with complex system architecture and elements, as GMES, Galileo, operational meteorology, human exploration, ESA is well placed to play a facilitator role defining and implementing incubators for new services based on the exploitation of space added value in integrated applications.

3.2.2. Synergies: Civil security and defence

A strong exploitation of the synergies between the needs of civil and defence space services is the only answer to the convergence of requirements needs, the interoperability constraints in crisis situations and the evolution towards common technologies. There are significant synergies to be exploited, in particular between civil security and defence requirements. Disaster relief and crisis management missions include civilian and military elements (transport capacity, medical treatment, food supply, temporary accommodation), requiring a close coordination and a coherent information source. Only common telecommunication equipment (secure communication) will guarantee access to necessary information benefiting civil and defence actors.

In the recent report of the ESHS-WG (European Space and Human Security WG, established in January 2006 and whose final report is due to be delivered in October), numerous actors in EU human security operations stress the need to endow Europe with appropriate space capabilities, remote sensing, meteorology, telecommunications, navigation, etc, to be exploited as a system of systems also with non-space systems. The report establishes a comprehensive roadmap which starts

with addressing user communities and initiating precursor services. It emphasises the need for interoperability of existing systems and for assuring the availability of the capabilities, identifying also gaps, such as data relay capabilities, to be addressed.

This is consistent with the European Security and Defence Policy paper on "ESDP and Space" that calls for a global space policy, drawing as much as possible on existing and potential synergies.

3.2.3. Projects and demonstrators

As the space component is an essential part, ESA has to take the role of promoter and enabler based on the experience with previous operational systems. This role will take into account the efforts and assets of the Member States. The approach adopted for GMES, developing precursor services, has to be enhanced, integrating different space and non-space systems in new applications.

New pilot projects are being initiated under the guidance of an ESA Interdirectorate Task Force (IAP-TF) aiming at preparing proposals for an Integrated Applications Preparatory Programme to be decided at the Ministerial Council in 2008. Examples include civil protection, disaster management, flight safety, human security, health, early-warning systems, maritime surveillance, support to developing countries (e.g. for resource management, education, etc) and others.

It implies partnering and promotion with users, institutional partners, research centres, developers, operators, space and non-space industry and service providers, in order to deliver adequate services to a range of existing and new user communities.

It is important to involve as early as possible EU institutions and potential operators, because space agencies need to work with an interlocutor which has the potential capability to sustain the operational services.

A strong coordination with national space agencies and their relevant projects will also be organised by the ESA Interdirectorate Task Force.

3.2.4. Surveillance of space

Europe is increasingly relying on space systems for vital applications; it is essential to guarantee the availability of those systems. A capability of surveillance of space, provided by ground and space-based assets, is required.

Efforts on space debris, space weather, on missions to near-Earth objects, on techniques such as formation flying, etc. capabilities on payloads, on modelling and simulation, complex data integration and information management networks, shall be put together to set up the capability and provide the services.

3.3 Budgets

The consolidation of core activities (continuation and new programmes) requires a continuous level of financing from ESA Member States coping with affordable ambitions; the profile of contributions of ESA Member States may be estimated as the result of a modest increase – in the range of 2-3% – at every Council at ministerial level, the two next being currently planned for late 2008 and late 2011.

The financing of the continuation of current applications programmes is driven by the relevant third parties: EC, GSA

and concessionaire, Eumetsat, telecom operators, etc., with, in particular, the EC playing a major and finance-wise larger role from 2009 onwards after the revision of the Financial Perspectives; ESA Member States will provide a contribution for developing new technologies and first satellites validating the operational applications.

The financing of the development of new integrated applications based on systems of systems (e.g. SESAR in the domain of air traffic management) and of security-related applications (crisis management, civil protections, natural disaster monitoring, etc.) is driven by communitarian and/or multi-national programmes.

ESA Member States will contribute to the development aspects of ESA competence including pilot testing and demonstrations, security-related applications assumed to be fully funded by third parties.

Accordingly, the main trends in the overall profile of expenditures may be described as follows:

- Launchers: approximately constant, in order to allow the development of evolution of existing launchers and the preparation of new ones, safeguarding technical competencies;

- Space and Earth sciences: approximately constant in real value;

- ISS exploitation and relevant sciences: approximately constant, at a level corresponding to the share of ESA in the ISS;

- Exploration: growing as priority area fully depending on resources from ESA Member States;

- Applications: growing as priority depending on mixed funding from ESA and other relevant sources for the development of the first system, and mainly on these other sources for recurrent systems and operations;

- Technology: growing as priority for competitiveness, mainly – but not exclusively (especially as regards technology for applications of EC interest) – depending on resources from ESA Member States.

For budget details, reference shall be made to the ESA ten-year Long Term Plan, which is planned to be updated at least yearly.

4

ESA and its Environment

4.1 European industry

Space industry is closer to defence-type industry than to aeronautics-type industry, since the commercial market represents a small share of activities of space industry in the world, even if an essential share for European industry.

The major restructuring process undertaken by the European space industry has been triggered by the commercial telecommunication market with the need to attain the critical mass. To reply to the needs of the institutional European and national markets this restructuring process has however resulted in maintaining within transnational corporate structures, a number of system capacities in Europe with redundancies in France, Germany and Italy.

Complementary to their system capacities, the two large system integrators have increased their equipment manufacturing capacities by internal developments and acquisitions. Due to the need to create large European consortium to face the requirements of the European programmes, this equipment development and manufacturing capacity of the large system integrators is not fully used in institutional programmes, while on the contrary it has resulted in commercial programmes in an increased vertical integration. This has resulted in a diverging evolution of the industrial organisation of the institutional and commercial programmes.

The acquisition policy of the large system integrators has reduced the independent equipment supplier base in Europe that has failed to counterbalance this process by a comparable merger/acquisition process.

In parallel with the restructuring process of the large system integrators, a number of small system integrators have emerged in Europe in the civilian and military institutional markets. Some of them have been able to enter in the commercial market in specific niches.

Except in the mature telecommunication sector, the downstream industry is still in a development phase. A variety of very different types of players are to be expected, e.g. a mix of very small and very large enterprises.

The above-described European industry has been confronted with a downturn of the worldwide telecommunications market, not alleviated by the institutional market, which requires new cuts in their capabilities, leading to no in-house investments in new technologies and making competition on ESA individual projects dramatic because of its consequences on the maintenance of capabilities.

Both the maintenance of key capacities and the competitiveness of European industry are at stake, and Member States of ESA cannot afford, either to lose irreversibly industrial capabilities which are necessary for implementing their objectives in space, or to depend on a non-competitive industry. Actions must be taken urgently on ESA's industrial policy (see section 5.1) and on technology policy and plans (see section 3.1.1), in order to maintain the key capacities and to consolidate the competitiveness of European industry.

4.2 Operators and users

ESA has to maintain a strong interface to user and operational organisations in order to derive the right mission requirements and to promote and demonstrate future service developments. New potential users include regions and local constituencies, NGO's, and public administrations.

For any application where a satellite operator[1] is identified, ESA interfaces directly with such operator, which interfaces itself with the service providers and/or users for understanding and federating requirements, and delivering services. When such operator does not exist, ESA must develop a direct dialogue with users in order to understand requirements, define appropriate system(s) to respond to these requirements, and stimulate the creation of a relevant operator.

Satellite operators which exist today are Eumetsat for meteorology, several operators (Eutelsat, SES Global, Telespazio, Hispasat, Inmarsat, etc.) for telecommunications, the Galileo concessionaire for navigation, several operators (Spot Image, InfoTerra, RapidEye, etc.) for Earth observation.

For telecommunications applications, ESA's role is that of an enabler, by demonstrating new technologies and services in partnership with space industry and operators.

For GMES, ESA together with the EC will promote Eumetsat for selected services (e.g. marine and atmosphere) and the creation of relevant operators for other services. ESA will develop a strong link to GEO to implement the global environmental observing system of systems (GEOSS).

For newly integrated applications (see section 3.2), ESA, in particular together with the EC, will interface with potential users in order to develop demonstrations based on their requirements.

In all three cases, and in accordance with the Space Council's orientations, ESA will support the technological preparation and validation of space systems responding to user needs, and develop technologies to maintain a globally competitive European space industry equipped to meet Europe's future space system needs, in cooperation with the relevant agencies and entities in Europe, and taking into account factors such as the integration of space with terrestrial systems and the diversity of sources of funding.

4.3 International relations

ESA is currently cooperating with many different partners, space powers or not, on almost all of its activities. The EU is encouraging the development of such cooperation, be it in the frame of the Galileo programme or in the frame of the development of the European Space Policy. The development of cooperation must be organised in taking into account: (i) the lessons learnt from past and current cooperation; (ii) the need to consolidate the competitiveness of European industry both for European governmental programmes and on the worldwide market (see section 4.1), and (iii) the driving effect of Intellectual Property Rights and Transfer of Technology rules on international relations.

Based on lessons learnt from ESA cooperation programmes and on current discussions within the process of developing an ESP, the following lines of actions will be followed:

a) Continuation of the special partnership with Canada

Canada is a special partner for ESA, being associated to both

[1] *"Satellite operators" in this section mean operational entities interfacing with customers in view of delivering space-based applications. ESA should stay a R&D organisation and not become an operational satellite operator for space-based applications, except during an interim phase when no operator exists yet. The Agency will however continue to operate satellites developed under its programmes and act as a centre of excellence for satellite operations in cooperation with other operational centres in Europe.*

basic activities and optional programmes. The development of such partnership will be based on the on-going mid-term review of current cooperation and on mutual interest.

b) Development of cooperation with the two main current partners: USA and Russia

- Concerns both development and utilisation programmes;
- USA: 40 years of cooperation, 40 years of success and lessons learned, and Russia: more recent cooperation, growing, consistent with the EU-Russia dialogue;
- Setting-up of joint strategy in certain fields of space activities: science, ISS exploitation, exploration (both USA and Russia), launchers (Russia), Earth observation (in the framework of GEOSS);
- Russian Space Agency and NASA could be invited once a year to a Council meeting for endorsement of joint sectorial strategies.

c) Cooperation with other space powers

- Concerns both development and utilisation projects;
- Relevant current partners: China, India, Japan;
- Setting-up of individual project cooperation based on each partner's interests. Individual projects are decided one by one, even if framed within an overall cooperation agreement.

d) Cooperation with non-space powers

- Concerns only utilisation of ESA space means;
- Relevant partners: developing countries (in Africa, South America, etc.) and international organisations (UNESCO, WHO, etc.);
- Particular relevance of integrated applications based on systems of systems.

5

The Evolution of ESA within the Framework of the European Space Policy

ESA has been very successful in all domains of its mission and activities: space sciences, applications and services, enabling tools and technologies. Thanks to the continuous investments of Member States, European scientists are at the leading edge of progress made in space science, Earth science and science under microgravity, European industry is successful on the worldwide commercial market and European operators for satellites and launchers are worldwide leaders.

ESA membership and programmes have contributed to Europe's integration and ESA's successes have participated in building up Europe's successful image both for European citizens and on the international scene.

As a result of these investments and successes, the growing interest of the EU in space is providing an EU dimension to a space policy so far developed and implemented by ESA Member States, which reinforces the space dimension of Europe. This growing interest has been materialised by the development of new user-driven application programmes under the EC initiative, such as Galileo, as well as by a Framework Agreement between the EC and ESA setting-up the Space Council. A European Space Policy integrating this EU dimension is under development for endorsement by the Space Council in 2007.

However, the growing importance of space in Europe is associated with growing difficulties for coherence and consensus, growing difficulties for governments to increase their investments in space, and growing difficulties for European industry to maintain its capabilities and competitiveness, which is putting at risk Europe's continued success and ambitions in space.

ESA must therefore evolve in order to both overcome current difficulties and prepare for a situation where the role of ESA will be embedded in a European Space Policy. Within that perspective, ESA will have more Member States and "will be positioned within the EU framework", and its Convention modified accordingly.

This evolution will be made in several steps in order to maximise its benefits and minimise its risks, taking into account the respective plans of current ESA Member States, potential new Member States, and the European Community, in terms of objectives, responsibilities and budgets.

a) The long-term and political perspective is to make ESA become an Agency of the EU by 2014 (associated with the new financial perspectives of the EU);

b) The mid-term perspective is to increase the number of ESA Member States to 22 and more by 2011, in order to associate more Member States of the EU to ESA programmes and activities;

c) The short-term objective is to amend the ESA Convention at the next CM in 2008 in order to improve its global effectiveness, enhance coherence and consensus among its Member States, reinforce motivations for Member States to invest in space, and prepare for new membership and for institutional relationship with the EU.

The process and calendar for the mid- and long-term perspectives will be decided at the Ministerial Council in 2008 together with the short-term amendments of the Convention.

The items to be evolved in the short-term to reach the above objectives are the following:

- Industrial policy rules and procedures;
- Decision-making process;

- Financial system and funding mechanisms;

- Stronger coordination between ESA and national programmes, resources and industrial policy.

The common guidelines to conduct these changes are the following:

- Increase flexibility in order to make ESA even more attractive for Member States, the European Commission and others to invest in space. Such flexibility concerns industrial return rules, decision-making process, financial system, funding mechanisms and coordination between ESA and national programmes and resources;

- Increase the proactivity of ESA vis-à-vis its Member States and industry, to (i), propose an industrial policy associated with a technology policy able to shape centres of competence, to (ii) propose a stronger coordination between programmes and resources in Europe, and to (iii) build-up consensus.

5.1. Industrial policy

The situation of the European space industry is today critical, as recalled in section 4.1, and the future of European industry has become the number one problem for the future of the European space sector and ESA in particular.

No European space policy could be implemented without a strong and competitive space industry operating in a government driven sector worldwide, capable of benefiting from technology evolutions enabling emergence of new space solutions.

An appropriate industrial policy should therefore be one of the major objectives of a European space policy.

ESA being the largest customer (over 50%[2] of governmental customers, the other ones being national civilian and defence programmes, Eumetsat and EC) of European space industry, must reassess its current industrial policy principles in order to adjust these principles such that European industry is able to face the challenges of being successful in both implementing the objectives of European governments and competing on the worldwide market, in front of stronger and stronger competitors.

As ESA is not the only customer, a much stronger coordination with other government customers must also be organised.

A reassessed ESA industrial policy should:

- Maintain and use the competencies needed to implement the European Space Programme and support their competitiveness for institutional and commercial programmes;

- Respect the national priorities as reflected by the contribution scales both in a quantitative and qualitative manner with appropriate leadership;

- Establish an overall scheme where Member States can be assured to achieve an adequate return on their investments into space systems.

The tools for reaching the above objectives are: procurement policies taking benefit from flexibility on individual project return, use of global return to maintain key industrial capabilities, technology strategy and plan supporting competitiveness and innovations.

[2] *54 % in 2004, 57 % in 2005*

As far as procurement rules and procedures are concerned, procedures must be adapted in order to take into account the hierarchy of return, i.e. driving procurements from an overall procurement plan to individual project procurements. Such overall procurement plan will include procurement per Member State, supporting the specialisation of centres of competencies. The decision-making process on procurements will be adapted in order to represent a fair distribution of interests among participating States to ESA programmes (see next section 5.2). A balanced overall return is the first priority of the hierarchy of return rules decided by Council in 2005 and of the related amendment of Annex V to the Convention. This priority is not sufficiently developed within ESA and its implementation should be improved. Measures will be taken for that purpose including addressing major procurements at Directors Committee level.

As concerns the technology strategy, the objectives are connected. First class competitive industry is the guarantee to efficiently maintain space-based solutions. A strong home market is fundamental for industry to be competitive abroad. Demanding research missions and federation of new demands are at the origin of new capabilities.

A strong coordination between the EC, ESA, Member States and industry will have to be set up in order to increase the coherence of industrial teaming among ESA, national and commercial programmes.

Industrial policy should lead to the specialisation of centres of competencies, which should be associated with long-term commitments from both Member States and industry.

5.2. Decision-making process

Two types of problems have been or could be met in the decision making process, both with a potential to significantly reduce the flexibility and efficiency of ESA's activities and programmes:

a) Possibility for one Member State to block or to condition all other Member States in decisions by unanimity, in particular when:

- Revising an optional programme declaration (unanimity of participating states). In particular, when the revision concerns the programme's financial envelope, this revision does not commit any participating state beyond its obligations and that state has to subscribe to that revised declaration. This process introduces therefore unnecessary inefficiency in the implementation of the programme;

- Voting the Level of Resources (unanimity of all Member States), which has led in the past to a continuous erosion of the LOR.

b) Possibility for small contributors to outvote big contributors, in particular the leading participating state (in contribution of 33% or more), when voting:

- Yearly budgets (2/3 majority of participating states);

- Procurements (simple majority of participating states).

The goal is to find the right balances between:

- The solidarity and efficiency (unanimity cases);

- The interests of leading contributor(s) who are taking

the risks to drive optional programmes and of smaller contributors who support the leading contributors.

The optimal solution would be to design a decision process able to represent a fair distribution of interests among participating States (and the EC when relevant) to ESA programmes for different types of programmes:

- Solidarity type of programmes, i.e. mandatory programmes with no leading participating State beyond 25 %;

- Leadership type of programmes, i.e. programmes with one or two participating States with a contribution share beyond 33%;

- National programmes, or programmes with few participants;

- Programmes with a significant contribution from the EC (see section 5.3).

5.3. Financial management and funding mechanisms

The reform of financial management is triggered by decisions already taken at ministerial level in 2005, so as to provide:

- Improved planning and management of financial resources through multi-year flexibility;

- Transparency and improved management of internal costs;

- Compliance to standards of external financial reporting, with a clear distinction between programme assets, common infrastructures and running costs;

- Improved management of income from new funding partners.

The reform of the financial management of the Agency aims at supporting the strategic purposes of the organisation and as such is closely linked to other reforms and reflections.

In addition to this reform, a reflection is needed for easing the funding mechanism involving the EC as well as third parties, since ESA will be exploiting more partnerships in future, be they public-private and / or public-public.

Difficulties experienced with Galileo and other projects such as Soyuz in Guiana should result in the development of partnership models and procedures not any longer affected by stop & go and uncertainties, linked to the decision process of partnership members.

Appropriate solutions are being investigated for the EC funding of GMES without changing the ESA Convention. In parallel, more general solutions will be analysed allowing ESA to operate speedily and easily on programmes funded by the EC, according to EC rules, while preparing ESA entering the EU institutional framework at a later stage.

5.4. Better and stronger coordination with national programmes and resources

The flexibility offered by the optional programmes of ESA has been one of the strengths of the implementation of a space policy in the last 30 years, allowing the start of new projects taking into account different motivations, different resources and different capabilities of Member States. Most ESA programmes have benefited from the leadership of one or two Member

States taking a significant share of funding and risks associated with a project while using the ESA framework to associate other Member States in a European-wide endeavour. Very often, the ESA Member States not participating in a given project have benefited from this project for projects they were participating in, e.g. use of a launcher, use of infrastructures or of technologies, providing a wide common interest among Member States. National programmes are also contributing to this common interest, be it for scientific missions they are participating in, for technological and industrial capabilities ESA projects can benefit from, etc.

This flexibility must be maintained in order to take into account facts and realities, but so far a lack of coordination among ESA and national programmes has led to some dispersion and lack of efficiency, in spite of the provisions set in the ESA Convention concerning the coordination of national programmes. This lack of coordination is unfortunately growing, leading even to a degree of competition between ESA and national programmes, to the detriment of common interest and mutual trust. Strong actions must be taken to overcome such divergence, and ESA must be the place for organising such coordination, in full transparency to all Member States. This stronger coordination will be a significant step towards a true European Space Policy and towards an Agency of the European Union.

6

ESA Internal Management

The need to continuously adapt to an evolving environment, to optimise ESA's way of doing business and to respond to the emerging needs of new activities requires urgent actions on the following aspects:

6.1. Developing competencies for integrated applications

- Reinforce in-house competence in relation to new user communities and understanding of customers needs.
- Reinforce in-house competencies to define integrated solutions (architecture design, system and software engineering, operations, multi-domain modelling and simulation of complex systems, network centric solutions, etc).
- Reinforce in-house competence to develop new technologies and precursors.
- Reinforce internal cooperation to develop multi-disciplinary teams.
- Reinforce capabilities for collaborative work, networking management, interfacing with new partners, e.g. WHO, UN, etc.
- Take advantage of synergies between ESA tools for design of complex systems (concurrent engineering, information technologies, etc.) and related capabilities of research centres and industry.
- Reinforce the coordination with Member States and the EC also on technology transfer issues and regulatory framework.
- Reinforce competencies, processes and procedures associated with security-related programmes, involving selected staff.

6.2. Reinforcing "One ESA"

Operating as "One ESA" – the Executive together with delegations – was already an objective of Agenda 2007. In spite of some improvements, there is still a long way to go. The objective therefore remains and an even higher emphasis is now required by all stakeholders: delegations and the executive at management and individual staff level.

The following line of actions will be taken:

- Organise Council meetings dedicated to strategy, policies and the Long-Term Plan;
- Strengthen consensus building with and among delegations;
- Address major procurements at DG/Directors Committee level;
- Create horizontal Directors' sub-committees (resources and technology);
- Develop an ESA-wide scientific policy, both within the Executive and across Programme Boards and scientific Advisory Boards;
- Improve lessons learned activities across directorates;
- Stimulate internal mobility for cross-fertilisation (see section 6.3 below).

Specific attention will be paid to improvement of internal communication, including top-down and bottom-up, as well as horizontal and vertical flows of information. To this end, the key role of the management will be underlined. Finally, internal communication will be reinforced.

6.3. Human resources and workforce management

The line of actions set out in Agenda 2007, in terms of increased mobility and fostering of the Agency's technical capability, have not been met. Restoring trust requires further significant and rapid efforts from all the players: Human Resources Department, managers and members of staff.

a) In this context, raising the importance of human resources management is essential.

This will be achieved first by addressing the management at Director level:

- The Human Resources Department Head will be a member of the DG/Directors Committee;

- The Human Resources Policy will be decided at DG/ Directors Committee;

- The agenda for and report from CJC meetings will be presented and discussed at DG/Directors Committee.

Second, by setting-up a clear and transparent process:

- The process shall begin with high-level discussions in the DG/Directors Committee, which will ultimately set out the general guidelines (e.g. vis-à-vis mobility, technical and managerial capacity, working arrangements, gender equity) proposed by the HR Department;

- The detailed implementing policies and implementation plans will be prepared by the HR department for negotiation with the Staff Association. Department and Programme managers will be involved in the drafting of the implementing policies and implementation plans;

- The implementation of the HR corporate policies will be tasked to managers, from Directors to Section Heads. Managers will have to report up to DG/Directors Committee on the lessons learned from concrete implementation.

Third, by establishing the flow of information through managers, top-down and bottom-up.

b) As part of the future HR policy to be discussed at DG/ Directors Committee, the following lines of action will be assessed:

- Stimulating the motivation of staff by entrusting them with more responsibilities, making them accountable and recognising their merits adequately;

- Setting-up active career planning by proactive identification and career alternatives for staff with a high potential, diversification of tasks and more training and development of all staff;

- Encouraging mobility of staff with the appropriate incentives (in terms of merit recognition) at corporate level. In particular, guidelines will be defined for the effective circulation of staff between support and programmes directorates and regular top management job rotation.

c) Since managers play the key role in the implementation of the HR corporate policies (e.g. recruitment, mobility, career management, staff development), the following lines of action will be implemented:

- Formal inclusion of staff management in managers' terms of reference;

- Assessment of managers against objectives specifically related to the management of their staff;

- Development of managerial and leadership capability by: setting-up training on Staff Rules and Regulations and organisation of development sessions.

d) Workforce management objectives shall be:

- Preparing for the quantitative and qualitative (competencies) evolution of staff resources, to support the strategic direction of the Agency. Specific attention will be paid to the competencies and skills required to implement systems-of-systems programmes;

- Defining and approving high-level policies and guidelines leading to the rationalisation of the utilisation of contract manpower.

Workforce management at both policy and operational levels will be an important element of the terms of reference of the newly created Directors' subcommittee on resources management.

6.4. Improved internal management

The further enhancement of ESA internal management remains a high priority in order to ensure efficient and effective management in a demanding and dynamic environment.

In particular, the internal management of programmes and projects must be adapted to significant changes in ESA types of programmes: less very large and long projects like the ISS, more individual satellite projects (in particular in Earth observation), a significant increase of technology projects, etc. In addition, the structural evolution of the space industry requires from ESA's project management more control of large system integrators, e.g. through "best practices" mechanisms.

Emphasis will be put on the following:

- From budget to cost mentality (following the introduction of accrual/analytical accounting as part of the financial reform);

- Implementation of coherent risk management policy and process;

- Improved project planning and execution on the basis of Project Plans and Integrated Project Reviews (IPRevs) aiming to optimised allocation of resources (budget, staff, contractors);

- Further development of Corporate Controlling for improved integrated and coherent reporting and analysis for informed decision making;

- Streamline administrative processes (process simplifications, internal instructions);

- Adapt technical design management and processes for reducing development, exploitation and production costs;

- Adapt competencies available in ESA according to evolution of industry;

- Improve internal information flows;

- Manage and follow decision making processes in a better way;

- Standardise reorganisation process with impact assessment encompassing compatibility with corporate policies, cost implications and due consideration of individual cases;

- Review the procurement rules and procedures framework defined some 25 years ago in order to reply to the evolution of the European space industry and to the evolving needs of the ESA programmes;

- Decrease lead-times in procurement by implementing new procedures and developing an e-procurement tool.

It must be recalled that an interdirectorate task force (see section 3.2.3) for pilot demonstration of services based on systems of systems has been put in place from mid 06 to the next Ministerial Council in 2008, in order to support the elaboration of an Integrated Applications Programme proposal to be submitted to that Ministerial Council in 2008.

7

Action Plan

7.1. Programmes and budgets – evolution of ESA within the framework of the European Space Policy

For the implementation of the objectives as set out in this Agenda 2011, three major lines of action can be identified within the medium term future.

7.1.1. The implementation of approved programmes and the preparation of new programmes

The programmatic decisions will focus on ESA core activities, continuation of current application programmes and newly integrated application programmes as described in the draft Long-Term Plan (LTP) 2007-2016.

7.1.2. The elaboration of a European Space Policy (ESP) to be endorsed by May 2007 Space Council

After an extensive debate involving ESA, EC and respective Member States for about two years, a European Space Policy will be endorsed by the Space Council in 2007, setting the strategic framework within which ESA actions and programmes will take place. The first draft of the European Space Policy will be available in November 2006, allowing several iterations at HSPG level for building-up consensus among ESA and EU Member States, and for defining the five main messages which will be endorsed by the Space Council.

The European Space Policy will outline on the one hand the European vision for space and its related objectives and priorities regarding the foundations of space, the access to space, the applications, the regulatory environment, the synergies between civil and defence, while on the other defining the general implementing principles related to industry policy, roles and responsibilities, institutional framework, and international relations.

Based on the frame provided by the European Space Policy, a European Space Programme will be elaborated, the drafting of which will require a high level of coordination among ESA, EC and Member States to exploit effectively the potential behind European public support to the European space sector.

7.1.3. Evolution of ESA

The proposed plan of action is the following:

1. October to December 2006: documented analysis of problems met in industrial policy, decision making process, financial system and funding mechanisms; comparison with other relevant European organisations. This period is dedicated to fact-findings for a common understanding of the problems, to be addressed in plenary sessions of Heads of Delegation.

2. January to June 2007: impact assessment of different possible solutions for correcting the problems identified above. This period could be divided into two parts:

- Consultation of all delegations from February to March, with a report by the DG during the March Council;

- Finalisation of impact assessment during plenary meetings of Heads of Delegation followed by a report to the June Council.

3. September to November 2007: decision by Council on selection of decisions to be prepared for the Council at Ministerial level 2008.

4. December 2007 to summer/fall 08: preparation of decisions by the Council Working Group to be set up for the Ministerial Council in 2008.

7.2. ESA internal management

7.2.1. Developing competencies for integrated applications

In order to properly prepare proposals for decisions on integrated application programmes at the 2008 Ministerial Council, the following actions are necessary:

- Development of pilot projects (2006-2008);
- Perform architectural analysis for integrated applications (2007);
- Reinforce D/TEC system engineering team (2007);
- Improve system engineering related tools (e.g. CDF, architectural design frameworks) (2007-2008).

7.2.2. One ESA

In order to further consolidate the aspect of one coherent ESA, the following actions will be taken:

By end 2006:

- Propose from 2007 onwards a new set-up for Council meetings (e.g. meetings dedicated to ESA strategy and plan);
- Setup of a High-level ESA Science Advisory Committee (HISAC), advising the Director General on all the scientific activities within ESA;
- Establish within the Directors Committee internal sub-committees responsible for resources management and technology to reinforce coherence among Directorates;
- Reinforce internal communication.

By end 2007: perform an interdirectorate analysis of synergies in the development and exploitation of scientific missions across ESA.

7.2.3. Human resources and workforce management

The human resources and workforce management line of actions shall be treated as projects. The projects will address the various issues at stake such as re-organisation process, staff motivation, managers' accountability for staff management, and utilisation of contractors. Each project will have a given timeline reflecting the complexity of the issue.

In general, the following process will apply:

- Definition phase (Directors Committee guidelines, drafting of detailed policies and implementation plans);
- Decision-making phase (consultations of managers and staff representatives and, as appropriate, negotiation in the Central Joint Committee);
- Publication of internal administrative instructions;
- Implementation phase (feedback to Directors Committee and commitment to its implementation);

- Review phase (following one year of implementation a review will be organised).

7.2.4. Improved internal management

- Ensure systematic implementation of established processes for Project Plans and Integrated Project reviews for all activities, projects and programmes.

- Review risk management policy framework by end of 2006, and introduce the coherent risk management process in 2007.

- Introduce a single, coherent resource-planning framework within the Corporate Controlling function in 2007.

- Identify measures for improving the internal information flows in support of "One ESA" and informed decision making, and ensure their implementation by end of 2007.

- Review administrative processes by end of 2007.

7.3. Implementation plan – relation to the ESA LTP

Chart 1 shows the implementation plan of the Agenda 2011, and the schedule for the main objectives as described in the document.

The ESA Long Term Plan will be the implementing instrument of Agenda 2011, updated and endorsed by Council on a yearly basis.