MINISTRY OF DEFENCE

National Security Through Technology:

Technology, Equipment, and Support for UK Defence and Security

National Security Through Technology:

Technology, Equipment, and Support for UK Defence and Security

Presented to Parliament
by the Secretary of State for Defence
By Command of Her Majesty

February 2012

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White Paper (Cm8278) Enquiries
DCC&E
5.N.23
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Whitehall
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SW1A 2HB

or

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Foreword

Peter Luff MP
Minister for Defence Equipment, Support, and Technology

James Brokenshire MP
Minister for Crime and Security

As global events continue to demonstrate, we live in a dangerous and unpredictable world. In autumn 2010 we set out what we believe to be the most substantive threats to the UK's national security, and our response to them, in the National Security Strategy and the Strategic Defence and Security Review (SDSR). We cannot afford to take risks with those threats.

We need to transform both the Ministry of Defence itself and the UK Armed Forces, as embodied in the vision of Future Force 2020, to deliver the objectives set out in those documents. We also need to take full account of the increasing overlap between the defence and security threats we face and the need to maintain our ability to respond to them.

This is a huge task. It is not enough to tackle the serious over-commitment in the defence equipment and support programmes that we inherited from the last Government; nor to implement the Levene review and give the military the ability and responsibility to make real capability trade-offs. It is not enough to turn Defence Equipment and Support into an organisation fit for purpose through Bernard Gray's Materiel Strategy work; nor to bring our regulations for single-source contracts up to date, as outlined in Lord Currie's independent report. It also means taking a new approach to buying and supporting defence and security equipment from industry.

This time last year we consulted on our proposed new approach in a Green Paper. We had a large number of responses with a wide variety of views; a summary of the responses is published alongside this White Paper. There were, though, a number of common themes that came through strongly. One was the need for Government to provide industry with transparency of our future plans. Another was to balance the defence equipment programme so that we do not keep delaying or cancelling projects.

One of our most important responses to both of these points will be the publication later this year of the MOD's ten-year equipment plan. This will represent a significant achievement.

We are focused on ensuring best value-for-money and delivering the best equipment for the Armed Forces and the security services. That is why this paper sets out how we will use competition as our default position and why we will look at the domestic and global defence and security market for products that are proven, that are reliable, and that meet our current needs. This principle is, though, qualified by the need to take action to protect our technological advantage where essential for national security.

Last year we published the updated CONTEST counter-terrorism strategy, setting out some of the key security challenges facing the UK today. The continued threat from Al Qa'ida and its affiliates, from lone actors, and from Northern Ireland related terrorism demands a concerted cross-government effort to deliver better national security through technology. Protecting our national infrastructure and borders, delivering the right equipment to our military, law enforcement and intelligence agencies, and ensuring that we have a coordinated approach to the overseas and domestic threat picture are all essential to the success of CONTEST. This approach provided the basis for the successful planning phase for 2012 Olympics Security and the resulting, highly acclaimed, Secure by Design methodology shows the high-quality, reusable outcomes that can be achieved through public/private collaboration and partnership. This White Paper provides a framework for bringing the military, civilian, and UK industry players closer together to deliver the technology and services we need to defend our national security, so that people can go about their lives freely and with confidence.

We believe that the best way for the UK defence and security industries to remain strong, with some of the most high-tech and advanced manufacturing facilities in the world, is to be competitive. That is why this Government will continue to support responsible defence and security exports; why we are helping to create the right conditions for companies in these sectors to invest in the UK, and why we will take significant steps to ensure small and medium sized companies can continue to deliver the innovation and flexibility we need. There was strong support for these actions in the consultation responses.

We share the concern raised in the consultation about the need to continue investing strongly in defence and security science and technology, an area where cuts have been significant over the last fifteen years. This paper sets out how we will support science and technology spending and our specific priorities for future defence research spending. It also sets out how we will protect the people, infrastructure, and intellectual property that allow us to build and maintain our national security structure.

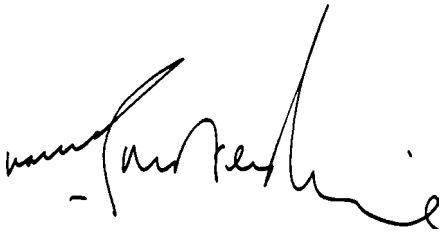
Many companies wanted a list of areas that we will protect, similar to that set out in the Defence Industrial Strategy of 2005, which this document replaces. At a time of constrained budgets and unpredictability of threat, we believe it is more appropriate to set out our understanding of what operational advantages and freedom of action we need to protect, and what steps we will take to preserve the minimum elements necessary to protect our national security. This approach provides a clear guide to industry and to the acquisition community that should endure beyond the next SDSR.

We are proud of the strength of the UK defence and security industries. They help the UK Armed Forces and security services to deploy around the world with some of the very best kit available; and they also ensure our law enforcement agencies remain among the best trained and best equipped. Indeed, they are better equipped now than they have ever been. The UK defence industry is the second biggest defence exporter in the world and the UK security industry has a good base to improve from. There are around 300,000 jobs in the UK associated with UK defence spending and defence exports. With the fourth largest defence budget in the world, the government spends around £18 billion for defence purposes with manufacturing

and service companies in the UK every year. Significant sums are also spent by the various security services and law enforcement agencies. The UK domestic market for security products is valued at £1.8 billion annually and UK industry is the fifth most successful exporter of security products in a global market valued at £260 billion. We recognise the wider impact such spending and exports can have and we are therefore establishing a new Ministerial working group to ensure that the consequences of MOD's decisions on defence spending on strategically important defence and security projects are considered and that we deliver the broad and ambitious intentions captured in this White Paper.

This White Paper is intended to be a high-level guide to our approach. Coupled with the publication later this year of the MOD's ten-year equipment plan, it will give the clarity that will help industry to invest in the right areas, protecting both our security and the contribution these companies make to the UK economy.

Peter Luff MP
Minister for Defence Equipment, Support, and Technology



James Brokenshire MP
Minister for Crime and Security

Executive Summary

i. Defending the UK is one of the Government's primary responsibilities. To achieve this, we need to provide our Armed Forces and national security agencies with the best capabilities we can afford, to enable them to protect the UK's security and to advance the UK's interests, both now and in the long term; and in doing so, to obtain the best possible value-for-money for the tax-payer.

ii. Wherever possible, we will seek to fulfil the UK's defence and security requirements through open competition in the domestic and global market, buying off-the-shelf where appropriate, in accordance with the policies set out in this paper. Procurement in the defence and security areas is, however, fundamentally different from other forms of procurement, so we will also take action to protect the UK's operational advantages and freedom of action, but only where this is essential for our national security. This new approach is shown in the diagram on page 16.

iii. Defence and security procurement has a significant industrial and economic impact. Our policy on technology, equipment, and support for UK defence and security also supports our wider economic policy objective to achieve strong, sustainable, and balanced growth for the UK. The Government has a vital role in supporting UK-based industry to succeed in a competitive global marketplace.

iv. Our assessment of the affordability of MOD's ten-year equipment plan, which will be published later this year, will enable UK-based industry to focus its investment in technology and development work and manufacturing infrastructure, thereby reducing costs and overheads and making its products more competitive for UK and overseas customers. And it will contribute to our wider initiative of publishing procurement pipelines for a range of sectors to give suppliers the confidence to invest for the future and compete on a level playing field.

v. We will ensure that the UK continues to provide a unique environment for industry in the defence and security sectors: a larger proportion of our overall business is open to competition than in many other major nations; we have a sophisticated demand for high-value products which have to stand up to active service; and we have an open market and diversity of suppliers that encourages innovation, new entrants, and inward investment.

vi. Generally we will favour bilateral collaboration on technology, equipment, and support issues, as we believe this offers the best balance of advantages and disadvantages. We will continue to work multilaterally, for example through NATO or the EU, where this offers a clear benefit to the UK. International programmes provide important opportunities for UK-based industry and we will look to encourage and support participation in such programmes.

vii. Technology underpins most equipment and support arrangements. The global availability of technology combined with an ever-increasing pace of technological change means that, in delivering the UK's defence and security, we face an increasingly capable and diverse range of threats. These are likely to include not only sophisticated military weapons, but also greater innovative and ingenious application of readily available civil technologies. Where adversaries can more easily buy high-technology products on the open market, this potentially reduces our operational advantages.

viii. The current impact and widespread influence of technology in our world stems directly from increased consumer demand and better manufacturing techniques. It is also the product of earlier scientific research, which in turn depended on investment, whether by the public or private sectors. To understand, counter, and protect against such threats, we need to be able to use effective investment in defence and security science & technology to access and deliver technology into our future systems and equipment to provide operational advantage. Given the critical role that science & technology plays in supporting our immediate needs and programmes, we will need to manage carefully the balance between this and addressing our future capability needs. We also need to ensure our own technical capability, infrastructure, and research organisations are carefully prioritised to retain our ability to be an intelligent customer, develop specific solutions, and maintain credibility with our allies.

ix. We are, therefore, carefully prioritising investment in science & technology. It is our intention to sustain investment at a minimum of 1.2% of the defence budget. Furthermore, despite the difficult financial position, we are planning a small rise in cash terms in defence science & technology spending over the period of the Comprehensive Spending Review.

x. We will focus investment of defence-related and security-related science & technology over the current Comprehensive Spending Review period in order to achieve the following six critical outcomes:

- support to current defence and security operations;
- plan for future capabilities that will be needed in the longer term;
- cost reduction and more future proof systems;
- support to critical science & technology capabilities/facilities;
- provide timely and effective advice to Ministers and Government; and
- particular focus on the human and sociological aspects of capability.

xi. Building on the Centre for Defence Enterprise's (CDE) success in providing efficient access to innovation, we will broaden its remit to cover both the defence and security domains. As part of this, we will seek ways to provide more support to small- and medium-sized enterprises in the development of routes to market for potential products and to enhance communication mechanisms between CDE and our suppliers.

xii. The Government recognises that, to fulfil the aims set out in this White Paper, we need thriving, innovative, and highly efficient suppliers. A healthy and competitive industry in the UK makes a significant contribution to developing and sustaining key defence and security capabilities, as well as contributing to export-led growth and a re-balanced economy. This also gives us greater leverage with international partners.

xiii. A well-regulated trade in defence and security products helps the Government to underpin strategic relationships and enhance the security capacity of our allies. We value highly the important role of defence and security exports in strengthening the UK economy and are clear in our commitment to promoting them overseas.

xiv. We will work to enable UK-based industry to be sufficiently competitive to provide best value-for-money to the UK taxpayer in meeting our defence and security needs and to export successfully. This approach is pragmatic, not altruistic: we will be supportive, but not protectionist.

xv. Cyberspace is complex, rapidly changing through increasing interconnection, and bringing us all closer together. This presents new opportunities and new challenges across the UK. The UK Cyber Security Strategy[1] recently set out the approach we will take to realise the huge potential of cyberspace for the UK; making this country one of the most secure places in the world to do business in cyberspace, more resilient to cyber attack and better able to protect our interests in cyberspace; and helping to shape an open, vibrant and stable cyberspace which the UK public can use safely and that supports open societies.

xvi. As part of our wider policy objectives, we will create the conditions for greater global private sector investment in the UK and to maximise the benefits of public sector investment. A healthy defence and security industry, including SMEs, brings wider economic benefits, in terms of providing jobs, maintaining skills, and making a considerable contribution to the Exchequer. The companies involved in defence and security already sell significant volumes of goods and services abroad at a time when strong and balanced growth, driven partly by increased exports, is the overriding priority of the Government.

xvii. We recognise that not all markets across the world share the UK's conditions and therefore will continue to promote open markets in defence and security capabilities. Our overall aim is to secure freer access to these markets, improve the flow of defence information and technology across borders, and to enable the UK defence industry to compete on merit in other markets. Ministers from across Government will do their utmost to assist UK-based suppliers in obtaining export orders.

xviii. We will also provide increased opportunities for small- and medium-sized enterprises to fulfil their potential in supplying defence and security requirements. This includes making our processes more transparent, simpler, and faster, which is seen as particularly important to SMEs. This is part of our wider work to simplify public procurement processes, which includes introducing a package of measures to ensure public procurement promotes growth, such as publishing medium term procurement pipelines, simplifying procurement processes to reduce burdens on industry, and engaging with potential suppliers at a much earlier stage, before formal procurement begins, to increase their opportunities to participate.

xix. In the security sector, we are evaluating the potential benefits of appointing a Senior Responsible Owner (SRO) within Government to head up a security authority and the merits of developing a UK Security Brand.

xx. We are establishing a new Ministerial Working Group to co-ordinate the cross-Government aspects of our new approach.

xxi. We will ensure that our Armed Forces and the wider national security community continue to get the equipment and support they require at an affordable cost and at value-for-money to the taxpayer. This will encourage a vibrant UK-based industry that is able to compete against the best in the world to meet not only the UK's needs, but is also able to win a significant share of the world market.

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1 http://www.cabinetoffice.gov.uk/resource-library/cyber-security-strategy .

Part 1: UK Defence and Security Procurement

1. The first part of this White Paper sets out how we will procure technology, equipment, and support to meet the UK's defence and security needs. The second part looks at the wider UK perspective – including growth, skills, and emerging sectors – in the context of our defence and security procurement policy and at Government action to encourage UK-based companies to fulfil our requirements and export successfully.

Chapter 1: Our New Approach

1.1 Technology, Equipment, and Support for UK Defence and Security

2. The 2010 National Security Strategy[2] and Strategic Defence and Security Review[3] set a target for the national security capabilities that the UK will need by 2020 and charted a course for getting there. This paper sets out a formal statement of our approach to technology, equipment, and support for UK defence and security, taking account of the responses we received in the public consultation last year[4].

3. This is our high-level policy until the next strategic review, which is expected to be held in 2015. It supersedes the Defence Industrial Strategy 2005 and the Defence Technology Strategy 2006.

2 A Strong Britain in an Age of Uncertainty: The National Security Strategy (Cm 7953) October 2010.

3 Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review (Cm 7948) October 2010.

4 Following the publication of the Green Paper 'Equipment, Support, and Technology for UK Defence and Security' (Cm 7989) in December 2010, a public consultation was held between January and March 2011. A summary of the responses received is being published in parallel with this White Paper. See Equipment, Support, and Technology for UK Defence and Security: A Consultation Paper - A Summary of the Consultation Responses (Cm 8277) February 2012.

1.2 Our objective

4. The sole objective of defence and security procurement, financed through the defence and security budgets, is:

To provide our Armed Forces and national security agencies with the best capabilities[5] we can afford, to enable them to protect the UK's security and to advance the UK's interests, both now and in the long term; and in doing so, to obtain the best possible value-for-money[6].

Part One of this paper explains how that objective will be achieved; and in particular our Open Procurement principle:

Wherever possible, we will seek to fulfil the UK's defence and security requirements through open competition in the domestic and global market

which will be qualified by the principle of Technology Advantage:

We will take action to protect our operational advantages and freedom of action, but only where this is essential for national security.

5. Our policy on technology, equipment, and support for UK defence and security also supports our wider economic policy objective to achieve strong, sustainable, and balanced growth for the UK. Defence and security procurement has a significant industrial and economic impact. The Government has a vital role in supporting UK-based industry to succeed in a competitive global marketplace. Part Two of this paper explains these linkages and how we are supporting exports and encouraging SMEs in these important sectors.

1.2.1 Defined requirements consistent with a defined budget

6. This Government inherited a defence programme with a £38 billion deficit, as well as under-provision for risk and optimism bias, so we have been determined not to repeat the mistakes of the past. We are making the difficult decisions that are needed to match commitments effectively to resources and will be bold and ambitious, in order to build formidable, well-managed Armed Forces that are structured for the rigours of future conflict and supported by an affordable defence programme.

7. As previously announced, the Ministry of Defence (MOD) will be publishing later this year an assessment of the affordability of its ten-year equipment plan, reviewed by the

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5 In this context, a capability generally comprises a body of highly trained people operating in accordance with UK doctrine and procedures, who have the necessary equipment and support to carry out the specialist tasks which they have been assigned. Support is essentially the range of activities that maintain a capability throughout its life-cycle – i.e. from acquisition to disposal. Much of this support comes from contractors providing services. As a rule of thumb, the cost of supporting a defence capability throughout its life is often said to be three or four times the cost of its initial procurement.

6 Value-for-money is the optimal combination of time, cost, and effectiveness, within available resources. It is a relative concept, which involves the comparison of potential and actual outcomes of different procurement options. Value-for-money for each programme is determined on a case-by-case basis, depending on the circumstances. Non-quantifiable factors may be relevant to value-for-money assessments, such as a supplier's track record and financial robustness. The MOD does not consider wider employment, industrial, or economic factors in its value-for-money assessments.

National Audit Office. The new realism about the equipment budget and programme costs will allow the MOD to give industry a clear, comprehensive, and credible view of plans for future procurement. This in turn should enable industry to provide the MOD with a much clearer view of its ability to meet the specified requirements, as well as to plan more effectively and invest more confidently in the development of new technologies – to the advantage both of firms and of the nation. This is consistent with the Green Paper consultation responses, which argued strongly for greater transparency of future requirements and budgets to allow industry to invest. And it will contribute to our wider initiative, led by the Cabinet Office, which is publishing procurement pipelines for a range of sectors to give suppliers the confidence to invest for the future and compete on a level playing field.

1.3 Achieving value for money: the Open Procurement principle

8. In many respects, the UK's defence and security requirements are just like the requirement of the National Health Service to procure the equipment it needs to treat patients or the requirement of the Fire and Rescue Services to procure the equipment they need to handle emergencies. Our general policy in these and many other fields of public procurement is to use open competition to achieve value-for-money – obtaining the best products and services at the lowest possible cost to the taxpayer.

9. Our starting point for defence and security procurement is the same. The Open Procurement principle is:

   Wherever possible, we will seek to fulfil the UK's defence and security requirements through open competition in the domestic and global market.

   In doing so, we will also seek to:

   - buy off-the-shelf[7] where appropriate, in accordance with the policies set out in this paper;
   - use a common set of open principles, rules, and standards wherever possible, to ensure that we have the flexibility and agility to upgrade capability incrementally and to ensure interoperability with our key allies;
   - make defence and security procurement as accessible as possible to small- and medium-sized enterprises (SMEs); and
   - ensure that support services provided by industry are increasingly integrated with our defence and security agencies so they can provide assured availability during operations.

10. We believe that applying the principle of open procurement will result in the greatest possible value-for-money for our defence forces and security agencies. Open procurement also offers the best catalyst for UK-based industry in the defence and security sectors to be efficient and competitive – and provides them with the best chance of gaining export markets, increasing their profits and market share, and reducing the taxpayer's cost of purchase.

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7 Off-the-shelf is usually understood to mean that a suitable product or service is readily available in the open market. This is discussed in more detail in Section 2.2 below.

1.4 Why defence and security procurement is different: the Technology Advantage principle

11. Open procurement cannot, however, be the whole answer, because the defence and security sectors are in two fundamental respects different from other fields. To defeat our adversaries and to protect ourselves at times when we most need to do so:

    - we often need superior technology and other forms of battle-winning edge (so-called "operational advantage"); and
    - we must be able to operate, maintain, and refresh certain capabilities effectively, without being dependent on others (so-called "freedom of action").

    As with all acquisition choices, this is subject to affordability and value-for-money. The extent to which we choose to protect our operational advantages and freedom of action always involves a balance of risk and opportunity cost.

12. Our principle of Open Procurement will, therefore, be qualified by the principle of Technology Advantage:

    We will take action to protect our operational advantages and freedom of action, but only where this is essential for national security.

    In doing so, we will:

    - identify and, if essential for our national security, take action to protect the critical areas where the UK needs either an advanced technology to counter our adversaries or special products or services to maintain our freedom of action, particularly during operations;
    - protect our ability to evaluate independently the effectiveness of technologies and equipment;
    - work with close allies to develop technology, equipment, and support arrangements that meet our mutual defence and security needs;
    - preserve a lean but effective group of highly skilled people within our defence and security establishment who are capable of acting as intelligent customers[8] for such advanced technologies and support services;
    - retain within Government research organisations those specific capabilities which are essential for our national security and use these organisations in a more coherent way to give us the greatest possible scope for technological advance; and
    - work closely with potential suppliers to ensure that they have a full understanding of our future requirements, so that they can develop appropriate advanced technologies and healthy supply chains.

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8 We define being an intelligent customer as 'having a clear understanding and knowledge of our requirements and of the products or services being supplied in response, including the management of their supply, as well as the ability to use those products or services safely and effectively'.

13. We will also seek to minimise the costs of obtaining operational advantage and freedom of action by, wherever possible:

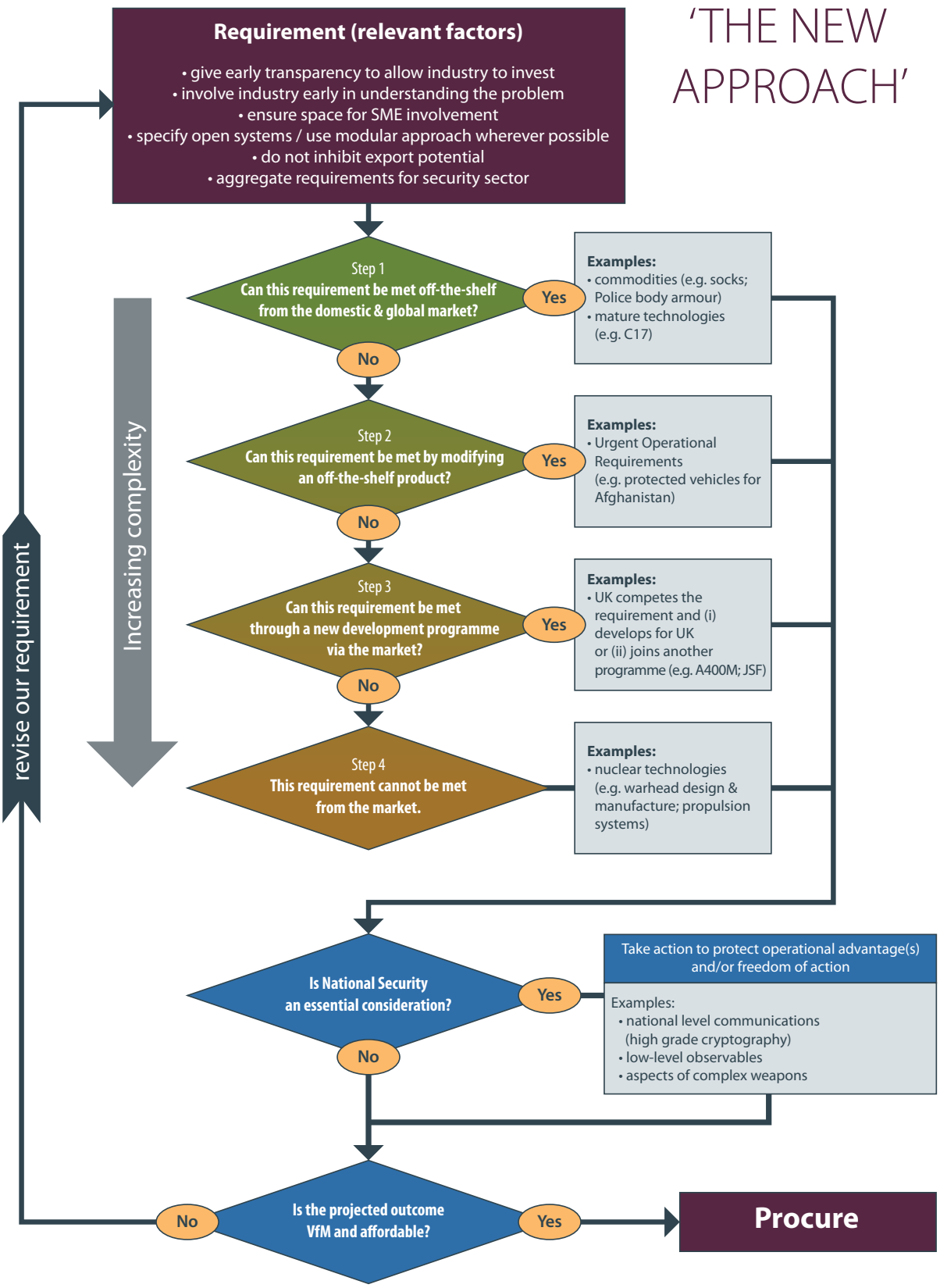
- integrating advanced technologies into standard equipment purchased through open procurement;
- sharing and developing appropriate technologies with our key allies;
- seeking the best and most advanced civilian technology that can be adapted and incorporated into defence and security equipment to give us operational advantage; and
- making the greatest possible use of synthetic training and simulation to reduce the cost of training personnel, particularly when applying advanced technologies to new capability needs.

1.5 Application of our New Approach

14. The diagram at Figure 1 is a high-level, schematic representation of how our new approach will work in meeting the future technology, equipment, and support requirements for UK defence and security. The key feature to note is that moving from Step 1 to Step 4 generally introduces greater complexity and therefore risk. It also requires greater direct investment by the Government. This is why we aim to procure capability off-the-shelf (Step 1) where appropriate, in accordance with the policies set out in this paper.

15. For clarity, the diagram does not attempt to show every aspect of the new approach. Three important factors in particular are not shown. First, it only shows one feedback loop, whereas in practice establishing a requirement and the best means of delivering it is a much more iterative process. Second, the question of whether to work with another country to procure capability (see Section 3.2) will be considered at the initial stage, but will be revisited as the time/cost/risk factors of successive stages in the process become clearer. Third, the new Ministerial Working Group may also be involved at different stages in the process (see Sections 1.7 and 5.4).

Figure 1


'THE NEW APPROACH'
Requirement (relevant factors)
• give early transparency to allow industry to invest
• involve industry early in understanding the problem
• ensure space for SME involvement
• specify open systems / use modular approach wherever possible
• do not inhibit export potential
• aggregate requirements for security sector
Step 1
Can this requirement be met off-the-shelf from the domestic & global market?
Yes
No
Examples:
• commodities (e.g. socks; Police body armour)
• mature technologies (e.g. C17)
Step 2
Can this requirement be met by modifying an off-the-shelf product?
Yes
No
Examples:
• Urgent Operational Requirements (e.g. protected vehicles for Afghanistan)
Step 3
Can this requirement be met through a new development programme via the market?
Yes
No
Examples:
• UK competes the requirement and (i) develops for UK or (ii) joins another programme (e.g. A400M; JSF)
Step 4
This requirement cannot be met from the market.
Examples:
• nuclear technologies (e.g. warhead design & manufacture; propulsion systems)
Increasing complexity
revise our requirement
Is National Security an essential consideration?
Yes
No
Take action to protect operational advantage(s) and/or freedom of action
Examples:
• national level communications (high grade cryptography)
• low-level observables
• aspects of complex weapons
Is the projected outcome VfM and affordable?
No
Yes
Procure

1.6 The wider UK perspective

16. We recognise that, to fulfil the aims set out in this White Paper, we need thriving, innovative, and highly efficient suppliers. A healthy and competitive industry in the UK makes a significant contribution to developing and sustaining key defence and security capabilities, as well as contributing to export-led growth and a re-balanced economy.

17. We recognise in particular that:

- the defence and security sectors are an integral part of the UK's advanced manufacturing sector, supporting many highly-skilled jobs and vibrant supply chains; and
- Governments are the leading customers of defence and security goods and therefore our procurement approach and the differing approaches in other countries shape the defence and security market;

and we have:

- an economic policy objective to achieve strong, sustainable, and balanced growth that is more evenly distributed across the country and between industries.

1.7 Taking action

18. We are taking specific action:

- Ministers from across Government are doing their utmost to assist UK-based suppliers in obtaining export orders;
- we strongly support exportability, including by creating opportunities for export potential to be built early into our own equipment and support requirements;
- there are increased opportunities for small- and medium-sized enterprises to fulfil their potential in supplying defence and security requirements; and
- a new Ministerial Working Group is being established to co-ordinate the cross-Government aspects of our new approach.

1.8 Opportunities for UK-based industry

19. We continue to procure defence and security technology, equipment, and support worth tens of billions of pounds per annum. The approach described in this White Paper provides multiple opportunities for UK-based industry:

- through participation in open competition, UK-based suppliers will maintain their efficiency and remain competitive with the best in the world;
- the increased use of off-the-shelf purchasing will give UK-based suppliers the chance to sell equipment and support services that are easily exportable; and
- through close cooperation in advanced technologies and operationally critical support, UK-based suppliers can earn profits while enhancing our defence and security capabilities, at costs that represent value-for-money.

20. Our assessment of the affordability of MOD's ten-year equipment plan, being published later this year, will enable UK-based industry to focus its investment in technology and development work and manufacturing infrastructure, thereby reducing costs and overheads and making its products and services more competitive for UK and overseas customers.

21. We recognise that many of the large companies that supply the UK are now transnational in outlook and therefore have choices about where they invest. We will ensure that the UK continues to provide a unique environment for industry in the defence and security sectors: a larger proportion of our overall business is open to competition than in many other major nations; we have a sophisticated demand for high-value products that have to stand up to active service; and we have an open market and diversity of suppliers which encourages innovation, new entrants, and inward investment.

Chapter 2: Open Procurement

The Open Procurement principle is:

Wherever possible, we will seek to fulfil the UK's defence and security requirements through open competition in the domestic and global market.

In doing so, we will also seek to:

- buy off-the-shelf where appropriate, in accordance with the policies set out in this paper;
- use a common set of open principles, rules, and standards wherever possible, to ensure that we have the flexibility and agility to upgrade capability incrementally and to ensure interoperability with our key allies;
- make defence and security procurement as accessible as possible to small- and medium-sized enterprises (SMEs); and
- ensure that support services provided by industry are increasingly integrated with our defence and security agencies so they can provide assured availability during operations.

2.1 Open competition

22. Our default position is to seek to fulfil the UK's defence and security requirements through open competition on the domestic and global market. We judge that this approach maximises the likelihood of finding a solution to our needs at an affordable cost and at best value-for-money. We also believe this offers the best catalyst for UK-based industry to be efficient and competitive, which is essential for both its long-term viability and for UK growth.

23. Experience shows that acquiring technology, equipment, and support from the global market works well in many important areas across defence and security. In delivering new capabilities for our Armed Forces and other Government departments in Afghanistan, we have made extensive use of suppliers from around the world, as well as the UK, to meet these requirements quickly and effectively. Similarly, we make considerable use of contractors to support our Armed Forces and other UK personnel on deployed operations. International suppliers are also used to provide equipment for UK security forces, such as the body armour used by the Police Service and the scanning systems used in aviation security. Our cyber security and information assurance defences and capabilities are similarly sourced from a global supply base – ranging from multinational systems integrators to specialist SMEs.

24. We are concerned about the proportion of non-competitive contracts that have been let by the MOD[9,10]. Although we recognise that this has been driven in part by the particular

9 In 2010/11, 36% of new MOD contracts by value and 68% by number were placed on a non-competitive basis (source: UK Defence Statistics 2011, table 1.15).

10 See also paragraph 165.

constraints of the defence and security markets, striving to meet our future capability requirements from the domestic and global market wherever possible will maximise the ability of the Government to achieve value-for-money in defence and security procurement.

2.2 Off-the-shelf

25. In our drive to deliver value-for-money, we will buy off-the-shelf where appropriate, in accordance with the policies set out in this paper, because this generally allows the UK to take full advantage of the cost benefits of buying from a competitive market. This approach applies to systems, sub-systems, and components.

26. Off-the-shelf procurement usually involves less risk, in terms of capability, timescale, and cost because we are buying mature solutions to our capability requirements, based on well-developed and understood technologies.

27. We recognise that buying off-the-shelf products or services does not guarantee we will always get the benefits of competition – for example, where there is only a single supplier to meet an urgent operational requirement. And we are conscious that mature technologies may become obsolete more quickly, hence the importance of future proofing[11].

28. Those aspects of capability that can most readily be bought off-the-shelf are 'simple product systems'. These have the characteristics of consumer markets – high-volume and relatively short-lifecycles. They can be technologically advanced, since in many fields it is civil applications not defence and security applications that drive innovation. The relationship between the consumer and supplier is usually remote, with the individual consumer not having much direct say in the design or manufacture of the products and with the failure of an individual company usually having limited impact on the consumer, because of the ready availability of alternative suppliers. These products also tend to have a high refresh rate, with new technology being introduced in new model variants, rather than through upgrades.

29. By contrast, 'complex product systems' tend to have a narrow range of customers, low-volume production, and long lifecycles. Most complex product systems are bespoke, even if the underlying technology is simple. They tend to have long production and in-service lives, which leads to issues about obsolescence of technology and components, and upgrading is an integral part of the individual product lifecycle. There tend to be few (and in some cases single) suppliers. As a result, genuine competition may be difficult to achieve and the loss of a supplier can have a significant impact on the customer.

30. In order to buy off-the-shelf effectively, we need to recognise these differences, take action to get the benefit of civil markets where we can (including by simplifying potentially complex systems), and focus our investment in research and development in those areas where the market cannot fulfil our needs or where we can influence the market effectively. However, a pre-requisite to this is that we must be an intelligent customer, able to set rigorous, robust, realistic, and stable capability requirements and able to maintain a comprehensive understanding of the global market. To avoid excluding off-the-shelf solutions, we must also ensure that we do not over-specify our capability requirements. This will, in addition, allow solutions to our needs to become

11 See paragraph 114.

more attractive in the export market, hence potentially reducing the price we ourselves have to pay for the capability.

31. The UK has bought complete systems off-the-shelf in the past: the C-17 Globemaster is one key example where we were able to purchase a mature product and its associated in-service support package, which was already being operated by the United States Air Force in large numbers, thereby significantly reducing the UK's upfront investment in expensive support enablers and delivering otherwise unattainable economies of scale in the cost of UK ownership.

2.2.1 Modified off-the-shelf

32. Off-the-shelf procurements may still require modification before being brought into use. For example, to meet:

- UK standards of airworthiness or health & safety;
- UK communications or other interoperability needs, such as radios; or
- higher standards for particular aspects of operational advantage, such as force protection, electromagnetic spectrum management, or cyber security.

Making these modifications often requires the assistance or agreement of the manufacturer.

33. An example of modified off-the-shelf procurement was the purchase of the Mastiff protected patrol vehicle for Iraq and Afghanistan in 2006. The vehicle was already in service with the US military, but it required modification for a variety of safety, operational, and protection needs before it came into service with UK forces – including the integration of superior UK armour, integration of communications and electronic counter-measures systems, and installation of the UK in-service protected weapon station.

34. Modifying equipment that is available off-the-shelf always involves a balance of risk. Significant problems with the acquisition of eight Chinook Mk 3 helicopters in the 1990s arose, in part, because MOD decided to modify the existing analogue cockpit.

35. Many of the Green Paper consultation responses were concerned about the long-term effects of the UK buying defence and security equipment off-the-shelf without sustaining the systems integration skills and experience in the UK to transform them into coherent capability. Where we do buy off-the-shelf, we will ensure that the UK's defence and security requirements are still met; and we will continue to sustain the systems integration and intelligent customer skills required to deliver the capabilities that our Armed Forces and national security agencies need (see Chapter Three).

36. We recognise, however, that on some occasions there is no 'shelf' available from which we can purchase technology, equipment, and support. This is linked to other potential limits to competition described in Chapter Three.

2.3 Open systems

37. To allow maximum use of open competition from the domestic and global market and enable us to buy off-the-shelf as far as possible, we will make greater use of open systems. These are systems which are based on publicly known standard interfaces that allow anyone to use and communicate with equipment that adheres to the same

standards. Open systems enable us to join together and use equipment that was made in different times and places, thus creating more scope for upgrading and easing interoperability with new capabilities. Further, they allow the use and replacement of high-volume generic components within systems, opening up opportunities for off-the-shelf components. The Green Paper consultation responses stressed these potential benefits.

38. An example of an extremely successful open system is the personal computer. This has a truly open architecture, whose hardware, software, and connectivity specifications and standards are publicly available. Electronics companies and software houses world-wide are therefore able to develop and market components, programmes, and applications that can be readily integrated to provide a wide choice for the consumer. We have already begun to make use of the open systems approach in military systems. For example, the New Generation Submarine Command System and the General Vehicle Architecture for Land Vehicles both use open standards. On the security front, the digital mobile radio service, Airwave, provides a secure, powerful and flexible communications network based on a European open standard for digital trunked radio.

39. Of course, we cannot simply adopt existing open standards and systems regardless of their suitability for our requirements. In order to be able to use open systems and off-the-shelf procurement of equipment that meets open standards, we will need to be assured of our own ability and that of our suppliers to integrate the diverse elements into a properly functioning system that delivers the capability we need.

40. In the security sector, increased and wider use of open (as distinct from proprietary) standards will facilitate a more open market, improve procurement, enhance market competitiveness, and achieve smarter procurement and value-for-money, without necessarily combining procurements into larger contracts, which can exceed the scope of SMEs. UK open standards should also assist companies in promoting their products and services for export, particularly if this was linked to the establishment of international standards.

41. Widespread adoption of system engineering principles within the acquisition process and within the underlying supply chain will also enable more agile use of science & technology. This allows a quicker response to new or evolving threats; more choice over technology options; more choice of suppliers and more competition within the supply chain to enhance value-for-money; and improved exportability because there are more opportunities to tailor variants for overseas customers.

42. To maximise these benefits, our science & technology spend will focus on modular approaches, based around packages of incremental development, that lend themselves to efficient and effective technology insertion, making use of open standards and architectures to fulfil our equipment needs. We will also look to incorporate new technologies incrementally and allow their insertion through modules or updates to develop equipment and systems through-life.

2.4 Small- and Medium-Sized Enterprises (SMEs)

43. SMEs typically possess characteristics that are particularly important when meeting defence and security requirements. These include agility, flexibility, genuine innovation, commitment, customer focus, lower overheads, and often niche or specialist skills and capabilities. These competitive advantages can help us get more value from our investment in defence and security capabilities.

44. Over recent years, the MOD has used a prime contractor model for many of its major procurements. The key benefit of this approach is that it transfers appropriate risk and responsibility for cost-effective delivery of the overall requirement or capability from MOD to the contractor who can best manage it. We are concerned, however, that this has meant that the Government is not doing enough to make the most of the many thousands of small- and medium-sized enterprises that are part of the MOD's supply network, a point reflected in many of the Green Paper consultation responses. We are therefore taking a number of steps to make defence and security procurement as accessible as possible to small- and medium-sized-enterprises, as part of our wider work, led by the Cabinet Office, to simplify public procurement processes to reduce burdens on industry. These steps are outlined in detail in Section 5.3.

2.5 Defence support

45. In recent years, industry has increased its role in providing logistics and service support to our Armed Forces on operations. This is known as Contractor Support to Operations (CSO) and has been important in Afghanistan and Libya. We expect to see an active and relatively increasing role for industry in supporting our Armed Forces in the future: becoming increasingly integrated with our military to provide an optimal, cost-effective, and – most critically – assured service that contributes to our success on operations. The Green Paper consultation responses from industry supported this approach and expressed confidence that our suppliers could do more in this role, whilst also providing better value-for-money.

46. Under the umbrella provided by the Whole Force Concept, the MOD is working with industry to develop a concept known as Total Support Force (TSF). This provides for a fully integrated and sustainable military (Regular and Reserve), Civil Service, and contractor support force, which includes the use of contractors in the Sponsored Reserve role. Under TSF, support capabilities can be analysed to determine what manpower mix is most appropriate to their delivery. Factors which will be considered include readiness, the nature of the environment (and threat level) in which the capability will be delivered, assured support for the Operational Commander, acceptable reward for industry, and value-for-money. Contractors and Reserves may be integrated into Regular structures against readiness and agile force generation requirements. TSF capabilities would exist in the Home Base and be deployable when necessary. The TSF mantra will be 'right person, in the right role, at the right readiness, with the right skills at the right cost'.

47. Industry has contributed to the creation by the MOD of a TSF Direction, which lays out the principles for the application of TSF. Initial pilot activity has begun and continued industry involvement is being facilitated through dedicated Contractor Support to Operations working groups.

Industry support to operations

Industry support to the UK Armed Forces can be crucial for successful operations. The speed and agility with which we are able to meet unforeseen challenges during operations often requires our suppliers to understand our needs and to work closely with the MOD and the Armed Forces at speed to provide the requisite support.

A recent example of this was industry's contribution to UK operations to enforce United Nations Security Council Resolution 1973 to protect Libyan civilians from Colonel Gaddafi's regime (known as Op ELLAMY).

Software for the Typhoon aircraft's radar and defensive aids systems was updated at speed to ensure the protection of aircraft and air crew. Industry also ensured that the digital mapping set required for Apache and Tornado aircraft to fly over Libya were provided in less than 24 hours.

The delivery schedule of additional Dual Mode Seeker Brimstone missiles, a critical capability that allowed UK aircraft to strike accurately and effectively at targets in populated areas with minimal impact on the local civilian population, was shortened by months.

In the maritime sector, a mixed industry and service team deployed to Taranto to undertake an emergency main engine change for HMS BROCKLESBY. The Royal Navy's unique partnership with industry enabled both Devonport and Portsmouth Naval Bases and their key industrial partners to support platforms deploying to Op ELLAMY and throughout the operation. This included the maintenance of HMS OCEAN at Devonport Naval Base, which was brought forward to allow the ship to deploy for an extended period. Additional industrial support was also provided to HMS LIVERPOOL and HMS YORK. In the case of our RFAs, contractual arrangements with industry enabled essential spares to be provided and maintenance undertaken, some in Malta.

These examples show the important role industry, alongside the Armed Forces and the MOD, play in our operational capability. This partnership will become increasingly important for our success in future operations.

Chapter 3: Technology Advantage

Our principle of Open Procurement will be qualified by the principle of Technology Advantage:

We will take action to protect our operational advantages and freedom of action, but only where this is essential for national security.

In doing so, we will:

- identify and, if essential for our national security, take action to protect the critical areas where the UK needs either an advanced technology to counter our adversaries or special products or services to maintain our freedom of action, particularly during operations;
- protect our ability to evaluate independently the effectiveness of technologies and equipment;
- work with close allies to develop technology, equipment, and support arrangements that meet our mutual defence and security needs;
- preserve a lean but effective group of highly skilled people within our defence and security establishment who are capable of acting as intelligent customers for such advanced technologies and support services;
- retain within Government research organisations those specific capabilities which are essential for our national security and use these organisations in a more coherent way to give us the greatest possible scope for technological advance; and
- work closely with potential suppliers to ensure that they have a full understanding of our future requirements so that they can develop appropriate advanced technologies and healthy supply chains.

We will also seek to minimise the costs of obtaining operational advantage and freedom of action by, wherever possible:

- integrating advanced technologies into standard equipment, purchased through open procurement;
- sharing and developing appropriate technologies with our key allies;
- seeking the best and most advanced civilian technology that can be adapted and incorporated into defence and security equipment to give us operational advantage; and
- making the greatest possible use of synthetic training and simulation to reduce the cost of training personnel, particularly when applying advanced technologies to new capability needs.

3.1 Sovereignty

48. The approach to open procurement set out in Chapter Two is our default position to meeting our defence and security requirements. However, procurement in the defence and security areas is fundamentally different from other forms of procurement, because we need to maintain:

    - operational advantage, which is fundamental to the effect that a given capability can achieve; and
    - freedom of action, which is essential to be able to use a capability effectively.

    We will take action to protect the UK's operational advantages and freedom of action, but only where this is essential for our national security. The extent to which we choose to protect our operational advantages and freedom of action always involves a balance of risk and opportunity cost. As with all acquisition choices, this is also subject to affordability and value-for-money.

49. These concepts are essential to our national security and are applicable throughout the acquisition cycle and the life of a capability; to the situation now and in the foreseeable future; and to current acquisition plans and long-term research priorities.

3.1.1 Sovereignty concepts

Operational advantage

50. Operational advantage is the ability to find and maintain an edge over potential adversaries, both to increase the chances of our success in hostile situations and to increase the protection of the UK assets involved, especially our people. This is also fundamental to the overall effect that a given capability can achieve.

51. Operational advantage can be based on factors such as superior intelligence, training, and doctrine, but it is particularly important in terms of equipment and underpinning technologies. It is always relative to a given opponent, so the potential operational advantages available against a state will differ from those available against a non-state actor.

52. Obtaining and maintaining any operational advantage involving technology and equipment inevitably requires investment, often long-term in nature. It also involves a balance of risk. We want to maximise our advantages, but the UK's resources are finite. Investing in any operational advantage therefore involves foregoing the opportunity to invest in other national security capabilities.

Freedom of action

53. Freedom of action is the ability to determine our internal and external affairs and act in the country's interests free from intervention by other states or entities, in accordance with our legal obligations. This freedom is the essence of national sovereignty. It is also essential to be able to use a capability effectively, although not at any cost.

54. For national security capabilities in general, freedom of action rests on the assurance that we will be able to use them – or continue to use them – whenever we need to; and that when we do so, they will perform as we require. In the field of defence, freedom of action includes being able to conduct combat operations at a time and place of our choosing.

55. Different acquisition options offer differing levels of assurance in relation to our future freedom of action, particularly where a potential supplier is based overseas. The UK may, therefore, have to balance the potential benefits of taking a particular acquisition approach for a specific defence or security capability against the possible risks to our freedom of action. The circumstances in which we will need to do this will vary according to the capability concerned and the external situation. In each case, there will also be a balance of risk between the extent of freedom of action that is practically achievable and the constraints that could arise from measures taken to protect it. In some cases, the costs of potential protective measures may be prohibitive.

3.1.2 Protecting sovereignty

56. The precise circumstances in which we may need to take action to protect our operational advantages and freedom of action will vary according to the nature of the threats we face and the capabilities we need to respond to them. However, we currently envisage that there are four general cases – not necessarily exclusive – in which such action is likely to be needed in the interests of national security.

General cases

57. First, where the capability we require is by its nature fundamental to our freedom of action as a nation. The leading example of this is secure information and communications transfer at national level. This covers the ability of the Government to conduct its business securely at the highest level, including communications with posts overseas and commanders of deployed forces. High-grade cryptography remains strategically vital across Government. The need to protect our most sensitive information, wherever it is in the world, creates a sovereign requirement to control those aspects of cryptographic production, deployment, and support that are critical to the integrity of the product and therefore to our national security.

58. Secondly, where the fulfilment of our requirement, or the operation of the resulting capability, is heavily dependant upon a supplier having access to highly classified intelligence information or technologies. In these circumstances we will only be able to consider suppliers of equipment and support services that meet the highest standards of trust. The leading example of this is the UK's nuclear deterrent, as regards both weapons and propulsion systems.

59. Thirdly, where operational circumstances mandate changes to an in-service capability that can only be met by having an assured ability to respond – particularly in terms of technical expertise and knowledge – at the highest levels of speed and agility. A leading example of this is electronic warfare and associated defensive aids, where the ability to update deployed capability in the light of intelligence is essential to survivability. Responding to cyber security threats is another area where speed of response is critical.

60. Fourthly, where the nature of the UK's potential operational advantage when using a particular capability means we need the highest possible confidence in one or more aspects of its performance. For this, we need to be an intelligent customer across a number of dimensions.

61. A key issue is our ability to assure the operation of critical sub-systems, which will often include the design and operation of complex electronic hardware and the associated controlling software. This may require us to request assurances relating to processes and components used in the manufacture of such sub-systems, as well as their subsequent operation and support through-life. Without these assurances we would be unable to judge the level of operational risk or take appropriate action to mitigate certain threats.

Similarly, the ability to understand a system as a whole and to be able to modify or upgrade it through systems integration can be essential to the performance of the system and to our ability to react to the changing and evolving threat environment. This point was stressed in the Green Paper consultation responses. This ability to understand and validate performance and risks, from component to system-of-systems levels, is also essential for safety certification or accreditation, as for example in airworthiness.

62. The general cases described above set out the circumstances in which we may consider taking action to protect operational advantages and freedom of action. They are not absolute tests: even where a particular requirement is similar to one or more of these general cases, this does not automatically mean that protective action should be taken. The decision whether to take action depends on other factors, particularly the balance of risk, affordability, and value-for-money.

Aspects of capability

63. Where we judge that it is essential to take action to protect the UK's operational advantages or freedom of action, we expect to seek to protect up to four aspects of a specific capability by obtaining specific security of supply undertakings. These four aspects are timely access to the:

- essential skills and knowledge needed to design, develop, integrate, evaluate, support and maintain key systems and sub-systems, together with the conduct of test, evaluation, support and upgrade processes for those systems. Science, technology, engineering, and mathematical (STEM) skills are likely to be particularly important here, a point of concern for many of those who responded to the Green Paper consultation;
- facilities and infrastructure which support these processes including specialist manufacturing and production facilities, design systems, support infrastructure, and test and integration rigs;
- technologies critical to the design and development of key systems and sub-systems; and
- appropriate freedoms from potential legal constraints on the use of technology (including intellectual property rights) to enable the UK and its suppliers to maintain, upgrade, and operate key systems and sub-systems.

The timescales within which access is needed will be established as part of setting the requirement and the delivery strategy for that capability.

64. We may also need to protect one or more unique services provided by a trusted supplier, where these are essential to operational response (see also paragraph 59 above).

65. Some of our suppliers may be fundamental to achieving and maintaining certain of our sovereignty requirements, so we may take action to protect those aspects of capability that they supply to us which are essential to our national security.

66. At present, the capability sponsor in MOD is responsible for setting out strategies for delivering future military capability, whilst the Defence Equipment and Support (DE&S) organisation is responsible for considering how those capabilities should be sourced. The future arrangements will be determined as part of MOD's on-going Defence Transformation and Materiel Strategy work.

Cost

67. Once the smallest critical component of capability required for protection has been established and a procurement route has been identified that meets our national security requirements, a relative cost will need to be established for maintaining this component through the procurement route identified. We will then make a decision about whether this cost is affordable and demonstrates value-for-money.

Other considerations

68. Where the UK has an operational advantage and freedom of action, it needs to ensure that these are not forfeited. We must not allow our potential adversaries to erode our advantages or use them against us, nor to constrain our freedom of action. It is therefore essential that these are not compromised by selling (or gifting) them, indiscriminate sharing through loss, or espionage. A further national security consideration is, therefore, having appropriate measures in place to prevent this happening, including export licensing (see section 5.2.3 below).

3.1.3 Impact of national security issues on the market

69. Individual countries' measures to protect their own operational advantages and freedom of action have a distorting effect on the international defence and security market. This compounds what would otherwise be the limitations of that market.

70. Some defence and security capabilities, or aspects of them, are required by many nations and are therefore available in the global market. Significant elements of many defence and security capabilities are similar, if not identical, to technologies, products, and services that exist or are needed for civil applications and in the private sector, so these too are available from the market. The market does not, however, always function in these ways.

71. The market in defence and security capabilities is inhibited because:

- the costs of entry into the market are high;
- Governments are usually the only legitimate buyers of capabilities that have exclusive military use;
- the export and import of defence-related and security-related products and services tend to be closely regulated. (The UK restricts commercial exploitation where this threatens national security and for similar reasons the UK does not necessarily have access to technologies and capabilities developed by other nations, even close allies);
- nations take national security considerations into account when deciding how to procure such capabilities; and
- some capabilities are so specialised or generate so little demand, that there is insufficient incentive for private sector investment in their development.

72. Key factors that normally drive availability, efficiency, and innovation of products and services are, therefore, sometimes absent in the defence and security sector – and there is no effective or legitimate market for some such capabilities.

3.1.4 EU commitments

73. The UK is required under the Treaty on the Functioning of the European Union (TFEU) to act fairly, transparently, and openly by competing defence and security requirements at a European Union (EU) level. The exception is where the essential interests of our security are at stake and in those circumstances the UK can, like all Member States, derogate from the Treaty to the extent necessary to protect those interests by invoking Article 346.

74. The UK has recently transposed EU Directive 2009/81/EC on defence and security procurement into national law[12]. This Directive sets new procurement rules for contracting authorities/entities that purchase military equipment, sensitive equipment, and related goods, works, or services. It also provides rules where contracting authorities/entities purchase works and services for specifically military purposes that involve, require, or contain classified information.

75. Our commitment to open competition for the UK's defence and security requirements is consistent with the UK's obligations as a member of the EU. Our approach to protecting sovereignty, working with other countries, and acquiring technology is consistent with our right to protect national security under Article 346.

3.2 Working with other countries

76. There are two main reasons for working with other countries on defence and security procurement. First, we may wish to take the economies of scale that become possible when working with another nation, as well as the opportunity to harmonise requirements, pool resources, share facilities and overhead costs, and benefit from longer production runs. This also allows us to spread the cost and risk of research and acquisition, as well as to secure better value from our respective investments in defence and security.

77. Second, working with another nation may allow us to maximise our capabilities, by sharing technologies and aspects of capability that would not otherwise be available to the UK. This may involve fostering cooperation in research and technology, as well as developing cooperative or collaborative equipment programmes that increase interoperability.

78. Working with another state in these ways is not detrimental to our national sovereignty, provided that we retain the operational advantages and freedom of action that we judge to be essential to our national security.

79. We will generally favour bilateral collaboration on technology, equipment, and support issues, as we believe this offers the best balance of advantages and disadvantages[13]. We will, however, continue to work multilaterally, for example through NATO or the EU, where this offers a clear benefit to the UK. International programmes provide important opportunities for UK-based industry and we will look to encourage and support participation in such programmes, consistent with the principles in this White Paper.

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12 This Directive was brought into UK law as the Defence and Security Public Contracts Regulations on 21 August 2011. See: http://www.legislation.gov.uk/uksi/2011/1848/introduction/made.

13 Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review (Cm 7948) October 2010, paragraph 5.5.

80. It is fundamental to being able to participate in international programmes that the UK invests sufficiently in relevant technologies and capability areas to be seen as a worthwhile partner. But the UK will do this only where such investment can be shown to provide value-for-money.

81. There are also broader benefits to working with other countries, including increasing participant nations' military interoperability, capability, and effectiveness, as well as strengthening bilateral relations and helping deliver the UK's wider national security objectives.

3.2.1 Bilateral

82. We will seek to engage strongly with potential partners for future projects or programmes whose defence and security posture is closest to our own or where we have shared interests.

83. The US represents our major bilateral acquisition partner, reflecting the close defence relationship between our two countries. Collaboration with US offers access to cutting-edge research and technologies and improved interoperability with our major ally. We are seeking to facilitate cooperation between our countries through the US-UK Defence Trade Cooperation Treaty and we are collaborating closely with the US Government and UK-based industry on the preparations for bringing the Treaty into force. The Treaty aims to speed up the delivery of equipment and enable easier sharing of information, by removing the need for US export licences – normally required by the US International Traffic in Arms Regulations (ITAR) – for items destined for US or UK government end-use when being transferred within an Approved Community of UK or US government establishments and industrial facilities. The Treaty will help improve interoperability between our Armed Forces and support to operations; and we share the US President's view that the Treaty "will be good for our workers and our troops in both our countries"[14].

84. In 2010 we signalled the start of a long-term intensification of our defence and security relationship with France, expanding cooperation across a range of defence initiatives designed to increase interoperability and complementarity and to maximise the value of our respective investments in defence. At the UK/France Summit in November 2010, we agreed a comprehensive programme of defence and security cooperation to be taken forward in the coming years. Alongside cooperation on joint nuclear research facilities, this includes a commitment to strengthen cooperation between our Armed Forces and to increase efficiencies through economies of scale. It also includes greater cooperation in those Research and Technology domains where national considerations are a key driver.

85. We will work closely to improve access to each others' defence markets and explore areas for greater industrial and technological cooperation, especially in those areas that are critical for maintaining key capabilities. We will also systematically look to align requirements and timelines for further medium/long-term opportunities. This is a long-term relationship that will greatly benefit both nations. It is also a critical factor in wider procurement and science & technology decisions.

86. Alongside this, we are also keen to increase cooperation with a range of other countries. Our shared interests are most intense with our NATO and EU partners, with many of whom we have a history of close cooperation on technology and equipment matters.

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14 https://london.useembassy.gov/gb118.html .

We also have vital and long-standing intelligence and science & technology partnerships in the 'Five-Eyes'[15] community. But our defence and security dialogues are global in their reach and many of them already have a technological dimension. We are always willing to explore the scope for partnership with other countries on future projects and programmes where this might spread the cost and risk of research and acquisition or help share technologies and aspects of capability that would not otherwise be available to us.

3.2.2 Multilateral

87. Where there is a clear benefit to the UK, we will work with other countries on multilateral acquisition projects and programmes. These offer potentially greater economies of scale (see paragraph 76) and can also increase interoperability. However, they also need to be appropriately structured and managed, as they can be hampered by contractual and political issues and can suffer from over-complexity.

88. The UK is committed to a number of key projects that are being procured multilaterally and are delivering or are set to deliver outstanding capability – for example, the Typhoon combat aircraft and the A400M transport aircraft. Furthermore, we will maintain our involvement in NATO initiatives that aim to create common standards for basic equipment. We also remain open to discussion about potential collaborations through NATO or other routes, such as OCCAR[16]. And we are in turn exploring opportunities to lead on new potentially multilateral programmes, such as the UK's Global Combat Ship (GCS).

89. Heads of State and Government endorsed the Lisbon Capabilities Package at the NATO Summit in November 2010. This package covers ten key capabilities, which include current priority shortfalls (for example, countering Improvised Explosive Devices (IEDs)); current, evolving and emerging threats (theatre ballistic missile defence and defending against cyber attacks), and developing long-term critical enabling capabilities (such as NATO's Air Command and Control System). We support the NATO Secretary General's Smart Defence initiative, with its emphasis on more pooling and sharing and on better prioritisation and coordination of effort to fill key capability gaps. The UK is also working to improve the effectiveness and performance of the European Defence Agency (EDA), including better-focused and more realistic work programmes, with efforts directed at increasing key areas of capability. We believe that discussions in such fora should play an increasingly important role in identifying and coordinating opportunities to harmonise requirements, pool resources, and share facilities with other nations, which could then be taken forward bilaterally or in small groups by interested parties.

Defence engagement

90. Across the range of our international relations, we are implementing the SDSR vision of bringing together all the levers of our international influence. In the defence field, the Defence Engagement Strategy will maximise the impact that all of our defence-related assets and activities will have in achieving our international objectives. This includes the significant role that industry and exports can have as a part of our comprehensive bilateral (and multilateral) relationships.

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15 The Technical Cooperation Program (TTCP), often referred to as 'Five-Eyes', comprises Australia, Canada, New Zealand, the United Kingdom, and the United States.

16 Organisation Conjointe de Coopération en matière d'Armement.

3.3 Technology

91. Technology underpins most equipment and support arrangements. It is the thread linking our current capabilities and our future plans. The Green Paper consultation responses stressed its central importance for almost all aspects of this White Paper.

3.3.1 Investing in technology advantage

92. Achieving operational advantage over potential adversaries depends on investment in technology. The current impact and widespread influence of technology in our world stems directly from increased consumer demand and better manufacturing techniques. It is also the product of earlier scientific research, which in turn depended on investment, whether by the public or private sectors. The Green Paper consultation responses stressed these points.

93. The global availability of technology combined with an ever-increasing pace of technological change means that, in delivering the UK's defence and security, we face an increasingly capable and diverse range of threats. These are likely to include not only sophisticated military weapons, but also greater innovative and ingenious application of readily available civil technologies. Where adversaries can more easily buy high-technology products on the open market, this potentially reduces our operational advantages.

94. To understand, counter, and protect against such threats, we need to be able to use effective investment in defence and security science & technology to access and deliver technology into our future systems and equipment to provide operational advantage. We must also recognise that although we frequently face low-technology threats, even the simplest of IEDs often requires sophisticated technical solutions for detection and protection.

95. Over the last decade there has been a reduction in the proportion of defence spending that goes on science & technology, from around 2.6% to 1.2% of defence spending. Given the critical role that science & technology plays in supporting our immediate needs and programmes, we will need to manage carefully the balance between this and addressing our future capability needs. We also need to ensure our own technical capability, infrastructure, and research organisations are carefully prioritised to retain our ability to be an intelligent customer, develop specific solutions, and maintain credibility with our allies.

96. Whilst we need to adapt and use more civil technologies to meet our defence and security needs, there remain areas of technology development where the market is weak, including Chemical and Biological Defence (CBD) and countermeasures for counter-terrorism (for example, electronic surveillance). These will continue to require focused investment in science & technology beyond what is provided by civil commercial markets.

97. We are, therefore, carefully prioritising investment in science & technology. It is our intention to sustain this investment at a minimum of 1.2% of the defence budget. Furthermore, despite the difficult financial position, we are planning a small rise in cash terms in defence science & technology spending over the period of the Comprehensive Spending Review.

3.3.2 Being an intelligent customer

98. Almost all technology development derived from current global science & technology investment is driven by the consumer market. We need to draw on and leverage this investment, but to succeed we need to know what to buy, where it can be bought from, and where we need to focus our own investment in science & technology. We need access to the knowledge and expertise to integrate civil technologies into our defence and security systems and equipment. We need to understand the inherent strengths, opportunities, and weaknesses in how it is used – in particular, when the protection of individuals is at stake. Equally vital is the provision of effective and accurate advice on defence-related and security-related science & technology in times of crisis or emergency; this is particularly important in being able to adapt rapidly to new security situations and respond quickly to urgent operational requirements. The role of an intelligent customer for science & technology – its acquisition, use, and application – is therefore critical to our success in defence and security activities, to operational advantage and freedom of action, and to achieving value-for-money.

99. Success as an intelligent customer nevertheless presents its own challenges. As well as knowledge of a particular technology - how we plan to use it operationally and how it was designed to be used through-life (including subsequent upgrades and insertion of new technologies) – we must understand and assess the market place, what is potentially available, who the suppliers are, and what processes and standards are being used. This can be achieved through greater sharing of defence and security problems, thereby helping suppliers provide the most viable solutions from the market, but it also requires further investment in the tools, techniques, and expertise to assess market products and services.

100. An intelligent customer has to be able to apply systems-level thinking and to understand how to integrate commercial off-the-shelf products, designed for markets with a high degree of certainty, into evolving defence and security systems and equipment. We have, therefore, to be able to identify, understand, and evaluate the technical, financial, interoperability, and security risks involved in such integration.

101. Improving our understanding of commercial products needed to address these challenges will require investment. The understanding needed will be different at various stages of the acquisition process, including in-service and disposal; such understanding will also vary according to the complexity of our requirements and systems. The Government is not able to sustain deep technical expertise in all areas of science & technology: access to trusted sources of information and retained experts with a broad knowledge regarding use of technology, rather than deep knowledge in a particular area of science & technology, will be required. Once potential solutions have been identified, demonstration within a realistic environment will be needed to provide effective comparison and to understand the integration issues. Being an intelligent customer is also vital where we choose to procure or assess bespoke systems. In general, the Government retains responsibility for safety and operational risk, so we will need to maintain sufficient in-house expertise to understand those risks properly.

102. In addressing the challenge facing us as an intelligent customer for science & technology in defence and security, we will prioritise investment towards providing timely and effective advice to Ministers and decision-makers. This includes maintaining a lean, skilled workforce in-house. We will also shape our expertise and access to expertise in developing and assessing markets and keeping up to date with the latest developments; and we will develop tools and techniques to assess, integrate, and evaluate our equipment and systems requirements, through modelling, simulation, and experimentation. This includes drawing on partnerships which already exist between

Government and industry, applying relevant industrial and operational expertise in collaborative teams to analyse problems, examine options, and make recommendations on de-risking requirements, helping us to make informed decisions.

3.3.3 Government in-house science & technology capabilities

103. The UK Government's research organisations play a critical role in the development of defence and security capability. They are essential to our national security, in particular where specific expertise is needed for sensitive international collaboration (e.g. where intelligence establishes the technical requirement, such as providing the lead in defeating IEDs); where the private sector does not meet market needs (e.g. Chemical, Biological, Radiological, and Nuclear (CBRN) protection); where the ownership of risk and responsibility for stewardship is retained by the Government (e.g. the nuclear deterrent); or where critical modification of commercially available technology is required (i.e. specific security add-ons to off-the-shelf products).

104. In meeting our defence and security requirements, we draw on the capabilities of a range of Government research organisations. The two principal Government organisations dedicated to science & technology in the defence and security fields are MOD's Defence Science and Technology Laboratory (Dstl) and the Home Office's Centre for Applied Science and Technology (CAST)[17].

105. Dstl supplies sensitive and specialist science & technology services to MOD and the other Government departments. It leads the formulation, design, and delivery of a coherent and integrated MOD science & technology programme, using industrial, academic, and Government resources. It manages and exploits knowledge across the wider defence and security community (through programmes such as ATHENA which makes existing MOD-sponsored science & technology research reports available to the wider defence and security community); and seeks to understand science & technology risks and opportunities through horizon-scanning.

106. CAST supports the full range of security and law enforcement capabilities through the effective use of specialist science & technology. Operating where others cannot for reasons of impartiality and national security, CAST provides advice, innovation, and frontline support to the Home Office, the police service, and the security and intelligence agencies in areas where work needs to be done within Government for national security reasons. The recent restructuring of CAST aims to enhance engagement with industry, academia, and other Government research organisations to share in the acquisition and development of knowledge and technology that can be applied to the unique problems faced across the security and law enforcement domains.

107. Many of the Green Paper consultation responses suggested that the Government should conduct research and develop technology only where industry is unwilling or unable to do so. We remain committed to the principle that our science & technology organisations will conduct research and development in the defence and security sectors only where it is essential for our national security to do so (see also paragraph 103 above).

108. Government science & technology organisations, their technical capacity and facilities with defence and security interests must be complementary, rather than duplicative. We recognise that it is often extremely difficult to rebuild capabilities that have been discontinued and that requirements and capabilities may lie across departmental

17 Formerly the Home Office's Scientific Development Branch.

boundaries. Requirements often change with time, so there is a need for an agile mechanism to re-assess existing capability balances. We will build on the existing Interlab Forum[18], which brings together the key public sector research establishments so that we can:

- develop and embed better mechanisms to link defence and security customer and supplier communities and to capture shared requirements; and
- ensure greater joint working and joint management of capabilities and activities across the relevant defence and security Government science & technology organisations.

3.3.4 Developing and communicating future requirements to industry

109. We need to exploit technology advances more rapidly into our capability, but we also need to recognise that science & technology is fundamentally based on specialist skills and experience, which take time to develop – in some cases these take a decade to become effective. Therefore, it is vital to sustain long-term investment in science, technology, engineering, and mathematical (STEM) skills to support our specialists in industry, academia and within Government. (More is said about the importance of skills in Section 4.2).

110. The rapid pace of scientific innovation means new technologies are appearing faster than we can integrate them into our capabilities. Potential new threats, such as cyber attacks, open up the national security environment even further. But while addressing these threats poses potential costs, technology can also offer opportunities to reduce costs as we maintain and upgrade our capability through-life.

111. The extent of the investment in advanced technology by the civil commercial market suggests that the Government, as a customer for defence and security capability, must be able to access this global market for its technology requirement. However, Government investment in science & technology remains critical for defence and security technology that is not available commercially off-the-shelf.

112. Private investment in defence- and security-related science & technology has a vital role in developing technology markets and ensuring equipment, systems, and services have the technical edge to meet the UK's defence and security needs. However, we recognise that industry will only put private investment into science & technology where there is a clear understanding of the route to market, to exploit this into products. Therefore, we will work with the science & technology supplier base by sharing our capability requirements and investment priorities early on and by understanding better future market opportunities, to ensure private investment is targeted and aligned to the needs of the UK, wherever possible.

113. The defence and security sectors have common interests in many underpinning building blocks of science & technology, including CBD and cyber threats. They also have a number of common technology sub-systems – for example, body armour, electronic sensing, and spoofing systems to detect and counter improvised explosives.

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18 The Interlab Forum was established in 2006 as the vehicle through which seven key public sector research establishments could develop and enhance the nation's capability in emergency response and disease control through sharing knowledge. They are: Defence Science and Technology Laboratory (Dstl); Food and Environment Research Agency (Fera); Centre for Environment, Fisheries & Aquaculture Science (Cefas); Health and Safety Laboratory (HSL); Health Protection Agency (HPA); Animal Health and Veterinary Laboratories Agency (AHVLA); and the Home Office's Centre for Applied Science and Technology (CAST).

However, despite these similarities, the solutions to some defence requirements have no corresponding security elements and vice versa – for example warships, armoured vehicles, combat aircraft; and airport security systems. We also recognise the need to balance the immediate application of science & technology in support of current operations against long-term research focused on potential future threats. The following priorities articulate the future strategic direction of Government science & technology in support of defence and security over the period 2012-2015. The priorities set out both the outcomes we wish to achieve through our investment and the set of core challenges faced by science & technology across both the defence and security sectors.

114. We will focus investment of defence-related and security-related science & technology over the current Comprehensive Spending Review period in order to achieve the following six critical outcomes:

- support current defence and security operations;
  - enabling technology solutions to be developed to address urgent and current operational issues
- plan for future capabilities that will be needed in the longer term;
  - researching new science & technology particularly aimed at developing and fulfilling the capability generations that follow those currently in use or in procurement, ensuring the needs of Future Force 2020 and beyond are addressed
- cost reduction and more future proof systems;
  - using science & technology to provide solutions and challenge approaches to defence and security capability, to ensure the long-term costs of such capability are reduced, thus ensuring approaches to our defence and security capability are adaptable to future requirements and technology evolutions
- support to critical science & technology capabilities/facilities;
  - ensuring critical infrastructure, skills, and facilities are maintained to enable intelligent customers status in critical areas and sovereignty in key technological areas
- provide timely and effective advice to Ministers and Government;
  - ensuring scientific and technologically based evidence and analysis is available to support Ministers and Government in decision-making, policy-making, and reviewing defence and security capability
- particular focus on the human and sociological aspects of capability.
  - providing scientific and technologically based solutions to training, coaching, ethos, leadership, health of our Armed Forces and security personnel, as well as understanding influence, human sciences, and psychological approaches in military and security operations

115. Set against these outcomes, there are seven priority challenges for science & technology posed by the risks outlined in the National Security Strategy. These do not cover the entirety of our science & technology investment, but they represent the most significant challenges currently faced by both the defence and security communities. They also represent the areas where we judge the UK will get best value-for-money from science & technology through greater collaboration across defence and security. The key challenges are:

- effective neutralisation and protection against improvised explosive threats;
- being able to identify and effectively mitigate CBRN threats to the UK and its interests;
- ensuring the UK and its assets are protected from cyber threats;
- ensuring we have a sufficiently developed understanding of human and social dynamics in undertaking defence and security operations;
- continuing to develop the ability to communicate rapidly and effectively within and between all relevant organisations, including being able to manage information from sensors deployed in challenging environments and develop accurate information pictures in real time;
- being able to extract value from complex, multiple data sources, media and streams; and
- developing our ability to identify and assess future risks and threats, across defence and security and ensuring our science & technology requirements align with these risks.

116. We are committed to greater openness and recognise the benefit that business gains from clarity of plans, especially investment priorities. The Green Paper consultation responses stressed this was important, particularly for pull-through from research into utilisation. However, we seek innovation, so the Government will not be specifying technology solutions. We will publish our defence and security priority themes annually, providing supporting strategies for defence and security science & technology. This will provide more clarity on our funded technology priorities and programmes than in previous published strategies and plans. In particular for defence technologies, these will replace the on-line Defence Technology Plan and supersede the Defence Technology Strategy 2006.

117. We will actively pursue arrangements that give our supplier base greater insight into the threats and problems we face at the earliest opportunity to ensure our systems and equipment make the best use all innovative solutions available.

3.3.5 Maximising value-for-money

118. Protecting operational advantages and freedom of action often comes at an additional cost. We will take a number of steps to ensure that this cost is minimised, including by utilising the best civilian technology and international collaboration.

Seeking the best and most advanced civilian technology

119. Advanced technology development, which was once the realm of Government research organisations, is now carried out almost exclusively in the civil and commercial sectors. Notwithstanding, there remains significant bridging between civil and national security science & technology, particularly in the defence and aerospace industrial sectors. The investment in science & technology in these sectors plays an important part in supporting overall UK science & technology investment. In some cases, such technology developed specifically for defence and security has viable commercial spin-off, which must be nurtured and encouraged to achieve strong, sustainable, and balanced growth.

120. The organisations responsible for defence and security within the Government enjoy important strategic relationships with the Research Councils, the Technology Strategy Board, and the UK Space Agency, which are responsible for funding research and for innovation and technology development in business. These relationships facilitate

access to the full spectrum of the UK's technology capabilities. Mechanisms to achieve this include the Knowledge Transfer Networks (KTNs) – through the Aerospace, Aviation and Defence KTN – and the Small Business Research Initiative (SBRI), which together with the new network of elite Technology and Innovation Centres will ensure we make full use of technologies developed for civilian applications and invest in the development of defence and security uses for them.

121. We will reduce the obstacles created by security classification of information, by extracting the core science from the classified requirement and passing the core science requirement to academia. If needed, and where appropriate, we will ensure security clearance for key members of the Research Councils to develop further top-level understanding of defence and security issues.

122. It is critical that large companies make best use of their supply chains, including SMEs and academia, and in particular follow an open systems design approach, to ensure that best technology in each domain is offered to Government. It is also important that industry and academia collaborate to facilitate this. We will promote such collaboration by greater sharing of information on our defence and security capability requirement, and where markets will not sustain effective collaboration, through direct investment in these areas.

123. The Centre for Defence Enterprise (CDE) remains our first point of contact for anyone who wishes to submit a research idea to the MOD[19]. Its work was strongly supported in the Green Paper consultation responses. Building on CDE's success in providing efficient access to innovation, we will broaden its remit to cover both the defence and security domains. As part of this, we will seek ways for CDE to provide more support to small- and medium-sized enterprises in understanding how MOD operates, the development of routes to market for potential defence and security products, and to enhance exploitation mechanisms between CDE and our suppliers.

International Research Collaboration

124. The UK engages in international research collaboration (IRC) to strengthen coalitions, both politically and operationally, assist in wider acquisition aims and ambitions, and achieve significant gearing and cost benefits. Collaboration with those partners we engage with operationally, both in the short-term and the longer-term, is particularly important.

125. It is therefore essential that we invest in science & technology which allows such collaboration to take place. Our investment in defence and security science & technology will be prioritised to strengthen and sustain collaboration with our key international partners. We will focus IRC on areas where outcomes can be exploited into our acquisition programmes, provide critical advice into our decision-making, or provide benefit to our overall defence and security capability.

126. Key bilateral science & technology research engagements with US and France, as well as multilateral research arrangements such as in NATO and The Technical Cooperation Program (TTCP) will be sustained. We will continue to monitor technological

19 CDE is a gateway between the outside world and the MOD for anyone with a disruptive technology, new process, or innovation that has a potential defence application. It brings together innovation and investment for the defence market, ensuring that our front-line forces have the best battle-winning technologies for the future. To contact CDE see: http://www.science.mod.uk/engagement/enterprise.aspx.

developments and explore opportunities for future cooperation and strategic relationships with other countries.

Technology awareness and exploitation

127. In order to achieve best value, we must access the results of the much wider and more extensive civil investment in research and development for use in UK defence and security. This will drive down costs, influence other markets' investment, and expose new technology solutions to defence and security requirements. Access is available through both tracking technology development and engagement with the greater range of suppliers active in the wider civil markets for technology. These suppliers are vital to helping the Government achieve this goal and we must improve the communication of our needs and of our willingness to invest in these innovators. We want to draw on this wealth of expertise to benefit defence and security - not just in large specialist defence and security firms, but in small- and medium-sized enterprises and universities too. Both enhancement of CDE and the role of Dstl in formulating and delivering the MOD's science & technology programme will be critical to achieving this. We must also seek to enhance the exploitation of Government-funded technologies, both those created by in-house science & technology capabilities and those created by contractors and academia, for the benefit of our defence and security capabilities and the wider UK economy.

Training and simulation

128. We are continuing to look at the increased use of modern synthetic training techniques and readily available simulation technologies across all training for the Armed Forces, from new entrants through to operational theatre training. We are clear that this will not be at the expense of conducting necessary live training, which prepares the Armed Forces for combat and operational roles, but there are significant benefits: improving operational effectiveness because the Armed Forces have the opportunity to train in a safe and realistic environment, when and where they need to, with the same equipment they will use in theatre; and driving cost-effectiveness because synthetic training means that we will often require less equipment to be dedicated to training.

129. Simulation technology continues to improve all the time and we will look at all the technologies available on the market to meet our needs. We will also explore opportunities to develop our training systems and infrastructure jointly with international partners.

Simulation

There have been rapid developments in simulation technologies driven by the demands of the civil entertainment and computer gaming market. Whilst this is perhaps most obvious in the quality of visual content, significant improvements have been made in other areas including distributed multi-player capability, game data management, and the way in which games are structured to encourage game-playing skill development. Despite very significant investment in development, the retail price of such games is kept down by the volume of sales.

Many of our simulation capabilities have harnessed such advances in computer games technology to support a broad range of training tasks, including mission preparation as well as pre-deployment and in-theatre training. Such systems are user friendly and can be adapted swiftly to respond to changes in the operational environment. We plan to make greater use of simulation, including the use of the latest generation of mobile handheld devices, to improve training and reduce costs.

For example, soldiers are being trained to avoid roadside bombs and ambushes using off-the-shelf Virtual Battlespace 2 (VBS2) software running with commercially available laptops and gaming steering wheels. The MOD also uses VBS2 to train pilots and forward air controllers in a single 3D environment to prepare them for operations in Afghanistan. The key has been the ability to tailor some VBS2 content, such as the Afghan terrain databases, specifically for MOD use. This allows for sophisticated training environments to be developed quickly, at a reduced cost and with minimal environmental impact. It can also be extended to include submarines, cruise missiles and artillery assets. The overall system provides the MOD with a proven training capability at a low price.

Increasingly, the accessibility of such products allow non-defence actors, including academia, to provide novel and responsive solutions at a low cost and within short timeframes to meet the needs faced by front-line personnel. For example, within a few weeks, students from a local Further Education College developed elements of a demonstrator showing how personnel could be trained to better integrate naval, ground and air fire support.

These are a few examples of how the cost and performance advantages of off-the-shelf products can be effectively exploited in MOD training.

Part 2: The UK Defence and Security Industry

130. The second part of this White Paper looks at the wider UK perspective – including growth, skills, and emerging sectors – in the context of our defence and security procurement policy and at Government action to encourage UK-based companies to fulfil our requirements and export successfully.

Chapter 4: The Wider UK Perspective

The Government recognises that, to fulfil the aims set out in this White Paper, we need thriving, innovative, and highly efficient suppliers. A healthy and competitive industry in the UK makes a significant contribution to developing and sustaining key defence and security capabilities, as well as contributing to export-led growth and a re-balanced economy.

We recognise in particular that:

- the defence and security sectors are an integral part of the UK's advanced manufacturing sector, supporting many highly-skilled jobs and vibrant supply chains; and
- Governments are the leading customers of defence and security goods and therefore our procurement approach and the differing approaches in other countries shape the defence and security market;

and we have:

- an economic policy objective to achieve strong, sustainable, and balanced growth that is more evenly distributed across the country and between industries.

131. The defence and security sectors of UK industry are an important part of the nation's advanced manufacturing base. They sustain large numbers of highly-skilled, high-value jobs and in 2010 supported export orders worth over £8bn, making the UK the world's second largest defence and fifth largest security exporter[20]. The Government purchased £27 billion worth of defence equipment and services in the financial year 2010/11, accounting for around 11 per cent of public sector procurement (the third highest type of public expenditure after health and social protection)[21]. Sales to the MOD account for almost a third of the UK shipbuilding industry's turnover and more than 10% of

20 UKTI website: www.ukti.gov.uk/defencesecurity/item/167940.html .

21 HM Treasury, Public Expenditure Statistical Analysis (July 2011 National Statistics release).

turnover for the aerospace sector[22]. The Government's approach to defence and security procurement, therefore, has a major influence on the size and shape of these major sectors of UK industry.

4.1 Growth

132. Our economic policy objective is to achieve strong, sustainable, and balanced growth that is more evenly distributed across the country and between industries. We need to continue to improve conditions for UK manufacturing companies. Wherever there are barriers to growth impeding UK companies, we will do all we can to remove them. These are challenging ambitions that should frame our actions for the next 10 years. We need a relentless drive for growth that provides the best environment to achieve these ambitions. In November 2010, we launched the Growth Review, assessing what each part of Government is doing to create the best conditions for private sector growth. The Growth Review is a rolling programme that will last the whole of a Parliament.

133. The Growth Review Framework for Advanced Manufacturing, published in December 2010, highlighted the key role that manufacturing can to play in creating a more balanced economy[23]. A thriving manufacturing sector will help create a more resilient UK economy that is less vulnerable to sector-specific shocks. Manufacturing is the third largest sector of the UK economy, after wholesale & retail and professional & support activities[24]. In 2010, it was responsible for over half of UK exports[25]; contributed some £130bn in gross value added to the economy[26]; and employed some 2.5m people[27]. The UK is a leading exporter of technology intensive manufacturing goods and has a strong competitive advantage in sectors with a strong skills and research base – such as aerospace, defence, microelectronics, and cyber security.

134. The Government has a vital role in engaging with industry to ensure that it continues to succeed in a competitive marketplace.

135. Defence-related business helps to sustain thousands of UK firms throughout the supply chain. MOD expenditure and defence exports support around 155,000 jobs, many of them highly skilled, with a further 145,000 people indirectly employed in the supply chain[28]. Over 100 UK companies are engaged in the supply chain for the US Joint Strike Fighter (JSF) military aircraft programme. Companies in the sector are also widely dispersed across the UK and therefore help to spread prosperity throughout the country.

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22 BIS analysis using statistics from DASA and ONS for the year 2008/09.

23 Growth Review Framework for Advance Manufacturing, BIS, Dec 2010 (http://www.bis.gov.uk/assets/biscore/business-sectors/docs/g/10-1297-growth-review-framework-for-advanced-manufacturing).

24 Table 2.3, United Kingdom National Accounts, The Blue Book, Office for National Statistics, 2011. (http://www.ons.gov.uk/ons/rel/naa1-rd/united-kingdom-national-accounts/2011-edition/index.html).

25 Manufacturing export [MQ10 UK Trade in Goods Analysed in Terms of Industry 2011 Q2, ONS 2011, Table 1. Series QBGW at http://www.ons.gov.uk/ons/datasets-and-tables/data-selector.html?cdid=QBGW&dataset=mq10&table-id=1] and Total Exports [Monthly Review of External Trade Statistics July 2011, ONS 2011, Table A1. Series IKBH at http://www.ons.gov.uk/ons/datasets-and-tables/data-selector.html?cdid=IKBH&dataset=mret&table-id=A1].

26 Office of National Statistics at http://www.ons.gov.uk/ons/datasets-and-tables/data-selector.html?cdid=ABML&cdid=KKE3&dataset=bb11su&table-id=2.3 .

27 Office of National Statistics, Labour Market Statistics, September 2011, Table on Workforce Jobs of document 'JOBS02: September 2011' at http://www.ons.gov.uk/ons/publications/re-reference-tables.html?newquery=*&newoffset=25&pageSize=25&content-type=Reference+table&edition=tcm%3A77-222431.

28 Table 1.10, UK Defence Statistics 2009. These are the last available figures, which relate to 2007-08.

136. Defence-related business accounts for a large share of R&D activity in a number of advanced manufacturing sectors. In 2010, defence-related R&D accounted for more than half of R&D in the electrical equipment and machinery industries and around a third in the aerospace sector[29]. This often leads to significant civil sector benefits. For example, the Typhoon combat aircraft's carbon fibre and engine technologies are being applied to civil aircraft and the motor car industry[30]. At the same time, the defence sector benefits from civil spill-over, for example in advanced electronics[31].

137. The fast-growing UK security sector is one of the most diverse and technically advanced in the world, with key strengths in: counter-terrorism, border control, transport security, forensics, and CBRN protection. The sector comprises 9,000 companies, including many SMEs, and employs around 140,000 people. UK security exports were worth £2bn in 2010, an increase of over 8% on the previous year.

138. UK-based suppliers in the defence and security market also have a significant impact within the UK by:

- encouraging innovative science & technology and sustaining the UK's science & technology base;
- creating valuable Intellectual Property that can be exploited to meet defence and security capability requirements, as well as exploited commercially to create wider value in the economy at large;
- creating and maintaining advanced engineering skills and knowledge, including strong skill clusters in some regions;
- providing high-quality employment; and
- contributing to growth more generally, including through tax revenue.

139. We are helping UK-based companies to thrive, through practical advice to exporters, backed up by robust diplomatic support, and with a specific emphasis on encouragement to the SMEs that are vital in providing innovation and flexibility to the defence and security supply chain. Our proposed Patent Box regime offers a reduction in corporation tax on profits attributable to patents and will also act as an incentive for companies in the defence and security sector to invest further in innovation and technology.

140. The UK's technological and industrial capabilities give this country greater leverage with international partners. As a leading industrial nation, the UK is able to work with other countries on research and acquisition, as a complement to its wider security relationships, and to export training and equipment, as part of broader relationship- and capacity-building and of wider diplomacy.

141. A well-regulated trade in defence and security products helps the Government to underpin strategic relationships and enhance the security capacity of our allies. We value highly the important role of defence and security exports in strengthening the UK economy and are clear in our commitment to promoting them overseas.

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29 Office of National Statistics, Table 12 (Expenditure on Civil and Defence R&D Performed in UK Businesses: Detailed Products Groups, 2010) in Business Enterprise Research and Development, 2010 at http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-237838.

30 Hartley (2008), 'The Industrial and Economic Benefits of Eurofighter Typhoon'.

31 Braddon, Dowdall and Hartley (2003), 'The UK Defence Electronics Industry: Adjusting to Change', Defence and Peace Economics, Vol. 15, No. 6.

4.1.1 How the Government is supporting growth

142. We will work to enable UK-based industry to be sufficiently competitive to provide best value-for-money to the UK taxpayer in meeting our defence and security needs and to export successfully. This approach is pragmatic, not altruistic: we will be supportive, but not protectionist.

143. There are critical roles that the Government can play in improving the UK's performance, through increasing the UK's share of world markets, raising employment, or improving productivity. In particular, we have identified the following objectives that are relevant to the defence and security sectors:

- consolidating existing strengths in high-value services and advanced manufacturing to drive export growth;
- supporting new and expanding industries where the UK has the potential to become a world leader;
- improving performance in large domestic sectors, which is critical to increasing overall productivity and employment;
- ensuring essential infrastructure sectors underpin growth across the economy; and
- acting as a more intelligent customer in sectors where the Government is a major purchaser and can promote innovation[32].

144. An example of this activity is the UK's first ever National Infrastructure Plan, published in October 2010, which set out the need to maximise market and growth opportunities for manufacturers from Government activity. We have established a dialogue with industry – including the defence sector – to ensure that the interests of industry are taken into account as early as possible in the development of policy.

145. Public procurement of goods and services provides a strong impetus to industry. The Autumn Statement set out measures that we are taking to help build capability in strong UK-based supply chains and support SMEs and mid-sized businesses[33]. This includes introducing a package of measures to ensure public procurement promotes growth, such as publishing medium term procurement pipelines, simplifying procurement processes to reduce burdens on industry, and engaging with potential suppliers at a much earlier stage, before formal procurement begins, to increase their opportunities to participate.

4.2 The importance of skills

146. A skilled UK workforce is essential to delivering the capabilities that we need for our defence and security, a point brought out strongly in many of the Green Paper consultation returns. We will retain and develop key skills in Government departments, in the Armed Forces, the security and intelligence agencies, and the police service, needed to work with industry. Niche skills in industry are often critical to maintaining operational advantage and/or freedom of action in the range of operations that we may need to conduct. And we need timely access to skills – especially from the wider science,

32 Path to Strong, Sustainable and Balanced Growth; HM Treasury & Department for Business, Innovation and Skills (November 2010).

33 Autumn Statement 2011 (Cm 8231), HM Treasury (November 2011), paragraphs 1.122 and A.125-132.

technology, and engineering base – that provide us with the know-how to design, develop, evaluate, support, maintain, and upgrade key systems and sub-systems.

147. Without readily available access to specialised knowledge, we would lose the ability both to react quickly to urgent operational requirements and to make reliable informed decisions as an intelligent customer, based on the correct interpretation of complex underpinning scientific and technical data. The skills development in and retention of our people is, therefore, fundamental to ensuring that the Armed Forces and national security agencies continue to receive the essential technology, equipment, and support they need. A strong and healthy skills base in the UK also helps the productivity and competitiveness of the economy, helping to ensure that businesses are equipped to succeed in an increasingly competitive and open market.

148. A Skills and Jobs Retention Group was established by the Secretary of State for Business, Innovation, and Skills in October 2010, to help skilled employees affected by SDSR decisions to find alternative employment in growing sectors of advanced manufacturing and engineering. This is an industry-led group, with strong support from business across advanced manufacturing. It has developed an action plan and a web-based system, known as the 'Talent Retention Solution', to facilitate the deployment of affected employees.

149. We are committed to investing now to ensure the UK has future generations of skilled employees. The Government is taking action to create a more educated workforce that is the most flexible in Europe, including by promoting skills and employment through funding for up to 100,000 additional work experience placements for young people, as well as by expanding the University Technical Colleges programme, to establish at least 24 new colleges by 2014. Apprenticeships are at the heart of our drive to equip people of all ages with the skills employers need to prosper and compete, often in a global market. We are creating new opportunities for young people to enter and progress to advanced level and higher apprenticeships. In August 2011 'Access to Apprenticeships' was introduced to widen access for young people aged 16-24 who have been NEET (not in employment, education or training) for 13 weeks or more; or who experience other forms of disadvantage. The Access pathway is expected to benefit some 10,000 people each year. In July 2011, the Prime Minister announced details of a new £25m fund to support up to 10,000 Advanced Level & Higher Apprenticeships. This fund will support the expansion of apprenticeships up to degree equivalent in companies, particularly SMEs, where there is unmet demand for the higher level skills.

150. We have signalled to the Higher Education Funding Council for England that strategically important and vulnerable subjects, which include a number of STEM (Science, Technology, Engineering, and Mathematics) related subjects, remain a ministerial priority for the teaching grant allocations that are made to universities. The Government funds STEMNET, a UK-wide organisation, whose purpose is to ensure that all young people, regardless of background, are encouraged to understand the excitement and importance of STEM subjects in their lives, and the career opportunities to which these subjects can lead. The BIS "STEMNET" STEM Ambassadors programme is a unique nationwide network of over 28,000 volunteers from science, engineering and technical companies and academia, who work with schools across the UK. The Government also supports the Big Bang Fair, the UK's first national fair celebrating young people's achievements in science and engineering and which works to ensure that this talent is nurtured for the future. Its centrepiece is the National Science and Engineering Competition, where the annual UK Young Scientist of the Year and UK Young Engineer of the Year are awarded from STEM projects developed by 11-19 year olds. Uptake of STEM subjects at GCSE and A level has been rising steadily; in 2011, Mathematics, Biology, Psychology, Chemistry, and Physics were amongst the top ten A-Level subjects. At

undergraduate degree level, in 2009-10 the number of UK-domiciled STEM entrants were up by 5% compared to 2008/09 and there were increases since 2008/09 in the numbers studying Mathematical Sciences (+6%) and Engineering (+7%).

151. Our university sector is world-class. We have introduced a sustainable funding system to ensure that we can maintain student numbers and ensure that all higher education students have a high quality experience. In the future more university funding will be in the hands of students. Their choices will shape higher education. Universities nurture talented students, challenging them to think critically and preparing them for rewarding careers. Our reforms will enable students to make the most of their skills and abilities and will sustain first-class research and scholarship. The Government has made a commitment to pay the tuition charges for people leaving the Armed Forces who are going to gain a "first taste" of further or higher education, between Level 3 and a first degree, via the Service Leavers' scheme. To be eligible, participants who have left the Royal Navy, Army, or Royal Air Force need to have registered as members of the Armed Forces Enhanced Learning Credit (ELC) scheme.

4.3 Investing in the UK

152. As part of our wider policy objectives, we will create the conditions for greater global private sector investment in the UK and to maximise the benefits of public sector investment. Our policy of open competition contributes to this. A healthy defence and security industry, including SMEs, brings wider economic benefits, in terms of providing jobs, maintaining skills, and making a considerable contribution to the Exchequer. The companies involved in defence and security already sell significant volumes of goods and services abroad at a time when strong and balanced growth, driven partly by increased exports, is the overriding priority of the Government.

153. We recognise that many of the large companies that supply our defence and security needs are now transnational in outlook and therefore have choices about where they invest. The UK continues to provide a unique environment for industry in the defence and security sectors in the following ways:

- a larger proportion of our overall defence business is open to industry than in many other major nations;
- we have a sophisticated demand for high-value products, which have to stand up to the rigours of operational service and consequently are easier to market to export customers;
- successfully meeting the demanding standards of the UK Armed Forces can be an asset in other markets;
- we have an open market and diversity of suppliers which encourages innovation, new entrants and inward investment;
- we expect to continue with the fourth largest military budget in the world;
- the Government helps to sustain an attractive overall environment, including:
    - leadership in science & technology, stimulated by targeted MOD investment;
    - strong support industries in finance, business services, design, and marketing;
    - a highly skilled and flexible labour force; and
    - specific export support for defence and security companies.

154. We are introducing a new approach towards engagement with overseas-based defence and security suppliers, with the aim of encouraging these companies to invest in the defence and security sectors in UK. We will encourage participating companies to:

- see the UK as a prime location to engage in research & development investment and technology transfer;
- extend opportunities for UK companies to become part of their supply chain; and
- engage specifically with SMEs in these activities and, where possible, provide advice to enhance SMEs' opportunities to succeed in the market place.

These activities will also underpin the promotion of defence and security exports.

4.4 Commitment to opening up markets

155. By challenging domestic suppliers to be lean and competitive, we will drive up their competitiveness in international markets; we will also support them in those markets. At a time of declining defence budgets, the key to UK-based industry's success lies not in dependency on the MOD, but in winning new business overseas. So our support for exports and our encouragement to new and innovative UK SMEs will help create competitive UK defence businesses. We recognise that not all markets across the world share the UK's conditions and therefore will continue to promote open markets in defence and security capabilities. Our overall aim is to secure freer access to these markets, improve the flow of defence information and technology across borders, and to enable the UK defence industry to compete on merit in other markets.

4.5 Emerging sectors

4.5.1 Cyber security

156. Cyberspace is complex, rapidly changing through increasing interconnection, and bringing us all closer together. This presents new opportunities and new challenges across the UK. The UK Cyber Security Strategy[34] recently set out the approach we will take to realise the huge potential of cyberspace for the UK; making this country one of the most secure places in the world to do business in cyberspace, more resilient to cyber attack and better able to protect our interests in cyberspace; and helping to shape an open, vibrant and stable cyberspace which the UK public can use safely and that supports open societies.

157. Some of these changes will affect how we work with industry. In this sector, industry is not primarily a supplier to Government: it is the owner of much of the infrastructure that supports cyberspace and is increasingly a provider of on-line services to the public. We must therefore find new ways to work together, establishing agile partnerships that can meet the changing cyber challenge.

158. Government's role must also change. We will seek partnerships that exploit the expertise that exists within industry, academia, and across the UK, recognising that those outside government are increasingly capable of taking responsibility for their own cyber security. These partnerships will allow us to build our cyber security capacity across the UK by identifying common needs, establishing a coherent approach to innovating,

34 http://www.cabinetoffice.gov.uk/resource-library/cyber-security-strategy .

co-designing solutions, and sharing information to ensure that suppliers are protected from the sometimes sophisticated threats to prosperity and security that they face in cyberspace. Information Assurance, which aims to reduce vulnerabilities and protect electronic information, will be crucial to strategic success in this area[35].

159. As the National Cyber Strategy sets out, we will develop the knowledge, skills, and capability that will enable flexible responses. And we will encourage the development of security technologies, as well as a deeper understanding of the risks in cyberspace across the UK. We will also seek to foster a culture that better recognises the risks in cyberspace.

160. In particular, we will establish further partnerships with industry to improve the security of commercial off-the-shelf software and hardware, to strengthen the resilience of critical information infrastructure, and to increase awareness of cyber security risks and risk mitigations. We will work with industry to establish robust cyber security standards which ensure that our key contractors in areas of national security importance (such as defence) act to protect sensitive information and systems against cyber attack.

4.5.2 Energy and materials security

161. The SDSR identified a range of risks related to the UK's ability to access secure, diverse, and affordable supplies of energy, which are essential to economic stability and growth. Although we are taking steps to diversify sources of supply and to decarbonise energy supply, these risks are likely to intensify over the coming years, due to our growing dependence on imports to meet remaining demand for fossil fuels at the same time that global demand and competition for these fuels is increasing.

162. Reducing the amount of fuel needed by the Armed Forces reduces costs and operational risks, as it is often expensive and logistically challenging to get fuel into challenging environments such as Afghanistan. The MOD uses more than 1 billion litres of fuel each year to power equipment; rising fuel prices, therefore, have a significant impact on the defence budget, potentially reducing the funding available for other necessities, such as equipment and manpower. There are also other resource risks, such as the supply of rare earth metals, which are crucial for certain defence capabilities[36]. It is important for Government and industry to work together to reduce the amount of energy and materials that are required, and so reduce vulnerability to shortages of supply. Producing more sustainable and efficient products will also help the Government to fulfil its Greening Government Commitments[37].

35 Information assurance is the discipline concerned with managing the risks to electronic information and services.

36 For example, the European Commission has identified 14 economically important materials for which there is higher risk of supply interruption. One of these, the rare earth element Yttrium, is used in many radar systems. The MOD is conducting research into how scarcity of such materials could affect defence capabilities.

37 Greening Government Commitments: operations and procurement; DEFRA paper, February 2011.

Chapter 5: Government Action

We are taking specific action:

- Ministers from across Government are doing their utmost to assist UK-based suppliers in obtaining export orders;
- we strongly support exportability, including by creating opportunities for export potential to be built in early to our own equipment and support requirements;
- there are increased opportunities for small- and medium-sized enterprises to fulfil their potential in supplying defence and security requirements; and
- a new Ministerial Working Group is being established to co-ordinate the cross-Government aspects of our new approach.

163. Our policy of meeting our defence and security requirements through open competition on the domestic and global market is complemented by the actions we are taking to promote the competitiveness of UK-based suppliers.

5.1 Working with Government

164. It is important that we have the right relationship with industry: business-like and focused on delivery. The MOD has a number of long-standing arrangements for working with industry, but the relationship needs re-balancing. We have, therefore, abolished the National Defence Industries Council and established a new Defence Suppliers Forum to get the right level of Government/industry interaction, with representatives from across the range of our suppliers including small- and medium-sized enterprises.

165. Lord Currie of Marylebone has recently published an independent review of pricing for single-source MOD contracts[38]. His report considers how these out-of-date arrangements should be updated to reflect the modern commercial environment. In broad terms his report focuses on achieving a more open relationship between MOD and industry, ensuring standardised high-quality cost data are provided by contractors to the MOD. This will help ensure greater transparency of costs and should improve the MOD's ability to negotiate realistic prices. Industry will be incentivised to deliver efficiency by the opportunity to make greater returns should they deliver cost savings for the MOD. Making industry more efficient should not only achieve value for money to the taxpayer, but also lead to a more competitive role for the UK defence industry in the export market. We have welcomed Lord Currie's recommendations and, following a public consultation on them, the MOD is now considering its response.

166. In the security sector, we recognise that arrangements for working with suppliers are not ideal, with responsibility dispersed across Government from the Home Office to the security and intelligence agencies. We are exploring how we can improve this, including by evaluating the potential benefits of appointing a Senior Responsible Owner within Government to head up a security authority, with a remit which would reach across the

38 Review of Single Source Pricing Regulations: An independent report on the single source pricing regulations used by the MOD; Lord Currie of Marylebone (October 2011).

security domain within Government. This idea was strongly supported in the Green Paper consultation responses. It would:

- act as the policy focus for security equipment and procurement in Government, including standards and reform of procurement;
- coordinate action between the Government and industry in the security field;
- act as the policy focus for the UK Security Brand (see paragraphs 190-191 below); and
- support security-related exports.

5.2 Supporting exports

167. The Prime Minister is clear that 'the promotion of British commerce and international trade [is] at the heart of our foreign and economic policy'[39].

5.2.1 Defence and security benefits

168. Exports play a critical role in the United Kingdom's defence and security policy and objectives. Helping one of Britain's most dynamic and successful industries to export is in the national interest, which is why the Government attaches so much importance to responsible defence and security exporting. Defence and security exports develop, build, and enhance bilateral relationships and defence cooperation with key allies and, by helping other like-minded nations to build up their own defence and security capabilities, contribute to regional security, helping to tackle threats to UK national security closer to their source. Defence and security exports leverage more influence in bilateral relations with our allies than any other area of trade. Defence exports also enhance interoperability with our own forces, such as during peacekeeping missions.

169. Exports can also reduce the costs of programmes to the UK. Export customers can help to spread the costs of fixed assets needed for long-term support and allow the Government to recoup some of its investment by the use of levies. If orders are received early in the development of a capability, then these help spread the very large non-recurring costs of research and development over increased production runs and reduce unit costs through economies of scale. Successful exports also improve the long-term viability of our suppliers, helping to smooth out the impact of fluctuating or limited domestic demand, and potentially ensuring that industrial capabilities that are essential to our national security are sustained. Through the United Kingdom Trade and Investment Defence and Security Organisation (UKTI DSO), we are supporting industry to make the most of the opportunities in growth markets such as Turkey, Mexico, Brazil and India.

170. To stimulate innovation in cyber security, the Government will support the UK's cyber security supply chain by promoting UK capability internationally. This will help ensure that the UK remains a global leader in niche areas of cyber security.

39 Confederation of British Industry, London, 25 October 2010.

5.2.2 Exports and growth

171. Promoting exports is also part of the Government's wider agenda for export-led growth. Defence and security companies make a significant contribution to national prosperity, as well as to our advanced manufacturing and technological capabilities. We will do more to foster a new economic dynamism, by backing those industries where we believe the UK enjoys competitive advantage, gearing our Diplomatic Service more effectively to support exports, making it easier for new companies and innovations to flourish, and ensuring SMEs have greater opportunities to reach their full potential and contribute to the UK's recovery. Defence and security companies can benefit from the range of support available to exporters through UK Export Finance, including the new products launched in the Trade and Investment White Paper[40].

172. In return for this extensive support, the Government expects the highest standards in the delivery of contracts. Poor experience with a UK programme, whether on the original purchase or subsequent customer support arrangements, can damage bilateral relations and harm the prospects for further UK exports for years to come.

173. The FCO launched its "Charter for Business" in May last year[41]. The Charter is a public expression of what the FCO can do for UK business and demonstrates the FCO's determination to play its part at home and overseas in building Britain's prosperity. The Charter clearly sets out the FCO's commitment to help UK business capitalise on every opportunity available overseas as well as promoting the UK as a place to invest.

5.2.3 Exporting responsibly

174. The Foreign Secretary announced in October 2011 that, while there are no fundamental flaws with the UK export licensing system, his review had identified areas where the system could be further strengthened[42]. Proposals include the introduction of a mechanism to allow immediate licensing suspension to countries experiencing a sharp deterioration in security or stability. Applications in the pipeline would be stopped and no further licences issued, pending Ministerial or departmental review. The Foreign Secretary also confirmed the Government's commitment to robust and effective national and global controls to help prevent exports that could undermine our own security or core values of human rights and democracy; to protect our security through strategic defence relationships; and to promote our prosperity by allowing British defence and security industries to operate effectively in the global defence market.

175. The UK will continue to be at the forefront of international efforts to establish global standards on arms export control. We led our partners in the EU in the adoption of a legally binding Common Position on arms export control, which reflects the UK's own high standards[43]. And the UK remains committed to the goal of an Arms Trade Treaty (ATT), which would be a legally binding international treaty, setting high standards for the regulation of the global arms trade.

176. We may limit the export of some goods, services, or technologies for reasons of national security. We will, therefore, retain robust processes that allow the Government to assess the risk of releasing protectively-marked information and exporting controlled items. We will continue to keep this regime under review to ensure we are delivering an efficient

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40 Trade and Investment for Growth (Cm 8015), February 2011; pages 56-57.

41 http://www.fco.gov.uk/resources/en/pdf/global-issues/prosperity/business-charter.

42 Hansard, 13 October 2011, Column 41 WS: 'FCO Review of Export Policy'.

43 The EU Code of Conduct on Arms Exports was adopted during the UK's Presidency of the EU in 1998.

and streamlined service. And we recognise that the speed of decision-making on export licences – whatever the outcome – is important to potential exporters. Several of the Green Paper consultation responses highlighted this point.

177. We recognise that those doing business abroad, in unfamiliar cultures, may face difficult ethical issues. However, the Government's position is clear: our support for promoting UK exports does not include accepting corrupt practices. We expect all those involved in UK exports to adhere to UK law, including the Bribery Act 2010. We have published clear, practical guidance on procedures that companies can put in place to prevent bribery. We are supplementing this guidance with advice for exporters and overseas investors, including through the Overseas Security Information Service and sponsorship of on-line bribery risk management tools[44]. We are also committed to pursuing a global level-playing field in bribery rules, pressing all 38 signatories to the Organisation for Economic Cooperation and Development (OECD) Bribery Convention to take active steps to enforce their own foreign bribery legislation, and working through the G20 to help emerging powers such as China and Russia to hold their own companies to account.

178. The Government has put respect for human rights as a core value at the heart of British foreign policy and has endorsed the recently established UN Guiding Principles on Business and Human Rights[45]. We expect the highest standards of behaviour and respect for human rights from British companies doing business overseas, including from the subsidiary companies and supply chains with which they work. Through the Overseas Business Risk service[46], the FCO and UKTI are also working closely to advise UK business on the risks they may face when expanding overseas, through providing key information on political, economic, and business security-related risks such as bribery, cyber crime, and protection of intellectual property rights.

5.2.4 Government-to-Government support

179. In the same way that the UK values the positive contribution that exports make to bilateral relations, some customer countries see buying from British suppliers as an important factor in building their relationship with the UK. They seek complete packages of capability, including equipment, support, and training, which places a premium on being able to deliver appropriate Government support.

180. Export customers and UK exporters sometimes regard direct Government-to-Government (G2G) involvement as necessary to secure a sale. The Green Paper consultation responses stressed this point and the value of being able to offer a rounded export package to match our competitors. The UK will consider entering into new G2G export sales where these are of strategic value and in the national interest. Direct involvement does, however, raise issues about the Armed Forces capacity to provide international training; the associated costs; the extent to which Government has a formal role in, guarantees, or underwrites major export packages; and the prioritisation of other resources, such as project teams, needed to underpin G2G arrangements. G2G arrangements involve significant initial administrative costs, as well as potential financial and reputational risks for the UK.

44 www.business-anti-corruption.com .

45 http://www.ohchr.org/documents/issues/business/A.HRC.17.31.pdf .

46 http://www.ukti.gov.uk/overseasbusinessrisk .

5.2.5 New Approach

Ministerial support

181. First and foremost, UK Ministers are now more personally involved in supporting defence and security exports. It is a principle of this Government that, when travelling abroad, Ministers from all departments are there in part to promote the UK and what it has to offer. When visiting a country, all Ministers are briefed on and expected to raise important export prospects with their interlocutors.

Equipment exportability

182. In the past, the MOD has sometimes set its equipment requirements so high that the resulting systems exceeded any potential export customer's needs or budget. As highlighted in the SDSR, we believe one way to increase the UK's share of global defence exports is to consider export-related issues early in the MOD's own acquisition cycle, while ensuring that our Armed Forces continue to receive the equipment capabilities and support they need. This approach was strongly supported in the Green Paper consultation responses.

183. We are considering how to modify the way the MOD specifies requirements, in order to create parallel opportunities for equipment to be sold on the global market. One approach we are exploring, which was supported by the Green Paper consultation responses, is to work with industry to specify broad parameters for our equipment requirements, which allow for export potential, and then to use methodologies such as modularity, open systems, and technology insertion to meet the UK's specific requirements, whilst industry adopts similar approaches to meet overseas customers' needs. Consideration of exportability issues is already mandated for inclusion in MOD business cases supporting equipment acquisition and we now plan to strengthen consideration of this aspect during the approvals process.

184. This approach will only be successful if industry can offer concrete benefits to defence programmes and budgets. Work in the field of complex weapons and on the Global Combat Ship is demonstrating the value of linkages between MOD, UKTI DSO, and industry at the earliest stages of a programme.

185. The Government and industry will work together to identify how early choices could potentially improve export prospects. Industry will need to design solutions with exportability in mind; making greater use of modularity and open systems in a cost-effective way; and the MOD will adjust programmes, having considered the qualitative and quantitative benefits to be gained from exports, underpinned by robust market analysis of customer requirements in potential export markets. The onus is on industry, however, to become ever more competitive in the global market, and to develop the world-class capabilities required by the UK Armed Forces and the wider national security and law enforcement community, while at the same time exploiting export potential.

Cross-Government support

186. UKTI DSO will operate a robust prioritisation mechanism to ensure that the Government is able to identify and focus on those campaigns which have the best prospects for the UK. However, as the SDSR acknowledged, many Government departments have to play a role in delivering defence and security overseas. The MOD, the Home Office, the Foreign and Commonwealth Office, and the Department of Business, Innovation and Skills will all support defence and security exports.

187. The MOD has established a Defence Exports Support Group, chaired by the Defence Secretary, with representation from FCO, BIS, UKTI and Home Office, to ensure the MOD is best able to support export campaigns and delivery programmes. And MOD has also appointed a Director with responsibility for export co-ordination. The new Defence Suppliers Forum has a dedicated exports working group.

International training

188. We recognise the need to ensure that training alongside the UK Armed Forces can be made available at a competitive cost for major export prospects, as long as this also represents value-for-money.

189. A key aspect of Government support to defence exports is our ability to offer military flying training in the UK, alongside the RAF. This is also important in strengthening our relationships with export customer countries. With the assistance of industry, we are developing an approach that would allow much greater scope for UK exporters to offer such training in future, whilst ensuring value-for-money.

UK Security Brand

190. A mechanism for supporting security exports in a fragmented market could be the development of a "UK Security Brand", combining the UK's worldwide track record in security matters, including counter-terrorism and policing, with the strengths of UK-based industry in this sector. A UK Security Brand would represent a hallmark of excellence in security and an endorsement of quality, reliability, effectiveness, and value-for-money. Products and services carrying the UK Security Brand would have been tried, tested, and endorsed; and would have a proven track record in service with UK security authorities or in an environment where there is a significant security or terrorist threat

191. The responses to the Green Paper showed strong support from industry for the concept of a UK Security Brand. The Home Office and UKTI DSO will consider the merits of developing such a brand. In doing so, we will need to balance the widest applicability and the highest standards, drawing on the standards regimes in the constituent schemes already in existence. The brand could include the following elements:

- a simple and efficient form of approval or qualification, without the need to create new testing regimes;
- an umbrella recognition arrangement that unites schemes already in place - the most notable examples are CESG evaluation and CAST's "Blue Book" (the Manual of Search & Detection Equipment) – and established physical security standards; and
- the scope for qualitative award of approval from UK Government security community.

5.3 Small- and Medium-sized Enterprises (SMEs)

192. SMEs are a vital source of innovation and flexibility in meeting defence and security requirements. We also recognise that SMEs are hugely important to the UK economy. At the start of 2010, there were 4.5 million private sector SMEs, defined as businesses having fewer than 250 employees, in the UK. These accounted for 99.9% of all UK enterprises, more than half (59.1%) of private sector employment, and almost half

(48.6%) of all private sector turnover[47]. The health and growth of these companies is therefore vital to economic recovery.

193. Among other initiatives to help SMEs, we are determined to increase SMEs' share of public procurement, and have an aspiration that 25% by value of Government contracts should benefit small businesses, including in supply chains, across the whole Spending Review period. In the year to March 2011, an estimated 42% of MOD contracts were placed directly with SMEs, representing some £953m or 13.2% by contract value. Substantial additional work is undertaken by SMEs in the supply chains for MOD contracts.

194. The Government has undertaken a range of measures to make public procurement more accessible to SMEs including:

- appointment of a 'Crown Representative' for SMEs to build a more strategic dialogue and launch SME 'Product Surgeries' to enable selected companies to 'pitch' innovative products and services[48]; and
- coordination of departmental action plans to help achieve our aspiration for 25% of contracts to be placed with SMEs.

We are also working to ensure that our initiatives to make public procurement more efficient, particularly centralising procurement to achieve economies of scale, do not disadvantage SMEs.

195. We are considering ways to ensure SMEs are able to contribute more easily to meeting defence and security requirements, both directly and through the supply chain. We are seeking to ensure a level playing-field, a fair chance for SMEs – neither preferential treatment, nor discriminatory barriers.

196. In support of the broader Government agenda, and in response to comments received from SMEs, the MOD has already:

- reduced by 75% (to £10,000) its threshold for advertising opportunities and now advertises these opportunities on Contracts Finder;
- adopted the new common core Pre-Qualification Questionnaire (PQQ) (and is working towards the Government aim of minimising the use of PQQs for the lowest value requirements);
- revised its internal guidance to ensure that SMEs are not rejected at pre-qualification on the basis of rigid turnover-to-contract value ratios without proper assessment of companies' actual capacity and potential;
- created a dedicated SME group in the new Defence Suppliers Forum, chaired by a MOD Minister, to provide a better 'voice' for small suppliers; and
- revised its approach to enable the submission of tenders in a way which helps protect the tenderer's innovative proposals.

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47 Department for Business, Innovation & Skills statistical release: Business Population Estimates for the UK and Regions 2010, 24 May 2011 (http://www.bis.gov.uk/analysis/statistics/business-population-estimates).

48 The Crown Representative for Small- and Medium-Sized Enterprises is Stephen Allott, Cabinet Office, 1 Horse Guards Road, London SW1A 2HQ.

197. In the security field we have also already instigated a number of measures to improve our interface with small businesses:

- the continued expansion of the annual Security and Policing exhibition, led by the Centre for Applied Science and Technology (CAST) in the Home Office and UKTI DSO, provides a world-class showcase event for industry. In 2010 this allowed over 400 companies, mainly SMEs, to demonstrate their capabilities to senior security representatives from over 70 nations;
- our approach to policing reform focuses on better engagement with industry, particularly SMEs, and we are developing a set of commercial principles to improve this;
- through stronger interaction with the Centre for Defence Enterprise (CDE) and the Small Business Research Initiative (SBRI) we have targeted SMEs in supporting our priority requirements in counter-terrorism; and
- through the Office for Security and Counter-Terrorism (OSCT) science & technology programme, we have effectively engaged SMEs, along with larger systems integrators, in counter-terrorism technology demonstrators.

198. The Green Paper consultation process identified the potential for improvements in three main areas: changes to government processes, particularly within MOD; the way MOD manages its direct relationships with SMEs; and SMEs' relationships with prime contractors. Our plans for improvements in each of these three areas are summarised below.

5.3.1 Changes to MOD processes

199. SMEs often find it difficult to engage with the MOD. This is usually linked to time and cost: SMEs do not have the resources to engage successfully with MOD procurement processes or the financial clout to wait for a concept to become a programme or to sustain them during programme changes. Making MOD's processes more transparent, simpler, and faster were seen as particularly important to SMEs.

200. To address these concerns, the MOD will:

- use e-procurement to roll out simplified, streamlined contract templates for lower value procurements, reducing the volume of paperwork and improving consistency;
- expand utilisation of its e-procurement system to speed-up invoicing and billing, which will particularly benefit SMEs, for whom we recognise cash flow is critical[49];
- strengthen the role of its senior 'Supply Network Champion' to include a specific responsibility, as part of the investment approval process, to ensure procurement strategies maximise the potential for SME participation at prime or subcontract level;
- make clear in Possible Future Purchase notices and Invitations to Tender that it will consider requests for interim payments on its contracts, taking account of the level of expenditure required in relation to the contract size and duration. (MOD will, however, need to balance its own interests and comply with Government policy on 'payment by outcome'); and

49 The MOD's target is to process 85% of all contracts on its e-procurement system by December 2012. Achievement of this target will depend in part upon the willingness of MOD's suppliers to accept electronic means of payment.

- implement reforms to the 'Framework Agreement for Technical Support' (FATS) arrangements[50] from April 2012, which include -
    - making it clearer that FATS is for short-term technical support and not for long-term projects, nor for management consultancy;
    - splitting FATS into two parts within the same framework – 'Duty of Care' (e.g. airworthiness) and 'General Technical Support', in order to manage better the different areas of capability and specialism and allow firms to match more precisely their capabilities to the MOD's requirements;
    - defining more rigorous initial selection criteria including, for example, relevant quality management criteria and knowledge of specific business tools;
    - greater management oversight to ensure that the proportion of FATS work packages which are competed is increased; and
    - exploring the creation of a web-based bulletin board that would allow FATS suppliers with the appropriate capabilities visibility of all potential FATS requirements in their area of work.

201. Lord Currie's recent independent review[51] recommended easing the reporting and administrative burden for SMEs who have entered into single source contracts with the MOD. It also recommends that prime contractors be encouraged to make maximum use of SMEs in their subcontract work. The MOD is currently engaged in assessing the responses to a public consultation on the recommendations of the Currie report.

MOD use of reverse auctions

Reverse Auctions (sometimes referred to as 'e-auctions') are a variation of the competitive tender process where, following evaluation of the technical aspects of tenders, compliant tenderers are able to log-in to a secure auction website, offering real-time visibility of both the 'leading' bid and their own ranking position, and are given the opportunity to improve their own bid if they wish to do so. The technique enables the MOD to deliver better value for money, and is considered appropriate for any well-defined requirement for which a strong field of competition exists. All tenderers invited to participate in MOD Reverse Auctions are offered training which includes advice on auction strategies, preparation for the auction, and prior exposure to the auction website. MOD Reverse Auctions are run by an independent third party provider, in accordance with the industry-agreed MOD Code of Conduct for Reverse Auctions. The reverse auction process does not preclude innovation and some requirements may be split into separately winnable auction lots, maximising the opportunities for SMEs to bid for smaller packages of work, in turn offering better value–for-money to the MOD. In considering use of reverse auctions, we also take into account the robustness of the marketplace and whether there may be a risk of limiting competition for future requirements.

50 Under FATS, companies compete to be included in a multi-year framework contract and then bid for individual MOD tasks in mini-competitions, thus facilitating rapid and un-bureaucratic tasking.

51 See paragraph 165 above.

5.3.2 MOD's relationship with SMEs

202. A criticism of the MOD from the Green Paper consultation was that SMEs do not get access to key decision-makers and that procurement routes favour prime contractors. To improve its relationship with SMEs, the MOD will:

- add 'SME awareness' as a new topic within the MOD's key procurement training programmes for senior acquisition decision-makers in project teams. There will be the potential for SMEs or their representative bodies to present on the issues they face and counter any misconceptions about SMEs;
- highlight, in training and guidance for procurement staff, the acceptability of tools such as factoring or invoice discounting, which will help small companies to fund their involvement in MOD contracts, and also the 'More Effective Contracting' procedures, which advocate dividing projects into discrete stages, each with explicit 'go/no go' criteria, with the aim of limiting both parties' overall risk and financial exposure;
- consider encouraging approaches from consortia of small companies that may be better able to offer a solution and accept risk than individual SMEs;
- sustain and expand the role of the Defence Suppliers' Service within MOD that provides a telephone and e-mail help desk and an 'outreach' service for would-be suppliers, mainly SMEs. In particular, we will create links with MOD Key Suppliers[52] so that SMEs who approach MOD may be referred to relevant prime contractors as well as to MOD procurement teams. We will also improve links with the Centre for Defence Enterprise, with UKTI (to identify inward investment and export opportunities), and with the new Local Enterprise Partnerships;
- continue to support industry's Supply Chains for the 21st Century programme[53];
- ensure that we specify defence and security requirements as far as possible in terms of capabilities and outputs, leaving industry to propose potential technical solutions. This will allow innovative suppliers (often SMEs) more scope to propose 'non-traditional' solutions which may offer better value-for-money; and
- enhance the role of CDE, such that it works more closely with the SMEs that it funds, including the facilitation of opportunities to engage with prime contractors to increase the likelihood of exploitation of the most innovative outputs.

5.3.3 SMEs' relationship with prime contractors

203. Prime contractors play an important role for the MOD in accepting and managing programme risk. Many SMEs specialise in niche technologies, processes, or products. They will typically lack the capability or capacity to deliver a complete platform or weapon system, particularly where this demands complex integration, high-volume or capital-intense manufacturing. It will rarely make sense for the MOD itself to assume the

52 MOD currently identifies twenty-one companies as 'Key Suppliers', on the basis of factors including their current strategic importance in defence, the total value of MOD payments to them, and the breadth of their engagement across the Department.

53 The 'SC21' programme, created by the Society of British Aerospace Companies (now A|D|S) in 2006, is 'a change programme designed to accelerate the competitiveness of the aerospace & defence industry by raising the performance of its supply chains'.

role of system integrator because it lacks the resources and skills needed to manage the task and the associated risks, which can be considerable. There will, therefore, continue to be an important role for integrating prime contractors, able to deliver and support complete weapons or systems, engaging and managing networks of specialist, lower-tier suppliers. Although MOD will not intervene in supply chain relationships, we wish to ensure an environment in which SMEs are able to contribute and thrive in roles where they can bring value, flexibility and innovation.

204. The MOD will therefore:

- ask major prime contractors to advise on the steps they will take to increase SME participation in the supply chain for Government contracts, either through direct participation or through licensed technology transfer enabling SMEs to earn income from royalties/licence fees. Ideas include primes advertising sub-contract opportunities on the Defence Contracts Bulletin and Contracts Finder portal, holding events to explain how companies might become supply chain partners, and placing contact details for primes' procurement divisions on the MOD website;
- invite bidders for prime contracts over £1m in value, where it is reasonable to do so, to identify the volume of work they intend to sub-contract to SMEs (although public procurement rules preclude making this a bidder selection criterion); and
- recognise the concerns which have been raised by the smaller companies and academia over the need to protect their Intellectual Property Rights (IPR) when dealing with defence contractors eager to incorporate new concepts and technologies into products and services saleable to MOD and into wider defence and security markets. The Government will work with industry and the Intellectual Property Office to explore what can be done to promote greater confidence amongst SMEs that their IPR will be respected. This may include –
  - developing a Code of Conduct for supply chain companies, to include the way in which higher-tier companies will be expected to treat and protect the IP provided by their suppliers, including SMEs;
  - changing our approach to contracting, so that our prime contractors and higher-tier supply chain companies are contractually obliged to recognise and respect the IPR of their sub-contractors (including SMEs, both at the pre-contractual stage and after contracts are awarded); and
  - raising awareness of the potential for licensed technology transfer as an alternative avenue for SME participation, potentially benefiting SMEs and extending the pool of technologies available for defence.

Security Requirements

A recurrent theme in SME-related comments received by the MOD concerns 'List X' security status and, in particular, a misconception that security requirements prevent companies without facilities cleared to 'List X' status from bidding for some Government contracts. This is not the case. The List X process is intended to safeguard protectively-marked information and assets; it does not of itself confer competitive advantage as the Government operates a 'level-playing field' where all companies are able to compete for work at any level of protective marking regardless of their List X status.

Companies that have not undergone the List X process are sometimes concerned that they may not be able to access protectively-marked material in order to construct a tender. However, MOD project teams and contractors are able to make arrangements for supervised access by tenderers who do not hold a national security vetting clearance to UK protectively-marked material up to 'Secret' level, where they have met the Baseline Personnel Security Standard. Tenderers finding themselves in this position should contact either the initiating Project Team or, in the case of a sub-contract, the Security controller of the UK company running the competition, who will arrange for supervised access to the protectively-marked material either at a MOD establishment or an approved List X Facility. For access to 'Top Secret' material, an appropriate sponsor can be arranged where required. This allows all potential bidders to tender for classified contracts, without compromising national security. Where a successful bidder is required to adhere to List X processes, these arrangements can be completed before they take custody of any protectively-marked material.

205. We will do all we can to increase the availability and visibility of the opportunities that MOD procurement provides, but SMEs must also seek out and compete for them, playing to their strengths of agility, low costs, innovation, and customer focus. Examples of steps SMEs can take include:

- monitoring opportunity notices on Contracts Finder and the Defence Contracts Bulletin;
- studying contracts published under our transparency policy in order to understand MOD requirements and how we procure;
- approaching prime contractors as potential customers for competitive and innovative sub-systems, components, specialist services etc.;
- attending advertised 'industry day' events and exhibitions run by MOD, trade associations, and prime contactors; and
- considering submitting innovative proposals with potential defence applications to the CDE.

5.4 Ministerial Working Group

206. This White Paper sets out our policy on a wide range of issues relating to technology, equipment, and support for UK defence and security. We are therefore establishing a new Ministerial Working Group to co-ordinate the cross-Government aspects of our new approach. It will be chaired by the Minister for Government Policy and include Ministerial representation from MOD, Home Office, HMT, FCO, and BIS.

Chapter 6: Implementation

207. This paper has set out our new approach to how the UK will procure technology, equipment, and support to meet our defence and security requirements. This chapter summarises the main actions we are taking to ensure that our new approach is implemented successfully.

208. This White Paper is part of a wider defence transformation programme that includes implementation of Lord Levene's Defence Reform report, the forthcoming Materiel Strategy, and consultation on Lord Currie's review of single-source procurement, which together will ensure that the MOD delivers its outputs in the most effective and efficient way possible.

209. The MOD will embed the new approach to open procurement and the protection of operational advantage and freedom of action in its Acquisition Operating Framework (AOF), which is accessible to MOD's acquisition staff and suppliers. We will take an important step towards greater transparency by publishing later this year the MOD's ten-year forward equipment plan and we will publish the future science & technology priority themes annually. We are also making MOD's procurement processes more transparent, simpler, and faster to ensure defence opportunities are available to the widest possible field of suppliers, particularly SMEs.

210. We place a high priority on future defence and security science & technology spending and will retain a group of highly skilled people in Government to maintain our 'intelligent customer' capability. We will achieve this, whilst delivering value-for-money, by working closely with our allies to fulfil the UK's defence and security requirements and seeking to ensure that support services provided by industry are increasingly integrated so they can provide assured maintenance and support during operations.

211. In the security sector, we are evaluating the potential benefits of appointing a Senior Responsible Owner (SRO) within Government to head up a security authority and the merits of developing a UK Security Brand

212. We recognise the value provided by a vibrant defence and security market. Our principle of open procurement will ensure industry is best placed to compete successfully in the global market, winning an increasing number of export orders. The Government will also do its utmost to support responsible defence and security exports by considering exportability issues early in the acquisition cycle and taking steps to ensure that training alongside the UK Armed Forces can be made available at a competitive cost for major export prospects, providing it also delivers value-for-money.

213. We are establishing a new Ministerial Working Group to co-ordinate the cross-Government aspects of our new approach.

214. It will be challenging to achieve these objectives in a period when we are simultaneously seeking to introduce much greater efficacy into the running of Government departments and the public sector more widely. We are confident that we can do so and ensure that our Armed Forces and the wider national security community continue to get the equipment and support they require at an affordable cost and at value-for-money to the taxpayer. This will encourage a vibrant UK-based industry that is able to compete against the best in the world to meet not only the UK's needs, but is also able to win a significant share of the world market.

Acronym List

AOF	Acquisition Operating Framework (MOD guidance)
ATT	Arms Trade Treaty
BIS	Department for Business, Innovation, and Skills
CAST	Centre for Applied Science and Technology (part of the Home Office)
CBD	Chemical and Biological Defence
CBRN	Chemical, Biological, Radiological, and Nuclear
CDE	Centre for Defence Enterprise
CESG	The National Technical Authority for Information Assurance (part of GCHQ)
Dstl	Defence Science and Technology Laboratory
EDA	European Defence Agency
ELC	Enhanced Learning Credit
EU	European Union
FATS	Framework Agreement for Technical Support
FCO	Foreign and Commonwealth Office
G2G	Government-to-Government
G20	The Group of Twenty
GCS	Global Combat Ship
HMT	HM Treasury
IED	Improvised Explosive Device
IRC	Internal Research Collaboration
KTN	Knowledge Transfer network
MOD	Ministry of Defence
NATO	North Atlantic Treaty Organisation
OCCAR	Organisation Conjointe de Coopération en matière d'Armement
OECD	Organisation for Economic Cooperation and Development
ONS	Office for National Statistics
OSCT	Office for Security and Counter-Terrorism
PQQ	Pre-Qualification Questionnaire
RFA	Royal Fleet Auxiliary
SBRI	Small Business Research Initiative
SC21	21st Century Supply Chains
SDSR	Strategic Defence and Security Review
SME	Small and Medium-sized Enterprise
SRO	Senior Responsible Owner
STEM	Science, Technology, Engineering and Mathematics
TFEU	Treaty on the Functioning of the European Union
TSF	Total Support Force
TTCP	The Technical Cooperation Program
UKTI	UK Trade and Investment
UKTI DSO	UKTI Defence and Security Organisation
US	United States
VBS2	Virtual Battlespace 2

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