

CHAPTER 14

EUROPEAN SPACE SITUATIONAL AWARENESS

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THE NEED FOR SPACE SITUATIONAL AWARENESS

Space technology and space systems have become a vital part of our daily lives and they hold the answer to many of the most pressing security problems. They are used by a wide spectrum of civil and defence communities. Space assets are major and vital enablers for many operational capabilities. Unrestricted access to space and to space services is a common interest of humankind. Accordingly, the need for sustainable space services and possibly the need to take actions to guarantee the unrestricted use of space are vital and recognized worldwide.

In the civil, commercial and defence sectors, the dependency on space assets increasingly raises concern due to their vulnerability. This vulnerability has to be considered during the development, deployment and operation of space systems. Some measures for the protection of space assets, for instance, hardening of components, redundancy and positioning of critical parts within satellites, have been applied. However, passive protective features are not sufficient to guarantee safe space operation; it is still possible to disturb the function of a satellite or a satellite system.

In view of the diversity of space users, each needs to realize that sustainable space security cannot be achieved by one nation or one user alone; it should be the goal for the community of all space users to provide a safe environment for space assets. Regardless of specific measures to be taken—for example, codes of conduct, international treaties, protection measures—information on what is happening in space is the key to any decision-making process regarding space security.

Europe has invested considerably in space. There is the need to maintain this investment and to have sufficient information on the environment of its space assets, that is, to develop a space situational awareness (SSA).

STATUS OF SPACE SURVEILLANCE IN EUROPE

In Europe, space surveillance aiming at a comprehensive SSA is seen as a multinational task not limited to the civilian or military user communities. Until now, some capabilities have been developed and are operational. These mainly nationally available assets, that is, ground-based monitoring capabilities, have proven to be very effective, but they are not linked. In 2001, the European Space Agency (ESA) director general tasked the Network of Centres Coordination Group on Space Debris to assess the feasibility of a European space surveillance system being able to routinely detect, track and characterize space objects, determine their orbits and correlate them with launch or release events. In support of this activity, ESA initiated definition studies resulting in proposals for a “concept of a European space surveillance system”. However, these studies could not take into account recent developments regarding space policies, in particular, developments within the European Security and Defence Policy and progress in that field at the national level.

THE ROLE OF THE EUROPEAN SPACE AGENCY

ESA, an agency representing 17 member states charged with developing major European space programmes, has proven its competence in defining and conducting the development of space systems and to identify preparatory technology programmes. Although not being a demander for or user of European space systems, ESA is perfectly suited to support the definition of needs for space systems at the European level and to develop solution options serving all European citizens. In this context, space systems are inherently of a multiple-use nature. European space developments may have been driven largely by the demands of civil applications, but many of them are also used by defence organizations without constraining or compromising military operations.

The notion of “peaceful purposes” in the ESA Convention reflects the international space law binding all actors in space activities. It is commonly interpreted to permit using space for non-aggressive military activities respecting the terms of the UN Charter and respecting the specific prohibitions expressed in the Outer Space Treaty.

ESA’s flexible management rules allow for the execution of programmes in different manners, for instance, as mandatory programmes (all member states participating) or as optional programmes (member states decide on a case-by-case basis how and to what extent they participate in a given programme). It is very well suited to manage complex space programmes at the European level and is open for cooperation worldwide.

SPACE-RELATED EUROPEAN SECURITY AND DEFENCE POLICY DOCUMENTS

The European Security Strategy document “A Secure Europe in a Better World” proposed by the General Secretary/High Representative of the European Union, Javier Solana, and endorsed by the European Council in Brussels on 12 December 2003 clearly states that the European Union needs to be more active, more coherent and more capable. It defines the main threats that need to be addressed, among them:

- The terrorist threat, and its linkages with international organized crime;
- The proliferation of weapons of mass destruction, addressed, inter alia, through verification of the provisions of the treaties; and
- Regional conflicts and their consequences.

It also recognizes that the first line of defence and security will often be abroad, though interconnected with European home security. This is true for all major threats. The causes, if not the actors, are most often rooted in remote countries.

Based on these identified threats and recognized capability gaps regarding European Union-led crisis management operations, the Headline Goal 2010 was established. It presents the European Union as a global actor, ready to share in the responsibility for global security, putting emphasis on timely crisis prevention and on responsiveness in all phases of

Crisis Management Operations suggesting the use of observation, communication and navigation from space.

The implementing document “ESDP and Space” of 16 November 2004 recognizes the added value of space systems for the realization of the European Security and Defence Policy, but notes that:

... too much reliance on space based assets, including in the economy sector, could induce new vulnerabilities in case these systems are defeated. This should be taken into account when considering European security and appropriate measures envisaged to identify, prevent, or at least to limit, these risks. Such measures could include space surveillance, space-based detection, monitoring and identification of illicit activities.

FUNCTIONS OF SSA AS DEFINED BY THE PANEL OF EXPERTS ON SPACE AND SECURITY

On 11 November 2003, the European Commission presented a White Paper on the implementation of the European Space Policy, dedicating one chapter to “Space as a Contribution to the Common Foreign and Security Policy, the European Security and Defence Policy and to Anticipation and Monitoring of Human Crisis”. Among other things, this document states the need for Europe to develop a space surveillance system allowing the European Union an autonomous capacity to detect and to identify space objects. It also states that a specific effort might be needed to ensure that Europe has the capacity to supply to the different users critical information on solar flares, near-Earth objects and space debris. In order to further assess the needed investments for a comprehensive European Union space-based defence and security capability, one of the actions was to set up a panel of experts on space and security that included ESA experts. This expert panel submitted its report in March 2005, stating that the growing importance of space in every facet of life in Europe means that the protection of our space asset is a fundamental need. The panel identified the lack of a space surveillance capability as a serious capability gap that must be one of the priorities of the future European space programme. Beyond the security of the European space assets, this system must contribute to the control of the application of international space treaties and to the evaluation of the activities of space-faring nations or organizations. The protection of critical

infrastructure in the space sector is a priority and services and capabilities of surveillance of space-based assets are needed. The panel recommended the integration of a European space surveillance capability into the European space programme in the short term.

Specifically, there is a need for a sufficiently independent European space surveillance system to:

- Acquire and maintain a sufficient knowledge of the environment in space in order to safeguard the functional capabilities of any European satellite assets;
- Monitor European satellites in order to detect any damage risk due to either aggression or collision with debris;
- Characterize any threat to these satellites;
- Observe and possibly forecast space weather (for example, solar activities) in order to protect space-based assets;
- Verify the application of international treaties in outer space;
- Participate in the strategic evaluation of technological and operational capabilities of other countries/organizations; and
- Provide decision makers with pertinent information regarding the situation in space within the decision process or the planning/ conducting of operations.

The space surveillance system could provide information concerning:

- The main characteristics of satellites (for example, orbital parameters, activity status);
- The main characteristics of potentially threatening debris (for example, trajectory, physical parameters); and
- Pertinent information related to space weather and near-Earth objects.

Quasi-real-time responsiveness is required for all operations related to atmospheric re-entry of satellites or debris.

DEVELOPMENT OF A PROGRAMME PROPOSAL FOR AN SSA SYSTEM

There are very specific requirements regarding the need for information about ground-, air- or sea-based assets and events. Regarding SSA, there is the shared view that it is needed, but specific common requirements for such a complex system, which could lead to necessary measures, are not yet in place. The civilian user seems to be mainly concerned with space debris and space weather, while the military interest seems to focus on “complete” SSA and early warning. Some civilian capabilities (only space debris related) are available in Europe. The military staffs are developing space-related needs for military operations including the need for space surveillance. The definition of a European space policy encompassing both civilian and defence demands requires the definition of a comprehensive SSA system that serves all user communities and takes advantage of the multiple-use character of space systems. In addition, recent technological developments—for instance, small, agile satellites—should be included in the considerations regarding space surveillance.

In view of this diverse scenario, there is a need for a coordinated discussion at the European level and initiating an activity aimed at generating a detailed common understanding of needed space surveillance capabilities and at the development of a characterization of SSA, with a mutually accepted requirement list. This activity is based on the assumption that military and civilian interests overlap. In any case, duplication should be avoided and only one space surveillance system should be developed. It is foreseen that a group of experts representing all space surveillance user communities will compile a list of needs as a first step. Considering this list of needs, the already available and planned assets that could support an SSA system will be assessed in order to identify detailed capability gaps. In parallel, architectural/feasibility studies will be conducted to support the identification of user needs and requirements by offering technical solution options, including ground- and space-based components, serving all user communities. The activity should result in a credible programme proposal for the development of a space surveillance system serving national and common interests.

In parallel, it will be necessary to address policy issues related to the foreseen multiple uses of SSA. An agreed data policy accommodating the specific operational needs of the defence and civil users is seen as a

precondition for a possible multiple-use development and operation. In addition, cooperative options within a European context should be addressed, for instance, the identification of national and common European elements.

CONCLUSION

Shared information on the situation in space is essential for confidence building regarding the conduct of space-faring nations. It is a precondition for making necessary decisions in case of events affecting the free operation of space systems in accordance with international law. The future realization of an SSA system should be seen as a common/multinational goal contributing to the reliable and secure use of space, offering unhindered access to space services for every user.