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AN INTEGRATED APPROACH TOWARDS TECHNOLOGY TRANSFER

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In 2001 the European Space Agency (ESA), the Dutch Ministry of Economic Affairs and the Netherlands Organisation of applied scientific research TNO initiated the Dutch Technology Transfer Programme (DTTP). Since then, 'technology transfer' has been a relevant part of Dutch space policy.

The DTTP aimed to promote the transfer of knowledge and technology from the European space industry to Dutch companies outside the space sector. Full and easy access to this knowledge and technology may allow these companies – and small and medium-sized enterprises in particular – to innovate faster and strengthen their competitive power. However, businesses that want to adapt space technology for commercial applications on Earth are taking a certain risk. The DTTP has been able to alleviate this risk by funding part of the costs involved in the initial research phase. This often concerns an exploratory study, in which the technical and/or commercial feasibility of the transfer are assessed.

While the DTTP focuses primarily on existing companies outside the space sector, there is another way to promote technology transfer and economic growth: business incubation. A business incubator intends to promote local entrepreneurship and accelerate the successful development of start-up and early-stage companies. Locating a business incubator close to one of the ESA knowledge centres, it becomes a real accelerator of space technology transfer.

ESA started its first business incubation centre (ESA BIC) at the premises of ESTEC in Noordwijk in 2004. By scouting entrepreneurial talent and screening suitable knowledge and technology from the European space sector, every year a selection of potential start-up companies is made. Once selected, these 'technostarters' receive an array of technical and business support services, both in the incubator itself and through its network of contacts.

In The Netherlands, both approaches to space technology transfer have been (and still are) quite successful and, when applied in conjunction, constitute an integrated approach towards technology transfer in general.

INTRODUCTION

ESA invests about three and a half Billion Euro per year in the development of technology and know-how for European space programmes. Parts of this technology and know-how are also applicable to solve problems outside the space sector. By using the available technology and know-how originally developed for space, European businesses may save considerably on their R&D efforts and bring their products and services to market much faster. This process is generally referred to as 'technology transfer'.

However, many non-space companies often are unaware of the know-how and technology that are (or have been) developed within the European space sector. Therefore, without stimulation, technology transfer hardly gets off the ground; in many aspects the 'distance' between both worlds (space vs. non-space) simply is too large.

It is for this reason that ESA started its Technology Transfer Programme (TTP) in 1990. Headed by the Technology Transfer & Promotion Office (TTPO), the aim of the programme was to promote the use of space-developed technologies and satellite systems by non-space companies, leading to three main benefits: (1) strengthening both space and non-space industries by creating business opportunities in other industrial sectors, (2) stimulating and accelerating innovation and (3) creating new businesses and jobs in the non-space sector.

In order to have a good technology transfer programme throughout ESA's Member Sates, the TTPO utilises a network of national broker programmes and initiatives: the ESA Technology Transfer Network (TTN). This paper particularly focuses on the Dutch initiatives for technology transfer from space and the complementary aspects of them.

DUTCH TECHNOLOGY TRANSFER PROGRAMME

In order to stimulate and enlarge the benefit of space technology transfer for businesses in The Netherlands, the Dutch Ministry of Economic Affairs initiated the Dutch Technology Transfer Programme (DTTP) in 2001, in close cooperation with ESA and TNO. The objectives of the programme were specified as follows:

- To see to the fact that the Dutch businesses can profit as much as possible from the knowledge and technology that have been (and still are) obtained and developed within the European space sector ('market pull');
- To offer the Dutch space sector (both businesses and research institutions) the possibility to market their knowledge and technology in other sectors, i.e. outside the space sector ('technology push');
- To communicate the importance and potential value of space technology broadly within the Dutch business community, also to start-up companies (so-called 'technostarters').

An important feature of the DTTP is the possibility to (partly) finance so-called 'feasibility studies'. After a potential transfer has been identified, the next step usually is to assess its technical and/or commercial feasibility. To this purpose, the DTTP has had at its disposal a limited budget of ca. € 100.000 per year to cofund a limited number of these feasibility studies. Cofunding is limited to 50% of the actual cost and a maximum amount of € 25.000.

Over a period of almost nine years the DTTP has cofundend a total of 43 feasibility studies. Nine of these studies (i.e. ~ 20%) had a very successful commercial follow-up, meaning that they contributed significantly to a new business activity in The Netherlands. Fifteen of the studies (i.e. ~ 35%) still have sufficient potential to become commercially successful in the near future.

The main reason for this 'delay' is the fact that follow-up funding is needed to engage in a further development phase, the so-called 'proof-of-principle' or 'valorisation' phase. One way to solve this funding gap would be to significantly enlarge the DTTP budget to allow for cofunding the valorisation phase of a limited number of promising transfers. Another way would be to actively promote spinning-off the transfer idea into a new established company.

Before getting into detail of the latter approach, we will first outline technology transfer collaboration between the Dutch Ministry of Economic Affairs and ESA: the ESA Business Incubator Centre at ESTEC in Noordwijk.

ESA BUSINESS INCUBATION

From 2004 onwards, ESA's TTPO has put more emphasis on specifically supporting entrepreneurs that are setting up a new venture in non-space markets with technology and know-how from the space sector. Europe's ambition to become the most competitive and dynamic knowledge based economy in the world, has led to an increasing demand for entrepreneurship and innovation.

This trend is also noticeable in the context of the ESA TTP. More and more entrepreneurs are seeing business opportunities in exploiting space-based technologies in the non-space market environment. Also innovative use of space infrastructures – i.e. navigation, telecommunication and earth observation satellites – became a favourite exploitation topic by entrepreneurs. Specifically young start-up companies are now key in creating Location Based Services with help of Global Navigation Satellite Systems (GNSS), e.g. the new Galileo navigation system. Anticipating this trend, the first ESA Business Incubation Centre (ESA BIC) was launched at ESTEC in 2004, along with an associated network of professional business incubators throughout Europe (ESINET).

From 2004 until 2009 ESA BIC Noordwijk alone has supported 49 start-up companies, of which 90% were still in business in 2009.

The aim of the ESA BIC is to support entrepreneurs and accelerate the start-up of companies that are based on a space technology or system in a non-space market. Starting-up a company comprises two main challenges: the set-up of a sound business as such, and applying a space technology in a new product or service.

With regard to the latter, it is crucial for an incubator to be located close to technical know-how. Hence it is no surprise that the first ESA BIC was located within the vicinity of ESA/ESTEC. Here, entrepreneurs have access to experts and facilities to aid them in the proper application of space technology.

With respect to business support, a network of service suppliers and business expertise is offered through collaboration with both national and regional government as well as local business partners. Also, a small funding scheme to support the first phase of business development is made available.

To increase the effectiveness of the incubation support provided, entrepreneurs and their related network of business services and technical support are clustered, enabling entrepreneurs to establish their businesses much faster and against shared costs. After all, it takes less time to find a good service supplier within the incubator's network, and cost reduction is obtained by sharing facilities such as office accommodation and resources.

With these two instruments of technology transfer in The Netherlands, a wide array of transfer opportunities can be served, i.e. from new product and service development within established industry to new venture creation in emerging markets. Yet another benefit arises when using both instruments in conjunction: reinforcement. In the next paragraph we shall illustrate this reinforcement by three different examples in which the DTTP and the ESA BIC Noordwijk have been working closely together.

DTTP AND ESA BIC EXAMPLES

Sport-Track.com

Some six years ago, entrepreneur Mr Paul Straathof was working on his start-up idea of projecting positioning data of contesters from sports events in a portal combined with mapping, video, audio and analyses. With this, he could offer an added value in contrast to other, more traditional media. To this end he set up the company Sport-Track.com. Apart from the business challenge, he had two main technological challenges: the implementation of EGNOS to offer a better accuracy and the miniaturization of tracking devices. Whilst being in the ESA BIC his main efforts concentrated on getting his business to market and gaining expert support to implement the EGNOS accuracy, it was the DTTP that was able to assist him with the miniaturization of the tracking devices. As this support was provided in parallel, Mr Straathof was able not only to provide a prototype to potential investors, but already to come up with a final product.

Consequently, he was able to sell his company to ChampionChip in 2008, soon followed by the merger of AMB i.t. and ChampionChip into a new company, MYLAPS, in 2009.

MetaSensing

MetaSensing is an innovative start-up company that specializes in remote sensing by Synthetic Aperture Radar (SAR). MetaSensing joined ESA BIC Noordwijk as an incubatee in 2008. Their vision is to become leaders in providing cost-effective, high resolution radar imaging sensors and services. MetaSensing proprietary technology is the result of several years of research carried out at the International Research Centre for Telecommunication and Radar (IRCTR) at the Technical University of Delft, The Netherlands.

In 2009 MetaSensing also applied for a feasibility study within the DTTP, in order to evaluate and adapt several data processing algorithms that are normally used for satellite-based SAR for airborne applications. This has made the technical expertise of MetaSensing quite unique.

Hence, it is no surprise that MetaSensing has been selected as the most promising company in the Earth Observation sector at the recent ESA Investment Forum in Stuttgart, Germany.

Fire Suppression Inside

Fire Suppression Inside (FSI) is a small company that was started in 2010 based on the development of a device to suppress fires in computer servers. Over the past years several large fires occurred in a number of data centres, destroying large amounts of data and causing serious damage. In general, news about these fires is kept secret and not communicated to the general public.

The product of FSI is based on a cool nitrogen gas generator, developed by TNO and based on the igniter technology of the Ariane V launcher. A cool gas generator generates a large amount of gas at room temperature out of a solid material, to which it is chemically bound. Unlike other products, a cool gas generator does not leave any surplus material that can further damage the surrounding equipment. Another advantage is that the gas does not have to be compressed. Hence a cool gas generator is intrinsically safe and can be stored for many years without the need for inspection.

In 2010 FSI performed a very successful feasibility study on their product idea within the framework of the DTTP, conducting several real fire experiments, in which the fire was extinguished quickly and successfully. The company is now in discussion with several providers of computer servers, e.g. HP and IBM. FSI may apply for support from ESA BIC in Noordwijk in the near future.

CONCLUSION

For almost 20 years the ESA TTP contributed to the capitalisation of space-based technology and know-how for the benefit of Europe's economy in both space as non-space industries. Apart from the economic benefits, numerous products and services made their way to professional markets in the medical, automotive and process industry, as well as to the every day homes on Earth. Similar conclusions can be drawn with regard to the results of the DTTP, in which 20% of the cofunded feasibility studies had a follow-up that was commercially successful.

Furthermore, the success of the ESA BIC in Noordwijk initiated three other BIC initiatives. Two ESA BIC's were started in Germany, one located closely to ESA's European Space Operations Centre (ESOC) in Darmstadt and one located at the ASTO Science and Business Park in Oberpfaffenhofen. The fourth ESA BIC is linked to ESA's European Centre for Earth Observation (ESRIN) in Frascati, Italy.

The transfer process was accelerated significantly when the DTTP and ESA BIC operated in conjunction. As our three examples demonstrate, collaboration between the two programmes can be before, after and parallel to each other. When sequentially, the two programmes appear to be closing gaps in the technology transfer from feasibility study to valorisation and from valorisation to implementation.

When deployed in parallel, commercial development can be accelerated even further.

Hence, it can be concluded that technology transfer from space is a lucrative and rewarding 'mechanism' to stimulate innovation and new business creation in the European business community. Especially when business incubation is combined with the assessment of technical and commercial feasibility, technology transfer becomes a true accelerator of innovation.