



Challenges

Development is challenged by, at least until 2050, a strong population growth, more severe environmental strains, growing mobility, and dwindling energy resources. All these factors will lead to serious consequences for humankind. Inadequate agricultural resources, water supply and non renewable energy sources, epidemics, climate change, and natural disasters will further heavily impact human life.

Space is a cross-sectoral instrument to address with these problems. It provides a range of precise and global data as a basis for decision-making. Apart from the identified needs for action in the six issue areas, some general challenges for space have been identified:

- The utilisation of space has to be better organised by systematically identifying and developing users and defining operational services, not already covered by existing initiative;
- Experimental space systems and programmes should be more easily transitioned into operational use;
- The space environment must also be sustained in order to continue being of benefit for future tasks;
- Europe has to make all efforts in broadening its knowledge base, in organising its own assets accordingly (with a particular role for meteorological satellites and GMES) and to support developing regions and countries in their attempt to increase their capacities.
- Data and information sharing between States, international organisations and private actors are necessary for solving and preventing problems that affect all humankind. Space-based information is important for security on Earth and in a broader way for sustainability on Earth. It should be made freely available as a "universal service".

Cooperation between these different sectors has to be enacted facing problems that are related to each other. This includes a structured dialogue with the space sector in order to find concrete and practical solutions that space as a tool can bring.

The conference

This conference, organised by ESPI, tried to shed a new light on threats, risks and sustainability by combining approaches from various disciplines. It analyzed what could be the contribution of space tools to predict, manage and mitigate those threats. It aimed at demonstrating that space is not a niche but has become an overarching tool in solving today's problems.

The conference introduced various methods and ideas addressed to national and European policy makers. In six different issue-areas, specialists in the broader field of "knowledge", "environment", "resources", "energy", "mobility" and "security" nourished the dialogue with space experts to examine and illustrate in detail how space contributes to sustainability on Earth and how this can be made even more efficient and focused.

These 20 leading international experts from various policy fields presented their ideas and views and discussed for each of the six issue- areas the context, the contribution of space and the need for action.

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Threats, Risks and Sustainability – Answers by Space



Conference Results and Recommendations

10-11 December 2007,
ESPI, Vienna, Austria

1. ENVIRONMENT

The context

How do we prepare humankind to face the consequences of climate changes and the world with new geographical features? Is the current pace and pattern of development sustainable? What changes in lifestyle, behaviour, patterns and management practices are needed, and by when?

The contribution of space

Accurate global data measurements are collected independently by several satellites such as SPOT, Ikonos, IRS, TerraSAR-X, COSMO-SkyMed, future Sentinels and many more to come. Space is an important tool that can help in a unique way the global monitoring of carbon dioxide, methane and other greenhouse gases, as well as, the melting of the polar ice caps, climate change and natural disasters. An initiative such as the International Charter Space and Major Disasters (initiated by CNES and ESA), supports disaster management. The contribution of space to environment monitoring is organised in programmes such as GMES (Global Monitoring for Environment and Security), GEO (Group on Earth Observation) and GEOSS (Global Earth Observation System of Systems). Networking is made possible by numerous satellite-based communication systems.

Need for action

A better organisation of the demand and supply system is required specifically by combining EO, SatNAV and SatCOM. The value of integrated space services has to be demonstrated more precisely to the clients maybe taking advantage of the model for the development of EO services within the GMES initiative. The users have to be identified more precisely. The space based assets and systems in place for many years have not yet been used on a truly operational basis to the best of their abilities. An annual European report on the status and utilisation of space assets could be useful. Eumetsat should be empowered to develop further into a European operational entity.

2. SECURITY

The context

Traditional peace-keeping and peace enforcement are no longer sufficient. Sustainable security is needed, i.e. protection, reconstruction, CIMIC (Civil and Military Cooperation), disarmament and State building. Security is also needed in outer space.

The contribution of space

For security on Earth, space applications can offer precise maps for peace-keeping, military and intelligence purposes, as well as verification and treaty compliance. Space plays a role in security in a broader sense, for instance, as food security or environmental security. To ensure security in outer space, the space environment has to be preserved and the use of force in outer space has to be discouraged.

Need for action

For security on Earth, access to data should be made easier in particular regarding the broader aspects of security. For security in space, rules of the road in the form of Space Traffic Management for secure and peaceful space activities have to be developed and agreed at the international level.

3. MOBILITY

The context

People continue to travel more. Land, Air and Sea traffic management through improved communication and navigation systems is a major issue. All modes of transports impact the environment to various extents. However, aiming at sustainability in this field might require limiting mobility.

The contribution of space

The European Galileo satellite navigation system will go on greatly improving all modes of transport. It will have many different applications such as maritime applications, precision farming and use for emergency services. In addition, it will have security applications (support to crisis management) and sovereignty applications. Satellite-based navigation increases traffic safety and security. Space-based positioning is essential for developing mobility applications. Telecommunication satellites combined with navigation play also a major role in ensuring a sustainable mobility.

Need for action

Galileo will be helpful but many issues will remain: The system will offer unprecedented reliability in navigation services; however, privacy issues may arise in the future and thus will have to be tackled. Galileo will ensure sustainability in mobility, but will also be used in the future to restrict or limit mobility, which has to be communicated to the users.

4. KNOWLEDGE

The context

Europe is a knowledge-based society. Knowledge is generated through basic science and in this context, basic science is necessary to understand the Earth system in order to shape technology development and future applications. Science and engineering prepare solutions to tomorrow's problems. Fundamental and applied science should not be separated from each other. Knowledge also helps overcoming resistance to change.

The contribution of space

Space is necessary to understand planet Earth and its place in the universe. Space research generates knowledge which helps the scientific applications as well as fundamental physics and even philosophical questions. Basic space science ranges from solar research to space weather forecast. Knowledge requires data that satellites can provide. Communication satellites can also help bridging the "digital divide", which is an issue for gaining and sharing knowledge.

Need for action

Europe has to raise its research performance and visibility and overcome the fragmentation of research and funding activities. There is a need for outreach and education to bring space science to schools as early as possible. Researchers need competitive career opportunities. Trans-disciplinary research should be supported and European excellence in frontier research should be promoted.

5. RESOURCES

The context

Humankind is confronted with a rapidly growing scarcity of non renewable resources. Access to food and water are universal human rights, Food security deals with the need to increase suitable land for sustainable food production and the need for increasing trade in food products. Due to climate change, food insecurity and vulnerability increase.

The contribution of space

Space technologies as well as information and communication technologies can contribute to the effectiveness of humanitarian response to food problems thanks to baseline mapping, crop modelling, agriculture monitoring, disaster management and development of water master plans. Notwithstanding the value of EO systems and data in this context, the practical problem solving must also include "earthbound" components such as the access and use of in-situ information to make a service feasible and effective.

Need for action

The task is to turn information into knowledge, which has to be put into an agenda, which ultimately has to be transformed into action. Clarification is needed as to who is paying for the services, who is providing the services and who is implementing the corresponding policies. Public customers, being the primary consumer of information services, must be enabled to implement corresponding budgets within their administrations. There is a need for enhancing practical collaboration and cooperation between the various national and international agencies. Public opinion should be able to support policies for solving long-term problems. Capacity building in the use of space-derived information, like remote sensing data, is a priority for developing countries that have to build partnerships for management purpose.

6. ENERGY

The context

Energy policy is built on three goals: security of supply, competitiveness and sustainability. The demand for energy increases, especially in emerging countries. Research for alternative (and even visionary) sources of energy is undertaken to reach these goals.

The contribution of space

Space provides tools for strategic decision-making in the energy sector. Space applications support the planning and monitoring of pipelines and the operational needs of the energy sector (weather forecast, seismic testing etc.). Remote sensing is a key tool to assess, plan and monitor exploration surveys and is used for hydrocarbon exploration and geophysical exploration. Space solar power concepts or the extraction of Helium 3 from the Moon are to be studied for sustainable energy supply in the distant future.

Need for action

In the energy industry, in particular smaller companies, the use of space for operational services has to be increased through creating a stronger awareness of the potential benefits. At the same time, the few existing satellite systems being useful in this field have to be sustained through back up and follow-on systems.