

executive summary

Space Capabilities for Crisis Management: Reducing Gaps, Improving Action

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Introduction

While Space activities in Europe began during the Cold war era, European expertise in space has gradually been viewed for only two decades as matching the needs for security and crisis management facing the European Union (EU). Today, however, substantial challenges remain in order to make space systems a more active and efficient segment in the European security chain.

Space-based capabilities are one of many elements required for effective crisis response. Organizing such capabilities for improved response will mean tackling issues dealing with independent and effective decision-making mechanisms and improved performance and responsiveness. Such ambitions call for dedicated systems whose use and performances can be guaranteed whenever and wherever required.

This study seeks to identify the existing gaps and necessary efforts which will need to be provided in light of an already well-documented experience in European R&D efforts devoted to the use of space for crisis response. It also provides some elements regarding future strategies allowing Europe to fulfil its goals in the most efficient and affordable way.

1 – A European Call for Security and Crisis Management Space Applications

The Treaty on European Union signed in Maastricht in 1991 established the first provisions on a Common Foreign Security Policy (CFSP), while including the potential building up of a common defence policy, which could ultimately lead to a common defence. Much progress has been made for the last two decades to engage the EU in a resolute strategy for ensuring its security in both a wide-ranging and independent manner. Materializing a succession of important steps made during the 1990s and early 2000s (establishment in 1999 of a European Security and Defence Policy encompassing civilian and military crisis management; setting up Headline Goals in 2003 and 2010 defining the format and mission of European armed forces), new institutional perspectives provided by the “Lisbon Treaty” that has introduced a new Common Defence and Security Policy (CSDP) contributing directly to the development of EU action in these areas. The establishment of a European External Action Service (EEAS) is not the least of several advances, including a Crisis Management Planning Directorate (CPMD) with the objective of pursuing civil-military synergies and coordination tasks, parallel to a Civilian Planning and Conduct Capability (CPCC) segment.

Military space programmes have already been developed by some EU Member States, mainly on a national basis. This is the case in the field of Earth Observation (with the French electro-optical Helios satellite series, the German Radar SAR-Lupe programme or Italian Cosmo), or in the field of military-oriented satellite telecommunication space systems (with the French Syracuse system and the UK Skynet series). Other dual-use oriented programmes are also envisioned to provide national or multinational capabilities.

In addition, since 2004, several initial R&D-oriented projects have sought to demonstrate the relevance of space-based capabilities for security and crisis management. Following the recommendations from key reports on the Security of Europe, this effort has also been highlighted by the European Space Policy (ESP), and supported by the Joint ESA-

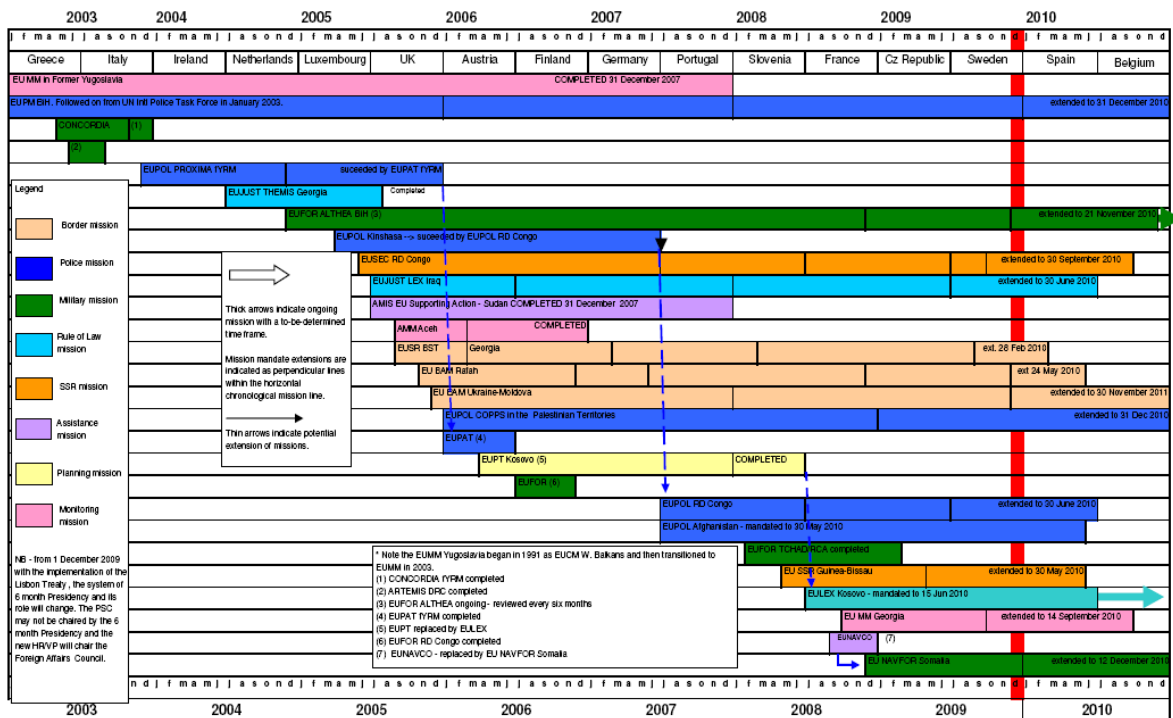
EC Space Councils in 2007 and 2008. First projects have been initiated by teams of European industry and academia under the auspices of the GMES (Global Monitoring for Environment and Security) programme and of the 6th and 7th Framework Programme for Research and Development financed by the European Union. These projects have been dedicated to experiments related to the use of space assets in situations of crisis involving man-made or natural disasters, or security issues dealing with border control, protection of critical infrastructures, humanitarian support or maritime surveillance.

- The EU has built its foreign and security policy around an evolving process merging civilian and military capabilities; as ambitions and operations expand, more will need to be done to bring coherence to the EU machinery and in the planning and development of appropriate capabilities, including in space.
- Until 2008, a slow but steady evolution in the field of civilian and security crisis management has clearly highlighted the need for more communal (or dual-use) space assets, i.e. serving both military and civilian security missions and needs, trend which may grow in the near future.
- By reinforcing its policy and operational entities, the EU has sowed the seeds for improved action and ambitions, including in operations or capability planning and development.
- Those institutional weaknesses being progressively remedied, the EU is now in a position to seize unprecedented opportunities for transitioning worded policies into action.

2 – Lessons Learned/Benefits and Limits to Current Efforts

Current budgetary and capability challenges in implementing new CSDP ambitions will require greater Europeanization of space for security programmes: current space for security governance remains in its infancy and ambitious political decisions must be made by EU Member States to further build Europe's crisis response capabilities. Existing experience related to multinational cooperation in space defence systems demonstrates at a minimum a genuine European know-how for cooperative space applications in critical areas.

Moreover, a clear need for European assets can be deduced from lessons learned in several EU missions devoted to crisis response over recent years. Already, the diverse nature of the missions as well as in their geographic and political environment has become a structuring element to be taken into account from the onset. While there has constantly been an obvious lack of space capabilities able to provide the necessary information to EU forces during many of these operations, no substitute can be found in exiting research projects underway in the framework of GMES.



As of December 2009, a total of 14 CSDP and EU missions are in an active status among which six in the Western Balkans, Caucasus and Eastern Europe, three in the Middle East, one in Central Asia and four in Africa.

In truth, this is not their role. Existing EU projects are mainly aimed at setting up experiments consisting in the use of existing satellites with the objective of assessing the relevance of security-oriented services to be delivered to users without addressing issues such as guaranteed operational availability of space based capabilities, or their increased reactivity. Under given precise scenarios used for addressing security and crisis situations, most of these projects have highlighted the current limits of space based capabilities in several areas. In particular, user assessments usually underline:

- ➔ The need for improving the flexibility of the relevant space systems, with the objective of providing quicker access to and a quicker response from the space systems as well as a more reactive information system;
- ➔ The need for more integrated space services, including telecommunication and navigation, to be delivered down to theatre level;
- ➔ The need for more frequent “revisit time” with more or better adapted satellites allowing operational uses based on “fresh” information;
- ➔ The need for improving the range and the performance of the sensors (from optical sensors to data collection systems) which will be used in a variety of situations, addressing diverse geographical terrains (terrestrial or maritime areas for example) as well as different contexts (urban/suburban zones, desert or forest zones, etc.) or different missions (from wide-scale monitoring for environmental or security monitoring to identification of non cooperative objects for law enforcement users e.g. small ships detection);
- ➔ The need for operational services.

In this respect, while a better merging of information on the ground provides great benefits to users, it does not solve issues related to the space-based capabilities themselves. At the same time, these experimental projects have shown the interest but also the current under-capacity of existing space-based systems and the need for a renewed approach that would be instrumental in successfully making the transition from the experimental character of these activities to their operational stage.

- Although GMES is today the key and determining European space for crisis response initiative, existing national or multinational programmes illustrate how much States perceive the sustained need for space systems with performances usually higher than what is currently envisioned for GMES capabilities.
- Considered from a European point of view, building upon European programmes such as GMES, augmenting European capabilities for more demanding missions would contribute to narrow this enduring gap and build a more efficient European space architecture (EU and national) for the efficient delivery of the CSDP.

3 – **Conditions to Be Fulfilled for an Improved European Space Architecture for Crisis Management**

Space-based capabilities required for real-life crisis management operations have to fulfil three key conditions:

➔ **More accessible and responsive space systems**

While genuine and efficient reactivity does not entirely depend on space assets themselves, using space-based architectures can be critical in complex situations or remote locations. Insufficient reactivity is today the main blocking factor preventing end-user communities from incorporating space generated products into their operational procedures during the crisis management phase. It is crucial to favour in parallel the flexibility and speed for tasking such space systems when needed, especially in the case of highly dynamic crisis situations.

➔ **Increased European autonomy**

The risk of not having guaranteed access to crucial data where European lives or property are at stake, in political terms, is far greater than the cost of investing in autonomous capabilities. Today, most of the monitoring and surveillance activities in the field of security are performed using a variety of space assets mixing European and non-European, public and commercial capabilities. However, the exact knowledge regarding the availability of space assets (technical and procedural) as well as the integrity of the data collected and transmitted must be ensured at European level in order for decision-makers, at any level, to have full confidence in their ability to get the information in time and in its accuracy. The diversity of possible crisis situations involving civil protection units, but also law enforcement units or even some military forces, require autonomous European control over each step of the chain of information.

➔ More operational services

Space systems must allow the furniture of ready-to-use customized products mainly based on a combination of Earth observation, telecommunication and navigation tools provided from space. A fully reactive and autonomous system would then require multiple constellations of satellites, which are obviously unrealistic and non-cost effective solutions. This highlights the need to have an affordable and sustainable strategy for the development of operational services. The development of multi-mission space-based infrastructure on which these services can rely could be a financially viable approach to the development of this capability. In order to provide constant availability and full control over the data source in an affordable manner, a strategy to integrate different functions at platform level (LEO Earth Observation and data collection functions, GEO Earth Observation and telecommunication coverage, etc.) should be pursued in order to keep the development of new space-based capability needs at a minimum. Obviously, once consolidated, such an integrated space-based architecture could then be completed by well-known existing “external” services capable of increasing the global performance of the guaranteed initial service.

- Space assets are but an element of the crisis response chain of capabilities; However, space systems may be crucial in specific complex cases falling within the European Security Strategy’s pervue of action.
- When users must rely on space systems, these need to be responsive and under full European control, or run the risk of being irrelevant investments.
- In order to be cost-effective, services need to be operational, user-driven and integrated, calling for creative yet challenging solutions for integrated architectures.

4 – Recommendations

In relation with the main objectives described above, efforts will have to be made at two levels, technically and institutionally.

- ➔ From the space systems perspective, recommendations can be formulated for:
 - ⇒ **Increasing of the number of European high-performance and integrated multi-mission space platforms** in order to match new needs from users confronted to highly dynamic and large-scale situations.
 - ⇒ **Rethinking the whole space architecture allowing for better reactivity of the different space components**, in particular via a better use of space telecommunication and new relay capabilities.
 - ⇒ **Ensuring European control over the systems and the data used in crisis situations:** the capacity to keep Europe in control of a core space capability related to crisis management will suppose an end-to-end autonomy that will guarantee the availability of such capabilities to those European stakeholders involved in support, relief and security operations.

- ⇒ **Ensuring a better integration of space capabilities to deliver products to the user:** Recent European R&D space projects have shown the benefit of instant combined information displayed “on the move” via portable devices. These user-oriented capabilities remain to be fully developed in an operational manner, and should be fully considered in the development of dedicated space-based systems and associated equipments. It will require the involvement of a diversity of actors and operators to coordinate the availability of such different systems, possibly leading to new governance schemes to fully “operationalize” those techniques.
- ➔ From an institutional perspective, it is necessary that:
 - ⇒ **such orientations be validated by the political institutions of the European Union**, including the European Parliament;
 - ⇒ **such orientations can be refined and stabilized by giving a prominent role to European users**, via for example the new EEAS, that would be used as a coordinating framework for security and emergency users;
 - ⇒ **the European Space Agency can act as the main space technology provider and as the prime space system architect**, as it naturally derives from the current institutional balance, in compliance with the reference framework provided by the European Space Policy.

These technical and institutional arrangements would provide the necessary mid-term stability allowing the development of a complex set of space systems that will compose the emerging European space-based architecture for security and crisis management.