

IAC-08-E6.2.9

ESA'S APPROACH TO PROMOTE THE COMMERCIALIZATION OF SPACE TECHNOLOGY AND BRIDGING THE EQUITY GAP

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ABSTRACT

Space systems are increasingly part of our daily lives. Today, there are more than 200 telecommunication satellites in geostationary orbit. Over the last three decades they have revolutionised society, changed the way our economies work and introduced new dimensions to television and entertainment. Space has pioneered methods for generating and exploiting electrical power more efficiently and the demands of space travel have thrown up the need for strong lightweight materials which have quickly found terrestrial applications. The Technology Transfer Programme (TTP) of the European Space Agency (ESA) promotes the use of space technology for the maximum benefit of the European population. ESA acknowledges that innovation is the engine that drives the world economy. Billions of euros are spent each year by industry, government agencies, universities and research centres on developing all kinds of technologies. If these are not commercialised, they will never reach their full potential and society could well miss out on the possible benefits. Hence, ESA, as a public body, has an inherent responsibility to arrange and facilitate the spin-off effects that contribute to the non-space economy and technological infrastructure in its Member States. Over the last decade, ESA TTP has established several initiatives for technologies to be identified and prepared for non-space use that result in commercially viable products and high potential companies, including the set up of dedicated business incubators. ESA has recently decided to go even further by sponsoring and being the catalyst of an early-stage Venture Capital Fund to assist in bridging the so-called "equity-gap" faced by start-ups. This paper provides an update on the establishment of an early-stage Venture Capital Fund (The Stella Growth Fund) that will be managed by E-Synergy Ltd. The background to and progress of the Stella Growth Fund is discussed, including some of the challenges encountered in the fund raising process.

FULL TEXT

INTRODUCTION

The Technology Transfer and Promotion Office (TTPO) is the first point of contact within ESA for technology transfer and incubator matters. It was set up in 1990 with the aim to adapt space technologies for commercial application on Earth. By finding applications for space-based technologies in non-space sectors, the TTP acts as a bridge supporting suitable transfer projects by providing funding, in partnership with others, for feasibility studies, pre-marketing studies and creation of prototypes. It also provides seed funding and support for start-up companies through three facilities known as business incubators.

To be at the forefront of space research and technology, it is vital that European industry maintains a high level of innovation. Spinning off technologies allows for further development, which may not be possible as part of a budget-constrained space programme. Through its programmes, TTP helps identify new business for space providers, maintain and increase expertise in space industry, facilitate creation and business growth of start-up companies through incubators, and promote wider use and acceptance of space technologies and systems. It is believed that the level of innovation in European industry, especially in small and medium-sized enterprises (SMEs), can be dramatically boosted if supported and promoted by large international centres of excellence, such as technology centres operated by ESA within Europe.

The TTPO is responsible not only for the Technology Transfer Programme (TTP), but also the Technology Transfer Network (TTN), and three ESA Business Incubators. It is also one of the key members of European Space Incubator Network (ESINET). The Office deals with national agencies and European Community networks such as the Europe Enterprise Network (formerly known as Innovation Relay Centres) for technology transfer activities. Recently, it has taken the initiative of supporting entrepreneurs in finding venture capital by promoting the establishment of an early stage venture capital fund.

In fact, moving from an initial idea to actually developing a successful and viable start-up company is quite a challenge. This difficult exercise is even harder in Europe where investors are more conservative and risk-averse than in the United States when it comes to investing in technology-based start-ups. In addition to that, the space component complicates even more the equation as the investment community lacks familiarity with space spin-offs and often has pre-conceived ideas about space. Space is considered (by many, including investors) as a risky sector and a business for large players, a market niche with a long time-to-market before eventual application and where the terrestrial competition is fierce in some of its sectors, such as telecommunications. As a result, seed capital is frequently difficult to raise, even though those companies using space technologies do not target the space sector itself; they are only

transferring into new applications, using technology coming from space programmes.

SUPPORTING ENTREPRENEURSHIP AND BRIDGING THE EQUITY GAP

Supporting Entrepreneurship

After years of involvement in technology transfer, it has been observed that a growing number of individuals are interested in adapting space technologies into innovative terrestrial products and services. Tony Anson's story is a good example. Working for Brunel University, he became fascinated by Shape Memory Alloys and came up with the idea to use this smart material for medical applications. One of his most famous innovations is the endovascular stent. This stent – a tube for reinforcing the blood vessels associated with the heart – could be inserted into the heart's aorta, but only after being squeezed into a smaller configuration. Once in place it is triggered to return into its original, larger, shape by the application of heat.

Tony Anson approached the TTN with his idea and obtained a small ESA contract to perform a feasibility study. With this study he won a UK "DTI SMART Award", a prestigious award granted by the Ministry of Trade and Industry, which gave him the financial means to apply for a patent as well as getting in touch with venture capitalists. One thing led to another, he founded a new company, and in 2001 he sold his business for more than €26M to Lombard Medical Technologies (LMT), a specialist in cardiovascular device and polymer

coatings, with headquarters near Oxford, UK.

For Tony Anson this was a great business opportunity, for ESA it was a clear case of technology transfer benefiting individuals. This is only one example: more and more start-ups are being created on the back of the commercial opportunities offered by the transfer of space technology.

ESA decided to support these entrepreneurs with a process known as incubation and it has now become an important part of TTPO's strategy for technology transfer. The first incubator facility opened at the European Space Research and Technology Centre - ESTEC (Noordwijk, The Netherlands) in 2003 and has since has supported some 60 start-ups. The Agency has opened two more incubators, one at the European Space Research Institute - ESRIN (Rome, Italy) in 2005 and the other at the European Space Operations Centre - ESOC (Darmstadt, Germany) in 2006.

It is not enough to just have a great idea about how to adapt space technology for a product or service. Developing that idea and bringing it to market are big challenges too. Established firms have a lot of business know-how but are not always open to radical ideas. Many of them need to concentrate on their core business and so do not have the necessary time to innovate. On the other hand, new technology-based firms are open to innovation but often lack business and management capabilities. These are the firms that need the structured support of an incubator. An incubator offers an environment where a start-up company

can find just the mix of skills and competences it is lacking to ensure a successful assembly of a sustainable, growing company.

In this sense, we can say that building a company is not so different from building a satellite, once it has settled on a competitive business model. It needs several subsystems like a saleable product or service (the instrument), management control systems (the software), cash flow (the energy), strategy (the mission planning) and so on. It also needs a clear mission statement with objectives and a marketing campaign to launch its business. In other words – and to continue with the metaphor – it needs “sub-contractors” who support the integration of these subsystems. A business incubator offers the services of such “sub-contractors” through a well-established network of technical experts, business experts, accountants, lawyers, venture capitalists as well as a number of researchers and other professionals from universities.

The second benefit of an incubator is the cost advantage. Since a business incubator offers its physical premises not just to one start-up, but to several, overhead costs are shared. Finally, in an incubator, start-up companies are clustered together, so that they may benefit from shared experiences: companies can learn from each other, help each other and share their expertise. This is commonly referred to as cross-fertilisation. After the incubation period, which takes between 6 months and 2 years, all the ‘subsystems’ have to be integrated into the company before it is ready to enter the marketplace.

For ESA, this support is much more than a stand alone programme: it is a long term strategy to ensure that it assists Europe’s technological advance on a broad front through innovation on a global scale.

Incubation works best when it is embedded into a regional network. For example, being close to an ESA establishment allows easy access to the Agency’s expertise and facilities. Likewise, being close to business partners allows faster interaction with them and better access to support. For this reason, ESA has set up its incubators in the vicinity of its existing establishments, allowing start-up companies to benefit from European world class technological excellence.

The first ESA incubator was launched at ESTEC in collaboration with SenterNovem, a Dutch governmental agency that supports innovation on behalf of the Dutch Ministry of Economic Affairs. A great deal of complimentary resource can be found around ESTEC in the shape of high-profile universities and R&D parks. The construction of a Space Business Park has started in the vicinity of ESTEC. Due to the very nature of the ESTEC, the spin-off activities in the incubator here cover the entire spectrum of ESA’s expertise.

ESA and the regional Government of Hessen have worked together to establish a recently opened Business Incubation Centre, in October 2006 at ESOC. Called the “Centrum für Satellitennavigation Hessen GmbH” (CESAH) is currently focussing on Galileo related navigations

applications. The Centre has teamed up with renowned universities, research institutions, IT and consultancy firms and key Galileo-user industries, all located in the Rhein-Main metropolitan area.

At ESRIN, incubation activities began in October 2005 in cooperation with BIC Lazio (the Business Innovation Centre of the Lazio region). This initiative has already brought together universities, research centres, major firms, the Polo Tecnologico Industriale Romano and ESA. At ESRIN, the spin-off activities are mostly related to earth observation data processing, telecommunication services and satellite navigation.

Bridging the Gap

Like any new technological venture, there is a relatively large number of promising start-up and early-stage companies aiming to use space-related technology or satellite applications. However, many of them lack the necessary access to seed- and early-stage equity. It is hard to convince investors to back high-tech space technology-related products and services because such ventures are often seen as risky. Although this is often a false perception, it nevertheless compounds the other perception that making early stage investments in technology companies is excessively risky. The legacy of the IT bubble of the early years of this decade persists in casting doubt over the perceived likelihood of good returns to investors.

It has thus become clear that a leverage of funding is required to stimulate start-up companies to create products with space technologies. In common with almost all technology based start-ups, they need help with early stage funding from publicly funded resources to share the risk with those private investors who are attracted by the prospect of exciting opportunities and partners willing to share risk. For that reason ESA has taken the initiative of establishing a venture capital fund focusing on early-stage investment. ESA will be the initiator and catalyst of the Fund and will also contribute to it. E-Synergy Ltd has been selected to set up, raise the capital and, later on, to manage the Fund. At this time, E-Synergy is in the process of organising the first closing but potential investee companies have already been identified.

The success of this fund is fundamental in order to ensure greater interest from the investment community for the wider exploitation of space-derived technology.

The Stella Growth Fund

The initial size of the fund is intended to be €40M. The Stella Growth Fund will specialise exclusively in the wider terrestrial commercial application of satellite and space-related technologies such as global positioning and navigation, communications, sensors and new materials. It will invest in companies with global market potential, whose opportunities for growth are enhanced by the use of these technologies, with protectable intellectual property.

These applications will be in areas including, but not necessarily limited to:

- Information systems and communications
- Transport management
- Low energy power generation
- Advanced new materials
- Healthcare
- Security
- Entertainment and leisure

The Fund will target deals where the early valuation is low but where there are opportunities for stellar performance through hands-on value-adding support of companies' management and marketing teams. The goal is to complete all investments within a five year period and to achieve profitable realisations through trade sales or flotation within a further five years.

Initial investments will typically be in the range €300,000 to €1.3million with a cap of €million in any one company. It is envisaged that the portfolio will not exceed 20 companies overall. This positions the Fund firmly in the "investment gap" which currently exists within the spectrum of European private-sector investment resources.

The Fund's objective is to build an investment portfolio which will provide significant capital appreciation from equity investments in growing companies. The Fund will exploit its access to the results of nearly €billion spent by ESA and others each year on space activities and technology development.

ESA and E-Synergy - a unique partnership for a unique proposition

The high risk profile of commercialisation of early stage technologies requires a partnership between public and private sector in order to address the risks successfully. The ESA/E-Synergy partnership combines the huge technological competence, outstanding risk management capability and Europe-wide reach with early stage investment expertise from a company with its own internal technological capabilities and knowledge of the space sector and technology transfer. This is a unique partnership.

As well as being a strong technological partner and providing technological support to the Fund, ESA provides access to its network of contacts, companies and organisations involved in space and the transfer of space technologies. It would not be possible for a fund of this size to develop and exploit such a large community of opportunity on its own. ESA therefore plays a key role in addition to seeding the Fund with €million.

E-Synergy brings scarce knowledge and skill in technology investing and also of the space sector itself. E-Synergy specialises in early stage investing and in blending support from public sector resources with private sector investment, recognising the limitations and political complexity of the former and the uncompromising motivations of the latter.

More than money, however, E-Synergy provides investment readiness training for entrepreneurs, which is key to the success of many investments. The hand-on approach of E-Synergy matched one of the fundamental criteria for ESA in selecting a partner to raise and manage the fund.

Challenges overcome

As a general rule, investors consider an investment opportunity as stellar because there is a business model with significant competitive advantage, large commercial prospects in terms of market size, commercial position and potential profit and manageably low technical risk.

Experience shows that investors traditionally have the exact opposite opinion of the space sector. E-Synergy and ESA have realised that investors need to be alerted and possibly educated about the potential of space technology for non-space products or services. The key messages that must be communicated are:

- The use of space technology opens up competitive opportunities in a wide variety of growth markets;
- Technologies derived from space programs have been heavily tested and therefore pose lower technical risk;
- Investment in space offers attractive and profitable opportunities for investors; the sector is still little known amongst investors, resulting in comparatively little competition for good investment opportunities, and there are a large number of potential deals

sourced from a well organised and well-resourced network.

Investors often know very little of the space sector and do not regard it as a priority. There are three main misconceptions that must be addressed in seeking finance for the sector.

The first is that the space sector is often perceived as a very closed, controlled and political market offering little potential for conventional entrepreneurialism. While this is true in the context of the application of technology in space (although decreasingly so), it is not and has never been applicable in relation to the use of space technologies in non-space applications. Investors' eyes have to be opened to the potential of spin-off from space.

The second challenge is that most people outside of the industry are not aware of the relevance of space derived technology to terrestrial markets. They are even less aware of the competitive advantage that space derived technologies often afford businesses addressing fast growth terrestrial markets. Investors often associate space with images of rockets or men in a space suits, they do not think about the multiple applications that are part of everyday life on earth that would never have come about had it not been for the space programmes. Only when talking through the challenges that have to be tackled when preparing for an exploration mission or launching a rocket, do most people begin to understand the potential of the technology and its ability to enable greater competitiveness in many of the world's growth markets.

The third challenge is that space technologies are seen as inherently risky. Investors assume that because the application of technology in space is demonstrably risky that the technology itself has a higher risk profile. On the contrary however, technologies developed for space must be inherently more reliable in order to face the exceptional risks of space. Investors do not always realise that rather than representing an increased risk profile, the application of these technologies in a terrestrial context can actually represent a lower technology investment risk than in classic venture capital.

Indeed, space derived technology is also often more market ready. Technologies are exhaustively tested and thoroughly understood before they are released for use in space, often resulting in a shorter lead-time when developing products or services for terrestrial applications.

Space derived technologies and the businesses that apply them leverage around €5 billion that is spent yearly in Europe on the development of space technology and the missions on which they are used. Technologies undergo exhaustive testing under extreme conditions to make sure that they can survive the harsh environment of launch and space and the rigours of complex, safety critical mission operation. Once a rocket is launched, it is not possible to fix problems. Every critical issue has to be envisaged before the mission is launched. Therefore, the technology readiness level for the development of space technology is much higher than in

almost any other sector for which R&D is undertaken. To name just a few, space technology has to survive exposure to radiation, immense variations in temperature, corrosion, extreme vibration, vacuum etc. It also has to operate on very low levels of power consumption. Such robust and efficient technology can solve many problems and address critical issues in a wide variety of applications on Earth, not least on emerging 'clean technology' markets.

The low technology risk is one of the factors that attracted E-Synergy to set up and manage the Stella Growth Fund. ESA is a very strong technological partner and it conveys the image of excellence in engineering, which is a strong selling point for investors because it reassures them of the quality of the technology being applied, the professionalism of approach and the European and global reach of its activities.

A further aspect that is crucial to attract investors is that they need to see space spin-offs as coming in a first instance to them, that there are a lot of opportunities and that competition for deals does not detract from the attractiveness of the opportunities.

The Stella Growth Fund will leverage the unique network of the Agency to develop its deal flow. The Fund will have privileged access to the 500 early stage companies in the network of European Space Incubators and will be the only fund actively promoted by ESA to its networks. In addition, E-Synergy's directors and staff are highly experienced practitioners in early-stage investing, with extensive personal

networks. Investment opportunities arise through these contacts, the company's programme of investment readiness training, its strong working relationships with Research and Technology Organisations and numerous universities and organisations working within the aerospace sector.

The Fund will therefore be in a unique position to exploit space technologies within the wide range of commercial market sectors to which space technologies can be applied on a day to day basis.

CONCLUSION

The development of the Stella Growth Fund is a ground breaking venture for ESA, which is designed to ensure that Europe benefits to the greatest extent possible from its investment in space. It is hoped that the benefits will accrue in terms of competitiveness, profitability, prosperity and quality of life. If this first fund is a success, it is planned to raise a larger fund in due course to continue supporting the wider exploitation of space technologies.