

# Future technology landscapes: Insights, analysis and implications for defence



EUROPE

- Research and innovation are crucial to defence, providing enhanced capabilities for the armed forces and creating export opportunities. The success of the Ministry of Defence (MOD) in harnessing external sources of innovation is very important for the future of the armed forces.
- The MOD has developed successful approaches to improve its engagement with external innovators, such as the Centre for Defence Enterprise. However, further improvements could be made. The MOD should therefore review its wider engagement across the supply chain, recognising that the civil sector now dominates most of the UK technology landscape.
- The MOD should continue its work to more readily address process innovation, including issues such as training and logistics as well as new technological items.

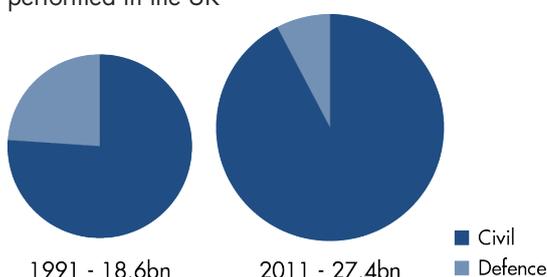
## RESEARCH

### The largest proportion of R&D investment is civilian...

Investment in research and development (R&D) improves the capability of UK armed forces both now and in the future. Moreover, high-technology exports help to sustain the R&D base in the UK. Stimulating innovation – both inside and outside the MOD – is an important aspect of effective R&D. However, the technology landscape is changing in three key dimensions. First, the development cycle for new military capabilities has decreased; second, there is greater application of civilian technologies to defence; and third, the defence enterprise is becoming increasingly internationalised.

The gap between defence R&D spending and civil R&D spending has grown significantly in recent years and is continuing to widen. This creates both opportunities and challenges for defence departments. In particular, it is important that MOD targets future R&D spending to leverage commercial developments and avoid duplication of civil investment.

Figure 1. Expenditure on Civil and Defence R&D performed in the UK



Source: Office for National Statistics, 2013

### ...MOD's research strategy needs to reflect this

The relative importance of MOD in the technology landscape is declining rapidly. Compared with the commercial sector, the MOD will be a minority actor in the future R&D environment. It must therefore develop a more strategic understanding of its impact and engagement within the broader innovation and technology landscape. To do this, the MOD should consider how to:

- **Invest strategically to maximise return on R&D.** A portfolio approach to investment and increased appetite for taking considered risks would likely deliver better overall return on investment. Identifying and investing in key parts of the value chain is also important to support development of critical technologies.
- **Improve access to emerging technology development from new sources.** The MOD should simplify and streamline procurement processes to reduce barriers to entry for new suppliers. It should also continue to develop creative ways to engage with the innovation ecosystem.
- **Ensure that the benefits of R&D investment are fully realised.** The MOD should move from a focus on developing new 'things' towards a more outcome-oriented approach. It should seek to embed technology across lines of development to derive full benefits in both effectiveness and efficiency.

## Insights in two emerging technology areas reveal implications for MOD

Our study identified sixteen emerging technology areas with potential significance for defence. The team then analysed two of these areas in detail to explore the dynamics of future development and application.

### Additive Manufacturing

Additive manufacturing – more commonly referred to as ‘3D printing’ – may have a transformative impact in a range of areas, enabling customisation of goods, localised production, added functionality and intricacy of design. However, the application, uptake and timescale for these impacts are uncertain. The MOD should prepare for the uptake of additive manufacturing and work to understand what this technology may mean for its business. As additive manufacturing technology matures, the MOD should seek to:

- Develop an understanding of the potential uses for additive manufacturing in a military context
- Engage with the research and supply base to influence the advancement of additive manufacturing and to evaluate how additive manufacturing could impact on the defence supply chain
- Investigate how additive manufacturing could impact on long-term capability planning.

### Synthetic environment

In the area of synthetic environments, the MOD has been an early adopter, pioneering the use of video game technologies within its training programme. However, after this initial push, the MOD appears to have lost some of its momentum – especially in comparison with other countries. It has also not yet embraced fully the organisational benefits that synthetic environments can facilitate. This is primarily because:

- The centralised structure and relatively rigid processes of the MOD can limit the adoption and benefits of synthetic environments
- The procurement processes of the MOD can present barriers to small and medium enterprises due to the transaction costs of working with the MOD.

In addition to engaging with developments in particular technology areas, it is important for the MOD to consider the links between technologies. Transformative impacts are often achieved by ‘connecting the dots’ between different technology areas and disciplines. It is crucial for the MOD to make connections between technology areas in order to realise the benefits that these interactions can produce.



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## ABOUT THIS RESEARCH

This document is based on a study performed by RAND Europe (*Future Technology Landscapes: Insights, Analysis and Implications for Defence*, Maryse Penney, Tess Hellgren and Matt Bassford, 2013), commissioned by Dstl in January 2013. This study aimed to provide insight into how MOD can assess and harness wider investment in relevant UK technology development. The study also evaluated which future technology and innovation models are likely to be most relevant to MOD.

For more information on this work and links to the reports please visit our website: [www.randeurope.org/dstl](http://www.randeurope.org/dstl)

During this study, we drew on RAND Europe’s expertise and analysis across a number of areas:

**Supply and demand side innovation strategy:** assessment of the evidence base on how to stimulate innovation and capture value.

**Science of science:** analysis of the impact of research, following technological development from initial investment through to product commercialisation.

**Key industrial skills:** identification of the skills which are critical to sustain industrial capabilities and meeting equipment targets.

**Supply chain management:** focusing on strategic industrial issues such as security of supply, non-dependence and supplier relations.

**Internet of Things:** investigation of the legal, social, political and industrial implications of the increasing connectivity of everyday objects.

**Futures analysis:** application of structured approaches to provide insight into future trends.

## CONTACTS



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