Europe's final frontier

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A Europe without a clear space policy is a Europe that lacks ambition. That was the central conclusion of the European Space Agency's so-called Wise Men's report nearly four years ago.[1] Since then governments have slowly started to understand that they need to take space policy more seriously than they have done in the past, and that the European Union (EU) should be the focal point for the development of new European space policies.

During the last few years the EU has set increasingly ambitious goals for itself in a number of areas. One example is the on-going process of EU enlargement, to bring stability and security to new parts of the European continent. Another is the aim of creating the most competitive knowledge-based economy in the world by 2010 (known as the 'Lisbon process').[2] A third is the effort to develop the EU's role as a global player in international security. In this area, the EU has laid out its ambitions in the 'European Security Strategy', which EU governments approved in December 2003.

Investing in different types of space technology can help to bring about success in some of these areas. For example, the development of telecommunication systems across the EU depends greatly on space-based technology. Hence, space can play a major role in developing Europe's high-tech industry. In addition, space technology can help governments with their security policies, whether they want to track developments in conflict zones or monitor the environment. Aid agencies already use a disaster monitoring system called UNOSAT, which provides satellite images to aid workers to help them locate and get relief to victims of natural disasters.[3]

In the 1960s, governments realised that no European country could have an ambitious space programme on its own and that they needed to combine their efforts if Europe was to have any meaningful role in space at all. Their attempts to merge their launcher projects and research activities during the 1960s led to the creation of the European Space Agency (ESA) in 1975. Paris-based ESA has 15 member-states, and almost 2,000 people work there. In 2003, ESA had a budget of €2.7 billion, which is re-invested in each member-state through industrial contracts worth more or less the value of each country's contribution. While military concerns have dominated and driven the American and Russian space programmes, the focus of European efforts has been civil in nature, and more oriented towards scientific research.

The success of the rocket maker Ariane as a commercial venture is a good example of the European approach. Europe has also developed a competitive satellite operations

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[1] Carl Bildt, Jean Peyrelevade and Lothar Späth, 'Towards a Space Agency for the European Union', Report for the Director-General of the European Space Agency, November 2000. Available from http://esamultimedia.esa.int/docs/annex2_wisemen.pdf

[2] For a review of the Lisbon process see Alasdair Murray, 'The Lisbon Scorecard IV', CER, March 2004.

[3] For more on the public use of space technology see Melissa Mean and James Wilsdon, 'Masters of the universe', Demos, 2004.

industry, especially in the telecommunications and direct broadcasting sectors. To illustrate: Luxemburg-based SES Global is the world's largest satellite operator. Other European successes with commercial space operations include Eutelsat, a company that supplies regional communications for fixed satellite programmes; Eumetsat, an inter-governmental organisation that offers satellite imagery data to national meteorological services; and Inmarsat, a company that provides wireless technology for mobile communications. The European space industry has three major players: the Franco-German-Spanish firm EADS, the French company Alcatel Espace, and Alenia which is based in Italy. And there are a host of smaller companies providing services and technologies for programmes dominated by these companies – such as Magna Steyr, an Austrian engineering company, which makes cryogenic fuel lines for Ariane rockets; and a Denmark-based firm, Terma, which designs software for satellites and manned space missions.

Despite these European successes, it is the United States that dominates global space efforts, undertaking around three quarters of all publicly financed space programmes. The primary reason for this massive American investment in space technology is its central importance to US national security policy. The Pentagon has different space systems for everything from target intelligence to advance warning of an incoming attack. Given America's global security commitments, the Pentagon considers it necessary to maintain a major space programme that is geared to the concept of 'space dominance'.

In contrast, these types of security concerns have been virtually absent from European space efforts. British and French nuclear forces were designed to hit cities rather than silos, and that required far less precise intelligence on targets. Furthermore, to this day, European security concerns remain more regional than global in nature. Consequently, European governments have not seen the need to develop and maintain a similarly vast range of space technologies and assets. There is, however, a growing realisation across Europe that space technology is increasingly important for various aspects of security policy. More importantly, political and business leaders are recognising the role that space-based assets can play in the development of various sorts of economic activity on the ground. Space has, in this sense, come down to earth.

EU space programmes

In 2000 the 'Wise Men's Group' called for a much stronger link between the European Union and ESA, to emphasise this need to integrate space policy into other EU priorities. The Wise Men also proposed that the European Council, which brings together heads of government, should set strategic goals for European space efforts in the same way it sets strategic goals for other policy areas. The European Commission and ESA already work well together. The November 2003 Commission White Paper on European Space Policy was written in close collaboration with ESA.[4] Furthermore, the Commission and ESA have signed a framework agreement that should enable future close co-operation. And over time, ESA should and probably will become the EU's space agency. But in the short-term, there is no need to engage in lengthy negotiations to integrate the two institutions. This is because there are important institutional differences between the supranational European Commission and the

[4] European Commission, 'Space: a new European frontier for an expanding Union', November 2003. Available from http://www.europa.eu.int/comm/space/whitepaper/whitepaper/whitepaper_en.html

inter-governmental ESA. Both organisations also have different memberships. Instead, EU governments should concentrate on developing space programmes and technologies that would be useful for implementing the Union's various policies, and on promoting a viable competitive European space industry.

The Galileo satellite navigation system will be a landmark programme, for a number of reasons. Galileo is the first EU space programme. It will have worldwide coverage and will be available to customers around the globe. In this sense Galileo will give Europe a global presence. Galileo is also the first major space programme to be financed through a public-private partnership. It is already generating significant international interest. China, India, Israel, Mexico and Brazil have all expressed interest in becoming partners in the system. Russia would like to investigate synergies between Galileo and its similar – but more military-oriented – Glonass navigation system.

Initial US opposition to Galileo, especially from the Pentagon, was fierce. Critics claimed that Europe did not need to build another navigation system when the American GPS system was available for free; or they said that EU governments want Galileo so that Europe could become a stronger commercial – and even military – rival of the US. But these critics missed the main reasons why Europe is investing in Galileo. While the US government has opened parts of GPS to non-US and non-military users, it remains a system defined by American military requirements, and it ultimately remains under US government control. In contrast, Galileo is primarily a non-military system, and therefore promises to offer non-military users both better and more reliable access in the future (see Tomas Valasek's essay). Since positioning and navigation systems are rapidly becoming crucial for the operation of transport systems – from tracking containers to monitoring air traffic – it is hardly surprising that Europe sees the need for an autonomous and reliable navigation system. Washington has now accepted Galileo, and the EU and the US signed an agreement in June 2004 to co-operate more closely on positioning systems.

Money, money, money

The key to Europe's future in space will be adequate funding for new programmes. Governments should assess the question of funding in a wider context of their need to boost spending on high technology research and development (R&D). EU governments agreed at the Barcelona summit in March 2001 that European R&D spending should rise from the present level of almost two percent of GDP to three percent by 2010. This is an important objective, not only for developing high technology, but also for halting the scientific 'brain-drain' from Europe to well-resourced American laboratories. Between 1991 and 2000, two-thirds of the 15,600 EU-born doctorate recipients in the US studied science or engineering, and 70 per cent of the Europeans with American PhDs planned to stay in the US.[5]

Europe's long-term competitiveness will depend on greater spending on high technology R&D. Intense manufacturing competition from China and elsewhere in the Far East, combined with more outsourcing of services to countries such as India, are compelling European governments to focus more on creating new types of

[5] European Commission, DG Research/MERIT 'Brain drain study', 2003
http://europa.eu.int/comm/research/era/pdf/indicators/merit_exsum.pdf

industrial and service jobs. Space programmes that bring together many of today's advanced technologies can help to ensure that European high-tech industry remains competitive. As a start, EU governments should agree to increase their space spending by 50 per cent over the coming years (an extra €2.5 billon a year). If they did so, a substantial part of the increase should go to the ESA budget while the rest should go to Commission-run space research programmes. In particular, governments should fund new programmes that would help them fulfil their EU policy objectives.

In addition, although 'spin-off' services from space-based technology, such as navigation and communications, are still in their infancy, European governments should consider spending more of their space budgets on developing space services sector. Currently governments spend most of their space money on manufacturing infrastructure, i.e. satellites. However, there are signs that not only do space services companies have substantially larger profits than space manufacturers; they are also experiencing significant revenue growth. In 2001, the British National Space Centre (BNSC) estimated that the earnings of the manufacturing end of the UK space sector were £436 million, while the turnover of the services end was £2.5 billion. The BNSC says that the income generated by the services sector grew to £3.4 billion in 2003, whereas the manufacturing sector remained more or less stagnant.[6] For major cross-border satellite programmes like the €3.2 billion Galileo satellite navigation system, the revenue potential for spin-off services is enormous. The European Commission estimates that the market for navigation products and services was worth €10 billion in 2003, and this figure could rise to €300 billion by 2020.[7]

The Commission has calculated that it will spend roughly €230 million on space this year.[8] EU governments are already negotiating the outlines of the next EU budgetary package, which will run from 2007-2013.[9] As part of its proposals for the next budget, the Commission has suggested a substantial increase in its research budget, some of which would be spent on space. Presently the Commission's research budget amounts to €4.4 billion a year, and it wants this figure to rise to €10 billion (10 per cent of the total EU budget). The Commission would also like to set up a more specific 'security research programme', with a minimum budget of €1 billion a year. The security programme could fund new technologies, like space-based communications systems, which would help police, emergency response services and armed forces to react more effectively to natural disasters or terrorist attacks.

EU governments should back these proposals. However, most space programmes in Europe are run on a national basis, which means they are less cost-effective than common European programmes. Furthermore, there is an artificial firewall between ESA programmes, which are strictly non-military, and the more security-oriented national or multinational programmes.

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[6] British National Space Centre, 'Size and Health of the UK space industry: 2003 update study', March 2004. http://www.bnsc.gov.uk/assets/Exec%20Summary%20v9%20new%20pic%20v2.pdf

[7] European Commission, 'Progress report on the Galileo research programme', February 2004. http://www.europa.eu.int/comm/dgs/energy_transport/galileo/doc/com_2004_0112_en.pdf

[8] European Commission White Paper, 'Space: a new European frontier for an expanding Union', November 2003. http://europa.eu.int/comm/space/whitepaper/pdf/spwhpap_en.pdf

[9] For an overview of the EU budget debate see Iain Begg, 'The EU budget: common future or stuck in the past?', CER briefing note, February 2004.

The military option

European governments need to break down the old-fashioned firewall between military and civilian space programs. More and more space programmes are 'dual-use', meaning that they can have both military and non-military purposes. Galileo is primarily a civil project but it could have security applications as well. In the area of earth monitoring, companies are developing environmental, commercial and military systems together, using similar technologies for each. The same dual-use potential also applies to communications systems.

According to its mandate, ESA can only work on programmes that only have 'peaceful purposes'. Traditionally governments have interpreted this to mean that ESA could not run programmes with any military content, such as constructing a spy satellite. But they have since revised this definition. European governments now agree that ESA may develop systems and run space programmes, such as those involving monitoring and surveillance satellites, which European armed forces could use for non-aggressive military activities like peacekeeping. The EU already has a satellite imagery centre at Torrejon in Spain, and governments have used imagery from Torrejon to assess Israeli settlements in the West Bank. ESA has its own monitoring centre at Frascati, outside Rome, which surveys environmental developments. Over time, it would make sense for EU governments to merge these two satellite centres and their analyses.

There is also a case for European governments to develop a more advanced surveillance system, which they would design and run collectively. Numerous states around the world are acquiring space-based surveillance systems. Israel, to take one example, already operates several military reconnaissance satellites. For the EU, it would be logical to build on existing French-run, and future German, observation satellites, as well as ESA's environmental-monitoring programmes (see Xavier Pasco's essay). European governments should use these existing programmes to construct a more coherent and advanced European group of satellites for security and environmental monitoring.

Broadband boom

European governments should also invest in space-based broadband communication systems. Broadband is not simply a faster way to connect to the internet – it fundamentally changes the way people use it. Connections are immediate and large volumes of data, from emails to television, can be transmitted almost instantly. Broadband services can be delivered in numerous ways. In some cities, companies transmit broadband services through underground fibre optic cables. Other companies use terrestrial systems based on third-generation mobile communications (so-called 3G networks).

Europe has, and must retain, a strong position in all these sectors, not least because of the massive investment in broadband in the US and parts of East Asia. For instance, the South Korean government provides access to broadband internet for all of its citizens. This investment has led to a massive growth in the amount of goods that are bought on the internet instead of in shops. According to Euromonitor, a market

analysis firm, internet retailing accounted for over four per cent of all sales in South Korea in 2002, rising from 0.1 per cent in 1998.[10]

There are areas, however, where terrestrial systems face limitations. These include more remote and sparsely populated parts of today's EU, where investments in terrestrial systems are simply too expensive. If the EU could make broadband more easily and cheaply available to these areas it would help to bridge the 'digital divide' between those who have internet access and those who do not, especially between the old EU-15 and the ten new member-states. But there could be potential political gains for the EU as well, in the areas that constitute Europe's 'near abroad'. The Middle East and North Africa are two large areas that would benefit from access to a space-based broadband programme. At the moment, these countries have some of the lowest levels of internet penetration of any region in the world, and this is undoubtedly an obstacle both to their economic development and to the opening up of their political systems. Similarly the benefits of an EU-funded broadband system would also apply to the Balkans, Turkey and the countries in between the EU and Russia.

Hellas SAT, a Greek-Cypriot satellite telecommunications consortium, is already planning to offer broadband services to customers in the Balkans, parts of North Africa, and on isolated Greek islands. The consortium has a satellite, confusingly called Hellas SAT 2, which cost roughly €140 million, and it transmitted much of the television coverage of the 2004 Athens Olympics. The EU, in collaboration with ESA, should go a step further, and fund a major programme to develop space-based broadband services across Europe and beyond. It should be possible for the EU to use some existing satellites to provide European citizens with cheaper, space-based broadband services. ESA is currently developing a more powerful satellite platform that would be well suited for such a programme. As with Galileo, ESA and the EU could develop and deploy the first satellites to demonstrate the technologies, and then open up the system to a public-private partnership or even fully commercialise it. Alongside Galileo and other earth monitoring systems, a broadband initiative would be a logical extension of Europe's efforts to use space technologies to help achieve its policy objectives.

Let's work together

European governments and institutions should also be prepared to take a lead in developing international space co-operation. A number of countries around the globe are building up their space assets, including some low-wage economies. China, Canada, Japan, India, and Pakistan all have active space programmes, although their respective budgets and technologies vary greatly. The first Chinese astronaut (known as a *Taikonaut* in Chinese) flew into space in October 2003. Although Chinese scientists were trying to build rockets over 800 years ago, the present space flight programme was approved only in 1992. In a relatively short time, the Chinese government has developed the skill base for key space technologies, for both civil and military uses. The Chinese space industry makes launchers, communication satellites, systems for gathering and disseminating sensitive satellite imagery, and navigation systems.

[10] Euromonitor, 'Home shopping in South Korea', July 2003.

The Canadians have very close ties with the space industries of the US and Europe in many areas; they made the crucial robot arm for the American space shuttle programme, and they have been actively involved with the Europeans in developing software for analysing satellite imagery of the environment. The Japanese space programme has created real success stories for some of its companies, especially in launchers and the environmental monitoring field. The Japanese ADEOS-MIDORI satellite – which gathers environmental data such as changes in water, the Earth's atmosphere and the ozone layer – was launched on Japan's H-IIA rocket. Pakistan has a space programme called SUPARCO, to develop low-orbit satellites for gathering images; and in 1997, India started a ten-year plan to launch its own satellites for scientific observation.

However, Europe's most important space relationship by far will remain the US. In January 2004, President Bush announced that the US space programme would focus on sending humans back to the moon by 2020, and then to Mars. The President also said that the US would phase out its space shuttle programme by 2010. Europe now needs to decide how much involvement, if any, it wants to have in what may become a real Mars programme. And the Europeans will have to discuss with the Americans and other international partners how the phasing out of the American space shuttle programme will affect the future of the International Space Station (ISS). The ISS is being built through collaboration between the US, Russia, Japan, Canada, and Europe, and ESA sent the first European astronaut there in 2001. At the moment, only American space shuttles can carry large cargoes to the ISS, and the station might have to close when US space shuttles are no longer running.

Europe's other major space partner will be Russia. Although it has had difficulty finding money for its programmes, Russia still has an ambitious approach to space. The Russian space industry offers a wide range of products that can give it a prominent place in any collaborative project. For example, Lockheed Martin and Boeing, the companies that supply expendable space launchers to the US, depend on rockets manufactured in Russia. The EU governments and Russia have signed many declarations to develop their space co-operation. But these paper commitments have not yet led to anything concrete.

Opening up Europe's final frontier

It is time for European leaders to take space policy more seriously. EU governments should understand that a limited space policy constrains Europe's prospects on earth. If EU governments wish to succeed with their current array of policy goals, they will have to make a new and expanded commitment to their space policies. European governments should build on the success of ESA, while also integrating space issues into other EU policies. The European Council should include space policy among its future priorities, devising a coherent framework for national-, ESA-, and Commission-run space programmes.

The Dutch presidency of the EU, which runs until the end of 2004, is leading a discussion on the Commission's 2003 space White Paper. The timing of this discussion is apposite, given the current negotiations on the next EU budget. These negotiations will include a debate on whether or not the Commission should have more money for research. In spring 2005, EU governments will conduct a halfway review of their Lisbon economic reform agenda. This would be a good time for

governments to agree on how to implement their stated commitment to increase R&D funding – including for space technology. With all these reviews in mind, it is time for governments to put space issues at the centre of their discussions on their future ambitions for Europe. Ultimately, governments must recognise that the success and competitiveness of Europe on earth will depend in part on the success and competitiveness of Europe in space.