Addressing key European Defence Technology and Industrial Dependences

10-R&T-OP-33

Executive summary

11/05/2012

Introduction

The purpose of this study was to map and analyse European defence technology and industrial dependences, develop a methodology for dependence management and to identify a set of priority actions. This was in the context of the ability of European member states to deliver future military capability. Two case studies on air platforms, UAS and helicopters, were selected to illustrate what dependency means in practice and the experience of other government and industrial areas was examined for best practice. To achieve the overarching goal the study sought to develop a methodology for dependence management and to identify a set of priority actions. The study was commissioned by the European Defence Agency and was conducted between April 2011 and March 2012 by a consortium that comprised FOI, ONERA and RAND Europe.

Context

Reducing European defence technological and industrial dependence on non-European sources has gained increasing prominence in recent years; at both national and pan-European level. In April 2011, these issues were discussed in detail at the 2011 EDA conference on European Technology non-Dependence.

Parallel streams of activities have been taking place across European institutions and Member States to address this issue of dependences. For instance, the EDA sponsored a number of studies in order to develop a strategic understanding of dependences in industrial and technological sectors. These include studies such as those on precision guided ammunition (PGA), future air systems (FAS4Europe), and a series of technology roadmaps including DISCOTECH and EOMAP. In parallel, other actors such as ASD and the European Space Agency have led initiatives on critical technologies, while the UK and France are including dependence management as part of their bilateral cooperation.

The EDTID study was designed to fit within and to complement this wider set of initiatives. Consequently, the study took an overarching approach, aiming to provide a framework within which to address the complexity of the dependence issue over different time-scales. This framework was designed to be applicable for the range of stakeholders and to cover the diverse scope of technological areas.

Objectives

The overall objective of the study was to map and analyse European defence technology and industrial dependences, develop a methodology for dependence management and to identify a set of priority actions. In this context it shall provide a general framework for systematic and evidence-based identification and management of industrial and technological dependences. In order to achieve this outcome, the project developed a methodology for pMS to analyse and manage risks linked to dependences and identified a set of up to ten European-level priority actions, each accompanied by a business case and roadmap for implementation. Further objectives were to conduct case studies on air platforms, UAS and helicopters, in order to illustrate what dependency means in practice and the experience of other government and industrial areas were examined for best practice. Relevant documents like the FAS4Europe study had to be referenced.

Study approach

To deliver these objectives, the research team developed an approach divided into several streams of work. One work stream defined the conceptual framework and the capability-based approach used throughout the study, and saw the development of a dependence risk management methodology. A case study on the aeronautic sector provided the vehicle with which to test and refine the methodology while providing the background for an industry survey on dependences, also exploring dependence management practices and potential actions at European level. The third stream of work aimed to identify best practices for dependence management in other industrial sectors as well as in the US DoD. The understanding gained in all these work streams was combined to identify a list of priority actions.

Findings

A **series of consultations with pMS** – through workshops and interviews – provided insight into the different approaches and actions taken by nations regarding the issue of dependences and the role for co-ordinated action at European level. While all pMS acknowledged the potential risks associated with dependences, there is currently little shared understanding of which dependences are most critical or which instruments are most suitable in addressing them. In addition, although there is widespread interest in the benefits of coordinated European action, there are areas where some member states consider bilateral action or an entirely

national approach to be the preferred framework for dependence management. A key conclusion of the evidence gathered is that the ambition of having a comprehensive set of agreed EU-level priorities in terms of investment is not aligned with current policy reality.

However, this does not exclude the case for wider European action. Rather, there is substantial room for efforts dedicated to empower pMS to address dependences by *developing applicable tools* and to *foster consensus* for action in selected areas. The tools required include methodologies, appropriate institutions and tested mechanisms for mitigating different aspects of the dependence problems. Priority actions should be dedicated to the creation of such tools and serve as pilots towards a stronger agreement on collaboration.

Our **overall assessment of European dependences** is that the defence system integration level in Europe is currently relatively healthy and globally competitive. However, the increasing disparity between European spending on defence R&D compared with US spending is likely to threaten this position in the future. The military aeronautics sector is particularly at risk, with a potential capability gap for next generation fighter aircraft and also for future unmanned air systems (UAS). The parallel study commissioned by EDA on military air systems (FAS4Europe) analysed these issues in detail. Cyber security is, like UAS, an emerging area, which requires attention in order for Europe not to lag behind the leading world actors. The complex weapons sector has some gaps, but here European collaboration is broadening industrial capability. At the sub-system and components levels there are several problematic areas, e.g. in high performance sensors. There is currently a strong dependence on the US for navigation and positioning technology, but Galileo and commercial sensor technology should reduce this dependence. Other areas such as data fusion and signal processing have limited dependence in a system development sense, i.e. European industries use European solutions, but rather a military capability gap, which implies operational dependences in coalition operations. Other operational timescale dependences concern validated data sets and operational models needed for planning and safe conduct of military operations.

An important conclusion from this is that there currently exists a European industrial base that can act to manage and reduce dependence issues but that the window of opportunity for action is limited.

Deliverables

To help pMS handle the complex field of dependences the study developed a **dependence risk management methodology**. The methodology consists of modules for *mapping capabilities and technologies, risk assessment*; and *mitigation analysis*. It is crucial to emphasise that defence dependence management has both a market-oriented side, similar to industrial Supply Chain Management, and a political one.

The other key deliverable of the study was **a portfolio of proposed priority actions towards European management of dependences.** This portfolio was developed in line with the dynamic approach outlined above. It contains a number of early actions to serve as pilots with the intention of demonstrating new forms of collaboration between pMS in addressing issues of collective concern. It is likely that certain actions will be more pertinent for certain pMS but most nations should find items of practical value. Consequently, the priority actions we have developed cover a range of dependence types and management methodologies. They are not intended to represent an exhaustive list of interventions; rather the list is designed as a starter set of dependence management initiatives. In addition the study has also identified a number of areas where further investigation is required.

Recommended actions

Four of the ten proposed actions focus on harvesting and leveraging European technological excellence to meet defence needs. Each of four actions is tailored towards a segment of the spectrum from COTS to defence specific technologies, as illustrated by Figure 1. Each action is about developing a generic tool, but specific pilot cases are identified in the study.

- *COTS-driven innovation*: this action addresses areas where COTS could potentially drive innovation: for example in navigation, positioning and communication. The proposed action requires domain specific demo projects, in particular regarding how to solve military specific security requirements based on a COTS platform. There are also structural efforts such as the formation of an incubator.
- *Smart use of COTS* focuses on the use of COTS components in supporting what is at the core military-specific innovation. This typically requires design, verification, packaging and assembly of COTS components to enable military qualification; consequently the proposed action is geared to strengthening these capabilities.

- *Identify and exploit dual use potential component technologies*. For some technologies, military applications are natural first adopters, but civilian applications may follow, hence motivating civilian R&T investments (e.g. from H2020) and enabling lower cost supply for military use in the future. Specifically the proposed action focuses on identifying civilian stakeholder and building joint communities.
- *Create or secure defence specific suppliers*: There are many candidate areas for this tool, including major military-specific R&T efforts on specific topics. Our proposal, however, is for a relatively small and industrially oriented pilot to explore and address the policy, legal etc. issues associated with a multinational setting. Precision Guided Ammunition power supply has been indicated as a case in point.

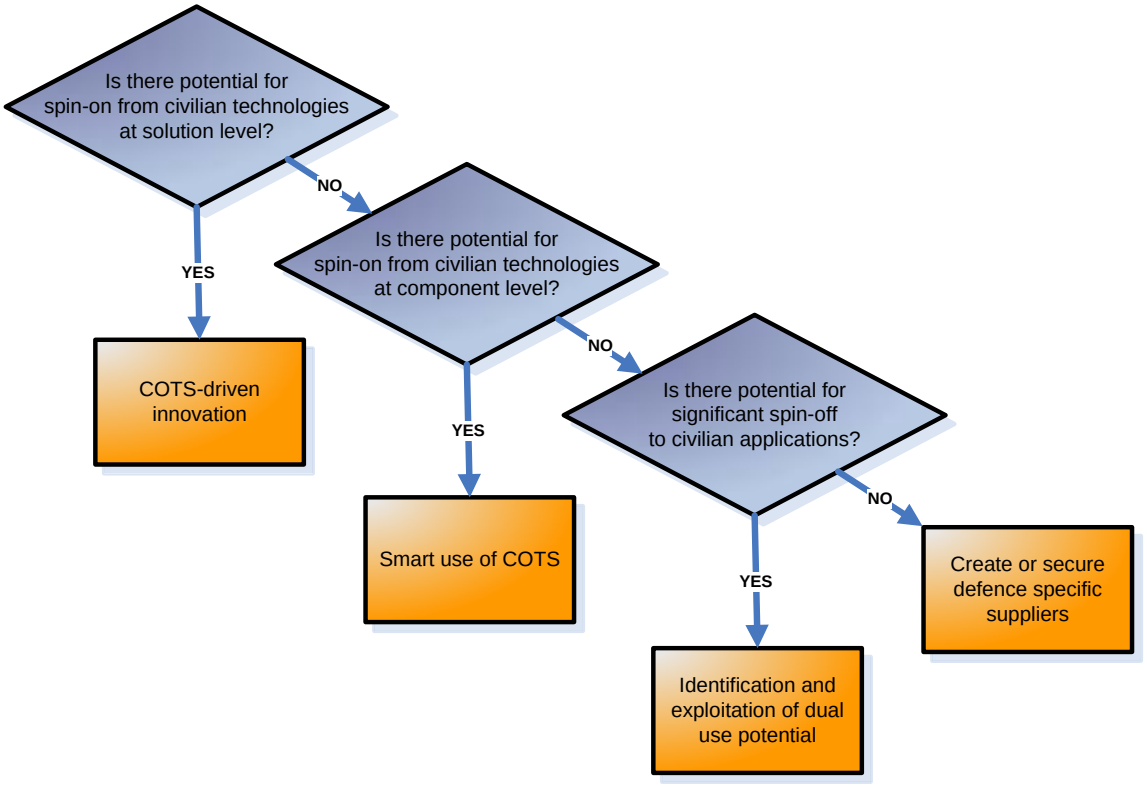

Figure 1. Proposed priority actions as they relate to civil technologies and applications

Four further actions dedicated to providing institutional tools for European dependence management are proposed. The first three are supporting in nature, while the last mitigates dependences in the supply of commodities for the use of European defence forces.

- *Technology foresight: early identification of emerging and key enabling defence technologies*. The purpose of this business case is to coordinate and enhance existing Eu-

ropean efforts to identify and early stage technologies with potential for defence. This would be delivered though establishing a capacity to synthesise existing foresight analysis and prioritise coordinated investment.

- *Establish a monitoring framework for the defence supply chain.* Although many European defence suppliers have structured risk management systems in place for technology dependences, there are very few examples of sharing knowledge and sharing good practice between defence suppliers. Hence, we propose an initiative to pilot and establish a joint monitoring framework though creating the right behaviours and incentivising trust and information sharing.
- *Establish EU-US market intelligence working group*. The EU and the US face a number of shared challenges but work independently to address them. This initiative would establish a joint working group designed to exchange good practice, share information on supply and demand of raw materials and standard components, and improve forecasting capabilities.
- *Manage commodity supply* explicitly addresses the issue of bottlenecks, and is specifically dedicated to an operational time-scale dependence. The proposed action concerns the establishment of a supply chain mapping capacity and conduction stress-testing exercise with respect to commodity supply

Finally, there are two actions which propose investment into priority areas, where sufficient consensus has been found to enable joint action:

- *Exploit and enhance operational modelling* concerns the technological support required to use advanced equipment in operational settings – an operational dependence of a clearly strategic nature. The area also has a link to systems development since the same or similar models are useful for qualification of systems. The proposed action would create stronger collaboration in terms of exchange of models, exchange of data and joint experimentation for validation and data generation.
- *Invest in a technology demonstrator in UAS capabilities*. This study – in common with others – has identified sensors as an area of high risk in terms of industrial capability that requires action in the near term. This business case outlines a technology demonstrator programme to develop technologies and sustain existing capabilities in a range of areas relevant to UAS. In addition to sensors this would also include wide-

band transmitters/receivers; signal processing and related technologies. Other options for a demonstrator addressing critical dependences include novel EO/IR sensors for UAS and low observability shaping & radio-frequency absorbing materials to develop and sustain European industrial capability in stealth.

Taken as a portfolio, these recommendations provide a starting point for shaping European action on dependence management. The focus is building consensus on priority areas and taking action where priorities have already been identified. To aid implementation we also present a high level roadmap in the report. The balanced nature of the recommendations set will help to create a first step in broad pMS engagement on the important issue of dependence management – and leverage existing strengths in the European defence technological and industrial base.

Conclusion

In conclusion there is a strong case for a more coherent European approach to managing dependences of the Defence Technological and Industrial Base. Priorities among Member States are, however, not fully aligned. Therefore a dynamic approach is needed such that early actions serve as pilots towards a stronger agreement on collaboration. In this spirit the study has developed a methodology for dependence management and a portfolio of proposed priority actions. It is likely that certain actions will be more pertinent for certain pMS but most nations should find items of practical value.