

Space Situational Awareness (SSA) for Europe A First Important Step

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Space Situational Awareness (SSA) has been recognized to be an essential prerequisite for the autonomous and safe conduct of space activities. Consequently, there have been considerations and preparations to set up a European SSA system. The recent European Space Agency's Council Meeting at Ministerial Level has decided to start a corresponding preparatory programme. This marks an important step in providing political backing, although the financial envelope is relatively modest and no significant hardware procurement is foreseen throughout the next three years. Some essential steps remain to be taken on the way to implementing a European SSA system. They include devising suitable concepts for governance, data policy, operation and sustainable funding.

SSA within the European Debate

Modern societies have become to depend heavily on space and its applications. Space assets with their associated terrestrial installations form a critical infrastructure. Loss or degradation of space based services would have serious detrimental effects on public and private life. Consequently, space assets need to be operated safely and to be protected against possible threats. As a precondition thereof, Space Situational Awareness (SSA) refers to knowing about the position, motion data, function and state of space assets as well as the dangers they might face. SSA usually covers the domains of objects orbiting the Earth (including space debris), space weather and near-Earth objects.

Currently, Europe is not in a state of SSA. Some eligible sensors exist at the national level, but they just provide part of the needed information. A bigger picture can only be drawn with data from abroad. The U.S. provides an unclassified subset of data from its Space Surveillance Network (SSN) for free, but these data are not always timely or accurate enough. Consequently, Europe has been pursuing plans to set up its own SSA system to acquire autonomy in this regard. In 2006, a European Space Agency (ESA) task force on space surveillance had already suggested to install a

radar system in Spain. The same year, ESA gathered a group of potential SSA users.¹ In the framework of a preparatory action, ESA commissioned various studies on possible architectures, hardware, governance and data policy within the General Studies Programme (GSP) and the General Support Technology Programme (GSTP). The ESA Council at Ministerial level decided to embark on a SSA preparatory programme in November 2008. The decision will be considered in more detail below.

A European SSA system is seen to serve the protection of European space systems, especially the ones relevant to operational services. Disposing of military applications as well, it allows for exploitation of dual-use potential. This is in line with the strategic objectives set out in the European Space Policy of 2007. An SSA system also fosters the general economic perspectives of space and thereby contributes to the EU Lisbon goal. Moreover, a European SSA capability will put Europe in a position to foster international cooperation and to negotiate with other space actors on equal grounds. It will also enable Europe to facilitate the peaceful uses of outer space by independent monitoring of compliance

¹ Status of Security-related activities in ESA.
ESA/C(2007)111

with relevant treaties or agreements. Last but not least, a European SSA system is a precondition for a comprehensive Space Traffic Management (STM) system.²

Right from the beginning, the European SSA system was envisaged as user-driven. This translated into involving different user communities, such as civilian, military, public, private, commercial and scientific ones. The issues of governance and data policy have been considered crucial as well, the latter understood as comprising the rules and procedures for handling and distributing information collected by sensors and manipulated or refined in subsequent system stages, as well as mechanisms to control and enforce compliance with these rules and procedures. Setting up a suitable governance and data policy for the SSA system is a trade-off process, accounting for different political, economical, security and legal considerations.

SSA at the ESA Ministerial Council 2008

On 25 and 26 November 2008, ministers in charge of space of the ESA Member States and Canada gathered at The Hague for a Council meeting. Among other things, they took decisions on ongoing and new programmes for ESA with a view to implementing the European Space Policy. One issue at stake was the proposal for a preparatory programme on SSA. Initially, it was foreseen to embark on a “full” programme proposal extending over a time frame of five years with a volume of €100 million. Previous figures even indicated amounts up to €300 million, based on suggestions from the studies commissioned by ESA.

Following political concerns of the Member States, changing scopes regarding space weather or near-Earth objects and given the overall financial and economical crisis, the proposal was then changed to a preparatory programme with a volume of €55 million and a time frame of three years. The political concerns included the attitude that issues like governance, data policy, ownership, operation and financing should be clarified for good before the system’s architectural set up is designed and the actual hardware is procured and deployed.

² Space Traffic Management. The new comprehensive approach for regulating the use of outer space. ESPI Flash Report 3, 2007, Vienna

The SSA preparatory programme for the next three years mainly foresees studies and paperwork, with some initial hardware procurements. The core element will comprise the issues of governance, data policy, data security, architecture and space surveillance.

Eventually, the proposal was endorsed and will be implemented as an optional programme.³ Eleven Member States subscribed to €50 million, with Spain contributing the largest share. The financial volume is a bit less than the proposed envelope of €55 million. The United Kingdom, besides subscribing one million Euro within the core element, issued a statement that UK existing facilities related to SSA will be offered free of charge. However, it is not clear which facilities are meant by that.

The programme, according to the proposal, foresees a core element and three additional optional elements. The core element comprises governance, data policy, data security, architecture and space surveillance. The three additional optional elements relate to space weather and near-Earth objects, to bread boarding of Radar components (in close cooperation with the General Support Technology Programme) and to pilot data centres.⁴ States wishing to participate in the additional optional elements also had to sign up for the core element.

The SSA preparatory programme largely consists of studies and workshops with the Member States (including representatives from the Ministries of Defence), for example clarifying the concepts of governance and data policy. The domains of space surveillance, space weather and near-Earth objects will be tackled separately. Moreover, upon completion of the data policy, pre-cursor SSA services are foreseen to be established, drawing upon national facilities that already exist. Some hardware activities are planned as well, with Spain playing an important role. These hardware activities include the aforementioned bread boarding of radar components and initial procurement of first assets and components.

³ European Ministers inject new impetus to ensure space’s role as a key asset in facing global challenges. www.esa.int/esaCP/SEMR3S9WYNF_index_2.html

⁴ Meeting Europe’s security needs. www.esa.int/SPECIALS/Ministerial_council/MC-SSA_1811.pdf

Assessment and the Way Forward

The decisions taken at the Ministerial Council represent an important step forward for the European SSA system. SSA has been accepted as an optional ESA programme and has been subscribed to by eleven Member States. The Member States have provided political backing and an official mandate. This highlights the importance that is attributed to the project and its value within the overall political system of Europe, as it supports various strategies and objectives.

As mentioned above, the “full” programme proposal foresaw a timeframe of five years with hardware implementation only scheduled for the last three years, so the preparations would have extended over two years. The preparatory programme that was now adopted by the Council will last for three years. Consequently, one could argue that the time delay induced by downsizing the proposal is not too severe.

However, there are also some suboptimal features to be noted. Ambiguities in the financing schemes for dual-use endeavours within some Member States seem to have spilled over into the European domain by cutting down subscription amounts. Also, the modest start of the programme might have impacted on Member States’ willingness to supply data from their national systems, because there is no reasonable “give and take” ratio from their perspective. This is aggravated by the fact that there is no finalized data policy yet, which raises security concerns – especially among the military entities at national level, which account for a major part of existing facilities.

The next steps on behalf of ESA will be to devise the work plans, to set up a project team and a programme board. In parallel, the ongoing studies in the GSTP on architectural solutions and within the GSP for governance and data policy will have to be finished and their results will have to be presented to the Member States. On top of these steps, additional issues will have to be tackled as well:

Governance and data policy will have to be devised in a way that allows for pursuing various objectives at the same time. The operational scheme and the exchange of data have to support an optimum availability of information, incorporating necessary redundancy as well as avoiding unnecessary duplication. They have to create incentives for

all potential contributors at national and European level to participate in the system (win-win-situation). At the same time, security concerns of military entities and economic interests of commercial participants have to be accounted for.⁵

Another aspect is the handling of military requirements for dual-use space systems. Military entities are not inclined to table their requirements at a transparent body like ESA. In the case of SSA, Member States mandated the European Defence Agency (EDA) to consolidate the military requirements for an SSA system. The results are due to be fed into the follow-up decision on a SSA programme proposal at the next ESA Council meeting at ministerial level in 2011. They will then be accounted for in subsequent system deployment.

The decision on SSA taken at the ESA Ministerial Council represents an important step, providing political backing and an official mandate. This step now has to be followed by others, like consolidating the governance and data policy concepts and ensuring sustainable funding.

This might be a viable route for the SSA system, because the implementation of conceivable additional military requirements will not change the system architecture in a fundamental way. Future space systems of dual-use, though, will have to be designed in way that allows for integrating civilian and military requirements from the outset. This touches upon the coordination of civilian and military aspects of security and their institutional handling at large, for example in the relationship between ESA and EDA.

The preparatory programme ensures funding for the next three years and opens up a financial perspective for the time afterwards. However, SSA is not likely to stay an optional programme forever. It might be changed to a mandatory programme within ESA or transferred to be run within the realm of the European Union. In any case, a fair burden sharing will have to be achieved in the long run, taking into account the contributions as well as the advantages gained by each partner. Again,

⁵ Europe's Way to Space Situational Awareness (SSA). ESPI Report 10, 2008, Vienna

this is influenced by the co-existence of civilian and military interests at stake.

Setting up a European SSA system is a complex endeavour involving trade-offs and balancing potentially contradicting interests of different stakeholders. Europe must try hard to overcome all obstacles, since disposing of SSA is an imperative for future space activities.

The issue of long term financing is linked to the question of the operating institution: The European Union Satellite Centre (EUSC) could be a suitable candidate. It is the only EU body

that is actively involved in space operations. As an agency of the Union's second pillar, it belongs to the domain of the Common Foreign and Security Policy (CFSP), which is an adequate environment for SSA system operation. Endowed with the political authority of the European Union, the EUSC is still subject to the Member States. This would reflect the important role of the national level in the security domain in general and regarding SSA facilities in particular.

Setting up a European SSA system is a complex endeavour involving various trade-offs and balancing potentially contradicting interest of different stakeholders. The process is inherently cumbersome. Irritations or conflicts between different parties already have occurred and are likely to occur again in the course of implementation. Still, this should not keep Europe from trying hard and succeeding in achieving its own SSA system.



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