

Summary

Space Activities in Sweden – a Strategic Asset? (RiR 2013:1)





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Swedish space activities – a strategic asset?

Summary

The Swedish National Audit Office has carried out a performance audit on government management of all public financed Swedish space activities, except telecommunications, in order to assess whether public investment in Swedish space operations is efficient and provides the conditions to make them a strategic asset.

Audit background

Objective: The Swedish Government has invested in space activities for more than 50 years. Each year Swedish public spending on space activities amounts to approximately one billion Swedish kronor. Space activities affect several societal services and the increasing social benefits of space activities imply that space infrastructure has become increasingly critical for society. The major part of public investment is channelled back to the Swedish space industry through the European Space Agency (ESA) and the Swedish contribution to the EU budget in the form of industrial contracts. Approximately two thirds of this investment goes to ESA space programmes and about 15-20 per cent to the EU and other international organisations. Decisions concerning space activities are taken internationally as well as at national level within a number of ministries in the Swedish Government Offices and within a number of agencies. Together with the extensive international element, this creates a complex decision-making structure.

Space activities are by nature high-tech and complex. The space industry is funded almost exclusively by governments. Sometimes this is done through national public procurement but usually through international organisations such as the ESA and the EU. Technological development in the last decade has enabled a sharp increase in space-based services. This has meant that the focus of the countries' space activities has increasingly shifted from exploration of outer space to development of earth based space services.

Swedish space activities as a whole have not been evaluated since the mid-1990s. According to the intentions set by the Riksdag (Swedish Parliament) in connection with the Research and Innovation Bill of 2009, Swedish space research and space activities should be a strategic asset for the knowledge society, for industrial competitiveness and for meeting the needs of society. The 2012 Research and Innovation Bill emphasised that space activities are

of growing importance to society. The Government states in the Bill that Swedish space activities continue to play an important role and therefore a national strategy is called for.

Aim of the audit: The National Audit Office has studied the Government's implementation and monitoring of Swedish space activities based on the Riksdag's intentions.

Implementation of the audit: In order to achieve effective control of such a complex area as space activities the Swedish National Audit Office assumes that effective coordination and a holistic approach are required. A survey was therefore conducted of different space actors involved in Swedish space activities, including the European Union and the European Space Agency. In order to illustrate and analyse the governance of state funded space activities, the Swedish National Audit Office examined in detail five specific examples of how decisions are taken regarding Swedish space activities. The examples are chosen in order to highlight aspects that are important for effective monitoring and control. The selection also took into account aspects of risk and materiality. It is important to examine the support for European launchers since that is the single largest expense for Swedish space activities. The European satellite system Galileo has been reviewed because it is the most resource-intensive space initiative in the EU. Earth observation has been studied since it is considered by the Swedish National Space Board to be an up and coming area with growth potential. Several other countries link civilian and military space activities. Therefore, the Swedish National Audit Office has studied the management of an international code of conduct for outer space. Since market competition and the link between technology development and space activities are important, parts of the review included the state-owned company Swedish Space Corporation and the Government's management of the company.

As space activities are largely carried out in international projects and on an international market, the Swedish National Audit Office also conducted a survey of thirteen other countries' space strategies. The Swedish National Audit Office also commissioned a consultancy company to conduct a market analysis of the Swedish space industry.

The audit results

The overall conclusion is that Swedish space activities as conducted at present are not implemented as a strategic asset. Lack of a holistic approach together with a lack of monitoring, mean that the full potential of space activities is not achieved.

The lack of holistic approach risks inefficient priorities

The Swedish National Audit Office finds that the overall objectives of space activities require holistic management. Furthermore, the complex decision-making and organisational structure along with the ongoing development of the space market clearly require both holistic and continuous review and

setting of priorities. The Swedish National Audit Office believes that no comprehensive strategy for space policies currently exists. The Government's management of space activities is characterised by decisions that are taken on each issue in isolation, without coordination between different areas. Decisions concerning space activities are largely taken in international negotiations. This means that European priorities are automatically transformed into Swedish priorities.

A holistic approach provides the conditions for concrete objectives that could serve as guiding principles for Swedish representatives in international negotiations. The Swedish National Audit Office considers that Swedish public management is characterised by fragmentation and lack of tangible objectives. It is therefore not possible to take a holistic approach on space issues and effectively pursue Swedish interests. Since there are no conditions for a holistic approach, there is thus no basis for discussions of priorities.

Lack of systematic monitoring hampers reassessments

It is a challenge to monitor space activities since it is difficult to isolate effects of governmental investments. There is a long chain from governmental investment in research and development to the final consumer-product, such as weather forecasts and satellite navigation.

The Swedish National Audit Office finds that there has been no overall follow-up of Swedish space activities since the mid-1990s. To date the Swedish National Space Board has only monitored individual actions. At the same time the Swedish National Space Board has an extensive influence on the design of space activities in Sweden. Despite a broad mandate, the Agency has very limited staff resources. This can result in background material that the Space board presents not being sufficiently extensive and detailed to allow assessment of the need for re-prioritisation. The audit also shows that the Government Offices' documentation of space-related issues is insufficient, which also hampers monitoring.

The Swedish National Audit Office also concludes that the Government's reporting to the Riksdag does not provide adequate insight into how the Swedish space related issues are prioritised. Space policy is to a large extent formulated by the priorities of Swedish participation in ESA and EU programmes. Unlike EU issues, there is no special routine for informing the Riksdag of issues related to the European Space Agency. The Swedish National Audit Office believes that increased transparency is a necessity.

The Swedish Space Corporation is not managed as part of Swedish space activities

The state-owned Swedish Space Corporation has three main business operations; operation and development of the space base Esrange, technology development through two subsidiaries, and advanced space services in the form of accessing and processing satellite data. The company is managed mainly by means of a fixed return on equity target.

The Swedish National Audit Office considers that the owner's management of the Swedish Space Corporation is ambivalent. The company is responsible for the operation and development of one of the most strategic

assets in Swedish aerospace business, Eorange, but in other contexts the company is seen as a company like any other.

The fixed return on equity target is based on market risk pricing on private markets. The level is comparable with targets for state-owned companies that to a greater extent operate on commercial markets. Other state-owned companies, with a profile in the area of technology development similar to the Swedish Space Corporation, have no such return target. The Swedish National Audit Office observes that the market in which the company operates is almost entirely institutional, that is dominated by government procurement. This means that the target yield is not adapted to the market in which the company operates.

The sale of the company's satellite division in 2011 was prompted by the poor profitability of the division and difficulties in meeting the target yield. The company's board worked actively to find alternative ways of financing the satellite division's development projects outside the funding provided by the Swedish National Space Board. The Swedish National Audit Office does not take a position on the question of the sale but notes that at the time of the sale the company had large cash assets and these assets could have been used to finance development projects.

The Swedish National Audit Office concludes that the Government's management of the Swedish Space Corporation does not take into account the company's strategic development remit, which means that the company cannot fully contribute to the continued development of Swedish aerospace business. In addition to this, the target yield level is not adjusted to the company's operations and the institutional market in which the company operates.

The organisation of government space activities has a lock-in effect

Since the global space market is institutional and dominated by government procurement, the market logic differs from many other markets. Resource efficiency is sometimes subordinated to national interests and concern for national companies. Aerospace companies in smaller countries such as Sweden often have a competitive disadvantage, since companies located in countries that contribute more funds to the European Space Agency than Sweden get more attractive assignments. In addition, favouring major dominant European space companies is an explicit ESA policy in order to strengthen the European space industry as a whole.

There are space market segments with high growth potential, especially those that refer to space services. However, these market segments also need active public support. The market analysis of the Swedish space industry shows that it is difficult to obtain funds for space activities from national funders other than the Swedish National Space Board. This creates a narrow market with limited opportunity for companies to grow. The market analysis also shows that Swedish aerospace companies have difficulties in attracting private investment capital. Neither private nor state venture capital actors invest in space, even though the remit of state venture capital actors includes complementing existing private actors.

The concept *commercial space market* is used by the Swedish Government Offices, the Swedish Space Corporation and the Swedish National Space Board to define funding outside the European Space Agency, the EU and national public funding. As space investments globally are also almost exclusively publicly funded, this way of defining space activities is misleading.

The limited and somewhat closed market, with few customers and financiers, leads to limited outcome from government investments in space activities in terms of new and growing Swedish space companies. This limited effect means that the potential for growth and strengthened competition for Swedish aerospace companies is not fully exploited.

Protection of space infrastructure receives little attention

There is little awareness of the risk of disruptions in space infrastructure. This was made clear when the forecasts of algal blooms in the Baltic Sea were hampered during the summer of 2012 due to lost contact with an ESA-environmental satellite.

Sweden is currently largely dependent on the purchase of data from other countries' satellites since Sweden's own satellite capacity is very limited. The systems that are currently being developed within the framework of EU cooperation will mean that Sweden is guaranteed some access to satellite capacity.

In the Research and Innovation policy bill, put before the Riksdag in 2013, the Swedish Government clearly states the importance of independent European access to space and that Europe and thus Sweden should become independent from third country priorities. However, there are no descriptions in the Bill of the consequences of such a position. This approach to independent access to space not only has implications for the future path of the Swedish participation in various European Space Agency and EU programs but also implies long term financial commitments.

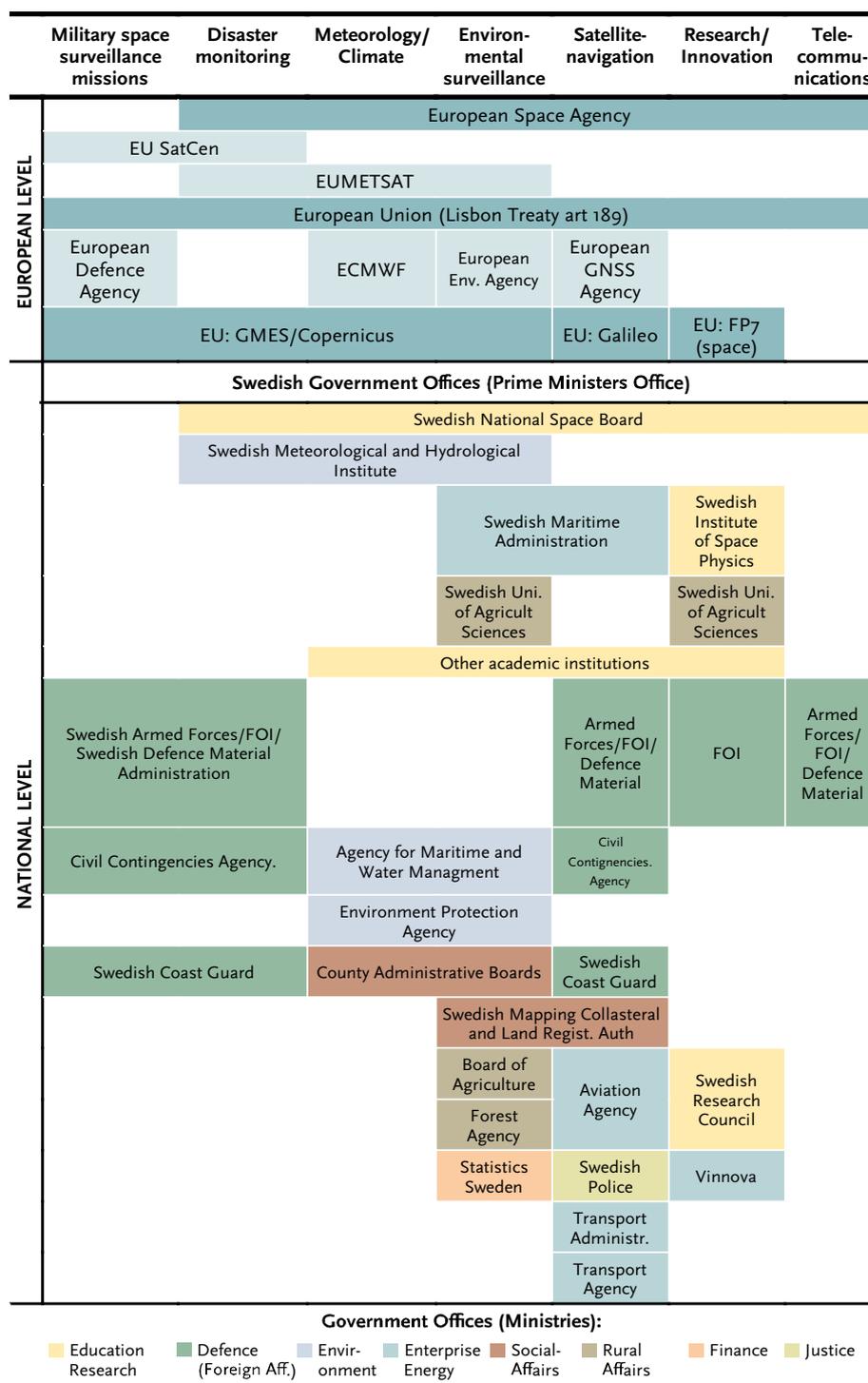
Recommendations

Following the observations and conclusions from the performance audit, the Swedish National Audit Office gives the following recommendations. These actions need to be taken regardless of whether a national space strategy is developed or not.

- In order for space activities to be utilised as a strategic asset the Government's continued work with space activities should include:
 - A widely supported process aimed at tying together different kinds of space activities. The approach should be broader than the strategies formulated by Swedish space industries (*Rymdagendan*) and the Swedish National Space Board (*Rymdstyrelsens strategi*). The discussion should be conducted in a broader setting of stakeholders than has been the case so far.
 - Review of the organisational structure in order to assign responsibility and competence so that the intentions of the Riksdag may be fulfilled.

- Opportunities for reconsideration of important issues for Swedish space activities. These discussions should include consideration of the development of Swedish strategic areas and the distribution of funding between national and international funding. An important Swedish strategic asset is the use of Esrange.
- Review of the role of the Swedish Space Corporation in the overall Swedish Space Policy and space activities.
- Impact assessment of the clearly spelled out European and hence Swedish position on independent access to space.
- Review of how societal challenges are related to space activities and of how the national space skills can be developed. Space skills comprise both space expertise and knowledge of the decision making processes.
- The Government should review the governance of the Swedish Space Corporation, including how the level of return on equity can be adapted to the company's actual business and the markets on which the company operates.
- The Government and responsible authorities should evaluate space activities systematically.
 - The Government should monitor the performance of Swedish space actors in various EU and European Space Agency programmes.
 - The Government should improve reporting to the Riksdag and other stakeholders on space activities. The Government should consider coordinated reporting on EU and European Space Agency issues to the Riksdag.
 - The Government Offices should review management of space related documents in order to fulfil transparency requirements.

Government management of societal services affected by space activities



The illustration should be read by following the societal service vertically. Several agencies use space infrastructure within more than a societal service. For example, the Swedish Meteorological and Hydrological Institute uses space infrastructure in several services: disaster monitoring, meteorology and climate and environmental surveillance. The bottom of the illustration shows which ministry each agency belongs to. Authorities' ministerial affiliations are seen in colouring.