Green Paper *on European Space Policy*

Discussion point:

Space technologies mean real applications on the ground

The idea of applying space technologies to our needs here on earth is not new, but while many people will have heard of the 'non-stick' frying pan developed in space, few would be able to cite other important examples. Large-scale technology transfer is often associated with NASA and the USA, but Europe, with its extensive programmes of space-based scientific research, earth observation and communications, has a proud tradition of producing beneficial spin-offs. Today, business opportunities related to space technology applications remain enormous.

The European space industry has developed numerous technologies now being used in ground-based applications. To cite a recent example: the so-called 'Mamagoose' baby pyjamas applies technology developed for a suit used to study the respiration of astronauts in space to a suit for monitoring infants during sleep, sounding an alarm at the first symptoms of cot death.

And what about the radar system being adapted to detect cracks in the roofs and walls of mine shafts, the spectrographic system that can recognize and colour-match over 30,000 different colours and shades in fabrics and textiles, or the packaging machine that can drop a potato crisp into a bag without breaking it? All of these and many other real applications have been developed thanks to European ingenuity in the space field. The return on the investment made in European space research is being significantly increased by the improvements in everyday life here on the ground.

From Earth to space, and back again

From the beginning, the high-risk nature of space activities has made reliability a key requirement. Wherever possible, designers have sought to use tried and trusted methods and materials. The earliest space systems were based on established, proven technologies, themselves spin-offs from the defence and arms industries. What space programmes have done over the last 40 years is to invest in raising these technologies to new levels of performance and capacity, perfecting them to unprecedented levels so that new and beneficial applications have been identified back here on earth.

More examples of "down to earth" space technology :

- Electro-optic sensors for meteorological satellites such as ESA`s ENVISAT and ERS missions to monitor the Earth environment are now being used on cameras in the offshore drilling sector to take pictures through oil inside wells.
- The SPADD (Smart Passive Damping Device) is used to protect satellites and space structures from vibrations during launch. The same device is now being used to reduce the noise of concrete mixers caused by mechanical shocks in the gear mechanism.
- Guidance & INto the Ground Exploration Radar (GINGER), developed for planetary missions, e.g. to investigate the Martian surface, is now being used in various earth-based applications such as geophysical investigations, the search of buried objects, measurements of thickness or properties of non-metallic materials and detection of anti-personnel-mines.
- A computer algorithm that can extract meaningful information from X-ray data gathered by the ROSAT satellite can powerfully assist the physician in the diagnosis of initial malignant melanomas.
- The European Simulation Language (ESL) software package, used for modelling highly complex systems, is now being used by water utilities to help ensure that drinking water is kept free from unwanted bacteria.
- Measurement systems and test procedures to quantify the performance of a robot and generate improvements through calibration is now being applied to robots in production lines, such as those used in automobile manufacturing.

Space – a trend setter

Space has been at the forefront of technology trends for decades. The demand for smaller and lighter materials and systems, for example, was largely stimulated by the space industry. Computers are an excellent case in point. Early computers filled several rooms and there was no particular reason at that time to want to make them smaller. The need to produce small, powerful, self-contained computers for space-related applications ultimately led to the development of the PC. One can hardly overestimate the impact of that development.

Beyond computer technologies, the sheer range of applications to which space research - much of which is undertaken in Europe - can contribute is fascinating. The same technologies now assist the astronomer using the Hubble Space Telescope to study the cosmos as well as the biologist seeking to understand the workings of the human cell. Materials developed to protect space instrumentation from the heat of launcher engines can now be found in theatre seat upholstery, reducing the risk of fire.

Business opportunities beyond the space industry

Space technologies offer countless possibilities in terms of practical ground-based applications. As such, they represent increasing opportunities for players other than those within the traditional space industry, including small- and medium-sized enterprises, service providers, content providers and private and public users. Space is a crucial link in the competitive knowledge-based society. Digital television, third generation mobile communications and the Internet are good examples of service platforms to which space-systems contribute.

At this critical juncture, therefore, priority must be given to the ongoing process of transferring space technologies from the research sector to the commercial sector. It is equally essential to support research aimed at industrial applications and value-added services that go beyond the strict context of space.