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The Defence Industrial Ecosystem

Delivering Security in an Uncertain World

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Defence in an Uncertain World

In October 2010, the government of the United Kingdom published its National Security Strategy and the Strategic Defence and Security Review (SDSR). Preparation was crammed between an election in May earlier that year, and the publication of a comprehensive spending review in the autumn – a period of time also defined by the negotiation, formation and initiation of the first UK peacetime coalition government in generations.

Whilst it is fair to recall that both Whitehall and Westminster had been preparing for a defence review for at least eighteen months prior to the election, there is little doubt that the impression left by the SDSR in particular was of a process that was short-term in nature, rushed, and undertaken without full regard to all of the forces, factors and variables that coagulate to form defence and security capability. The on-shore defence industrial base – and the myriad of original equipment manufacturers (OEMs), researchers, supply chains, service providers and advisors that form it – certainly seemed to be a key enabling ingredient that was woefully ill-considered and unrepresented by the 2010 policy review.

Yet the headline outcomes of this work would surely impact upon industry and add a further layer of challenge to corporate decision-making. A reduction in real terms in the defence budget of about 7.5 per cent over four years,¹ significant force reductions for the army, fleet and RAF, and the scrapping of systems such as Nimrod MRA4, Harrier and Sentinel, not to mention the planned mothballing of one of two new aircraft carriers, have combined to build doubt across industries within the defence and security sectors.

The lack of a robust and considered industrial policy agenda within the review is hardly a surprise, as those working on it had to operate quickly and pragmatically given the extraordinary fiscal circumstances facing the UK. Indeed, the government itself has recognised the short-term horizon of the SDSR by acknowledging that a further review could begin as early as 2013.

Driven by developments over which they have very little real influence and constrained by the immediate political and financial imperatives, the UK's defence and security policy-makers struggle to define and nurture key strategic partnerships for the new millennium at a time when major choices with long-term consequences cannot be avoided.² Instead, British defence and security policy – and with it, the continued maintenance and projection of power envisaged by the 2010 review – may be moulded in the short to medium term by unprecedented fiscal and structural challenges.

The defence and security space is consequently a complicated and unyielding place to be for the policy-maker, military practitioner and analyst. It is equally

complex and uncertain for the people who create and exploit technology; design, demonstrate and manufacture equipment;³ and train the military or in some other way support or maintain the activities of the soldier, sailor or airman. These are the people without whom military capability in the twenty-first century could not be imagined. They form the defence and security industrial base, along with the organisations that employ, develop and sustain them.

This paper introduces the Defence, Industries, and Society Programme (DISP). It goes on to discuss the nature of the roles of defence manufacturing and service industries in a complex world, and introduces the notion of a defence industrial ecosystem as an analytical tool. This concept is framed to make sense of the array of considerations, organisations and relationships pertinent to the industries that are involved with national defence efforts.

The research activities of the programme will provide a coherent interrogation, and subsequent understanding, of the defence industrial ecosystem and pertinent policy choices; answering both ‘what?’ and ‘what next?’ This body of knowledge will be made widely available through a broad variety of media and proactive engagement with policy-makers, practitioners and industrialists.

An Uncertain World

Observers of the UK defence and security sector will be aware of the ‘perfect storm’ of drivers present when the coalition government came to power in May 2010. There was a requirement to simultaneously address the needs of difficult military operations, particularly in Afghanistan; a decline in government revenues, and a rise in government borrowing; and a significant gap between Ministry of Defence (MoD) equipment commitments and expected revenues. However, as Michael Clarke points out, while these factors are immediately important, none are genuinely game-changing.⁴ But behind these short-term drivers lies a strategic landscape that has changed fundamentally in the last twenty years. Arguably, the UK finds itself at a ‘strategic moment’, characterised by a confluence of different trends that are at once full of possibilities, but also difficult to interpret and liable to rapidly evolve.⁵

The transition to a post-Cold War world is characterised by a new distribution of power. Rising powers are acting upon their newfound diplomatic influence, economic strength, military potential, cultural outreach and international leadership – all in a global environment of interdependence.⁶ This new multi-polar world will have significant, long-term consequences for the international system at all levels. However, what impact this reconfiguration of power will have on international norms and stability is still unclear. Political, economic, social and technological change is generating a highly volatile world. The

random, the uncertain and the complex – what we might conceive as the tyranny of the unforeseeable – are likely to pervade the future.

This sense of complexity⁷ will define the global operating environment for governments, corporations and individuals alike. In the face of an inability to diminish uncertainty, a vital attribute will be the capacity to cope with the effects of surprise. As H R McMaster observes, ‘The key [...] is to not be so far off the mark that it becomes impossible to adjust once the conditions of conflict are revealed.’⁸

The Defence, Industries and Society Programme

The Royal United Services Institute has initiated the Defence, Industries and Society Programme as part of a major effort to create an authoritative and evidence-based understanding of the place of industry in Western defence and wider society.

The need for such a programme is both urgent and long-term: urgent because the effects of the global recession and subsequent squeeze on public expenditure may provoke short-term and reactive policy responses to complex defence, industrial and social problems; long-term, because there is an evident need to build independent research expertise in the grey area between industry/technology, governmental policy-making and social developments. A well-founded knowledge about the defence industrial ecosystem and its constituent elements improves understanding about the UK’s defence capability. Unchallenged misunderstanding, on the other hand, will have significant negative consequences for Britain’s influence in the international system and for the security of the British people.

A credible, independent source of quality research and public commentary, the programme will inform mainstream academic, industrial and political debates regarding future military capabilities, foreign policy ambitions, investment choices, and policies impacting on businesses supporting defence. Key research areas deriving from the ecosystem include:

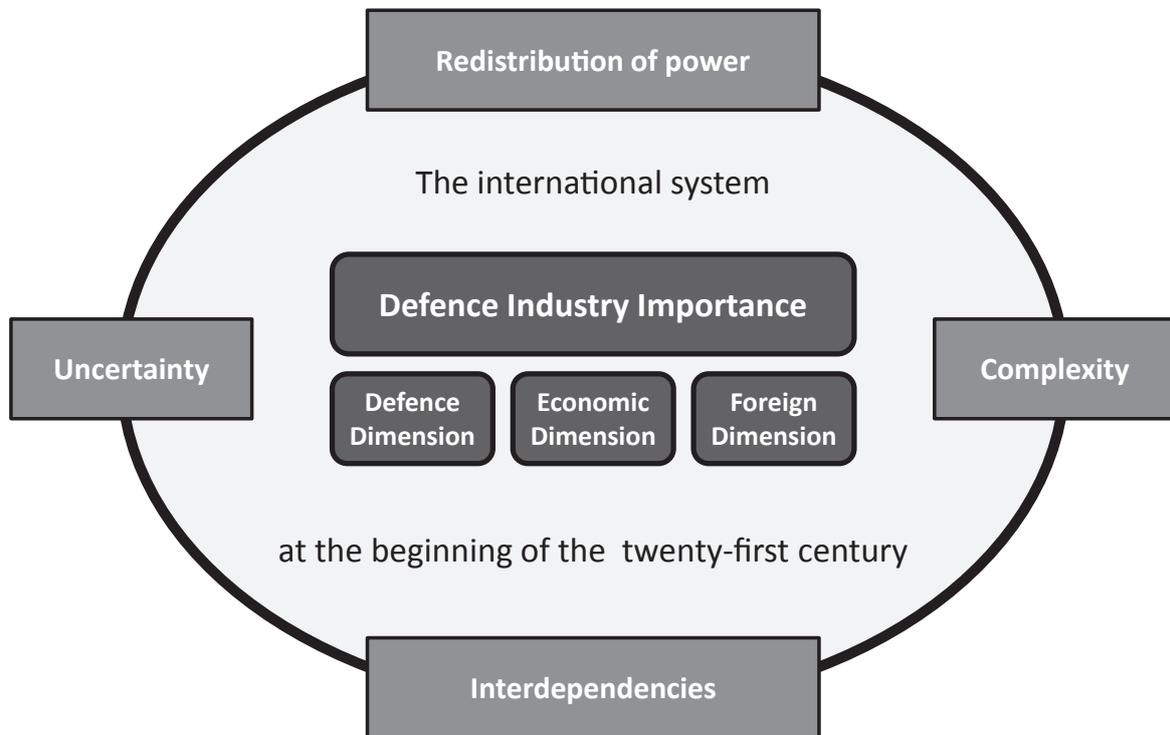
- The concept of a defence industrial base and its purpose in a Western state
- The role of the defence industrial base in the projection and sustainment of military capabilities
- Lessons for the future from military operations since 1990
- The reconciliation of government roles as customer, sponsor and regulator of defence businesses in an era of multinational corporations

- The impact of national and European regulatory frameworks on industrial conduct and policy
- Ethical considerations relevant to the defence industrial effort
- The place of research and technology expenditure, within and without government, on the health of industries serving defence
- The risks and benefits associated with defence exports from a defence, national governmental and societal perspective
- The risks and benefits associated with the offshore ownership of defence companies
- The constituent elements of defence industrial capabilities
- The impact of public and political attitudes towards defence expenditure on the health and structure of the defence industry
- Industry's economic, commercial, ethical, partnering and operational perspectives.

In order to advance the national and international discourse on these pressing issues the RUSI DISP, in close co-operation with its sponsors and partners, will:

- Publish regular research papers
- Provide articles in the national and international press
- Initialise a workshop series
- Organise roundtables providing space for discussion
- Establish an annual conference on defence, industries and society.

Together, this reinforcing work output of the RUSI DISP will generate an unrivalled body of knowledge across the defence industrial, societal and policy space. Of special importance is an understanding of the view from the industrial base, and a clear sense of the economic perspective, a partnering perspective, a commercial examination, an ethical view and an operational perspective, all the while embracing the governmental and societal dimensions.

Figure 1: The Importance of the Defence Industry

Defence Industries

The Nature of the Sector

The public and private companies that form the defence and security industrial base have been traditionally characterised by a sometimes useful but often lazy set of labels. A company is said to be a 'prime' if it is frequently the principal responsible delivery agent in a certain MoD domain or programme. That company, or indeed a completely separate one, could be labelled the 'Original Equipment Manufacturer' (OEM) if it is the business that first designed and manufactured the equipment in question or, perhaps, purchased the licence from elsewhere to do so.

Often supporting the 'prime' or 'OEM' is an extensive supply chain providing essential parts or services. The lead levels of these chains are often described as 'second tier' companies contributing towards the generation of defence capabilities. Bringing all of these constituent elements together (occasionally) can be the 'systems integrator', which may well be the prime contractor, the OEM (if different), or an advisory company specialising in programme or project management. For major items of equipment, there are normally many sub-layers of hundreds of suppliers, some of whom may not even be aware of the eventual destination of their products. There is also great variation among MoD suppliers as to the degree of their focus and dependence on the defence and wider security sector. The defence industrial space is a complicated place in which to operate (see Figure 1 and Figure 2).

Multinational corporations open to investors from around the globe are a reality of today's world. An organisation that may have owners in multiple countries can in turn operate in many countries. Defence is no longer an exception, with most of the major firms employing large numbers of people outside their 'home base'. The UK government adopted a significant stance in the 2002 Defence Industrial Policy when it announced that any firm adding significant value in the UK would be treated as 'British'. That meant that firms including Thales, Finmeccanica, Lockheed-Martin and General Dynamics could be defined as UK national entities.

The Economic Importance of the Sector

It is helpful to consider the defence industrial base in the UK in the context of the wider economy. In terms of the proportion of UK output as expressed by GDP, in 2010/11 the largest sector was manufacturing at 17.5 per cent; wholesale and retail at 10.5 per cent; and financial services at 8.1 per cent. The defence industrial sector (as an aggregation of defence manufacturing and service provision), by comparison, comprised just over 1 per cent of economic output.⁹ In terms of MoD expenditure, in 2009, £13.4 billion was spent on the equipment and support programme (of which £6.7 billion was spent on capital infrastructure, £4.3 billion on equipment support and

£2.5 billion on research and development).¹⁰ This represented just over 40 per cent of the total defence budget, so we can say that the equivalent of approximately 2 per cent of British GDP is spent on defence activity with half of this used by government to purchase goods and services from the industrial base. When adding other non-equipment lines, MoD spend within the industrial base gets close to 55 per cent of the budget.

These numbers provide some interesting signposts. Whilst the defence industrial base is self-evidently important to the UK economy, particularly in some regions and communities, on scale alone it is not as economically significant as the manufacturing, retailing or financial services sectors. Indeed, the primary sector – agriculture and extraction – represents 3 per cent of the economy and, as such, is three times the size of the defence industrial sector. Yet reliance on a monetary analysis disguises the significance of the defence industrial base, which cannot easily be measured in monetary terms due to the elusive value of defence outputs: there is no precise, unchallenged definition of a ‘unit of security’ or a ‘unit of peace and stability’.¹¹

The private sector base on which a country depends for its defence capability may not be located entirely within its own territory, and, clearly, placing contracts overseas has important economic, foreign policy and defence implications. While the UK has stopped publishing figures for identifiable defence imports, the historical broad brush figure was that the UK imports about 10 per cent of its equipment needs.

As an illustration, albeit an exceptional one, let us consider BAE Systems, the UK’s largest defence company. Of course, it is not simply a UK business: it would be more accurate to describe it as a global defence and security corporation listed and headquartered in the UK. The company employs over 95,000 people worldwide and specialises in the research, development, design and manufacture of complex military and security equipment products, and the preparation and support to the effective military deployment of equipment packages, typically involving the exploitation of complex technologies and electronic systems.¹²

In terms of the UK, the operations of BAE Systems find employment for approximately 40,000 people, with almost half of these being professional engineers, either in practice or qualifying. Consequently, it is the UK’s largest single private employer of engineers¹³ which, in itself, hints at a substantial foundation of knowledge and intellectual capital residing in the UK under the banner of defence industries. Indeed, the UK part of the business generates revenues in the region of £9 billion annually. An economic analysis of the business into the contribution of BAE Systems to the domestic economy for 2009 highlighted the following findings:¹⁴

- The company's direct value-added contribution to UK GDP was £3.3 billion¹⁵
- Productivity, as measured by value added per employee (or full-time equivalent) was 85 per cent higher than the UK economic average¹⁶
- UK operations generated net exports of £4.8 billion and contributed £653 million in direct taxation
- Combined company and contract research and development accounted for £900 million
- An estimated £4.1 billion was spent on the procurement of equipment, components, materials and services from UK suppliers
- The company supported 125,000 jobs in the UK economy.¹⁷

On one level of understanding, therefore, BAE Systems could be characterised as having a significant and quantifiable impact upon the society and economy in which it is headquartered as well as, on a more assumptive basis, a major impact upon the individuals it employs (both directly and indirectly) and, by extension, the individuals it serves at both policy-making and war-fighting levels.

The Foreign Policy Importance of the Sector

This paper does not extensively discuss foreign policy dimensions, but it is self-evident that companies with defence products are, first and foremost, commercial entities with an interest in sales and thus export opportunities. From a governmental perspective, such exports need to be regulated to ensure they are compatible with the country's wider security concerns. The example of Libya, once a priority market for UK defence exports, exemplifies the inherent risks associated with defence exports.¹⁸ However, defence exports also represent an opportunity to advance diplomatic and economic relationships with the recipient country.¹⁹ When a government buys a major piece of equipment from an external source, a long-term high-level relationship may be created between the two governments because a continuous supply of parts, information and sometimes support services is normally needed. Domestic defence industrial capabilities are important in foreign policy terms: they permit reduced dependence on external suppliers and offer chances to sway the behaviour of external customers.

The Military Importance of the Sector

Fundamentally, the UK government has chosen not to (and cannot in the short to mid-term at least) make weapons systems or components. The government has also entrusted the delivery of many important services, including the provision of much training, to the private sector. Both goods and services come from the defence industry and, when integrated with service personnel, provide a buttress of national defence and international security. The role of the private sector in generating a needed military capability can therefore be of particular significance when a government opts to use its forces in operations.

It helps to think of two distinct, though overlapping and interdependent areas of analysis: the role played by the industrial base in preparing the military for operations, and the various activities undertaken by industry within those theatres of operations, close to the sharp-end of military endeavours.

Within the former, we would argue that the defence industrial base provides four key functions. First, it enhances the chances of armed forces being supplied with equipment that meets their perceived needs, so they do not have to rely solely on that already available in the marketplace: with sufficient lead times industry can research, develop, manufacture and support new systems for operational exploitation by the military. Second, it offers decision-makers and military commanders the ability to 'surge' the production of military equipment. Next, within industry there potentially resides a body of knowledge that can be exploited as a national resource for military effect at time of international tension or crisis. Fourth, industry can responsively modify existing equipment packages to meet new and emerging in-theatre scenarios and threats.

In terms of in-theatre support, contractors from the industrial base usually have an immediate and integral role to play in equipment maintenance and turnaround in support of the military effort on operations. As well as equipment servicing and support, people from industry are also engaged in managed service functions such as guarding, catering, accommodation and logistics.²⁰ The private sector has become a 'force multiplier' in contemporary military operations or perhaps even, as Norman R Augustine formulates, a 'branch of the armed forces'.²¹ The defence industry's involvement in the military effort in ongoing operations in Iraq and Afghanistan through Contractors on Deployed Operations (CONDO)²² is a key element of the UK's defence capability, which must also be considered for future British military operations.

The final MoD report on operations in Iraq, during which about 1,500 civilian contractors were deployed into the Gulf region from 2003, states with regard to the task of force generation:²³

The very considerable success in delivering equipment against very demanding time and performance criteria owed much to the excellent contribution of contractors in the face of relatively late changes to the force composition and constraints on early consultation with industry.

In 2010 about 7,000 contractors were deployed and contracted by the MoD on operations *Telic* (Gulf Region), *Herrick* (Afghanistan), *Calash* (Indian Ocean) and *Oculus* (Balkans). The Contractor Support to Operations (CSO) accounted at the same time for 40–45 per cent of the UK overseas operational defence sustainment effort. Estimated annual CSO expenditures for 2010 came to around £2.6 billion.²⁴

The use of CSO has proceeded in an ad hoc incremental fashion and the expected reduced scale of operations offers the chance for the development of a more structured and rationalised approach. Whilst these activities are widespread and significant, they have not been systematically reviewed and explored. And the question is whether there is a profound change in the economic and political dependence of the state on its industrial base for the successful execution of military operations in an era of globalisation and interdependence. If military operations become, or have become, fundamentally dependent upon industrial know-how, will this necessarily drive common foreign, security and industrial policies between allies?

Defence Industries: A Multi-Faceted Asset

A capable defence industrial sector must be recognised as a multi-faceted national asset contributing to that elusive concept of political power. In the words of Ashton B Carter, the US Under-Secretary of Defense for Acquisition, Technology and Logistics:²⁵

A strong, technologically vibrant, and financially successful defence industry is therefore in the national interest. In this respect the warfighter's and taxpayer's interest are fundamentally aligned with those of the industry stakeholders.

Indeed, it is notable that US political leadership increasingly considers the strategic role and tactical purpose of industry in delivering defence and security capabilities.²⁶ Following Bernard Gray remarking at RUSI in 2011 that the US and UK are facing similar problems in this regard,²⁷ the national discourse in the US can offer lessons for the UK.

First, the US has recognised that government and society have a long-term interest in the defence industrial base, with the political elite echoing the actions and instincts of long-term investors. There seems to be an emerging consensus across the political spectrum on generating and promoting policies that will secure long-term innovation, profitability and productivity growth, all of which must be suitably economical for the public purse.

Second, as a cornerstone of their defence industrial policy the Americans wish to rely on normal market forces to make structural adjustments to the defence industrial base, believing this will make for the most market-efficient amendments. In this way the confluence of technological change, creativity and capital markets will ensure, so it is believed, a sustainable defence economic base for the US. Since competition is seen as a key driver of productivity and prosperity, the Obama administration does not support any further consolidation of principal weapons systems prime contractors.

Third, the US is reviewing its defence industrial base sector by sector – from aircraft manufacture to managed services – believing that the dynamics of each sector vary significantly from the next. When the specific sector, through market adjustments, is ‘right-sized’ and ‘right-shaped’, the government of the US will generate policies and incentives, as yet unidentified, to sustain it.²⁸

A fourth strand of US defence industrial policy is that it is interested in the industrial base below the primes. A doctrinal belief that smaller firms, start-ups and new entrants generate refreshed technologies and better ideas which, in turn, drive down programme costs is at the heart of President Obama’s defence policy. Also, the service sector is identified as being especially important as approximately half of all defence prime contracts by value goes to this sector.

So the debate in the US on the role, size, shape and durability of the defence and security industrial base has already begun, with the US defence industrial strategy paraphrased as follows:

- A commitment to a strong, vibrant and financially successful defence industry
- Prime reliance on market forces to generate needed structural change
- Competitive pressures should be preserved and even enhanced
- All established and emerging sectors relevant to defence should be addressed
- Barriers to market entry should be minimised
- Globalisation should be embraced and exploited.

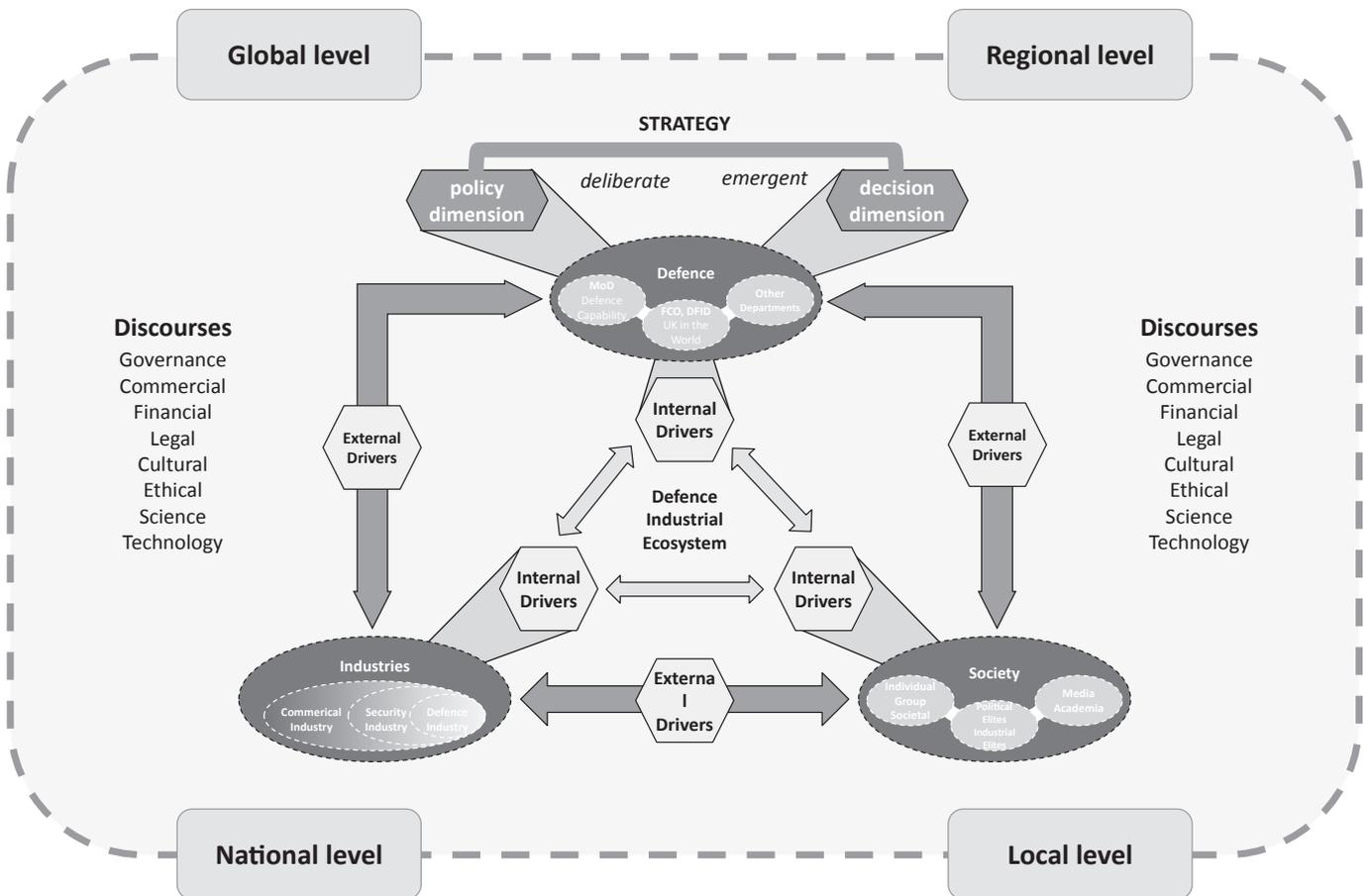
Where the US leads, Europe and the UK in particular often follow. A national discourse, informed, rigorously researched and evidenced-based, on the economic, societal, strategic and operational purposes of our own defence and security industrial base is long overdue. The Defence, Industries and Society Programme is designed to address this shortfall and encourage and inform UK corporations to seize the opportunities emerging across the defence space.

The Defence Industrial Ecosystem

Given the above, this paper conceptualises the spaces where the policy-maker, military operator, industrialist, employee, taxpayer, citizen, commentator and other stakeholders interact as a complex ‘defence industrial ecosystem’ (see Figure 2) whose forms and evolution can be explored and understood through systematic research and analysis.

There are three core elements, namely ‘defence’ (policy formulation and implementation through decisions), ‘industries’ (providers of goods and services) and society (the source of manpower, other resources, discourses and permissions), which are culturally interdependent as they combine to generate the defence industrial ecosystem. The formation of the ecosystem’s constituent parts and the transactional processes among them are shaped by a multiplicity of internal and external drivers and relationships. These are dynamic, creating the potential for conflict and uncertainty, but also present significant systemic impetus for innovation and reform.

Figure 2: The Defence Industrial Ecosystem



As all social systems, the defence industrial ecosystem has, at its heart, a set of actors, organisations and discourses relating to governance, commercial, financial, legal, cultural, ethical, science and technological issues. An in-depth understanding of these discourses is a crucial element in exploring the rules and habits of collective decision-making within defence and its constituent parts.

The constituent elements, and consequently the defence industrial ecosystem as a whole, are integral parts of the global, regional, national and local levels of the international system. Although interdependent, every level imposes a specific set of push- and pull-factors on the constituent elements and the relationships among them.

At the global level, the ecosystem is tied to processes of globalisation and internationalisation. Investment decisions and co-operation across industries are not necessarily limited to specific sectors or a single customer.

At the regional level, the defence industrial ecosystem is driven by changes in the European and transatlantic contexts (for example, the future of strategic relationships, institutional reform and the regulatory framework) and by the political, economic and social situations in regions like the Middle East, Central and Southeast Asia. These geopolitical considerations shape policy formulation, national requirements for goods and services, and business opportunities alike.

The national level is the main area for discourse between government and society on key public issues like spending priorities and the UK's position in the world. Further, sovereignty and autonomy are critically linked to the structure and conduct of the defence industrial base as part of the wider, national industrial sector.

At the local level, where the impact of political and economic decisions and events is felt by society, the interaction between the society and the defence industry finds its most direct expression in the provision of workplaces by the industry, and provision of the workforce by society. This relationship is the point of origin for discourse on the role of the defence industry within Western defence and wider society, and acts as a reference point for the social perception of governmental-industrial interactions.

I. Industries

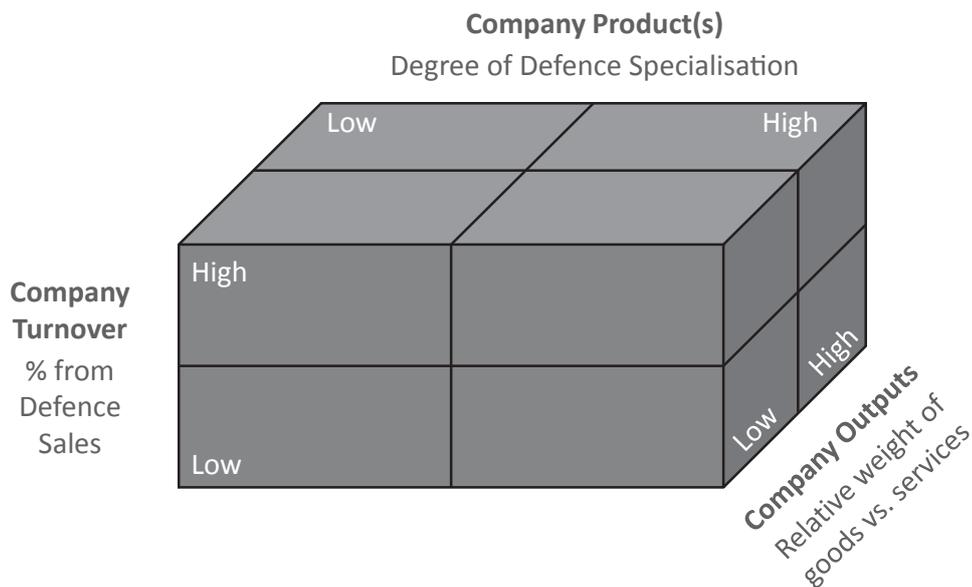
The industries element of the defence industrial ecosystem embeds defence and security businesses and supply chains within a broad, industrial framework. Companies that provide defence products may also operate in civilian markets. This cross-cutting aspect is reflected by ambitions, strategies and capabilities of companies, as well as by their corporate structures and

ownership. These, in turn, determine both the internal setup of the defence and security sector and its relationship with wider society. Whereas the industrial-defence relationship is mainly defined by industry’s role as an enabler of government power projection in the defence and security field – as well as a generator of corporate tax revenue – the industrial-society relation focuses on the provision of work and skills, and also encompasses ethical questions regarding the relevance and role of defence and security industries in post-modern societies.

As our simple grid (see Figure 3) illustrates, the supposedly ‘typical’ defence corporation operates in a variety of guises. There is the degree of defence specialisation of the company’s products; the percentage of a company’s turnover that comes from defence sales; the relative weight of goods vs services in a company’s output; and also, as a separate point to the degree of market specialisation, there is a dimension of dual-use (where a product has both civilian and military applications) that adds a layer of complexity to industrial decision-making.

A crucial aspect of the defence industrial ecosystem is the considerations that arise from the position of companies as commercial enterprises, with the resulting need to raise capital, make profit and generally perform to the expectations of shareholders and wider stakeholders. There are of course some elements on the margins between the governmental sector and the defence industry, such as government agencies operating under quasi-commercial pressures. The UK’s Defence Science and Technology Laboratory

Figure 3: The Multiple Dimensions of a Defence Company



(DSTL), and notably the Defence Support Group, both fall into this category. A significant question relates to the pressures on defence businesses to meet the needs of their defence customers while also behaving as commercial enterprises under pressure to maximise profit. To raise human and financial capital, businesses labelled as 'defence companies' must compete with every other firm on the market, not just those in the defence sector.²⁹ This question can have particular salience at times of unexpected military operations.

The defence industrial sector also needs to be able to recruit, develop and retain skilled staff of the right quality, and must be financially, intellectually and emotionally appealing to talented individuals. It must do this in competition from both the governmental defence sector and the wider civil economy. Companies engaged in defence procurement are, albeit in a special way, an element of the wider industry.³⁰ Consequently, the provision of goods and services by the defence and security industry, offering substantial value to the state, is not free of tension from the government perspective. An accurate characterisation of this state of the defence industrial base is presented by Frank Kendall:³¹

[The defence industrial] base today is more global, more commercial, and more financially complex than it was in the past. The defence industry, from the prime contractors that work directly with the government to their subsystem and component suppliers and even their raw materials suppliers, is constantly changing, constantly adapting to the Department's requirements and to the conditions in the marketplace. This natural evolution in the base is inherent in a free enterprise system, but it can bring with it new challenges for a Department of Defence that seeks to sustain and grow a strong defence industrial base even as budget growth declines.

A specific regulatory framework is a further feature defining the defence sector. Because of the potential for defence businesses to enhance the lethal capability of other states, and because defence corporations are entrusted with extensive classified information, they are subjected to law and regulation about whom they can employ, to whom they may sell and how they can operate. As Jacques S Gansler stresses, these legal constraints can sometimes be directly detrimental to military operations,³² as over-complex export processes, for example, have more than once limited the provision of equipment.

On the other hand, there is the perspective that governments frequently support defence businesses; for instance, by supporting export campaigns, helping with research and so on. Defence companies are indeed unusual in that their customers are also their regulators and their sponsors.

II. Societies

The societal aspect of the defence industrial ecosystem, which is generated by cultural principles, social interests, wider public opinion and social structures, is a second element of consideration. The socially determined interactions within the ecosystem are the product of a society's culture and derive from public opinion on security, defence and foreign policy issues.³³ Together, these interdependent elements of social context determine the processes, decisions, physical structures and perceptions associated with the UK's defence policy and create the societal foundation for the formation of the industrial base.

As a milieu which shapes the imaginations and considerations of policy makers, industrialists and citizens, a nation's culture illustrates social commonalities, reflects a society's historical experiences and describes collective perceptions of future political and social developments.³⁴ National culture provides wider society, political actors and industrialists with the general direction regarding the use of the military instrument and sets out constraints, in the form of societal acceptable conduct in foreign, defence and economic policy.

The constituent principles of the UK's national culture – whether in continuity or change – directly affect the defence industrial ecosystem. Fundamental, abrupt changes in the collective identity of the society (such as the societal trauma experienced in the UK following the Great War), although rare,³⁵ would have a far reaching impact on the relationships between the constitutive elements of the defence industrial ecosystem in addition to the persistent uncertainty in the international system.

From this dynamic cultural background, public opinion can, under certain conditions, exert influence on the defence industrial ecosystem. The influence of the public depends on the issue salience (the relevance, priority and importance of a topic),³⁶ the institutional opportunities to exercise influence for the public³⁷ and the level of public consensus.

Media coverage is a key factor in the 'regulatory circuit of public opinion'.³⁸ It represents a principal source of information about foreign, economic and defence policy for the public. As an agenda-setter, it provides and frames information, significantly affecting how the public perceives an issue.

Key elements of these trends are individual, group and societal perceptions of the UK's political and economic position in the world, the personal and societal degree of (in)security and the causes of internal and external threats, as well as societal preferences regarding the level, ways and means of the UK's international engagement, the utilisation of the military instrument, priorities in public spending and the future development of defence spending.

Moreover, the cultural constraints of legitimate social and ethical behaviour, as well as the non-uniform effect of public opinions, amplify the complexity of the business and policy environment. Not surprisingly, the discourse between defence industry and society features a complex ethical dimension, which is not limited to questions of business conduct but also encompasses the ethical assessment of goods and services provided by the industry for defence and security tasks. If not appreciated openly and managed in an accountable and sensitive manner, the stress between the layers of an ethical discourse poses serious challenges for the stability and effectiveness of the defence industrial ecosystem. Consequently, the harmonisation of the contradicting elements of an ethical discourse is a central task for all actors of the ecosystem.

In essence, 'society' is a mix of all its levels (individual, group and social). 'Society' therefore embodies many tensions within it, and is characterised by the ever-present potential for conflict and disruption. It is an important part of the analysis within this paper's unpacking of the defence industrial ecosystem.

III. Defence

There are two dimensions of the activities of government when we consider defence: the policy dimension, which is usually conceptualised as strategic in nature; and the decision dimension, relating to the particular activities that are being undertaken, usually as a response to deliberate policy.

The policy dimension is concerned with the generation of military effect principally as a consequence of a formal strategy and planning process. Policy choices usually carry with them implications relating to the use of public and other scarce resources, and can inform industrial investment decisions.

In contrast, the decision dimension refers to activities related to the creation of forces ready to act within various time scales and the immediate, often tactical decisions taken by military commanders, and by executives within the industry space and officials within the MoD and enabling support echelons. An accumulation of tactical decisions can generate an emergent strategy at the policy level, rather than the deliberate strategy intuitively associated with the policy dimension.

We also consider notions of defence capability, the simplest definition of which is the ability to execute tasks at the strategic, operational and tactical levels using military forces. Tasks can be executed through the assembly of different sorts of capability, which can be divided into eight sub-elements that the UK calls Defence Lines of Development (DLoD – Training, Equipment, People, Infrastructure, Doctrine, Organisation, Information and Logistics). The UK since the SDSR has been focusing on seven high-level tasks³⁹ which

require a blend of seven capabilities in the Defence Capabilities Framework – Prepare, Deploy, Inform, Command, Operate, Sustain and Protect – for which the DLoDs are the ‘ingredients’. Industry is clearly closely associated with the equipment line but actually has a major role in many other DLoDs, including training.

There is a mutual interaction between foreign policy and the ability to generate and use defence capability: foreign policy can be shaped by aligning ambition to military capability, whilst military capability is equally framed by foreign policy ambition. Policy, however, cannot be divorced from fiscal and economic factors, for foreign policy ambitions have to be realisable and affordable if they are to be credible. Together, sustainable economic and military power are foundations of influence in the international system. Following the financial principle of connectivity, in which public expenditures is a ‘condition *sine qua non*’ for the realisation of politically defined tasks,⁴⁰ the available financial resources are key elements of the ‘bridging function of strategy’⁴¹ connecting the political and military spheres. In setting priorities and balancing risk in the political and industrial sectors, policy-makers as well as corporate decision-makers need to reflect on this basic dependence of policy on resources.

Not surprisingly, therefore, within a wider economic dimension there are a number of factors to be considered. The proportion of a state’s economic output or GDP that is allocated to the defence and security effort tends to reflect society’s spending priorities. The industrial base for defence, however, is complex and usually characterised by large regionalised workforces that tend to be specialised, highly skilled and technologically advanced. Regionalisation, consequently, may well impact upon the defence policy space and by its very presence tends to be disproportionately significant to society.

In addition, the government’s policies and processes for procuring defence capabilities from an industry base are pivotal to those who work in the commercial base. The stories of cost overruns, time delays and requirement-creep are legendary, and major defence project reviews from the National Audit Office make for sober reading. The government is bent once more on reform of the defence acquisition process – personified, perhaps, by the appointment of Bernard Gray to the post of Chief of Defence Materiel. The nature of the organisational and process reforms to be rolled out by Gray, coupled with the wider Defence Reform programme led by Lord Levene, will shape the nature of the relationship between industry, the government and the military end-user for the foreseeable future. How significant this will be, and the manner and extent to which it supports the projection of military force, is very much at the heart of the RUSI Defence, Industries and Society Programme.

Conclusions: Exploring Complexity

With this paper we have outlined our approach to understanding and explaining the supposed relationships between military operational activities, government policies, society and the defence industrial base. This approach is framed and fashioned by our sense of a defence industrial ecosystem, whereby key research questions can be explored through this constructed paradigm, delivering sub-system insights and systemic coherence and clarity. In this manner our work will form a major part of a national discourse into the role and purpose of defence and security industries as societal force and constituent part of the military/security component.

The paper has explored the nature of the defence industrial sector, its economic importance, criticality to the foreign policy effort of a nation-state, industry's significance to the military effort and its wider role in society. It has gone on to unveil systemic interdependencies and to consider the nature of operations in an uncertain world, whilst introducing the Defence, Industries and Society Programme as the vehicle for research and exploration.

Throughout this programme we wish to challenge our own ways of understanding, query our beliefs, and re-interpret the once-held certainties of our past experiences, recognising that our 'truths' are derivatives of social discourses and conventions. Our world is complex and multi-faceted, and our futures uncertain. Yet humanity has developed a clear methodology for facing extreme levels of complexity and uncertainty – the promotion and application of knowledge. Exploring our world through systematic research can give us an understanding to inform tomorrow's defence and security choices.

The pursuit of knowledge, therefore, in the spaces between the policy-maker, the citizen and the industrialist is the mining of a critical national and public resource. Through it, we inform our choices in relation to both capability requirements in response to a derived set of needs, and national investment decisions, defining the sort of nation we think we are and wish to be, and signalling Britain's sense of purpose and perceived role in the world. It could hardly be more significant.

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