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Sweden Needs a Defence- and Security-related Space Strategy

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In some respects, Sweden is an advanced space nation. Investment in military space systems, however, is still modest, and civilian and commercial interests are the primary propellants of Swedish space-related research and engagement in the space domain. This is reflected in the proposal for a Swedish space strategy that emerged from the 2015 Space Inquiry. Dependence on space-based services increases in parallel with greater use. This is true also in the military sector, where dependence on space-based systems is becoming increasingly evident. There is a risk that if Swedish space policy does not pay more attention to and put more emphasis on the defence and security policy aspects of space-related activities, Sweden will be left behind by a range of other actors. In addition, the development of future space-based services and the ability to handle likely threats and risks might be hampered in ways that in the long term could have implications for national security.

The importance of space in a deteriorating security situation

Sweden's security situation has deteriorated since 2008. As a small state with an interest in protecting and promoting the norms and agreements on which the prevailing international system is based, Sweden has adopted numerous measures to increase common security. EU membership and the solidarity nominally associated with it is an important dimension but important security policy partnerships have also been developed with the USA, Finland, Norway and NATO. Measures to strengthen the possibility of joint action in the event of a crisis or war are being complemented by enhanced capabilities as well as better coordination, situational awareness and information-sharing, and secure infrastructure for the Swedish concept of total defence.

Since the 1960s, space-based systems and services have been important in many states for strengthening their capabilities to pre-empt risks and threats, and increasing their capacity to defend themselves. Today, many states rely on satellite navigation services, space-based Intelligence, Surveillance and Reconnaissance (ISR) and satellite communication, for both civilian and military uses. In several instances, the same system is used by both sectors, and space is one of the arenas where this type of dual use is most apparent. Technical and conceptual developments in the space domain are advancing quickly. The future role of space-based systems is therefore seen as of ever-increasing importance to defence and security.

Sweden has been slow to make the connection between the security architecture in space, and defence and security policy. Swedish space-related activities have primarily been an academic and industrial issue, which has meant that the development of civilian space activities has dominated. At the same time, however, Sweden uses space-based services in its defence and security sectors on a daily basis. This usage is likely to grow as the range of available services increases and their quality improves. To date, military developments in space have involved various parallel activities linked to short-term operational requirements, and have not been the result of a long-term overarching strategy.

Space trends and future space threats

As a result of the global development of the space domain, Sweden, too, has become more productive and efficient. For example, satellite communication can be used to broadcast crisis information during major accidents, when cellular networks have broken down or become overloaded. Satellite navigation saves money when building highways and contributes to more fuel-efficient freight traffic. For stock markets, banks and trading firms, the exact timekeeping delivered by GPS satellites is vital for conducting their operations. These advancements also exemplify dependencies that space-based services have created in civil society. These dependencies, in turn, also lead to a number of defence and security related threats and risks that Sweden must be able to deal with. Three

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overarching space-related threats or risks have been identified internationally:

First, many states are increasing their military capabilities with the aid of satellite services, not only through their own systems, but also using the growing network of commercial services. There are also examples of non-state actors, such as rebel or terrorist groups, making use of space-based services. Access to space has been ensured through several independent national launch programmes, a technology that can also be used to develop ballistic missiles. Both Iran and North Korea currently have a launch capability. Pakistan and Turkey have ongoing development programmes.

Second, military logic leads to the development of concepts and plans to prevent a potential enemy from gaining access to space-based services in the event of a conflict. This is a consequence of the ways in which space systems have become crucial for dealing with broad questions of national security and for the conduct of war in several major powers. If space-based systems and services are a prerequisite for conducting operations, the need to secure and protect those systems follows. There will also be a drive to limit access by potential opponents. Consequently, leading space nations such as the USA, Russia and China have continued to develop anti-satellite technology.

Third, near Earth space has become dramatically more congested and littered with debris in recent decades as a result of the more frequent use of space by more actors. This increases the risk of collisions between satellites. The most pressing problem, however, is space debris, or uncontrollable objects of varying sizes that have been left or lost in orbit. There is currently no efficient way to collect these objects. Nor is there any consensus internationally about how the problem should be dealt with. This is a long-term problem as many objects can remain in orbit for decades or even centuries before they descend and disappear. In certain scenarios, the amount of debris increases exponentially as a result of sequential collisions, in the end rendering space unusable. The same effect might be the outcome of a deliberate attack on a satellite.

A limited Swedish space strategy

Even if Sweden has become more productive and efficient due to its ever-wider use of space-related services, there is still enormous potential for improvement that would allow Swedish space-based activities to become even stronger and more competitive. The need for a cohesive strategy on the development of the space sector has therefore received attention in recent years. The resulting government Commission of Inquiry published its report, En rymdstrategi för nytta och tillväxt (A space strategy for benefit and growth), in 2015. The report concentrated primarily on civilian and commercial interests, and envisaged ways in which Swedish space research and related activities can continue to contribute to growth and increased employment. This approach reflects the traditional approach to space-related activities in Sweden, with its focus on civilian and academic research and development.

The defence and security policy issues discussed above make the direction of the strategy proposed in the report problematic. It certainly raises the need for better civil-military coordination, but it lacks a defence and security perspective more generally. For a document that is intended to be the foundation for a national space strategy, this is a serious flaw. This begs a number of questions:

- Is there sufficient understanding of the security implications of current and future space systems, and has Sweden's use of space been thoroughly thought through?
- Are there sufficient knowledge, the right capacity and the coordination needed to assess adversaries and meet eventual threats?
- How can the accumulated knowledge and experience of the civilian sector be used when the importance of space to defence and security policy becomes more tangible?
- What are the risks if the defence and security policy perspective fails to have an impact on national space strategy?

Space activities are generally undertaken in the civilian, the commercial, the military and the intelligence

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sectors. The national space strategy should be able to connect these four sectors more clearly than was the case in the Inquiry's proposal. It must set out how Sweden can retain and develop the strengths of its current space activities; and make proposals on how defence and security policy aspects can be more thoroughly considered, as a complement to and a strengthener of the industrial and academic aspects. It should be possible for the space strategy to identify in a more visionary way the long-term opportunities available to the defence and security sector, given the rapid development of the space domain.

The space-related opportunities for Swedish defence and security

In some areas, Sweden is an advanced space nation. International trends in the space arena correspond in part with what is happening here at home. However, there appears to be several opportunities for Sweden to make new and additional national advancements. For example, the development of small satellites, coupled with cheaper launch alternatives, could provide future opportunities for Sweden to build, launch, operate and use its own national satellites free of the oversight and restrictions of other states. Other areas that could be further developed and strengthened are useful not just for the civilian and commercial sector, but especially for the military and even the intelligence sectors:

- propellants for ballistic missiles and space rockets
- space-based situational awareness
- robustness-enhancing technology for satellite communi-cations as well as space-based positioning, navigation and time synchronisation (PNT)
- space-related electronic warfare
- ISR from space.

There are many opportunities to develop national capability domestically, as much in research and technology development as operational capability. For example, academic research could be commissioned on the problems associated with space debris. The satellites launched by the Swedish state could also be seamlessly employable in defence and security research as opportunities arise.

Expanded knowledge of how both Sweden and the rest of the world use and develop space services for defence- and security-related purposes increases the ability to assess an adversary's capability, but also plays a vital part in attaching a higher priority to Swedish development of space products and services. National capacities for research and technology development as well as operational services could be further developed, for example, to more clearly highlight the dual-use perspective. A broader Swedish understanding and acceptance of the space domain's many and complementary applications could also prepare the way for deeper and more extensive international cooperation in the defence and security field. It is likely that strengthened military engagement in space will also lead to more opportunities for cooperation with the already strong Swedish space industry and academe.

The need to formulate a more complete Swedish space strategy

According to the space inquiry report, military space-related activities make up less than 5 per cent of the state's total commitment to space activities. Such military activity, however, is an emerging sector and the significance of the space arena for Sweden's defence and security is steadily growing. According to a 2016 report by the non-profit organisation, the Space Foundation, the USA invests approximately 53 per cent of its national space budget on defence and security, while the rest of the nations of the world together invest an estimated 33 per cent of their national budgets on defence and security. Any new Swedish space strategy should ensure that all four sectors – the civilian, commercial, military and intelligence sectors – are pursued in a balanced way. It should be possible, for example, to devote more attention to the synergies between civilian and military interests. Current research and high-tech product development needs should also be identified and development started to ensure that defence and security needs are met in the long term. The strategic direction should be set so that Swedish space-related activities help to enhance military capabilities and

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strengthen Swedish defence, thereby providing a more secure Sweden. This can be achieved by building on existing strengths and identifying development opportunities.

The proposed national space strategy must therefore be complemented with a dedicated defence strategy for space. This could either be a freestanding document or integrated into the comprehensive national strategy. A defence and security strategy for space would discuss all the operational authorities' needs, materiel supply, regulations and permissions, export questions and educational requirements, as well as research and technology development. It should consider current strengths and weaknesses, and future opportunities and threats in relation to space-based activities. All the relevant total defence entities should be included and given clear roles.

The absence of a Swedish defence and security strategy for space issues has prevented effective utilisation of space-based services for national security purposes. Sweden currently relies on commercially available space services or international cooperation in the defence and security sector. Dependence on other states leaves Sweden vulnerable. Failure to tackle these issues in a clear way risks leaving Sweden ill-prepared for the future. This is as much about taking advantage of development opportunities as the threats and risks that the Swedish state might face as other actors advance their positions and strengthen their capabilities in the space domain.

A STRATEGIC OUTLOOK FOR THE FUTURE

Sweden has long been a space actor and Swedish society has a high level of dependency on a wide array of space systems and services, both civilian and military. Our dependence on, for example, the US GPS system is such that it will not be either economically or practically possible, even in the medium to long term, to move towards relying exclusively on the EU's satellite navigation system, GALILEO – a system that Sweden has been part of setting the parameters for and helped to finance by virtue of its membership of the EU. The absence of a long-term, comprehensive national space strategy is probably a strong contributory factor to why we find ourselves in this situation.

In the rest of the world, the space domain is developing rapidly. The number of new actors with satellites in space has almost doubled since 2000. Even less technically advanced developing countries are establishing their own satellite systems, since the technology is now so accessible and becoming cheaper. This is also a way for these states, in parallel and in cooperation with other states, to develop their own domestic research and industry, and to strengthen their defences. Dependence on space-based services means that these assets have to be protected. The development of anti-satellite programmes by the major space powers is especially worrying. At worst, it could see space becoming the new arena of conflict.

It is right that the proposal for a cohesive Swedish space strategy highlights the need for increased civilian-military collaboration. The problem with the proposal is that it fails to offer suggestions on how such collaboration could be achieved. Instead, the proposal reflects how Sweden has traditionally pursued its space-related activities. Questions or activities that could directly enhance or contribute to national defence and societal security are hardly mentioned at all.

Sweden is a small country with limited resources. It is unrealistic to believe that it will ever be possible to undertake broad and comprehensive civilian and military space-related activities and space-based development alone. Nonetheless, Sweden must continue to develop its utilisation of space in all sectors. A first step in finding a balance will be to produce a defence and security strategy for space issues that, together with the civilian strategy, would set national priorities for and make fundamental decisions on the future of Swedish space research and space-related activity.

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