“Politics, science and innovation across the Atlantic”

Aspen Transatlantic Dialogue

New Technologies, Space and Defence

P. F. Guarguaglini

Chairman & CEO, Finmeccanica

Rome – 28 November 2009

In a **global market**, it is important to be able to develop **state-of-the-art technology**, particularly in areas such as Aerospace and Defence, which have become strategic sectors for countries wishing to maintain a prime position on the international stage, or indeed for those countries with ambitions to join them.

However, against a backdrop of **increasingly limited resources**, it is necessary to adopt a **selective approach** to innovation in the 21st century.

Specifically, the top players in Aerospace and Defence must **prioritise investments** that will continue to push the **boundaries of technology and increase the gap to potential newcomers**, particularly in emerging markets, which are still going to benefit in the future from higher GDP growth than developed economies.

Taking the **United States** (which still accounts for **50% of global Aerospace and Defence production and R&D**) as an example, military spending as a percentage of GDP has shrunk from an average of **10% during the 1950s** (Korean War, nuclear arms race) to **8.7% during the 1960s** (Vietnam War, continuation of the Cold War) and **6.3% during the 1980s** (missile defence shield).

The **Star Wars programme**, otherwise known as the Strategic Defense Initiative, which was championed by the Reagan administration, represented the **peak of military spending in absolute terms**, and brought with it the positive resolution of the Cold War.

As far as spending on space programmes is concerned, from the 1960s the **NASA budget** grew at an **average annual rate of more than 6%** until the end of the 1980s.

In 2009, the budgets for the Department of Defense and NASA came to USD 662 billion and USD 18 billion respectively, which together represent **5% of GDP**.

Moreover, most of the Department of Defense budget is intended for field operations in Iraq and Afghanistan, with only a small proportion going to new investment in systems and equipment (procurement and R&D).

The **vast resources** available to the US between the 1950s and the end of the 1980s had an impact on **three important aspects**:

- **Attracting talent**
- **Technology spin-offs**
- The **technology gap** between the US and the rest of the world, including Europe

Technology spin-offs in particular have **revolutionised the very way we live**, benefitting society by improving the quality of everyday life and enhancing the **wellbeing of ordinary citizens**.

To give some sense of the scale of this phenomenon, it is worth mentioning that the **Apollo programme** alone generated **in excess of 160,000 technology spin-offs**.

One of the most famous **spin-offs** to emerge from this programme is the **ARPANET military IT network**, which was created in 1972 and is widely considered the **precursor to the Internet.**

Other technologies that came about as a result of spin-offs include:

- The microcomputer
- Photovoltaic systems
- Satellite dishes
- Wireless communication devices
- Laser technology

– Food dehydration and preservation methods
– Innovative synthetic materials for clothing
– Water purification methods, etc.

Even the roof of the Olympic Stadium in Rome is made from a material that was originally developed for the re-entry parachutes of spacecraft.

Spin-off technology increasingly became a **structural tool** and **business model**, particularly with regard to aerospace programmes, essential for greater innovation and for the very financial **sustainability of the programmes**, as well as **guaranteed return on investment**.

Over time, **dual-use technology and systems** have become ever more common.

A classic example of this is the space industry, where **European countries** tend to develop **satellite systems**, such as the Earth-observation services of the **COSMO-SkyMed** constellation, that can be **used for both military and civilian purposes**, in order to make the most of the available resources.

In this case, the hardware is the same, and it is only the **quality of the data** that distinguishes the different **types of application**, allowing even individual **citizens** to access **images from space**.

These days, in **certain sectors** such as **innovative materials** for aerostructures or **ICT (devices such as terminals, radios, routers, computers and servers), technology developed for the civilian market is also finding new applications in the military segment.**

Despite the fact that access to technology for commercial applications is increasing, the **technology gap** between the US and the rest of the world is still very wide, although **Europe** is gradually **bridging the divide** thanks to a more targeted (and larger) allocation of **resources for investment in R&D** on the Old Continent compared to the US.

According to the 2009 *EU Industrial R&D Investment Scoreboard*, R&D investment in the Aerospace and Defence sector grew by 6.0% in Europe, whereas the figure for the US was only 3.3%.

It is worth emphasising that the **Aerospace and Defence sector (and latterly also the Security sector)** continues to represent a **significant source of innovation**, as is demonstrated by an analysis of areas of innovation conducted by the consulting group Ambrosetti.

This study showed that although **R&D investment in Aerospace and Defence amounted to just 1% of global GDP, it has a positive impact on up to 30%.**

Adding in microelectronics – which is intimately linked to these sectors – increases the positive impact from spin-off technology to more than 50% of global GDP.

With regard to **Italy**, Italian **companies** have increased **their R&D expenditure by 20.4% (between 2008 and 2007),** a figure that is significantly higher than the average for **major European nations (7.6%).**

Finmeccanica comes second in Europe for R&D investment in the Aerospace and Defence sector, and is placed 18th out of the top 1000 companies across Europe.

Emerging economies are starting to play an **increasingly important role** in this scenario, and they are causing significant shifts in the transatlantic balance.

Jane's Information Group estimates that **total military spending in the Asia-Pacific region has grown from approximately USD 220 billion in 2008 to around USD 239 billion this year, with a further increase to come in 2010.**

In particular, **China** has increased its military spending from **USD 69 billion in 2008** to **USD 79 billion in 2009.**

Moreover, the Economist Intelligence Unit **innovation index** shows that **China has moved up from 59th in the world in 2006 to 54th in**

2008 thanks to its investment in R&D and university education.

Finally, in **2006 public spending on global R&D** amounted to **1.4% of GDP**, with the government aiming to increase this to **2.0% in 2010**.

However, the **technology gap** that still separates emerging economies from developed nations – the US, Japan and Europe – in the Aerospace and Defence sector can be **quantified as 10-15 years**. **Narrowing this gap will require a significant degree of technological transfer** from the latter to the former.

It is precisely this point that is being stressed by emerging economies and countries with large cash reserves.

The **growth strategy** of these countries is based on **an increase in high value-added manufacturing and technology**, and therefore implies a need to **transfer technology and production**.

Europe is well positioned to take advantage of this scenario due to its greater openness to allowing access to its technology in exchange for access to new markets, whereas the US takes a much more rigid approach to technology transfer.

In other words, European countries can adopt greater flexibility in "fertilising" technology in emerging economies, thus creating a dependent relationship with regard to our products and enabling us to indirectly exercise a certain degree of control.

The other side of the coin is that in doing so, we will be helping emerging economies to increase and improve their industrial and technological facilities.

It is therefore clear that this strategy of market penetration must be accompanied by significant domestic investment in research and innovation, with resources focused on the production of enabling technology offering a high level of specialisation and/or complex integration in order to maintain our current advantage and ensure that our industrial system remains competitive.

Technology transfer, particularly between the US and Europe, is a **very delicate** subject when it comes to **military applications**, notwithstanding the close military cooperation between the two sides of the Atlantic, as embodied by NATO.

The numerous restrictions imposed on even non-sensitive technology by US legislation and the responsible US agencies severely limits industrial transatlantic cooperation and places obstacles in the way of European countries wishing to export systems and products that contain US components or technology.

Especially in light of the period of crisis that we are currently experiencing, an agreement on **transatlantic technology transfer would be mutually beneficial, and the development of products using shared technology would also facilitate the interoperability of troops engaged in coalition operations.**

Moreover, in the new model of asymmetric warfare, **mature technology is more suitable for operational use than state-of-the-art technology**, which has not yet been sufficiently optimised in field operations.

For this reason, **innovative applications for tried-and-tested technology** can be a good way to satisfy the increasingly widespread need for both military and security operational capacity.

I would like to conclude by outlining the **sectors where the European Aerospace and Defence industry can – and must – continue to invest** in order to further enhance the **areas of expertise** that it already possesses:

- **New materials**, particularly composite materials for **aerostructures** and smart materials
- **Nanotechnology**, with a particular focus on **nanosensors**, starting with use in NBC applications
- **Multiband transmit/receive modules** (TRMs) on a gallium nitride substrate
- **Photonic processing on optical carriers**
- **Robotics for unmanned and unattended systems** (the latter

being completely autonomous systems with no human intervention in the management and control loop)

- **Complex integrated command and control systems** (satellite/on board/ground) with open architecture and real-time/safety-critical processing capacity for (free space) navigation aid applications
- ICT technology for **cyberwarfare** applications

Only by investing more effectively and more determinedly in high-intensity technology sectors will it be possible, if not to bridge, then at least to reduce the gap that separates the two sides of the Atlantic and at the same time maintain Europe's advantage over emerging economies, where the only effective "protectionist" strategy is to focus on state-of-the-art technology that will ensure the barriers to entry remain high.