Defence Mapping Research (DMR) Project Report

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Table of Contents

Revision history

Version Number	Date	Author	Detail
1.0	28th February 2020	R. King C. Lane T. Danby A. Mackay S. Vallance	
1.1	20th March 2020	R. King C. Lane	Updates to reflect comments back from Adriana Curca of PCC on behalf of HotSW LEP, DCC, UoP and UoE

Executive Summary

"Building defence sector competitive advantage and unlocking productivity gains for HotSW"

Ministry of Defence

We work for a secure and prosperous United Kingdom with global reach and influence. We will protect our people, territories, values and interests at home and overseas, through strong armed forces and in partnership with allies, to ensure our security, support our national interests and safeguard our prosperity.

The defence sector is one of the Heart of the South West region's bedrock sectors, as well as one of its most productive. It has been the bedrock of many sub-HotSW economies built around a unique composition of key physical assets spanning land, sea and air and a growing cyber cluster.

There is currently an estimated **£2.6bn GVA in defence-related activity** across HotSW. Through the development of this bedrock capability and encouraging innovation within the sector, this **value could rise to £6.9bn GVA by 2040,** more than meeting the defence sector contribution to HoTSW's overall ambition of doubling the size of the economy over 20 years. In addition, with a scenario that considers dual use from non-defence sectors, the potential could rise to a **value of £11bn by 2040.**

The published HotSW Productivity Strategy Delivery Plans (PDP) in place for the advanced engineering and digital sectors can help leverage regional business engagement and complement organic defence growth. The Defence PDP should reflect the study recommendations which raise awareness of the opportunities, encourage cross-sector business engagement and break down barriers to market access.

Whilst the defence sector remains demanding in terms of understanding and engagement, and is always vulnerable to national policy and international pressure, the right approach to enhancing cultural alignment between the customer and supplier base can present the best opportunity to address the structural vulnerabilities and **seek advantage through new entrants, innovative capabilities, export potential and developing high value engineering skills capacity.**

Below, we summarise the key recommendations for developing a HotSW LEP defence sector growth strategy:

1. Innovation - Guide and enable HotSW businesses to embrace and respond to the defence market and its policies, initiatives and **aspirations for Defence innovation and SME engagement**.
2. Finance - Seek investment for enabling business support services secured so that HotSW businesses are developed to **compete in the defence market**.
3. Skills - Enhance the leadership skills of the businesses to develop strategically valuable businesses able to offer expertise and capacity to **develop capabilities required by the defence sector**.
4. Market - Identify and develop new defence opportunities both domestically and to **deliver international export growth**.
5. Offer Portfolio - Establish a collaborative **LEP-led 'defence ready' supplier ecosystem** focused around the distinguishing regional capabilities identified.

The key report recommendation is to **establish a programme with resources** to enable the LEP to direct the activities of the networking clusters, their technology centres of excellence and the business support and market engagement services required to bring about the productivity gains envisaged possible from a significantly **increased defence market share**.

Adoption of the recommendations increases the awareness and appreciation of the addressable market and the likelihood of successful contract awards that will **offer HotSW competitive advantage and productivity gains**.

Proposed HotSW vision for defence

With an enhanced understanding of the defence sector further support could be offered to the defence sector by matching key businesses, and their distinctive capabilities with defence market opportunities. Further engagement with the Ministry of Defence as they address the operational requirements of the Integrated Operating Concept 2025 through an experimentation programme and a procurement process that integrates capabilities across the five domains of Sea, Land, Air, Cyber and Space, projecting forwards to 2040 would aid HotSW in creating an agile, assured and sustainable supply chain that is defence-ready, maximising potential growth in strategic value and future productivity. This modern defence sector would adhere to the principles of the Local Industrial Strategy and promote inclusive and clean growth.

CHAPTER I: Introduction

Project Rationale[1]

Since the release of the Philip Dunne report[2] there has been renewed emphasis on the local economic impacts of the defence sector. Using existing evidence bases the report outlined the significant, but little understood, contribution made by defence (MOD, Armed Forces and industry) to the economic prosperity of the United Kingdom. The review revealed that the South West had the highest expenditure with industry and commerce, valued at £5.1b with major defence suppliers in the region including Airbus, Babcock, Boeing, Capita, Rolls Royce, Leonardo and Thales. The South West region is also home to the second largest cohort of regular military personnel at 36,240, with 11,700 of these located in the HotSW. However, being constrained by only using existing evidence, the Dunne review failed to capture the wider impacts of defence.

The HotSW Industrial Strategy and the accompanying evidence base initially highlighted the significant role that the defence industry plays in the HotSW regional economy. Despite a narrow definition of the sector which only accounted for '*Defence activities (civilian employment only)* and *MOD military employment'*, the sector still generated a total impact of £1.95b in GVA and employed 38,000 FTEs. Table 1 below portrays the high degree of specialisation in defence, compared to both the national average and other regional sectors of significance.

HotSW	**Specialisation (Concentration) - LQ (GB=1), 2016**	
	GVA-based	**FTE-based**
Advanced Manufacturing & Engineering*	1.30	1.15
Food & Drink	1.15	1.55
Digital technologies	0.52	0.56
Creative industries	0.49	0.48
Agritech industries	0.62	0.64
Marine	1.25	1.14
Defence	8.59	6.77
Medical, health & life sciences**	0.98	0.69
Environmental industries***	1.27	1.00
Photonics & electronics	0.85	0.75
Aerospace	1.07	1.15

[1] PCC Project Specification, tender documentation

[2] Growing the Contribution of Defence to UK Prosperity

Energy (electricity, transmission and distribution)****	1.52	1.64

Table 1. Advanced Modelling of Regional Economics (AMORE) Economic Impact Tool

The defence sector has therefore been integral to the past successes, and the future growth of the HotSW economy. It has been the bedrock of localised economies, built around a unique composition of key physical assets spanning land, sea, air and a growing cyber cluster. These include HMNB & Dockyard Devonport, the largest Naval Base in Western Europe, RNAS Yeovilton, one of the busiest airfields in the UK and the UK Hydrographic Office in Taunton. These have since borne and nurtured a complex, yet little understood, ecosystem of supply chains, skills, innovation and expertise and has catalysed many of our transformational opportunities such as marine, advanced manufacturing and aerospace.

The purpose of this work is therefore to understand how to best support the defence industry and to help future-proof policy to keep pace with emerging technologies and capabilities. In particular, the HotSW LEP wants to know how to enable businesses to grow their market share and increase the benefits to the wider business community through development of the supply chain. It recognises the competitive environment in which defence procures and wants to explore how to maintain its edge. An appreciation of wider market developments, MoD demand, cluster development and cross-sectoral collaborations will all help to achieve the purpose.

The high-level requirements of project were specified as mapping:

- Key businesses and capabilities of its defence sector including the supply chain and location and size of firms, both within the HotSW area and beyond;
- The value of Defence and the supply chain to HotSW;
- The key challenges and barriers to entry to the supply chain;
- The key challenges and opportunities for the sector as a whole;
- The sector's future needs;
- The impact and capabilities of our key physical and research defence establishments.

National Context

Through initiatives such as the Defence Growth Partnership, which encourages a more competitive and internationally focused defence sector, the government has demonstrated itself as a key supporter of the defence sector. This commitment to initiatives promoting export is set against a renewed UK imperative to operate globally with a forward presence and an operating concept that recognises the need for 'sub-threshold' persistent operations that offset the need to fight. Cyber and Space are recognised as the domains that add to the traditional environments of land, sea and air.

The MOD has called upon industry nationally to meet the operational requirements of their Integrated Operating Concept 2025 through a future procurement process that integrates key capabilities across the five operational domains of Sea, Land, Air, Cyber and Space; **the HotSW distinguishing capabilities evident in the region in maritime, aerospace, land vehicle and intelligence related systems support this approach but are not the entirety of the solution**. These are well represented by current prime contractor capability leadership, research support and clustered businesses engagement and provide the key assets around which a coherent and well-developed growth strategy can be effectively implemented to realise the growth potential.

In accordance with North Atlantic Treaty Organisation (NATO) guidelines, the UK's defence spending amounts to at least 2 percent of its gross domestic product. In the Strategic Defence and Security Review 2015 (SDSR), the government committed to spending £186 billion on equipment and equipment support in the ten years from SDSR 2015. [3] At a national level, 2017 saw spend achieve closer to 2.1% so it remains encouraging that the level is sustained. For HotSW this means that the key capabilities for which it has distinguishing capabilities in the delivery of major programmes, funding is likely to be maintained and the opportunity for long-term growth is probable.

Figure 1 below shows a breakdown of the balance of the UK Defence annual budget, which many regional prime companies already play into.

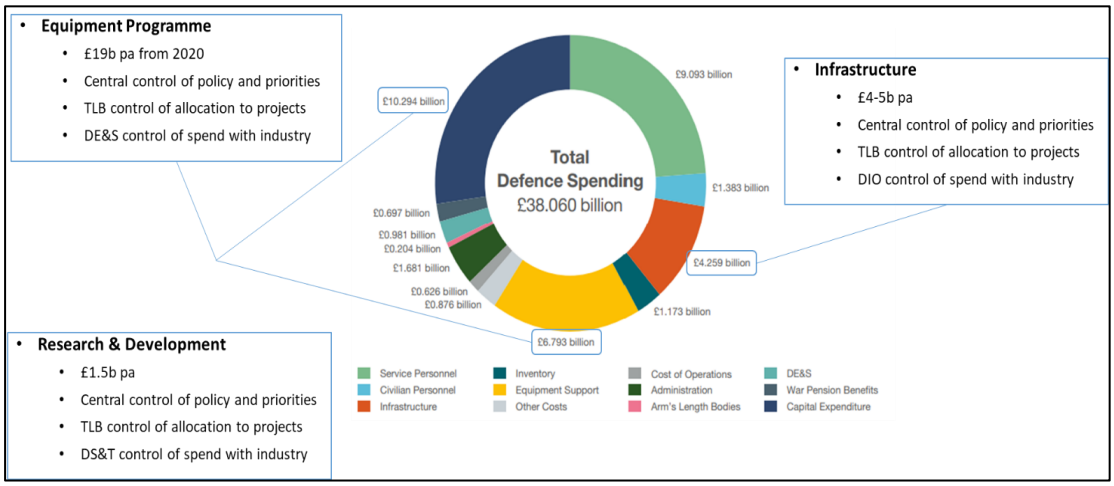


Figure 1 - Defence Spending

Moreover, the sector is export, research and skills intensive. Of the approximate 142,000 people directly employed by the UK defence industry (ref. ADS), 21 percent by job function were in research, design and engineering.

There is significant regional employment with defence suppliers spread across the UK. These include shipbuilding and maritime services in the South West and Scotland, combat aircraft in the North West, submarines in Cumbria and aerospace in the Midlands. For HotSW this implies an imperative for action in addressing the skills gap to sustain and deliver growth. Leveraging the training capabilities within the region that are associated with defence, through academic training programmes and those employed by the primes, will be key to addressing the skills gap to meet sector demand and opportunity. This is a broad range that covers engineering, digital, cyber security and can be directly addressed in conjunction with the skills initiatives directed by partner authorities.

These skills gaps will be compounded by the 'Information Age' and the implications that has for national security. The Information Age demands a new approach to warfare where ubiquitous data, cloud connectivity, artificial intelligence, autonomy and genetic enhancement are allied to advances in traditional technologies with the promise of revolutionising warfare. This in turn drives a new operating concept for defence. The MOD's Integrated Operating Concept 25 (IOpC25) seeks to

[3] HM Government (2015). National Security Strategy and Strategic Defence and Security Review 2015 A Secure and Prosperous United Kingdom. HM Government; London.

respond to these challenges through seamless integration with wider Government, Allies and industry partners and across all of the domains in which it operates.

In the Information Age cyber security has been recognised as a Tier 1 threat to the UK and attracts ministerial oversight, delivered through solid funding of the National Cyber Security Centre. MOD have specifically, and uniquely within Government taken advanced steps to increase its resilience from the impact of cyber compromise through the DCPP initiative and compliance regime.

Given the commonality for many of the capabilities (cyber) that see utility across sectors and the procurement opportunity arising from the other larger Government Departments (e.g. Home Office and Foreign and Commonwealth Office) we can foresee wider potential for growth by extending the reach from defence more widely.

This is characterised in Figure 2 below.

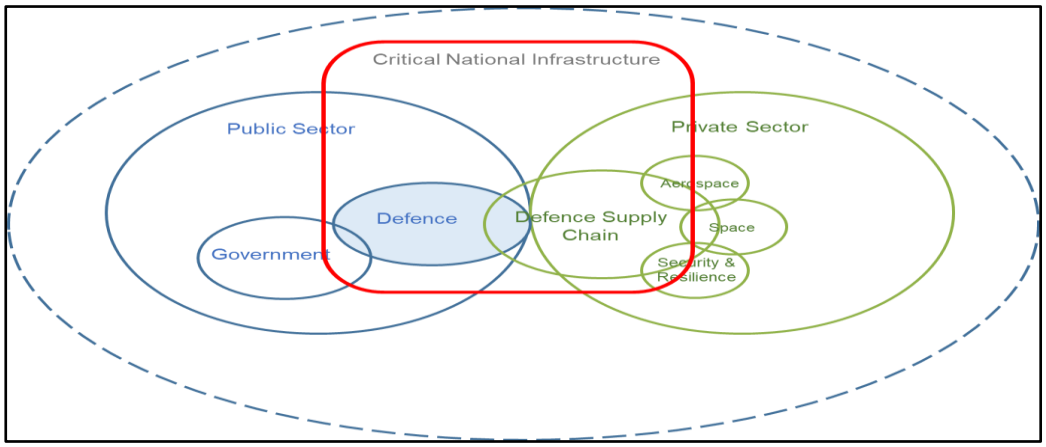


Figure 2 - National Security Market Sector Adjacency

In light of this broader view of defence, HotSW LEP is well-positioned to consider the opportunities for collaboration with other LEPs to maximise procurement opportunities, develop supply chains, enhance cluster engagement and leverage Centres of Excellence and share learning.

Alignment of HotSW businesses to the market in order to maximise the potential for strategic value and future productivity will address the ambitions of the UK Prosperity Agenda; HotSW businesses will need to show an organisational maturity level that is “defence ready” across the dimensions of business, products, services and supply chain.

CHAPTER II: Study Approach

The following chapter explains the methodology involved in the present study. The approach brings together three key elements:

1. The market analysis, resulting from the development of the Defence Sector Map (DSM), elaborates both the definition of the sector and the associated value of the programmatic spend that MOD place out through industry for the acquisition of capability, support, research and sustainment of defence estates. This is exposed through analysis of the MOD Equipment Plan, Infrastructure Procurement Plan, Innovation Priorities and Research Programmes. The Defence Sector Map (DSM) tool was built as a framework in which SIC's were mapped as proxies for business capabilities to opportunities. In turn this allows the businesses of the HotSW region and their associated trading performance to be identified and evaluated in order to shape the vision that can characterise future growth;
2. The engagement plan and visits with various organisations validated the findings and assessed individual growth strategies and plans. This has enabled a broad perspective to be taken across the national and regional picture for organisations comprising Prime Contractors, SME businesses and innovators, academic centres of excellence, cluster organisations and research providers. The collation of engagements has been used to inform the distinguishing capabilities of the region and identify the nature and impact of challenges faced by them, as described in the findings. The engagement plan shows organisation, contact, role and type and is found at Annex D. The derived context is reflected as case studies throughout the findings with three specific examples at Annex E;
3. The nature of business in the region in relation to the three-tier construct, as described above (2.4), that can be used to understand the potential for impact on regional growth.

It is worth noting that Defence programmes are structured and sourced from capabilities that are either bedrock, innovation or dual use. These three layers of economic activity both structure and scale the opportunities. We, therefore, considered the current market estimation and potential growth based on the relationship between these activities in order to match their capabilities and develop appropriate strategic pathways through the programme opportunities. These are:

- Bedrock – established supply to defence both directly and through extended supply chains in and outside of the region;
- Innovation – the ability to readily align with the published defence innovation priorities and the associated technology areas noted to be of particular interest to MOD for both accelerated innovation and within the longer-term research programmes;
- Dual use – the ability to consider applicability to become suppliers to a broader defence sector requirement in such areas as defence infrastructure and logistics support as well as be positioned to seek increased revenues through defence related exports.

Figure 3 below summarises this approach.

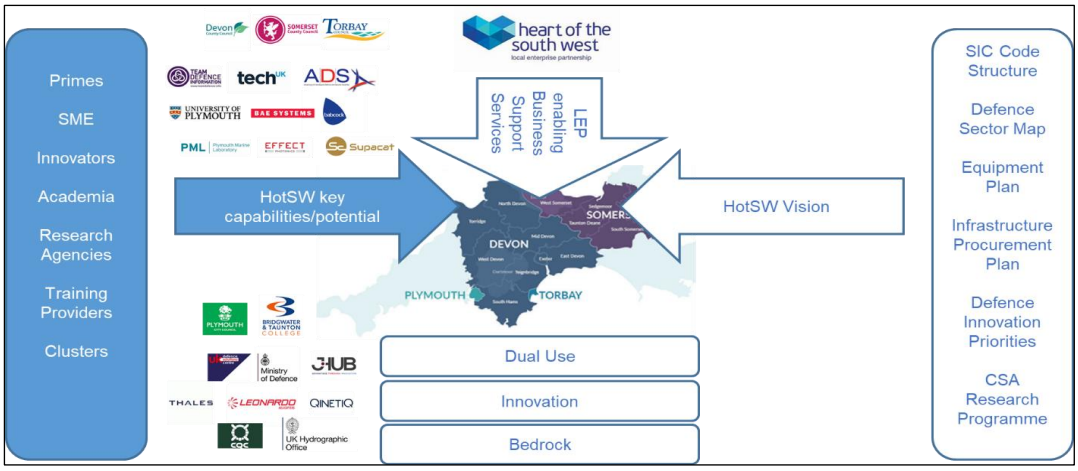


Figure 3 - Project Approach

Defence Sector Mapping

The scope here is the identification of the key businesses and capabilities of its defence sector including the supply chain and location and size of firms, both within the HotSW area and beyond.

The ability to better understand the landscape for the regional capabilities applicable for defence has been shaped by the development of the Defence Sector Map (DSM)[4]. This has clarified the scope of the defence market in terms of capability areas that expand from the specification identified from MOD and the EU and correlate with the recently released Defence and Security Industrial Strategy (DSIS) capability areas. This enables us to consider the question against the values of committed and future looking procurement plans for MOD spend.

The DSM is the tool used to establish the nature of how we can assess scope and scale and be more specific in understanding defence capability requirements. The degree of correlation can now be established between the opportunities and the businesses (both prime defence contractors and the Small Medium Enterprises (SMEs) that form their supply chains) that are both trading within the region currently and have the potential to do so in the future.

The key output supporting this analysis is the Defence Sector Map, Figure 4.

[4] Deliverable D1A Report – 6.11.19

	UK MOD Definition			
	Aerospace	Maritime	Land	Intelligence
	EU Definition Mapped and Aligned			
Budget analysis by Programme	BAR Gap Analysis – Complete (Ref to DSIS Capability Areas)			
Equipment Plan - Nuclear	✓ **A comprehensive breakdown of opportunities by MOD organisation and budget - £21bn per year across 54 equipment / support programmes and 24 research programmes**			
Equipment Plan - Navy				
Equipment Plan – Army				
Equipment Plan - Air				
Equipment Plan - Joint	✓ **A recognisable and coherent set of 31 capability areas provided by industry**			
Equipment Plan – Strategic Programmes				
Defence Innovation	✓ **25 capabilities identified within HotSW and its near neighbours**			
Research Programmes				
Defence Infrastructure	✓ **A unique tool offering structured match between capability and industry SIC to establish delivery opportunities**			
Services - Logistics				

Figure 4 - Defence Sector Map

Market Valuation

The process for assessing economic impact has been derived from the application of BAR defence domain expertise in mapping the defence programmes to industry sector capabilities using SICs. Accordingly, the Defence Sector Map (DSM) 1 has been refined during this activity.

The mapping identifies those industry sectors which have capabilities to currently trade in the defence market. Subsequently databases provided by HotSW partners have been used to retrieve business performance information for those organisations currently defined by SICs found on the DSM. This has been manipulated to estimate the current direct economic impact of the businesses within the HotSW region.

The SIC-based approach to estimating the current value of the defence sector is summarised in Figure 5. It should be noted that the definition adopted in our valuation of the defence sector was further refined, concentrating on a smaller number of relevant SIC's. This was done to ensure that our approach was focused and appropriately conservative.

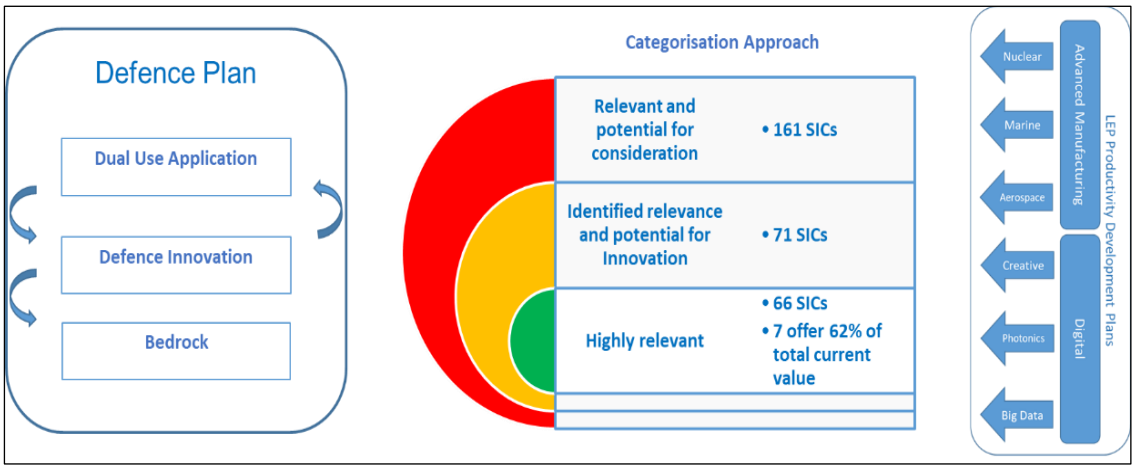


Figure 5 - SIC based evaluation

The method for estimating the current economic impact of the defence market in the HotSW region has evolved during the study, notably during the design and development of the HotSW Defence

Sector Map (DSM). The method and evaluation supporting the development of the report has been submitted in parallel to this report (DMR - Method and Evaluation Ref. v1.1 - 19th March 2020).

This framework has shown all the planned areas of spend by the MoD, custodians of the UK defence budget. The timeframe for each programme varies from 1-10 years and is a good indicator of where contracts have been previous let. For each programme, the SICs thought to be most relevant have now been mapped against the definition of defence. This will allow the businesses of a particular SIC(s) to be discovered through database searches and economic data retrieved.

The use of SICs to associate business data has been directed by the customer and is recognised to carry implicit difficulties. As with many sectors, the defence market cannot easily be defined through SIC's. The process of introducing programme context and defence domain expertise mitigates these risks particularly as the method has been refined and iterated, in collaboration with the customer.

Each SIC code[5] was categorised by taking a more holistic view of Defence relevant SIC codes. A total of 298 SIC codes have been identified as potentially relevant to defence, to differing degrees. This methodology operates in conjunction with the expanded BAR definition of Defence. This expanded SIC list, however, does not ignore that its contents are relevant to defence to varying degrees. Accordingly, these codes have been categorically ordered into

- Green (Highly Relevant to Defence/frequently found on DSM),
- Amber (Identifiable Relevance to Defence, Potential for Innovation), and
- Red (Minor Relevance to Defence)

However, it is important to note that through the various iterations of this work, the 'Green' list was subject to further refinement – reducing the number of SIC codes further to ensure that they more closely align with defence-related activities. The numerical distribution of these codes can be seen in table 2.

Traffic Light SIC Categorisation	No. of 'Defence' SIC Codes	No. of Businesses
Green	**66**	**2348**
Amber	**71**	**8248**
Red	**161**	
Total:	**298**	

Table 2 - SIC Code Categorisation and numerical spread

Three methods using different sources of business performance data were compared - IDBR, BRES, MINT UK – to ensure the most appropriate assessment of market value.

Scenario-based Forecasting

To enable forecasts of future sector growth, three scenarios were developed. These are based around assumptions regarding the same three layers of economic activity mentioned above, i.e.:

1. Enhancing bedrock capability;
2. Innovation-led productivity improvement;

[5] The UK SIC list has some 700 codes

3. Enabling dual use.

It is important to note that *these scenarios should only be viewed as illustrative*. Given the uncertainty of any future projections, then some significant assumptions have needed to be made.

Moreover, the scenarios should not be viewed as mutually exclusive; they are interlinked. For example, promoting innovation (scenario 2) could be an important element in improving the competitiveness of the HotSW's bedrock assets – allowing them to better compete in the opportunities that arise out of (national and international) market demand (scenario 1). In fact, it is realistic to expect that scenario 2 – improving the competitiveness/productivity – will be an enabler of success in scenario 1 – bedrock assets exploiting greater market share. In that sense, it the economic benefits associated with scenario 2 should be viewed as a subset of those benefits estimated for scenario 1.

Equally, it is important to note that these potential benefits would build over time - they will not be immediate. In effect, they could be viewed as the potential benefits at the 'point of maturity' in terms of how support landscape might be able to facilitate a greater exploitation of defence-related opportunities.

Stakeholder Engagement and Desk Research

This exercise was carried out in order to complement the current and future market estimation with more in-depth qualitative information regarding the needs of the sector, barriers to growth/ access to defence supply chain activity for SMEs, as well as challenges and opportunities for existing businesses engaged in defence-related activity. Desk research also helped setting out the national context as defined by the MoD, which adds to the understanding of final demand in the sector, its projected growth based on national strategic objectives, and requirements for accessing contracts.

The table below summarises the stakeholder engagement carried out.

Organisation	**Role**	**Type**
Torbay Development Agency, Electronics and Photonics Innovation Centre	Investment Development Manager	Partner Authority
Devon County Council	LEP Board Member	Partner Authority
Somerset County Council	Senior manager, Economy and Employment service	Partner Authority
CQC	CEO	SME
Supacat Group	CEO	SME
VisionAir Klugmann	CEO	Innovator
Leonardo Helicopters	Strategy Director, iAero	Prime

Thales MMS	Maritime Strategy Director	Prime
Babcock	Innovation Manager	Prime
University of Exeter	Assoc Dean, Head Industry Research	Academia
University of Plymouth	Executive Dean, Faculty of Engineering and Science	Academia
UK Hydrographic Office	Head Marine Geospatial	MoD Agency
Plymouth Marine Laboratory	Chair FAST; Head of Smart Sound	Research Organisation
Oceansgate	Investment Manager. MBTC	Partner Authority
SW Maritime	Sec, SW Maritime Cluster	Networking cluster
Navy X	Navy X Strategic Advisor	Independent Consultant
UK Defence Solutions Centre	Director Innovation	Defence Growth Partnership
Bridgwater and Taunton College	Director Business Development	College
UK Met Office, Environmental Intelligence Lab	Hd International and Defence	Research organisation
Electronics & Photonics Innovation Centre, Future Autonomous at Sea Technologies Cluster, SW Cyber Security Cluster	CEOs	Innovators, Centres of Excellence

Table 3 – List of Stakeholders Interviewed

CHAPTER III: Defence in HOTSW

Current Landscape – Business Capabilities and Physical Assets

HotSW LEP has invested in understanding the defence-related capabilities and potential in the Devon and Somerset region, provided by businesses, MOD establishments and academia. In identifying the key capabilities, the DSM has also enabled the identification of capabilities that exist with the regions bordering the HotSW region. This is relevant in the context of understanding the potential for inter-LEP regional collaboration as part of the 'Great SW' and its initiatives, along with appreciating the economic impact associated with workforce placement within bordering defence establishments.

This section discusses HotSW's distinguishing capabilities related to defence - centred on Primes with their current supply chains and their corresponding demand for innovation and wider SME engagement, shown at Figure 4. This is consistent with the national picture which is driven by MOD Policy evident in the MOD SME Action Plan.[6]

Figure 5 - Distinguishing Capabilities

Using the DSM, we can readily identify the distinguishing capabilities for the region which whilst not unique are certainly assessed as being strong, Table 3.

DSM Capability Area	Domain	Industry activity	Prime lead, Cluster
Aerospace	Helicopter	Manufacture and MRO	Leonardo, iAERO
Maritime	Nuclear submarines	MRO	Babcock
	Surface vessels Warships, amphibious, patrol and support	MRO	Babcock, iSupport

[6] MOD (2019). Small and Medium-sized Enterprise Action Plan. MOD; London.

	Command and control for ships	Maritime mission systems development and provision	Thales MMS, Sonar Academy
Land	Light armoured and wheeled logistics vehicles	Manufacture and MRO	Supacat, UoE
Intelligence (C4ISR)	Cyber	Maritime	Plymouth University CyberSHIP Lab, SW Cyber Security Cluster
	Data processing		UKMO Informatics Lab and EIL, UKHO Innovation Centre
	Remote and autonomous systems	Maritime systems	MBTC/FAST (Oceansgate EZ), Thales Autonomy Centre
	Communications	Electronics and photonics research development and supply	EPIC

Table 3 - HotSW Regional Capabilities, DSM

Key procurements identified through the DSM from the MOD Equipment Plan and the Defence Infrastructure Organisation that exemplify distinctive capabilities for the region are:

- Babcock Marine - Development and implementation of a new industrial and contractual arrangement for warship maintenance and support activity in Naval Bases, aimed at delivering significant efficiencies, simplifying governance and allowing increased opportunity for Small and Medium Enterprises, while providing the quality and flexibility of support required for the future maritime force. The future opportunity has just been announced on the Defence Contracts Online (DCO) and is thought to be worth several billions to Babcock should they be successful.
- Leonardo Helicopters - The Apache Capability Sustainment Programme, which will provide the basis for the UK to maintain a battle winning Attack Helicopter that is aligned to and interoperable with our major allies. The programme was referenced at £1.6Bn in the DE&S Corporate Plan.
- Thales MMS - Initial development work on locating, identifying and neutralising maritime mines, using unmanned autonomous systems. The opportunity is being explored by Jane's Defence Weekly.
- DIO - Refurbished capital works as applied to Devonport: Building refurbishment; Site construction services (including marine); Nuclear safety services; Security services. The

opportunity is estimated to be worth in the order £1.4Bn (Ref: MOD source and DIO Procurement Plan).

DIO Case Study - Devonport

The infrastructure budget splits into 3 areas:

Maintain & Sustain – in the order of £70m per annum;

Major Projects - in the order of £10m each, expected spend £140m over the next 10 years;

Capital Projects - upcoming major programme of capital works "once in a generation investment"; a 7-10 year programme to uplift the Devonport infrastructure in support of the ongoing submarine and surface ship maintenance activity on the site. Costs have not yet been finalised and he expects this figure to increase as they understand more about exactly what needs to be done.

In addition, the potential indirect and induced impact that neighbouring defence suppliers offer is particularly notable in the defence capability in Bristol (BAE Systems, Rolls Royce, Babcock), space capability in Cornwall and defence activities in Dorset around the QinetiQ Winfrith area.

Key physical assets

HMNB Devonport

As the largest naval base in Western Europe, HMNB Devonport represents a significant proportion of the MOD's estate in the HotSW region. It is the base for some £500-600m of MOD-funded fleet support activity per annum and demands a considerable amount of ongoing investment to maintain its condition to a satisfactory level to sustain this level of engineering operations.

The historic annual spend by the MOD on routine infrastructure maintenance for the site is in the order of £70m per annum. In addition, the MOD plans to spend somewhere in the region of £140m on major infrastructure projects over the next 10 years and in excess of £1bn over a similar period on a programme of capital projects to provide a significant uplift in the standard of infrastructure on the Devonport site. The MOD's expenditure on infrastructure maintenance and improvement activity in HMNB Devonport is often channelled through Babcock, who act as the client on behalf of MOD for services procured.

Recent routine infrastructure maintenance projects (from within the £70m pa budget) in HMNB Devonport include:

- The maintenance of Crane 399 to support engineering work on large ships in the dockyard. The project involved an initial survey, installing specialist scaffolding and containment, surface preparation and painting of the steel structure and mechanical repairs, while ensuring the crane remained correctly counterbalanced in severe weather conditions. The project was delivered by Denholm Industrial Services, with its head office in Yeovil and a local office in Plymouth, and its subsidiary Relay Engineering (also based in Plymouth). Denholm Industrial Services was incorporated in 1983 with some 190 employees and has an annual turnover of approximately 12.5m, with a gross profit of 20%.
- Refurbishment of a number of dry dock related water control barriers, including scaffolding and containment, steel surface preparation and painting and both mechanical and electrical works. Working within the constraints of tidal patterns and working at height and over water, the works involved preparation of substrates that were heavily contaminated

with sea salt and the application of protective coatings within splash zone areas. The project was also delivered by Denholm Industrial Services and Relay Engineering.

- The refurbishment and upgrade of the central boiler house in Devonport, including both design and build aspects. The project was delivered by Alpha Construction, contracted in by Babcock via Torishima Europe.

In all three cases, the lead company delivering the contracted work will have generated GVA from the value of the contract, both direct and indirect (through their supply chains). In addition, the salaries paid to the employees of all companies involved will have delivered induced impact in the areas where they live and work. In the case of the two projects delivered by Denholm Industrial Services, it can reasonably be assumed that the direct, indirect and induced impacts will all have been felt within the HotSW area. In the case of the project delivered by Alpha Construction and Torishima, the direct impact will have been felt outside the HotSW area. Assuming the company will have used a combination of known suppliers from outside the area and local suppliers, the indirect and induced impacts will have been felt partly within the HotSW area.

This strategic MOD supplier will have a significant impact on raising productivity levels to increase prosperity in line with Defence Prosperity agenda.

Whilst still embracing the opportunity for innovation as part of the way programmes are delivered to MOD, the broader MOD Equipment Plan and Defence Infrastructure spends represent significant new revenue growth for businesses in the region, particularly the gift of the primes but with the associated impact of a well-positioned supply base.

Aerospace – iAero

The iAero Centre is a joint project between Somerset County Council and the region's aerospace industry, but primarily Leonardo Helicopters and the West of England Aerospace Forum. It will help the town remain at the heart of the industry's latest technological, engineering and manufacturing innovations. The facility is anticipated to provide Yeovil with a high value research, design and innovation centre.

Leonardo Helicopters are looking to build capability that both meets the contracted business need and has impact. It looks at innovators as bearers of new technologies that enhances that capability. iAERO will be an environment for such a cluster to flourish. Digital adoption and innovation - EPIC, Manufacturing Catapult (Additive), UKRI, Defence Innovation Centre Winfrith (Dorset LEP, John Sutcliffe, atmospheric electronics).

Environmental Intelligence

The globally leading capabilities of both the UK Hydrographic Office (UKHO) and the UK Met Office (UKMO) have significant impact upon the region in terms of the cross-cutting work they do and the notable defence related capability that they offer. UKMO by example, have a current collaboration with the University of Plymouth to provide acoustic channel analysis in the Gulf for the UAE Navy, along with extensive meteorological service provision directly into the US DOD. Both, at the leading edge of research in their respective fields, characterise the region in terms of advancing scientific research through skills and expertise as well as providing core defence services that are relied upon for mission delivery. In the context of a future looking defence strategy centred upon the concept of

Information Advantage, recently launched by the Chief of Defence Staff at Integrated Warrior, their contribution will be key.

Case Study - Innovative Weather radar from VisionAir

With context set by an established UKMO capability gap in forecasting in low visibility and severe wind conditions, VisionAir have developed a novel, patented instrument using InnovateUK funding to demonstrate the concept. HotSW regional support from the Environment and Big Data Impact Lab (EIL) was able to advance the solution by adding in support to develop a data services solution able to feed upstream data models and systems. By taking the opportunities associated with the MOD Information Advantage approach and the implications on future defence capability, particularly in the use of remote and autonomous systems (RAS) in challenging environments, VisionAir were able to closely link the potential for innovation and be well placed to consider front-line applications for the technology. With clear reference across to the maritime use for RAS, considered utility can be foreseen for defence utility and into the wider dual use applications for shipping, offshore renewables and wider transportation sectors.

Beyond HotSW

There is merit in looking beyond HotSW boundaries at neighbouring regional capabilities and assets to grow economies of scale in the sector; this could also bring significant benefits through boosting innovation and cross-sector dual use by expanding the scope for applications beyond HotSW borders. Additionally, this could help realise the potential for inter-LEP regional collaboration as part of the 'Great SW' and its initiatives, along with appreciating the economic impact associated with workforce placement within bordering defence establishments. These include the Defence Equipment and Support Agency (DE&S) at Abbey Wood employing close to 12,000 people, many of which are based in Bristol and the Land Warfare Centre at Warminster which It is currently home to a number of Army specialist training schools and a sizeable portion of the Headquarters Field Army, not to be confused with Army HQ in Andover.

In addition, the potential indirect and induced impact that neighbouring defence suppliers offer is particularly notable in the defence capability of the Bristol area, home to: BAE Systems, Rolls Royce and Babcock); the space capability in Cornwall and defence activities in Dorset around the QinetiQ Winfrith area.

At present there are emerging defence innovation initiatives which are engaging with the defence sector within and beyond the HotSW boundaries. The South West Regional Defence Cluster (SWRDC) is being facilitated by the University of Exeter in conjunction with DASA to increase regional engagement through proposed cluster activities. Recognition of the opportunities for harnessing innovation and accessing dual use technologies indicate a proactive approach that can drive competitive advantage. As the MOD rationalises its footprint and invests in better facilities on fewer sites there will continue to be some significant opportunities for infrastructure-related businesses and their supply chains. HotSW approach to increasing productivity based on its distinctive capabilities and future business support provision will allow it to compete well with neighbouring LEPs for both public investment and defence market opportunities. These include Solent, Enterprise M3, Swindon and Wilts being those LEPs beyond the "Great SW".

Market Estimation

It is important to understand that this valuation is still effectively a sector-based approach. By mapping market opportunities through the DSM, we have identified those sectors which are most relevant to those programme, thus allowing for the capture of those businesses which do not operate within the traditionally recognised sectors of defence. Conversely it is hoped that this approach will also capture businesses in those sectors which are not currently active in the defence market. The scale of businesses retrieved from the various company databases described above illustrates this.

The approach presents a range of increasingly focused definitions of activities that are highly relevant to defence. The valuation arising is shown in table 4.

HotSW Defence Quantum	**Value**
Number of SICs	66
SIC refinement	32
BRES market value	£1.75bn
Defence Personnel (addition)	£0.89bn
Total Current	**£2.64bn**

Table 4 - Current Valuation

Our valuation of the activities associated with defence market equates to £2.64bn. **To place this in context, that represents c. 6.9% of total HotSW economic output (GVA) - uplifted to 2019 prices**.

Given the inter-relationship between many of the sectors, it is likely that many secondary (indirect) impacts are already captured in this overall valuation. Consequently, secondary impacts were considered and taken to be catered as part of the "upside" of the £2.6bn assessment

Geographic Distribution

The heatmap in Figure 6 illustrates the geographical distribution **of business units** which have been identified by the "highly relevant to defence" SIC codes that estimate the current value. It is important to note that because the map has been derived using local units, then it does not necessarily tally the economic value. Some service-sectors within our definition will have a large number of smaller businesses. Conversely, some sectors tend to be associated with fewer, but larger, businesses. In effect, all enterprises are given equal weighting in this map.

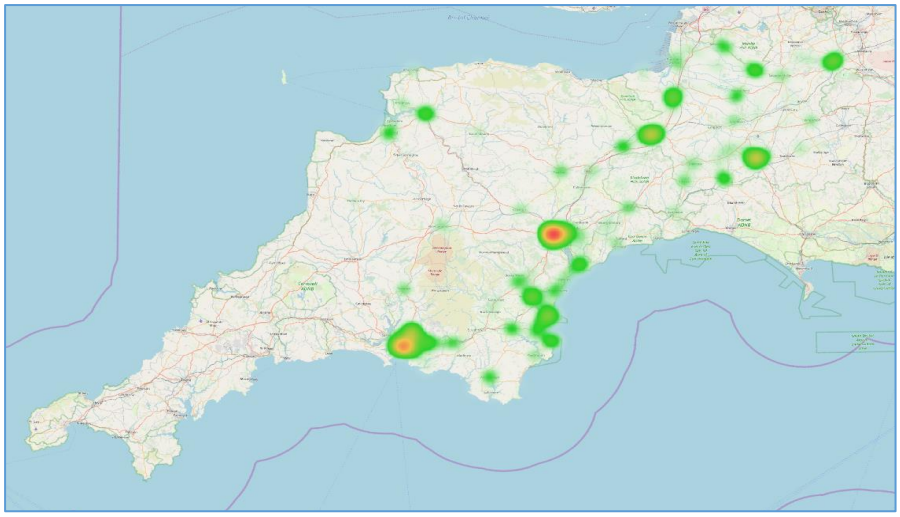


Figure 6 – Heatmap showing distribution of business units

Employment

Figure 7 below shows both the GVA associated with employment along with the sectoral distribution based on SIC code. Using the more narrowly characterised definition, we estimate that these sectors employ circa 31,400 FTE jobs in the HotSW. This excludes those direct MOD service personnel as defined previously. Bringing them into consideration results in total employment of circa 43,000. Again, it is important to reiterate that not all will be directly engaged in the defence market. However, they will be employed by those sectors with the capability most closely aligned to required defence capabilities.

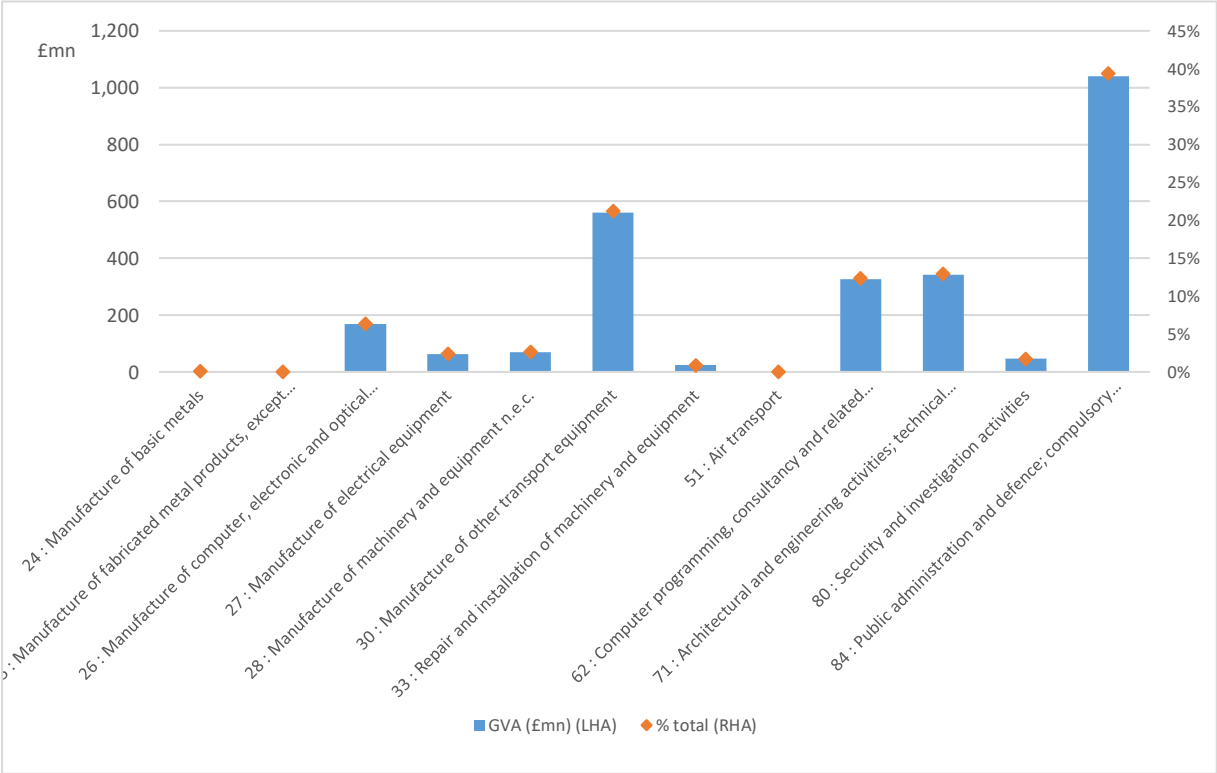


Figure 7 - Sectoral GVA based on employment

Figure 8 is a complementary view to figure 6 and shows the distribution of **FTE of businesses and service personnel**. It shows a deeper concentration of activity within the Plymouth area.

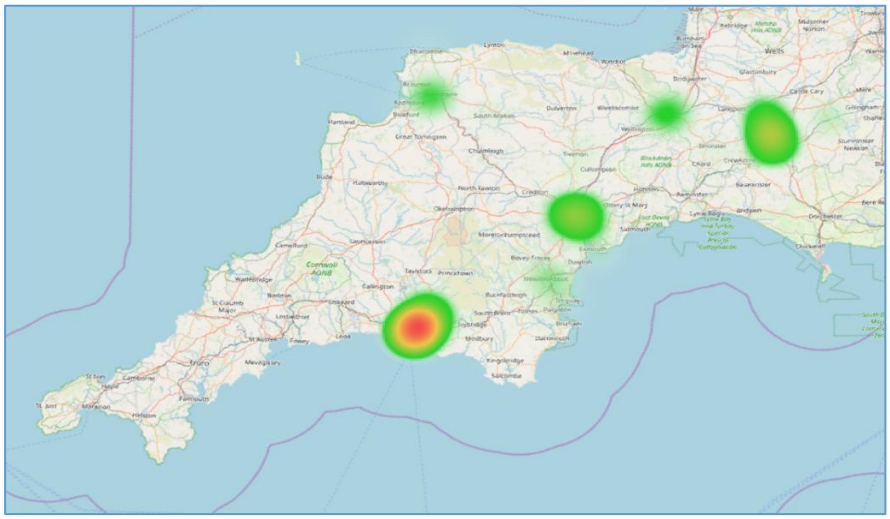


Figure 8 - Heatmap showing distribution of FTE

Location Quotient

We have used this definition to estimate the relative importance of these sectors to the overall HotSW economy. In terms of GVA contribution, those sectors within our most tightly described definition has a Location Quotient of 1.3. That is, the estimated GVA contribution as a proportion of total HotSW economic output (GVA) is 1.3x the national (GB) average. On an employment basis, the profile broadly matches the national profile i.e. a LQ of 1. However, this does exclude MOD service personnel which could not be included for methodological reasons.

Figure 9 shows the HotSW region LQ by industry sectors with a higher proportional share of output produced by manufacture of electrical equipment (4.1), manufacture of other transport equipment (3.7) and public administration and defence services (2.8).

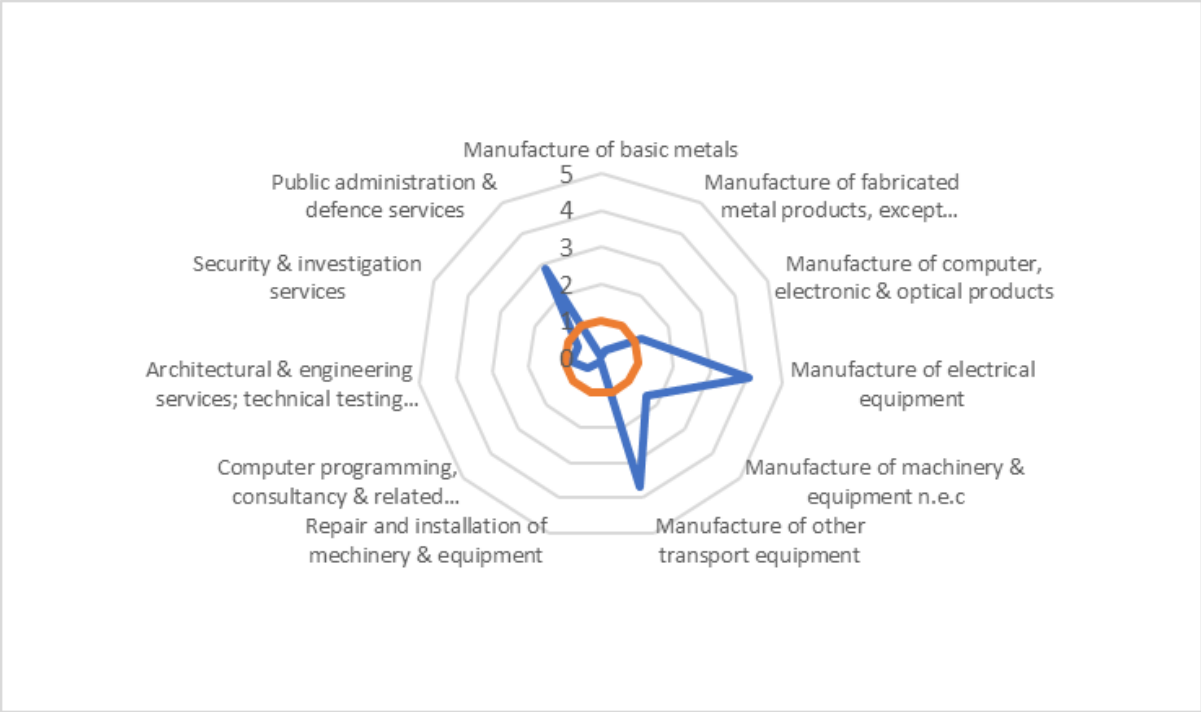


Figure 9 – LQ by sector

Further LQ analysis can be found at Annex F showing the LQ for each of the four unitary authorities in the HotSW region. Significant concentration of manufacture can be found in Plymouth (Babcock and supply chain at Devonport). Torbay reflects the legacy of Nortel and presence of the Torbay Hi-Tech cluster with a high contribution from computer electronics. Devon has a reasonable share of MoD organisations and military bases. Somerset has a significant contribution from manufacturing other transport activities predominately Leonardo Helicopters.

Productivity

We have estimated the typical productivity within those sectors that we have defined as 'highly relevant to defence' and compared it to productivity across the HotSW economy. This is shown in Figure 10. These estimates indicate that productivity – as measured by GVA per FTE job – is 15% higher in those sectors than the regional average. The average GVA per FTE job in these sectors we have estimated to be £61,722 (current prices), compared to £53,786 in the wider HotSW economy[7].

[7] We have used the AMORE database for our model, uplifting 2016 prices to current 2020 prices using Consumer Price Index.

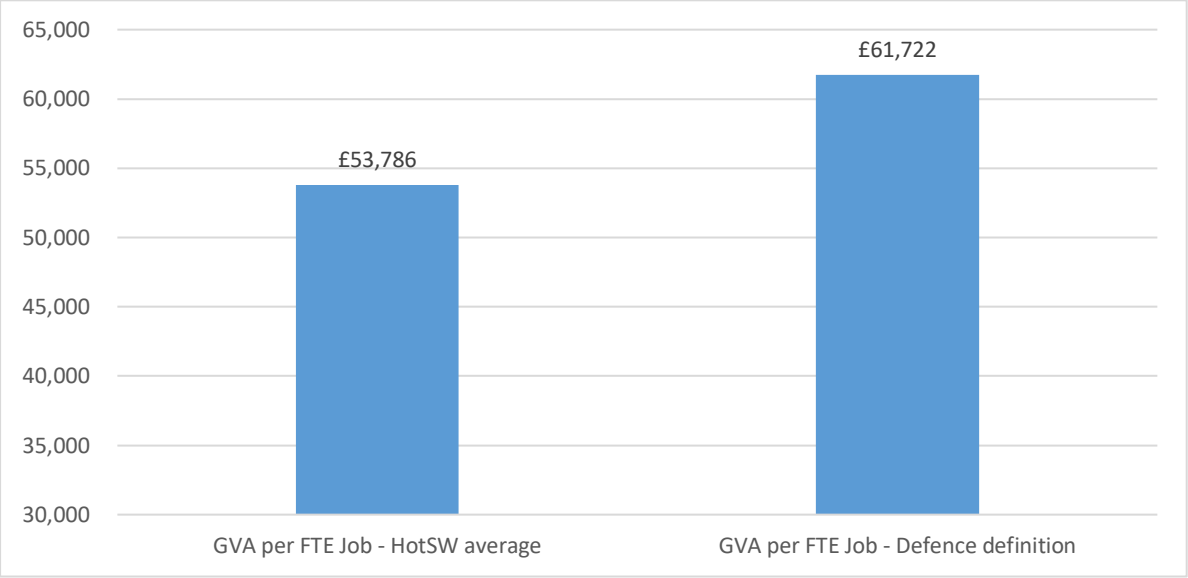


Figure 10 - Estimated GVA per FTE Job (Refinement 2 definition versus HotSW average)

Figure 11 shows productivity across the broad sub sectors at 2-digit SIC level. On inspection, the more economically productive defence sub-sectors are shown to be manufacture of fabricated metal and electrical and other transport equipment.

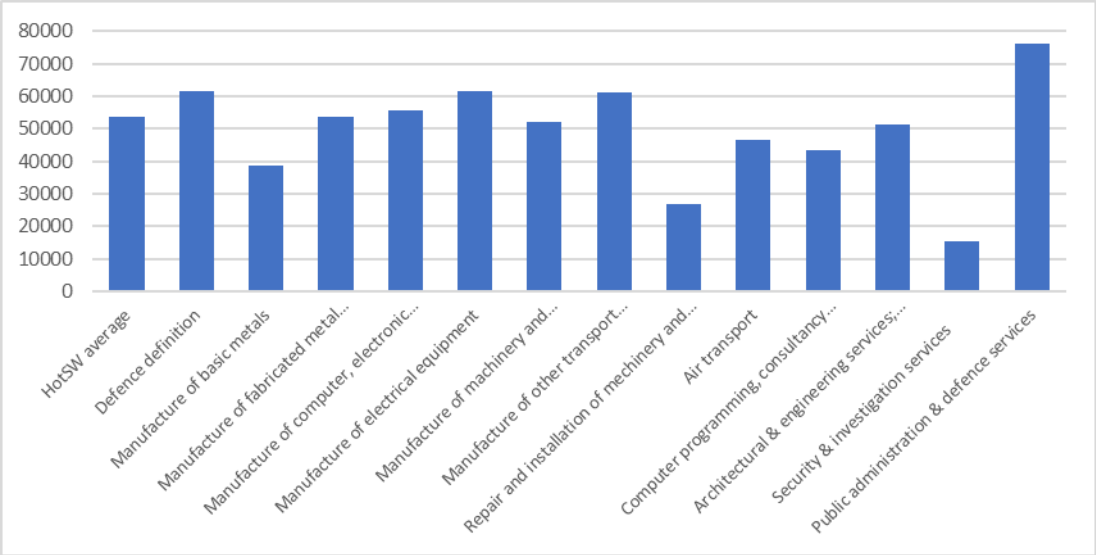


Figure 11 – Productivity by sector

Recommendations:

Proactive use of the DSM to identify new defence market programme opportunity

This would provide better visibility of the capabilities of businesses to respond will increase the number of opportunities for which local businesses can compete, including those not currently involved in the defence sector. Moreover, a greater coordination of effort across businesses, the LEP and the MOD will present a more coherent regional offering for the defence sector. This in turn will increase the proportion of future opportunities contracted to businesses in the HotSW area rather than elsewhere.

Focus on businesses with strategic potential within the defence sector as identified by the DSM

Select the High Potential Opportunities (HPO) arising from the defence sector in order to develop specific programmes for clusters that represent individual businesses able to achieve significant strategic growth. There is the potential to develop a portfolio of target scale-up businesses that could be selected through sponsorship by Prime/Centres of Excellence upon which a development programme could accelerate their defence market engagement. Sponsors deemed most relevant in relation to the project stakeholder engagement would be Babcock, Thales, Leonardo, Plymouth Science Park, MBTC and EPIC. The selected business can be representative of the three scenarios of growth in order to shape a longer-term regional programme of activity.

Engage directly across MOD organisation

To facilitate access to key defence initiatives, such as Integrated Warrior, will enable businesses and their capabilities from the region to participate directly with MOD and its key stakeholders in developing concepts and solutions, where new approaches are now being sought. This would allow businesses in the HotSW area to shape and position their offerings to maximise chances of success with the defence research and innovation community.

Leverage HPC supply chain for advanced skills and supporting services

Improve the understanding of the DIO in order to leverage the advance construction capability and capacity arising from the HPC supply chain and skills base to inform a development project especially appropriate for HMNB Devonport, Babcock and their refurbishment programme. A cross-sector collaborative response would maximise the proportion of contracting opportunities awarded to businesses in the HotSW area.

Address UKHO strategic opportunity for MOD Information Advantage

Apply the outcomes of the defence “Remote and Autonomous System” innovation programmes to the market opportunity provided by the UKHO for global dynamic autonomous collection of marine data. Defence sector requirements can drive the HotSW cross sector opportunities of global scale and impact.

CHAPTER IV: Understanding Defence Sector Needs

This chapter discusses the current and known future needs of the sector, as derived from desk research and regional stakeholder engagement, with regards to four key aspects:

- Supply chain barriers and opportunities
- Skills opportunities and challenges
- Export opportunities
- Innovation opportunities
- Clean and Inclusive Growth opportunities

Based on this discussion, the chapter concludes with a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis and a set of recommendations.

Supply Chain Barriers and Opportunities

Awareness of the opportunities vested in MOD and its requirement for either commercial or academic engagement can be challenging. Whilst the research domain readily reaches through to academia and the prime contractors for support in developing new capability, many small and medium businesses will be naturally excluded from becoming aware of these opportunities.

Less evident is the ability to identify wider procurement opportunities. Despite the MOD policy for SME engagement, many procurement opportunities are not exposed to the lower level supply chains. The DSM, and its inclusion of key programmes driving procurement across the spectrum of defence requirements, better provides the ability to understand the nature of opportunities and the associated supply chain and can provide an appropriate entry point directly or through effective partnership/collaboration with prime contractors or Tier 1 suppliers.

The defence industry is not a single entity but a series of supply chains, headed up by a Prime or Original Equipment Manufacturer (OEM) taking the contract and supported by extant and future suppliers. Each entity knowns its place in the supply chain, is aware of its value add and the talent and skills required to deliver. Yet the introduction by MOD of the Defence Innovation Initiative and the more recent associated guidance in the Defence Innovation Priorities (DIP) and Defence Technology Framework (DTF), now require industry to embrace the pursuit of innovation in collaboration with them thus signalling a change in procurement.

Whilst the defence innovation initiative seeks new and interesting capability from non-traditional defence suppliers (NTDS), this does not necessarily represent the largest regional opportunity for growth. The innovation requirements exposed through DASA provide only a partial view of the demand and there is still work to do to enable MOD to provide an efficient process to take innovative capabilities and ideas through to commercialisation, where the value lies with the innovation hubs of the FLCs and DE&S in terms of proximity to procurement.

More broadly, the potential for larger growth lies in the ability to access larger value contracts from within the prime contractors. They seek not only new capabilities from within current supply chains, but also the capacity (skills, outsourced capabilities and internally driven innovation) to deliver to the larger programmes they are contracted for, both domestically and through their export routes.

It is noted here that limitations in capacity for direct MOD commercial engagement with SMEs steers the procurement route to the Primes. As an exception, direct contracting frameworks (although for defence are typically managed by Primes) do offer a more direct route; for ICT services the Crown

Commercial Service contracts (GCloud, Digital Outcomes etc) are available for use by all Government departments and can be an effective route to more direct revenues.

In addition, there is a requirement for 'defence readiness' for suppliers, either directly or through supply chains. Above and beyond what would normally be expected of supplying into a mature and demanding supply chain, the key elements identified are cyber security provision and granular assessment of defence and security suppliers and their ability to readily share their 'fitness for business'.

These principally are identified as:

- Defence Cyber Protection Partnership (DCPP)

DCPP is a collaboration between the MOD and its key suppliers to ensure the defence supply chain understands the cyber threat and is appropriately protected against attack. The principles enable all to understand the risk, protect proportionally and to meet the defence standards. The MOD/industry buyer completes the risk assessment, this determines the cyber risk profile using MOD Defstan 05-138. This includes Cyber Essentials for a "very low" risk profile and Cyber Essentials Plus for "low". Additional controls for higher sensitivity levels sit above this at level 3 and 4. The supplier is required to complete a Supplier Assurance Questionnaire (SAQ) to demonstrate their compliance with the requirements and a Cyber Implementation Plan (CIP) will be required to demonstrate an alternative approach to meeting the requirements, if what the supplier has differs from the MOD standard for compliance.

- Joint Supply Chain Accreditation Register (JOSCARS)

This is a collaborative tool used by the aerospace, defence and security industry and acts as a single repository for pre-qualification and compliance information. Using JOSCAR can determine if a supplier is "fit for business" and enables several benefits for both supplier and customer:

- EASIER REGULATORY REQUIREMENT - comprehensive, accurate and regular updated insight into third party risk.
- REDUCED PROCUREMENT TIMESCALES - instant access to third party information, reducing the time needed to qualify new suppliers or renew contracts.
- HIGH QUALITY VALIDATED INFORMATION – all third-party information is checked in accordance with a consistent, objective and continually updated process
- COST AND RESOURCE EFFICIENT - Costs are shared amongst community members, significantly reducing the cost of an in-house solution
- PEER NETWORK - Access to the combined experience and resources of other members in the community with shared goals and challenges

Case Study - SWCSC

The South West Cyber Security Cluster (SWCSC) is established to increase the awareness of the broader regional cyber security capabilities available to improve the protection of businesses, promote innovation and make increase the skills available. The cluster companies are able offer a range of services to address DCPP requirements for business through consultancy and managed security services, as well as engage against the wider regional digital agenda and co-ordinate related activities with the Universities and training providers. By example, Securious are offering an ISO27001 Academy to help local businesses develop their compliance position along with service offers that include a Secure Operations Centre developed for SMEs; Securearm offer specialist services to meet the higher sensitivity levels within Government and defence as for DCPP levels 3 and 4.

Lessons drawn from HPC could offer an alternative and acceptable approach to simplify supply chain engagement but will be dependent upon the nature of supply chain management invoked by the procurer.

- Security Vetting and Facilities

Case Study - Krowdthink, still pushing hard for commercialisation

Exposed to understanding utility for its innovative mobile application within the defence and security sectors, Krowdthink were introduced to a call for innovation on behalf of the Office for Counter Terrorism. Securing £250k to support the accelerated development of the product to meet a call for Improving Crowd Resilience, Krowdthink delivered a successful project where the client was able to identify clear benefit in the approach and the unique value it offered in the area of improved public safety within major events. However, post project funding and direct support from the customer community following project completion has limited progress towards full commercialisation and has been left to the organic development of the Krowdthink business and the constraints that this imposes in creating 'at-scale' growth.

In order to be able to handle sensitive information related to the defence and security sector the issue of personnel clearances to handle sensitive material may also be required. This issue may be limited in the case of open innovation but for programme delivery and some engagement into the research and development areas it is likely to be a core requirement.

In addition, there is a potential demand for secure facilities to meet MOD requirements for delivery sensitive capabilities. It is noted that the larger regional organisations have provision for this, however smaller innovators often need support to operate to these demanding standards. Whilst much can be done outside of the scope of this, enhanced facilities provided by the innovation hubs can be helpful to support the development of defence-specific capabilities. Facilities such as Oceansgate have considered this as an opportunity to facilitate the levels of assurance required for defence-related innovators.

More broadly, with regards to supply chain engagement there lies two key challenge areas:

- Supply chain compliance is complex and onerous for many SMEs as they need to support the prime with a flow down of requirements distilled from the MOD contract approach. Whilst this is noted to be made simpler through defence supply initiatives[8] (MOD SME Action Plan v1 dated March 2019) it is still more than most can provide. Experience from Hinkley Point C supplier engagement shows there can be up to two years to secure the necessary supplier credentials to be able to supply and there are many similarities to that for defence.

- Within the innovation space, the need for sustainability in taking an idea through to an opportunity to deliver as part of MOD procurement is critical as time can place the innovator into the 'Valley of Death'. This means viability and sustainability becomes a critical factor. Funding is key here and for many the availability of finance to sustain beyond DASA project funding or being able to provide match funds for non-MOD development, is limited and limiting. This becomes a key factor for the region as it characterises the need for 'patient capital' that could provide funding aligned with the development and measurement (KPI) of accruing strategic value for both the business and the LEP.

[8] MOD (2019). Small and Medium-sized Enterprise Action Plan. MOD; London.

National level challenges relevant to the region also include the transformative change required of MOD to improve commercial processes that better enable wider engagement from industry. Limitations on MOD commercial capacity leaves much of the focus for procurement with prime contractors, as part of the DE&S key supplier management process and its KPIs. Primes find it costly to fund broader supply chain engagement. With established supply chains already in place, in many cases they will defer to current suppliers rather than expend limited time, effort and cost on seeking and on-boarding new suppliers. In addition, they carry their own commercial risk in doing so, which if not passed on within their contract is not sustainable and leaves them vulnerable to competition from external markets and in some cases from within their own internal business units.

In addition, in the context of the wider political impact of Government policy in relation to new trade policy, the primes are left vulnerable to shift in supply from the US at a policy level which is notable for both Leonardo and Thales with their European ownership.

However, development of the right capability within local supply chains remains attractive. If a vibrant and well-resourced workforce is readily available within the region then this can become a key asset for the Prime in winning and securing new programmes, along with securing their own intra-company position within the region. In addition, the reach for regional businesses into national level opportunities is readily achievable if the opportunity identification approach is good, especially if regional engagement with the national trade bodies is effective. All Primes are similarly tasked by MOD for increased SME engagement, particularly around innovation, and are not tied to local supply. This can serve to broaden the supply chain based on creating a more competitive offer portfolio from the region but requires an approach that understands the defence enterprise.

Similarly, stimulated from the flow down of responsibility to the primes for SME engagement from MOD, then a well-purposed pool of 'defence ready' suppliers is an attractive proposition. A target of 25% MOD spend with SMEs as part of the UK Prosperity Agenda is a key driver here.[9] Aligned with the key strategic driver for innovation in seeking operational advantage, MoD Defence Innovation Priorities (Sept. 2019)[10], a focus on regional innovation from similarly developed suppliers becomes key. Specific opportunities noted include the systemisation of identifying key procurement opportunities and co-ordinating the commercial response from local businesses. This has worked effectively for HPC but requires more from the defence market given its diverse and complex nature. The notion of deep engagement with MOD and local partners would seem to map well across from the Hinkley Deal approach but it is recognised that the nature of such an approach is different as the broader MOD market landscape is less focussed and more competed across regions who have differing distinguishing capabilities but similar respective strengths. The suggestion made for including regional MOD representation on the LEP Board may help to shape this however and leverage the position of The Minister for Defence Procurement at a national level. It is noted from the project engagement activities that Commander SW District (MOD Land), Col. Andrew Dawes CBE, has indicated there is scope for cross-LEP collaboration, which can be further explored in light of the Swindon and Wilts model for having MOD representation on the LEP board.

Skills Opportunities and Challenges

[9] Dunne, Phillip (2018). Growing the contribution of defence to UK prosperity: a report for the Secretary of State for Defence by Philip Dunne MP. MOD; London, p. 21.
[10] Defence Innovation Directorate (2019). Defence Innovation Priorities. MOD; London.

Industry suppliers require the skills to design, manufacture and support the development and sustainment of defence "equipment-based" capability as envisaged in the MOD 10-year Equipment Plan. This equates to a full range of products and services to meet the set of defence missions and military tasks. In so doing, MOD collaborates with Industry and requires that the equipment-based capability is developed, delivered and supported through life using DE&S's acquisition management system and across the defence lines of development (DLoDs) of doctrine, information, people, training, organisational structure, infrastructure and logistics.

It is crucial that in assessing the industry skill types and indications of capacity, industry and their support organisations consider the technology families and their application to identify, develop and employ concepts and technology that equip the Armed Forces to operate in the future. These are summarised as:

- Advanced materials;
- Artificial Intelligence, Machine Learning, and Data Science (i.e. software);
- Autonomous systems and Robotics;
- Power, energy storage, conversion, and transmission;
- Sensors;
- Advanced electronics and computing (i.e. hardware);
- Effector technologies.

Set against this, the DIP identifies the challenges it faces more specifically for future skills, for which it will seek industry and academic support to help deliver. These in summary are:

- Effective approaches to attract and retain Suitably Qualified and Experienced Personnel (SQEP), especially with specialisms in Signals and Communications, Engineering and Cyber Security;
- Tracking and management of important skillsets across the workforce, to include industry partners;
- Alternative approaches to contracting specialists in organisations with high security considerations, including partnering with industry to deliver;
- Technologies, services and other opportunities to improve standards of welfare, workforce health and wellbeing for Defence personnel;
- Identifying and collaborating with organisations that have experience in the development of programmes that improve the safety of critical infrastructure, through education, research and engagement that advocates scientific excellence and supports engineering-related research, training and education.

Of note here would the transferability of skills programmes specifically related to Hinkley Point C which would naturally offer a great deal of synergy and leverage the capability of resources with HotSW.

During the stakeholder engagements, businesses showed varying degrees of awareness of the nature of skills they required to address the delivery of future defence contracts; this not only due to MOD being amidst procurement transformation but also being pre-occupied with the delivery of current contracts. Currently any surge capacity is sought from current supply chains, either sub-contracted or outsourced. In most cases, notably with Primes, established defence businesses run specific recruitment and training programmes or use the existing programmes of training providers to maintain their skills requirements.

The Babcock annual report 2019 explains its business delivery and future growth depend on their ability to plan for management succession and for the continuing and future need to recruit, develop and retain experienced senior managers, business development teams and highly skilled employees (such as suitably qualified and experienced engineers, technicians, pilots and other specialist skills groups). It acknowledges that competition for the skilled and experienced personnel is intense and therefore likely to remain in limited supply for the foreseeable future, posing a risk in both recruiting and retaining such staff.

Thales note in "The Contribution of Thales to the UK Economy , March 2019", that 30 percent of their training spend is focused on building capability in research and development whilst another 16 percent is for employees' personal development and to enhance leadership and management skills. Thales runs dedicated and structured schemes for providing continuous development and upskilling for its employees throughout their careers. As well as helping to ensure that the company has a good source of senior engineers and leaders in the years ahead, these schemes contribute to the overall skills base of the UK. Thales also participates in and supports several initiatives to promote the development of technology and engineering skills at an early age, and to encourage under-represented groups to enter the field.

Table 6 summarises the more specific skills initiatives brought to our attention by those business engaged during the research:

Business	Initiative	Detail	Skills nature and shortfall
Babcock[11]	The Babcock Digitisation and Innovation Programme	iSupport, maintaining subs afloat; global support independent of static infrastructure, etc.	The initiative enables Babcock to modernise their engineering service provision enhancing effectiveness and efficiency.
Babcock	Babcock Infrastructure procurement department will know the nature of refurbishment and which businesses of its supply chain to tender/contract. The scale of the work is likely to require a surge in certain skills/number that may not be readily available	MOD has committed £1.4bn to refurbish HMNB	HotSW LEP/PCC is helping get better visibility of what the local infrastructure sector has to offer; use the DSM to identify where the local capabilities lie by matching, alignment and bidding process.

[11] Babcock Annual Report and Accounts 2019 "The Trusted Partner"

Thales	Sonar Academy	Mine Countermeasures (MCM) - sonar, C2 systems and a range of services to upgrade MCM vessels. Anti-Submarine Warfare (ASW) sonar markets for submarines and surface ships	The Thales Sonar Academy will be a centre of excellence for sonar best practice and tailored to meet the demands of the market.
Leonardo Helicopters	"Future of high value engineering" – new approach for advanced engineering	Digital product development and not physical testing	LH would like LEP services to support foundations of/for innovation that build on LH agenda. Example given of "engineering tolerances" where LH looking for technologies from viable innovative businesses.
Supacat Innovation Ltd	Mechanical engineering, high mobility in challenging environments. Electrically powered (and autonomous) vehicles. Apprenticeships.	Skills apply across markets, critically aware of the risks doing business with MoD - meeting environmental standards, skills fade.	Strong linkages with UoE through KTPs to protype new production processes and capability demonstrators. HotSW LEP should consider how they might enable these competencies to be developed in less mature innovative businesses.
UK HO[12]	Capacity required for 80% ocean still needs mapping, core chart data plus environmental overlay through marine geospatial data collection from autonomous systems	Opportunity in partnership with PML (Smart Sound), MBTC/FAST (Autonomous Systems at sea), Babcock and Thales	This strategic opportunity would benefit from central facilitation by a Partner Authority in conjunction with e.g. SWRDC. A feasibility study would assess the scale of the requirement, notably the skills.
Bridgwater and Taunton College	The BTC are a well-established and significant training services provider to MoD	○ Engineering Skills foundation delivered for MOD DE&S; ○ JV Colleges Partnership for army apprenticeships for Royal Signals, Intelligence Corps, Paramedics and Equine.	BTC and other providers can adapt and modify their courses to meet the challenges described in the DIP "Defence People – Skills, Knowledge and Experience" which asks how we can access people with the right skills, knowledge and experience.

[12] Annual Report 2018-19 "Enabling a deeper understanding of the world's oceans"

HPC	HotSW LEP are acutely aware of the skills and expertise driven out of the HPC construction programme	Advanced engineering and nuclear safety professionalised workforce.	Impact within HotSW region where near neighbours attract more prominence and interest at a MOD/Government level - notably at MOD Abbey Wood and MOD Corsham.

Table 6 - Skills Initiatives

The findings of this study can be used in conjunction with the proponents of the STEM skills shortage strategy[13] to provide insights into specific future defence needs. The technology families can be readily mapped to HotSW industry sectoral capabilities. By using the DSM, the HotSW LEP Skills Advisory Panel can work with business support services to advise of programme opportunities and help assess specific future skills requirements.

Recommendations:

Implement a matching service to align defence priorities with HotSW businesses

Leverage cluster involvement to more broadly reach those relevant to defence demand through a matching service that identifies SMEs that would otherwise not engage. This would enhance the efficiency of presenting new opportunities to a broader reach of HotSW businesses who can realise growth from the defence sector.

Enhance supply chain compliance specific to defence requirements

The development of defence supply chain compliance support services (e.g. DCPP and JOSCARS) for businesses identified as being capable of offering new capabilities to defence and its prime suppliers. Properly targeted support in the supply chain compliance areas will minimise the risk of businesses failing to exploit the potentially lucrative opportunities in the defence sector.

Enhance the quality of business management to meet the defence market demands

Enhance skill levels through targeted development programmes for advancing the quality of management and leadership to build long-term strategically valuable businesses for defence sector growth. Increasing the likelihood that businesses will develop in such a way that they maximise the opportunity for strategic growth that the defence sector offers.

Increase skills for defence to meet Primes engineering resource shortfall

Leverage and adapt existing skills development programmes across the region to enhance high value jobs that enable capacity and capability to meet defence requirements. Increasing the quantity and quality of jobs that arise from the defence sector will deliver enhanced economic impact.

[13] Devon County Council Skills Advisory Panel

Export Opportunities

There were £14 billion of defence and security export orders in 2018 nationally, rising from £9 billion in 2017; UK exports have grown by 120% since 2013[14]. This upward trend indicates a strong appetite for centralised support for increasing defence export sales which through regional engagement can be leveraged for those with defence related capabilities from within HotSW.

These values accrue over the next 10 years and make a considerable potential contribution to the growth projection. In addition to the domestic market, these provide opportunities for export which adds a further 30% to the value, based on 2018-19 UK performance, where Defence and Security exports totalled £14bn, 19% of market share and second only to the USA. This impressive performance has grown year on year since 2016 and is a testament to the work of FCO, DIT/DSO and UK exporting businesses. The forward-looking trend indicates significant future export defence and security opportunity for the UK.

Within HotSW, there is already significant export activity taking place amongst defence prime companies. For example, Thales are growing the UK footprint through an export-led strategy with inward investment from the Thales Group. Their capabilities lie in: Unmanned air systems; Weapon systems; Sonars; Electronic warfare; Military avionics & air training solutions. Thales MMS operates successfully in the export market and its products and services currently contribute 50% of all revenue.

Leonardo Helicopters also have a global presence, with exports focused with strong industrial presence in four markets: Italy, UK, US and Poland. Their products, solutions and services are in use across >150 countries worldwide; 85% of 2018 revenues came from international markets.

The MOD have recently enhanced their commitment to the export of defence products through the Type 31 programme. Following previous successes of the Type 26 export programme which saw BAE Systems win an £18bn contract with the Australian government the Babcock and Thales-led programme, commonly known as the Type 31e programme to emphasise the export potential, will present significant opportunities for the HotSW region should the ambitions be realised.

Recommendations:

Case Study - CQC Ltd

Established for 20 years with a £5.3m turnover (95% export) and 50 FTEs, CQC has a loyal and contented workforce in Barnstaple, proud of their work and the "Buy British" kite mark. It operates in three global markets: Defence products - Soldier systems (Wearables e.g. body armour); CNI Products - CBRN protection; Marine Distributor for Survitect - Fibrelight ladders and cradles. The operating model involves design with manufacturing outsourced to China, Romania and will only undertake R&D if a customer funds the requirement. CQC has a positive impact on the local economy despite poor regional infrastructure. By virtue of the challenges which can characterise procurement within the UK defence market, the CEO has adopted a culture of self-determination, not given to external support. This has driven the company growth through diversification to adjacent National Security sectors and exports, providing a good example of both export and dual use despite operating in isolation.

[14] https://www.thalesgroup.com/en/countries/europe/united-kingdom/markets-we-operate

Engage the national defence and security sector trade bodies

Increase the engagement with national level trade organisations with the offer of regional representation – possibly within the scope of SWRDC. These should include: TechUK – they are key to engaging with direct MOD-industry engagement; Team Defence Information – key to industry collaboration with supply chains for information services and support logistics; ADS – SME engagement for primes within the defence and security community. Positive engagement with the relevant bodies already involved in the defence sector will play a major part both in raising awareness of future opportunities and will increase the probability of HotSW businesses winning contracts, notably through partnering.

Increase defence exports for the region

Enable broader cross-sector collaboration with the UK Defence Solutions Centre (UKDSC) which provides access to a wider set of funded programmes, access to the key defence primes under Defence Growth Partnership (DGP) sponsorship along with that of the Department for International Trade (DIT) and its direct support of exports markets through the DIT Defence and Security Organisation (DSO) and the UKDSC Market Intelligence Service.

Case Study - UK Defence Solutions Centre (UKDSC) - High Altitude Intelligence (HAI) call for innovation

Signposted via exposure of DMR project to the UKDCS, the wide-ranging scope of the HAI is of significance to EPIC in that it seeks leading innovation across the spectrum of technologies that include communications, sensors, cyber security and data processing. Seeking outreach to centres of excellence for complementary technologies, UKDSC welcome the opportunity to brief on the funded project (c.£7m) which not only seeks the advancement of high altitude intelligence capability for defence but has already identified opportunity to provide cross-cutting innovation to the fisheries, agricultural and construction sectors, along with basing the work on export-related exploitation with Australia in collaboration with DIT.

Innovation Opportunities

The defence sector is R&D intensive, driven by the recognition of joint enablers offered by technology. This is manifested in the publication of the Defence Innovation Priorities that are to be serviced by the Defence Technology Framework under the proposed operating concept that is driven by MOD Strategic Command.

R&D expenditure in the UK for defence purposes was £2.7 billion in 2018 and contains a number of highly innovative companies across the supply chain. Of this total, 61% was provided by the Government, 25% by UK industry and 14% from foreign investment. To provide context for HotSW, Thales UK invested £130m in R&D in 2017; LHD spend 10% of total turnover on R&D which equates to c.£340m per annum.

These overlap with R&D spending in the adjacent maritime, civil aerospace, space and security sectors. While the sector retains a defence core, the sector is increasingly integrated with the civil sector, not least as cutting-edge technologies, such as cyber and autonomous systems, are increasingly developed first in the civil sector. Leveraging the interaction with complementary productivity plans within the HotSW region, dual use innovation can help drive the increased growth for key sectors that focus on transformation through technology. This is especially relevant if supported through business services that increase the funding and skills available for commercialisation of innovation.

The sector will benefit from the sustainment of budgets with a renewed commitment to NATO of meeting the minimum 2% of GDP funding to defence. This was noted as being in excess of that in 2018

at 2.2%. This will not only flow through the development and procurement of new capability but the wider transformation that is identified within the Modernising Defence Programme (MDP).[15]

Persistent, aggressive state competition now characterises the international security context. In response to the growing threats the Modernising Defence Programme was launched in January 2018 with Secretary of State for Defence making a statement to Parliament, 18 Dec. 2019. The MDP has three key objectives:

- Mobilise, making more of what exists to make the current force more lethal and better able to protect UK security. This will improve the readiness and availability of a range of key Defence platforms: major warships, attack submarines, helicopters and a range of ISTAR platforms. Our overseas training and deployments will be adjusted to increase global points of presence, better support allies and influence adversaries.
- Modernise, embracing new technologies to assure competitive edge. Launching new 'Spearhead' innovation programmes that will apply cutting-edge technologies to areas including sub-surface threats to submarines, intelligence, surveillance and reconnaissance capability, and command and control in the Land Environment as well
- Transform, radically changing the way MOD does business in Defence, improve markedly the way Defence runs. To sustain strategic advantage in a fast-changing world, MOD must be able and capable of continuous and timely adaptation. Modern business practices will be embraced and a culture that nurtures transformation and innovation established.

This is key as it addresses a number of drivers for which the region can specifically benefit. Most notable is the need for cross sector innovation, embracing the development and exploitation of capability developed within defence, along with the need to accelerate the opportunity to embrace dual use capability already proven in other sectors. With a strategy for future warfighting being identified in the MOD Information Advantage concept, JCN 2/18 dated 18 Sept. 2018.[16] This places the capabilities resident in the area well in their ability to address the new ways defence will deliver its missions.

Key here is the ability to converge the critical priorities that defence has now identified in the Defence Innovation Priorities (DIP) and the Defence Technology Framework[17] to identify use cases and new providers able to deliver the innovation required.

[15] MOD (2018). Mobilising, Modernising & Transforming Defence: A report on the Modernising Defence Programme. MOD; London.
[16] MOD (2018). Joint Concept Note 2/18: Information Advantage. MOD; London.
[17] MoD DTF Sep 19 (7 technology families, 9 application areas).

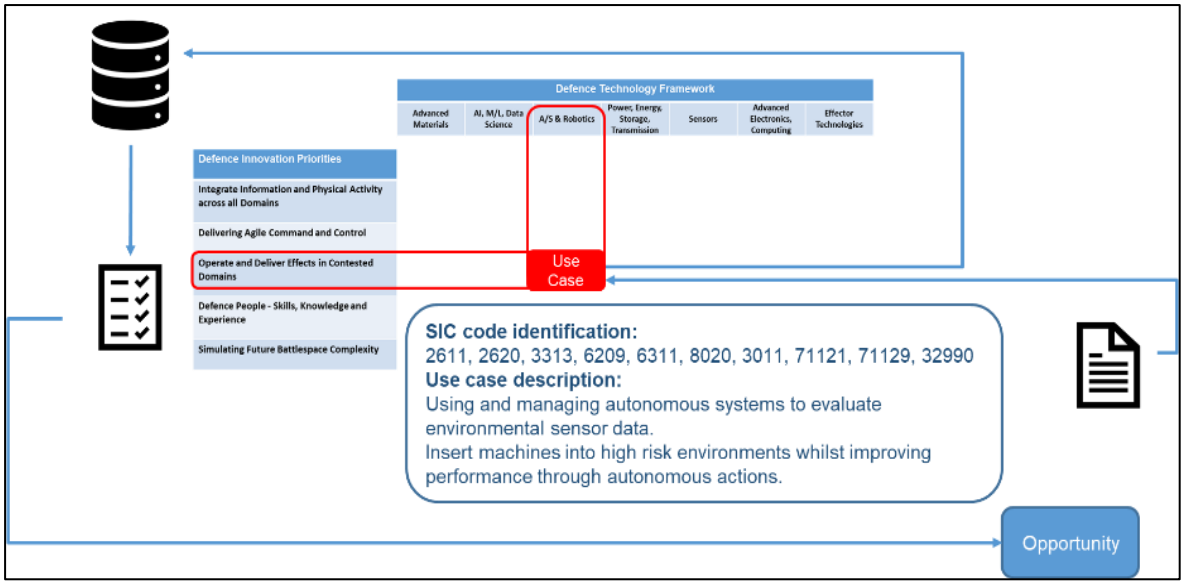


Figure 12 - Innovation Opportunity Workflow

The workflow associated with finding new innovators against the opportunity arising from the use case exposure is summarised in Figure 12. An example of this is the development of Remote and Autonomous Systems (RAS) that whilst are clearly aligned to the key operating domains – air, land and sea, will share common capabilities such as sensors, data processing, secure information infrastructure, advanced communications, connected systems and optimised human-machine interfaces. The cross-cutting and globally leading capabilities of the region found at the Centres of Excellence are ideally placed to step forward to support MOD with meeting these challenges.

An example of good practice in innovation within HotSW is Thales MMS, based at Templecombe, Somerset. Thales is a strategic supplier to the UK Ministry of Defence (UK MOD) and is a significant player in the UK Defence Industrial Base, contributing to productivity both nationally and regionally. Within the industry MMS occupies market leading positions in the Mine Countermeasures (MCM) sonar and Anti-Submarine Warfare (ASW) sonar markets. Thales operate in the civil and defence sectors across aerospace, transport, space and security with notable capabilities: autonomous systems across transport and defence; air traffic management in civil and defence aerospace. A current example is “Four Lines Modernisation” - Circle, District, Metropolitan, and Hammersmith and City lines - a new signalling system introduced in stages, complete by 2023. Their DMS 2023 brochure "one voice" - outline of business ambition, expresses 6 business challenges and associated performance indicators: to grow annual revenue to £700m by 2023; 50% export; proportion from services from 50 to 60%; internal R&D spend to 5%.

In 2017 Thales carried out £130m of R&D including contributing to Engineering and Physical Sciences Research Council Projects. Partnerships with UK Research Organisations and Universities are central to winning awards and delivering innovative programmes. Their stated local ambition is to establish Plymouth as the premier location for the development and testing of Maritime Autonomous Systems, initiated with the opening of their Marine Autonomy Centre in 2018 and available to academia, SMEs, partners and suppliers to use. Thales are also a key member of the FAST cluster accessing the test and evaluation facilities of Smart Sound. Two key opportunities are presented to Thales and their partners in the HotSW region: UKHO requirement for autonomous collection of seabed GIS data and the prioritised innovation requirements of the Royal Navy. The innovation focus areas include advanced autonomy, alternative propulsion, advanced manufacturing and materials, environmental modelling and monitoring and Cyber Security and IoT technologies, all well suited to Thales UK portfolio. Local

Impact on Defence businesses in the South West made the third highest contribution to UK GDP behind the South East. Thales has maintained 3600 jobs and contributed £210 million to the GDP. The GVA contribution by Thales UK in HotSW region is assessed as £49m p.a. rising to £118m p.a. when taking into account the indirect benefits to the economy generated by our supply chain.

Another local example of good practice in innovation is Leonardo Helicopters (LH). LH relies on innovative concepts and technologies being offered from within or into the supply chain, often at T3, T4. LH have few suppliers in Somerset many more in Plymouth and Dorset. Global Presence, export focused with strong industrial presence in four domestic markets; Italy, UK, US and Poland. Products, solutions and services in use >150 countries worldwide. 85% of 2018 revenues came from international markets.

Leonardo focuses on dual use applications in aerospace and electronics for defence and security[18]. The Leonardo Mini can cut, vaporise, coagulate and blend the dual wavelengths for unique results. LH is looking to build capability that both meets the contracted business need and has impact. It looks at innovators as bearers of new technologies that enhances that capability. iAERO will be an environment for such a cluster to flourish. Digital adoption and innovation - EPIC, Manufacturing Catapult (Additive), UKRI, Defence Innovation Centre Winfrith (Dorset LEP, John Sutcliffe, atmospheric electronics).

Finally, the DSTL Serapis Programme illustrates the demand for integration of SME capabilities whose scope covers the Military Intelligence Cycle, which is critical to all military operations and aims to provide the right information to the right people, at the right time. This includes anything from enabling the driver of a tank to see his enemy before he is seen, to enabling a strategic commander to know if an adversary is building up troops or preparing a missile launch. In the case of Serapis, each of the framework lots that cover discrete elements of capability development have key performance indicators associated with SME engagement. This is the mechanism by which broader reach into the NTDS innovation base are encouraged by the prime contractor lot owners.

The case studies above reflect successful investment, the clustering of technologies of distinctive capabilities, and communities of collaboration and show current achievement, noting on-going challenges that impede growth and indicate where growth is planned.

The recommendations of the report have taken an enterprise view at the regional level, advising how to achieve the objectives of the HotSW LIS and build on the derived distinctive R&I capabilities and the case study experiences. The vision for the HotSW Defence LIS presumes business support services, skills and infrastructure of the type described in the recommendations. Implementation of the vision will bring about distinctive and investment-ready business capabilities to service targeted opportunities of the UK and international defence market.

Key HotSW Clusters and Research Pull-through for Innovation

Not only does this open the opportunity for new innovations that arise from the work of the existing businesses operating in the area, especially those in the clusters (FAST, EPIC, SWCSC) but also provides the focus for the development and application of specialist skills associated with those emerging from

[18] https://www.leonardocompany.com/en/innovation/our-technologies

the Universities in the region around engineering and computing sciences and both maritime and cyber security specialism.

By example, identified as a result of the recently announced UKDSC Cross Sector Innovation call for Subsea Autonomous Next Generation Technology, the region was able to establish the ability to respond by engaging through the Plymouth Marine Laboratory (PML) lead for Smart Sound, Dr. James Fishwick. Representing the unique capability that Smart Sound offers in the connected marine environment, its facilities and expertise it was able to position itself as the lead to open the call more broadly across the FAST cluster, along with signposting directly to both MSubs and Autonaut who were able to apply directly. This approach leverages the ability to secure cross-team working for all participating innovators to promote HotSW capability. BAR was pleased to be able to facilitate in this instance as part of the project to demonstrate how otherwise missed opportunities could not only be identified but a coherent approach to participation with cluster involvement could be achieved. This was not only welcomed at a local level but also appreciated at the UKDSC Executive level to increase regional capability awareness within the defence sector.

This approach is to be replicated on behalf of EPIC and the UKDSC call associated with High Altitude Intelligence which sees both defence applications and cross sector innovations into the fisheries, agriculture and construction sectors in the UK and Australia.

More broadly, the University of Plymouth (UoP) has a successful history of working with the Armed Forces to develop foundation and honours degrees with HMS Drake and at Britannia Royal Naval College (BRNC), the delivery of the academic elements of Initial Naval Training at BRNC, joint research and postgraduate degrees in oceanography, the Royal Marines School of Music enabling qualification, and the provision of degrees for international navies. Plymouth established the Dartmouth Centre for Seapower and Strategy (DCSS) to meet the clear and growing need to raise knowledge, awareness and understanding of strategic and defence issues as they relate to maritime affairs and the use of sea power in the 21st century. DCSS delivers an MA in Applied Strategy and International Security to the Greek Military and Senior Civil Servants, which is also open to civil servants from NATO and its global partners. DCSS also delivers continuing professional development (CPD), including cyber security awareness training for seafarers. Plymouth also offers unique “Autonomous Systems” undergraduate and postgraduate qualifications.

UoP has world-leading expertise and unique facilities in the arenas of marine cyber and maritime autonomy, for example the COAST lab. Plymouth is a leading University in terms of Innovative Ocean Data Capture, and Expert Interpretation leading to fundamental understanding of Ocean Processes. It has experience in bidding for and managing defence funding, including two current projects with the US Department of Defense (DoD) Defense Advanced Research Projects Agency (DARPA) and for the UK Human and Social Science Research Capability (HSSRC) for the Defence Science and Technology Laboratory (DSTL). UoP also works with veterans and has a pioneering collaboration with the Help for Heroes (H4H) Plymouth Recovery Centre, which aims to bring additional therapeutic benefit and value to H4H beneficiaries through educational and research engagement.

Where the opportunity to commercialise innovation is enhanced through the academic centres of excellence, the ability to pull through research into industry becomes evidenced in examples of the collaboration between Supacat and UoE for the All-Terrain Mobility Platform (ATMP). UoE's Engineering College and SC Innovation of the Supacat Group have collaborated through a knowledge transfer partnership to co-develop the hybrid/electric drive for the high mobility off road ATMP vehicle targeted at UK special Forces. The British Army plan to invest a further £100m in novel technologies such as hybrid/electric drives. The benefits to each partner are complementary and summarised at Table 7:

Supacat Group	University of Exeter
Increased revenue 16-fold from initial investment resulting from reputation as an innovator in electric drive	Enhanced experience of industrial processes
EV/hybrid design guide	Reputation in industry as partner for innovation in hybridisation and electrification and prospect for the unmanned variant and autonomous environment
New skills for high voltage vehicles	Better knowledge in implementation of hybrid and electric into vehicles, 20 student projects
Planning to enter new markets	Cross-sector opportunities in marine

Table 7 - Benefits for Academia Support for Innovation

More broadly for the University of Exeter (UoE), currently nearly 100 academics work in defence, security and conflict related projects across all Colleges. Key areas of defence and security activities include:

- Materials and structures research
- Metamaterials and transformation optics
- Multi-functional materials and additive manufacturing
- Quantum systems and nanomaterials
- Data Science, AI, big data
- Cyber security and data analytics

Case Study - University of Plymouth - Cyber SHIP

With funding and commitment to collaboration secured from Government and 18 industry partners, the £3.2m project will develop a globally unique facility addressing the increasing threat to the maritime sector from cyber vulnerability. Specifically designed to meet gaps in the current ability to determine the real-world impact of threats, it is taking a 'whole ecosystem' approach addressing complex challenges in the connection of Information Technology, Operational Technology and Internet of Things based systems. This is of particular use to the defence sector as they assess threats to current platforms and address the future cross-cutting challenges of autonomy and the connectivity demands imposed that are critical to mission success. As a catalyst to reach into the MBTC, Smart Sound and its FAST cluster, it is likely that the successful roll out of CyberSHIP will provide significant opportunity for the region and its extended capability to innovate.

- Chemical, biological, radiological and nuclear defence including vaccine development and post exposure therapeutics
- Human Sciences including performance, attention and human-machine interaction
- Global security and military strategy
- Foreign policy analysis
- Counter-extremism and de-radicalisation
- Law of military operations
- Military leadership and professional development

There are two separate issues to be considered here:

I. The impact of the R&D activity carried out within the region, both in MOD establishments and in the private sector;
II. The impact of the presence of large MOD establishments in terms of the infrastructure and maintenance/support spend from the MOD.

In both cases the nature and impact are different; it is relevant to different sectors of the local economy and the money comes from different parts of the MOD, so engagement with and procurement from will follow different pathways.

In the first case the identification of programmes associated with DSTL and the broader research community will offer clarity on the research areas of interest being undertaken. It will also provide detail as to who is running the framework contracts on behalf of MOD and its departments, delivered under a private sector arrangement. Typically, here the MOD will be seeking enhancements to operational effectiveness in line with future operating concepts.

Innovation Hubs

Case Study - Plymouth Science Park (PSP)

The density, quality and relevance of SME innovative businesses evident at the PSP is of interest to the defence sector. The sponsorship of these businesses from PCC, UoP and University Hospital Derriford provides a range of complementary technology capabilities that closely align with requirements that are exposed by the DSM. They show the cross-cutting potential for capabilities already mature and established within the Health and Maritime sectors that underpin the UoP-led strategy that sees defence as the third component. Businesses of note include Argans who specialise in earth observations and sensing, Chess Dynamics providing advanced engineering for defence land and sea targeting systems (Hawkeye and Sea Eagle FCEO), RoweIT with specialist software development expertise, Artemis Optical with advanced Optical

Along similar lines, the physical presence of key hubs for innovation are a focal point for advanced research, new capability development, extended supplier base reach and skills enhancement.

- Primes establishing new innovation facilities across the region include Leonardo iAero, Thales Sonar Academy and Babcock iSupport.

- The expansion of the maritime innovation hub at Oceansgate in support of the growing MBTC, FAST and Smart Sound;
- The ongoing development of academic facilities able to serve defence requirements across a range of capability areas – UoE, Engineering College probably have £2-3m active research contracts at any one time and all see defence as a major sector. Strategic relationships exist with key suppliers – Babcock, Leonardo, Thales and neighbouring Rolls Royce, Airbus and BMT Defence and Security Ltd;
- The innovation and training facilities supported by the Institute of Technology at HPC with clear synergy for defence and the nuclear sector;
- Science Parks offer a range of services to support innovation in business that can be readily applied to the defence sector. These include Exeter and Plymouth Science Parks that service the HotSW region.

In considering how the future defence infrastructure elements are provided, this widens the scope of innovation to include elements such as environmental sustainability and logistics efficiency.

Case Study - Babcock Innovation Pilot

In order to accelerate the opportunity to reach more broadly beyond its current supplier base, Babcock sought assistance from BAR Associates to establish the viability of an alternative, external approach to augment its internal innovation team. Tasked with considering a systematic approach to identifying new innovators, the pilot project established that there was an ability to identify innovators not known to Babcock and that, based on a specification to improve the maintenance of dockyard infrastructure, they were able to consider new capabilities measured against an assessment of organisational maturity and innovation readiness.

Recommendations:

Enabling SME defence innovation through improved insight and access for business into MOD

Provide business service support to the SME innovators so they can meet the Primes need for securing and delivery of new programmes and MOD direct demand signals through its innovation ecosystem across all stages of its concept, capability and integration lifecycle. This would result in an improved ability of SMEs to win and deliver defence sector innovation opportunities with strategically valuable impact.

Identify defence dual use innovation activity within the LIS

Increase the awareness of the defence innovation priorities and requirements through proactive engagement with the owners of the productivity development plans and the associated cluster businesses to share innovative HotSW cross sector business capabilities. This would accelerate the pace for which new defence sector opportunities can be fulfilled by a broader set of existing HotSW businesses.

Exploit UKMO intellectual opportunity for defence innovation

Provide better open access to the world-leading data sets and expertise held within the UKMO for the benefit of defence innovation and global exports. This would create a unique environment to commercialise innovations with applicability for defence with cross sector exploitation potential.

Pull-through research for enhanced commercialisation of innovation for defence

Increase the potential for the clusters to embrace opportunities arising from the defence sector and ensure coherence with key research establishments within the region e.g. UoE Engineering College, Exeter Science Park, UoP Science and Engineering Faculty, Plymouth Science Park, UKHO Innovation Centre. UKMO informatics lab and Plymouth Marine Lab. Review current business engagement with individual research establishments and work to focus enhanced collaboration on broader defence-specific opportunities maximising the region's distinctive capabilities. An increased alignment of existing research activity with the current and future requirements of the defence sector will allow more targeted use of resources and increase the prospect of commercialising innovations.

Enhance cluster impact through effective defence engagement and business development

Strengthen the gravitational pull of the innovation hubs around their physical location; extend reach more widely to businesses across the region to minimise the impact of 'distance decay' and create more effective 'virtual' clusters achieved through focused engagement with the cluster leads. Enhanced collaboration will improve the ability to meet the requirements of the defence sector.

Clean Growth / Inclusive Growth opportunities

It is important that any strategy to support the growth of the defence sector aligns with HotSW's priorities outlined in its Local Industrial Strategy of delivering Clean and Inclusive Growth. This would also address the Defence Infrastructure Organisations (DIO) goals for climate change and sustainability. The aim around wider business engagement and raising productivity directly contributes to Government's objectives around inclusive growth and supporting the 'long-tail' of businesses (in relation to productivity performance). The innovation objective can invite solutions to clean technologies, processes, and products in defence and its supply chain.

Supply chain engagement can be driven by economic rather than considerations of social value; this is typical with the best price approach and constraints imposed commercially on reaching and finding new suppliers who may better represent social values for the region. Whilst supply chain policies may stipulate compliance to elements of social value, the opportunity here is to understand where the social agenda of the MOD can be reflected back into the region for wider benefit. Elements may include, but not be limited to:

- How veterans and reserves can be engaged into industry to leverage their domain skills and expertise (Whole Force Concept) and retain the capacity within the region. The impact of inclusivity with regards to the Armed Forces Covenant is a pledge that together with subscribing organisations, there can be a collective acknowledgement and understanding that those who serve or who have served in the armed forces, and their families, should be treated with fairness and respect in the communities, economy and society they serve with their lives. If retained at a regional level these can have a significantly positive impact locally.

- MOD Corporate Social Responsibility (CSR) is driven by the pan Government CSR strategy released in 2014. This highlights the aim to create a workplace that encourages diversity and equal opportunities for all, to include actively encouraging professional development through committed learning programmes and support for employee health and wellbeing.

- The implications of MOD Environmental policy and the associated Environmental Management System (EMS) recognises the importance of protecting the environment and that good environmental management performance has, more than ever, to be demonstrated. This is because public opinion expects it, increased efficiency requires it, local ecosystems and global cycles are preserved by it, the reputation of the MOD depends on it and MOD policy insists upon it. MOD EMS Policy requires that all MOD sites are covered by an EMS based on the ISO 14001. From a front-line command perspective there is a mutual gain associated with lower cost of operations and increased and improved operational performance with reduced implications on logistics re-supply, particularly with regards to fuel. This aligns well with the HotSW clean and sustainable growth agenda.

- It is important to consider the locations within the region that can be key to the scope here to ensure the city centre locations can as equally be considered valuable to the sector as those where the concentration of engaged business are represented (Ref LEP Board 24.1.20; Exeter City Council, CEO).

SWOT Summary

Table 1 below considers the SWOT analysis from the perspective of the HotSW region and its ability to deliver enhanced productivity through greater business with the defence sector.

Strength	**Weakness**
The region has distinguishing defence capability and an associated skills base; Existing defence bedrock business has a current footprint and significant economic value in key prime relationships with Leonardo, Babcock and Thales;	The ability to drive defence sector growth will require funding and a strategic approach that is not currently committed; Pressure on competition from overseas at a political level could impact current bedrock capability;

Complementary clusters have well established expertise that can be applied more widely to defence; Key physical assets and research organisations can be the catalyst for future growth.	Current defence supply chain readiness and an SME awareness and culture to engage may be limited in the wider industry sectors; Current limitations on capacity and skills to achieve substantial growth.
Opportunity High potential and scope with growth through innovation; Innovative capabilities can readily flow into bedrock capability through Prime supply chains; Dual use capabilities can be positioned for export through establish channels; New defence opportunities once identified can be leveraged through established clusters within the region; Establish an effective defence cluster supported by an integrated and visible framework linking primes, small businesses, research organisations, academia with business support providers and government stakeholders.	**Threat** Inability to shift the culture to fully embrace defence opportunity and for it to be sustained through to revenue; Time taken to establish a defence-ready supply chain is too long; Leaderships skills are not robust enough to deliver the new capabilities required; Reliance on a narrow route to defence innovation could limit the ability to identify and commercialise new capabilities across the businesses; Funding is not made available to support the growth agenda.

CHAPTER V: Future Growth in HotSW Defence Activity

As part of this work, we have developed three scenarios of how the capability within the HotSW defence related sector could result in improved future economic performance. Given the uncertainty of any future projections, then some significant assumptions have needed to be made. Many things need to be put in place for HotSW businesses to be able to better exploit the considerable opportunities that arise out of the defence-related markets – both domestically and internationally. The approach to each scenario is different and not necessarily comparable – the mechanisms for improved economic benefits that underpin each differ.

These scenarios should not be viewed as mutually exclusive; they are interlinked. For example:

- Promoting innovation (scenario 2) could be an important element in improving the competitiveness of the HotSW bedrock assets.
- Allowing them to better compete in the opportunities that arise out of (national and international) market demand (scenario 1).
- It is realistic to expect that scenario 2 – improving the competitiveness/productivity – will be an enabler of success in scenario 1 – bedrock assets exploiting greater market share.
- The economic benefits associated with scenario 2 should be viewed as a subset of those benefits estimated for scenario 1.

Equally, it is important to note that these potential benefits would build over time - they will not be immediate. In effect, they could be viewed as the potential benefits at the 'point of maturity' in terms of how the support services might be able to facilitate a greater exploitation of defence-related opportunities.

Scenario 1 – Bedrock estimation

Using our valuation of those sectors that we have defined as 'highly relevant to the defence sector' (c£2.6bn GVA) and we assume that only one-third of that bedrock capability were able to exploit the enhanced market opportunities and only by 25% over its current share – this would still result in a c£210mn uplift in market opportunity, per annum. In effect, this scenario is assuming that the current bedrock assets will be able to access a larger proportion of the available contracts (domestic and export) through an enhanced capability, based on LEP business support services outlined across the recommendations.

In effect, it represents average annual growth of c. 5% p.a. from our current valuation baseline. This compares to projected growth of 1.5% for those sectors. Part of this uplift may be delivered through innovation-led productivity improvements (see below scenario – which should be viewed as a subset of this scenario). However, the uplift estimate also implicitly assumes that potential growth will be market-led i.e. over and above productivity improvements.

Scenario 2 - Innovation

By supporting businesses to better engage with Defence Innovation, and to embed funded activity into their business models, it has the potential to facilitate improvements in productivity *over and above projected* growth. These productivity-led improvements closely correspond to the strategic priorities of the LEP and, importantly, have the potential to deliver significant economic benefits over the longer-term.

> *"Ideas are cheap, concepts are not" – Director, MOD Defence Concept and Doctrine Centre (DCDC)*

The growth trajectories that could be associated with each 'productivity uplift' scenario is illustrated though the below charts. These are set against the projected growth associated with the 'business as usual' trend (the baseline). The Charts illustrate the uplift that could be achieved if innovation-led productivity could be achieved.

Businesses assumed "highly relevant to defence" (green SICs) show a value of £764m over 10 years, based on an assumed growth of 2.5%. Figure 12 refers.

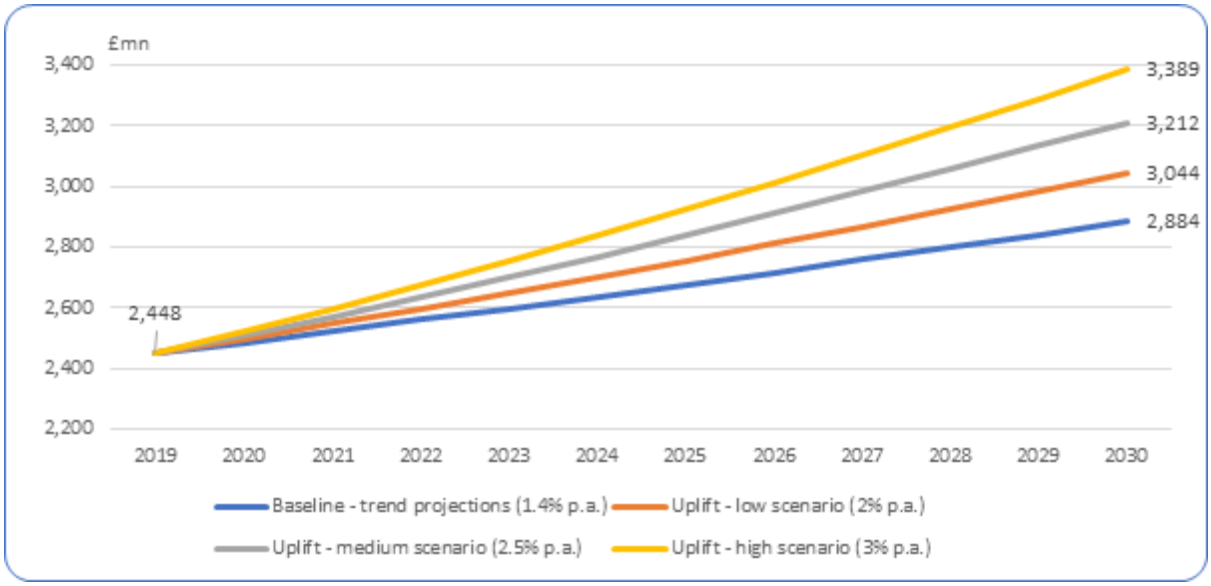


Figure 12 - Growth projections (GVA) for market activity associated with those sectors with 'highly relevant to defence' – productivity uplift

Businesses assumed to have "identifiable relevance to Defence" (amber SIC's) show a value of £530m over 10 years, based on an assumed growth of 2.5%. Figure 13 refers.

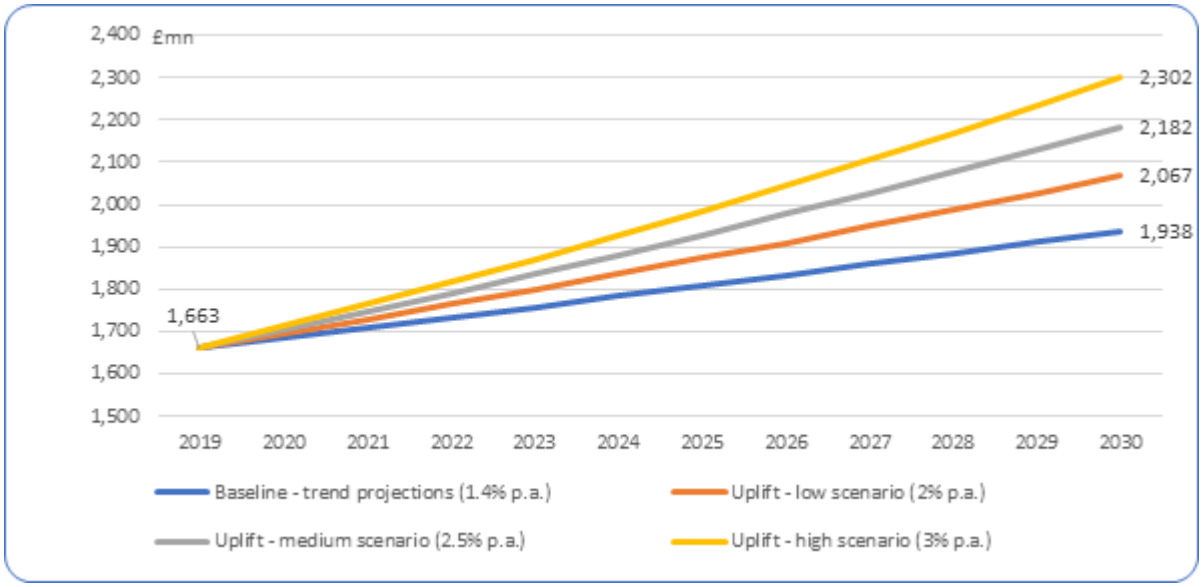


Figure 13 - Growth projections (GVA) for market activity associated with those sectors with 'identifiable relevance to defence' – productivity uplift

Both components contribute to the future evaluation already calculated for scenario 1.

Figure 14 shows the geographical spread and density of those businesses "directly relevant to defence" associated with amber SIC codes. It is noted that the concentrations build on those identified in scenario 1 showing that there is a natural enhancement through regional clustering able to develop innovations that present an incremental growth to future bedrock capability. This is represented on **business unit count.**

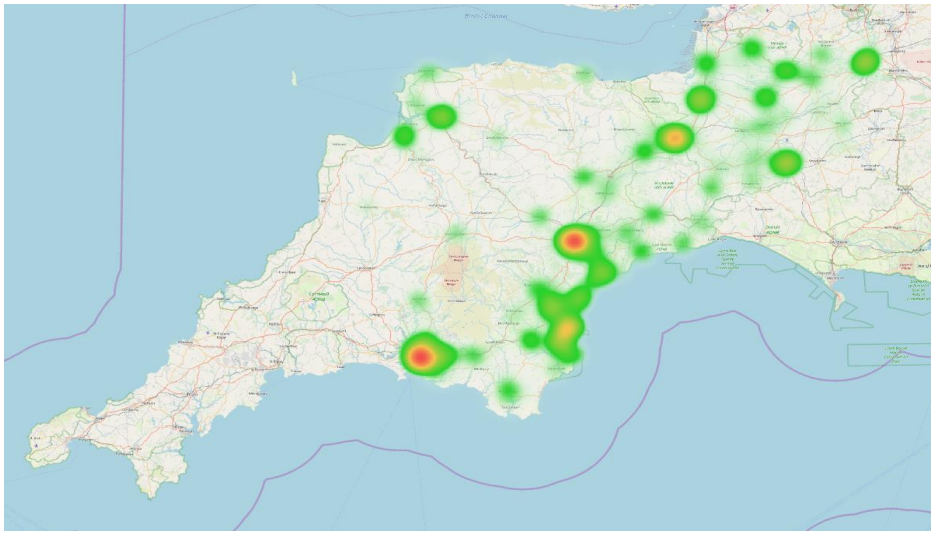


Figure 14 - Heatmap showing distribution of potential businesses (unit/count) thought directly relevant to defence

Scenario 3 - Dual Use

The principle of a 'dual-use' scenario is based on the notion of finding capabilities from non-established (traditional) defence suppliers but with potential applicability into the defence market – both domestically and internationally. The scope of this possible applicability is highly uncertain and

certainly not possible to estimate. Again, it is the principle of dual-use and applicability which is important.

Along with other members of NATO, the UK has a commitment to spend 2% of its GDP on defence. Currently, it is one of few countries that exceeds this guideline – spending 2.1% in 2017. This is in part represented by the c.£21bn annual spend through the MOD within UK industry as highlighted earlier in this section, or £5bn within the wider South West region. However, it will also include UK spend from overseas suppliers (imports).

As previously stated, our assumption is that the majority of domestic spend currently will be within the bedrock assets and their supply chains – as represented in our 'highly relevant to defence' definition. However, there is the potential for some of those sectors/businesses which do not currently exploit defence-related needs to position themselves to potentially exploit any future opportunities. The assumption that underpins this scenario therefore is that those sectors which currently do not benefit from defence-related market opportunities could do so (in marginal terms) if the appropriate support structure was put in place, and those businesses had the desire and capabilities to access defence markets.

If we assumed that output could be uplifted by the same proportion as the current national defence spend (2.1%), and taking account of export opportunities (which we maintain the constant assumption of representing one-third of domestic demand), then this would be equivalent to c. 2.7% uplift. When set against the baseline valuation of the 'minor relevance to defence' definition, this would be equivalent to c.£207mn uplift in market activity per annum.

Summary of future evaluation

The analysis for future evaluations is based on a "significant" addressable defence market deduced from the DSM and its source data which itemises the UK domestic 10-year MOD budget. In addition, we have considered factors such as exports, strengths of the businesses in the region (distinctive capabilities), differentiation against the other regions and the nature of the support to businesses required to increase productivity. The findings would appear to endorse a public investment to be applied across the three scenarios given the potential to significantly enhance GVA, summarised in table 5:

Scenario	GVA 2020	Uplift 1	Uplift 2	GVA 2030	GVA 2040
Bedrock	**£2.6bn**	**30%**	**25%**	**£4.2bn**	**£6.9bn**
Innovation*		£760mn	£540mn	[£1.3bn]	[£2.6bn]
Dual Use**		2.1%	0.6%	£2.07bn	£4.1bn
Stretch Total				£**6.27bn**	£**11.0bn**

Table 5 - Summary of future estimated values

*Innovation 2030, 2040 values included in Bedrock;

** Dual use used as a scaling factor for growth outside of Bedrock.

Figure 15 summarises the nature and scale of projected growth.

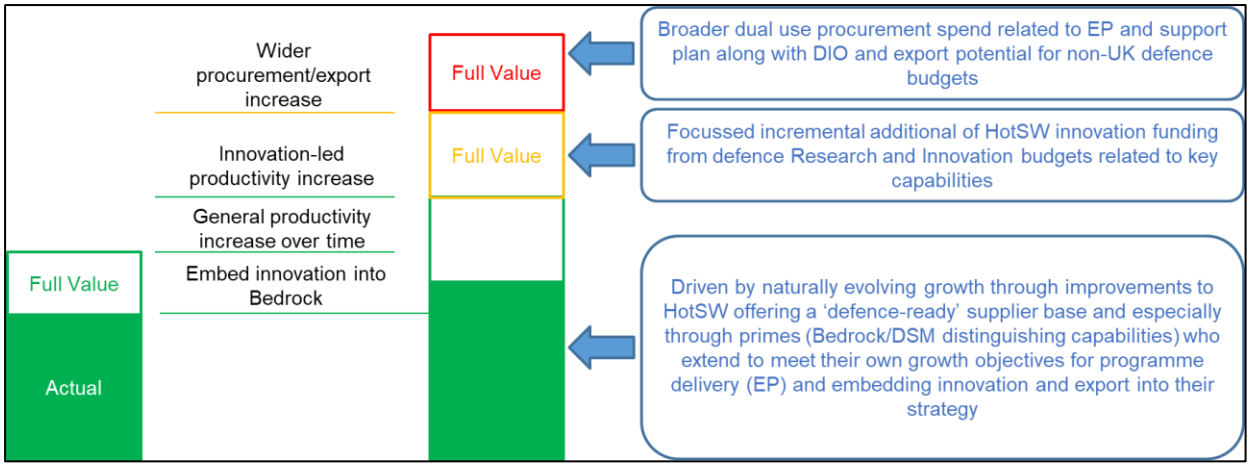


Figure 15 – Summary of nature of projected growth

It is also noted as part of our assessment that at a national level it remains a challenge to map across all sectors. Engagement with the trade bodies most relevant to defence reveals the following key observations:

- The Joint Economic Development Hub (JEDHub) project residing with the DGP, commissioned by Secretary of State for Defence, has had a challenge in developing a national level picture. Whilst we understand the approach attempts to make a more detailed financial assessment of defence expenditure flow down through the primes contractors into their supply chains, it seems to limit the ability to agree a more general approach as directed by the HotSW DMR project where SIC codes have been used;
- A similar picture emerges from ADS where consensus on the applicability of individual SIC's proves challenging to determine a national picture;
- A general appreciation from both DGP and ADS on the approach taken by the DMR project has yet to be validated with them – something that could follow as a consequence of the final report to seek national context to the HotSW approach.

Recommendations

Prepare an investment case to exploit HotSW defence market potential

Use the assessment as the evidence base upon which the investment case can be prepared to reflect the scope and scale of business support services essential to realise the financial growth projections; this includes stimulation of the regional private investment community who are able to release development capital in order to support the need for sustainment of the businesses entering the defence supply chain.

Benefits:

- The development and submission of a robust investment case that quantifies and justifies the investment requirements will increase the economic impact in the HotSW area.

Promote the HotSW evaluation method at a national MOD level to increase HotSW brand

Promote the HotSW method for economic assessment for defence at a national level (JEDHub) in order to increase prominence for the region.

Benefits:

- Increase the effectiveness of the MOD nationally commissioned work being delivered through DGP/UKDSC and supported by the ADS Group.
- Championing the wider adoption of the methodology will add credibility to the analysis used as the evidence base for realisable benefits and therefore strengthen the investment case. In turn, this will make the HotSW area more attractive for external investors, both public and private sector.

Leverage wider cross-sector PDPs for defence dual use

Consider the non-Defence PDPs to identify scale up businesses with dual use technologies and capabilities applicable to defence procurement and innovation opportunities.

Benefits:

- Alignment with other LIS PDPs will expose the broader potential capabilities to be offered to the MOD from within the HotSW area.

1 Conclusion

Summary Recommendation

The key recommendation is to establish a programme with resources to enable the LEP to direct the activities of the networking clusters, their technology centres of excellence and the business support and market engagement services required to bring about the productivity gains envisaged possible from a significantly increased defence market share.

Adoption of the recommendations increases the awareness and appreciation of the addressable market and the likelihood of successful contract awards that will offer enhanced HotSW competitive advantage and productivity gains.

Annex A - Candidate Delivery Plan

In line with the BAR proposal and its A3M approach, the following section brings together the outputs of the research project into a candidate delivery plan that has been used to check and validate the recommendations are coherent, consistent and comprehensive. It is recognised that this may not be how the HotSW LEP decide to take forward the work, but it does offer the Partner Authorities and key stakeholders the opportunity to consider their own approach to enhancing productivity from the defence sector for their local businesses.

Development of the Strategy

The proposed Strategy has been formulated based on the BAR A3M™ activity within the DMR study. This converges the findings and associated recommendations of the project with the 12 components of strategic value embodied in the A3M. This enables a set of five key Strategic Objectives to be distilled against which a vision and strategy can be set.

The value of the Business Strategy framed in this format is that it provides the opportunity to demonstrate a clarity of purpose to internal and external stakeholders, the HotSW business community, customers and investors. The mapping between recommendations (as derived from high level requirements of the project) and the strategic objectives is summarised in table 8 below:

RECOMMENDATION	A3M STRATEGY COMPONENT	STRATEGIC OBJECTIVE
Promote the evaluation method at a national MOD level to increase HotSW brand	Innovation	Innovation
Engage the national defence and security sector trade bodies – TechUK, ADS, TDI		
Identify defence dual use innovation activity within the LIS		
Engage directly across MOD organisation		
Exploit UKMO intellectual property for defence innovation	Competition	
Pull-through research for enhanced commercialisation of innovation for defence		
Prepare an investment case to exploit HotSW defence market potential	Financial situation	Finance
Leverage wider cross-sector PDPs for defence dual use	Quality of earnings Revenue mix	

Enhance the quality of business management to meet defence market demands	Quality of management	Skills
Increase skills for defence to meet Primes engineering resource shortfall	Staff skills	
Extend reach beyond defence to National Security	Quality of customer	Market
Focus on businesses with strategic potential within the defence sector as identified by the DSM	Size	
Address UKHO strategic opportunity for MOD Information Advantage		
Proactive use of the DSM to identify new defence market programme opportunity	Penetration	
Implement a matching service to align defence priorities with HotSW businesses		
Increase defence exports for the region		
Enabling SME defence innovation through improved insight and access for business into MOD	Business scarcity	Offer portfolio
SWRDC engagement		
Enhance cluster impact through effective defence engagement and business development		
Enhance supply chain compliance specific to defence requirements	Brand value	
Leverage HPC supply chain for advanced skills and supporting services		

Table 8 - 21 Point Delivery Plan and Strategic Objective mapping

This strategy outlines the opportunity to engender a strategically based culture across the HotSW business community to maximise productivity within the defence sector. A consistent approach and embedded processes to deliver strategic value through the distinguishing capabilities in the region is required to unlock the productivity gains that can be acquired through building competitive advantage for our businesses.

This can be measured by economic and social impact across the region and realised through an increase in the number of successful scaleup businesses providing defence capability for the UK and its overseas markets.

This is predicated on the recognition that we can build strategically valuable businesses that can be well designed, developed and monitored and there is a clear view of success across all stakeholders that will create funding opportunities to sustain through a long tail towards significant procurement.

The vision

HotSW LEP support the development of the capabilities of our distinctive businesses by matching them to the defence market opportunities using our enhanced understanding of the defence sector. We will work with MOD to address the operational requirements of the Integrated Operating Concept 2025 through an experimentation programme and a procurement process that integrates capabilities across the five domains of Sea, Land, Air, Cyber and Space, projecting forwards to 2040 and funded through the existing Equipment Programme in the short term. We will work with businesses to create a more agile, assured and sustainable supply chain that is defence-ready and thereby maximise the potential growth in strategic value and future productivity. In all that we do we recognise the opportunity to increase exports and address the MoD's goals for climate change and sustainability.

Strategic Objectives

The strategic objectives will be delivered under a consistent and clearly identified plan which will embrace all stakeholders. This plan will provide clarity on the rationale against which each objective is set and KPIs. The KPI's characterise change and indicate progress against the successful execution of the strategic objectives.

Innovation

Objective - Guide and enable HotSW businesses to embrace and respond to the defence market and its policies, initiatives and aspirations for Defence innovation and SME engagement.

> Rationale - MoD and Key suppliers have KPIs for innovation and SME engagement and need to engage better with industry to deliver it for and with them. Emerging MoD processes and business management best practice show requirement for a lifecycle approach - ideation to delivery to sustainment.
>
> KPI - To have an Innovation-led strategy and system and a measure of its success

Finance

Objective - Investment for enabling support services is secured so that HotSW businesses are developed to compete in the defence market.

> Rationale - MoD requires businesses to be "defence ready" to be eligible for contracts; as such businesses are challenged, without support, to sustain the defence "Valley of death" which demands patient capital and strategic intent.
>
> KPI – Programmes in place to facilitate supply chain compliance (JOSCARS), DCPP (Cyber Essentials as a foundation layer), Trade body membership, funding availability, skills development and infrastructure improvement.
>
> KPI – Business readiness level assessment both as a region (macro) and for individual businesses (micro)

Skills

Objective - Enhance the leadership skills of the businesses to develop strategically valuable businesses able to offer expertise and capacity to develop capabilities required by the defence sector.

> Rationale- There is an extant demand for defence enabling capacity in both committed programmes being delivered by the prime supply chain to UK defence and in the innovation programmes that seek new solutions.
>
> KPI – development programmes in place to ensure business leaders are able to offer effective products and services to meet the defence sector requirements

Market

Objective - Identify and develop new opportunities both domestically and to deliver international export growth.

> Rationale - The DSM exposes a large and addressable market for HotSW businesses that can be able to exploit distinctive capabilities through targeted opportunities. This can be readily systemised to deliver scale and increase prospects of success.
>
> KPI - Achievement of increased economic impact/value

Offer Portfolio

Objective - Establish a collaborative LEP-led 'defence ready' supplier ecosystem focused around the distinguishing regional capabilities identified

> Rationale - Clusters are evident and key but not are not yet developing their market. There is a clear MoD appetite to identify and attract non-traditional defence suppliers.
>
> KPI – Develop an appropriate culture and behaviours with effective clusters operating to deliver within supply chains to a recognised standard e.g. ISO 44001 - Collaborative Business Management.

Communications Plan

For the productivity gains associated with the Defence Strategy to be materialised, successful consensus needs to be built between the stakeholders such that it can be successfully resourced and implemented. There needs to be agreement on the strategic value that can be achieved and a process by which this is monitored.

There are 4 key messages to include within a communications plan to ensure that the strategy is explicit and can be embedded across the HotSW community:

1. Clarity of ownership and strategic vision;
2. Strategic planning and delivery are key enablers;
3. Appropriate KPIs are established and agreed for the objectives and become measurable targets of the strategy;
4. Delivery of the objectives within the strategy are delivered as part of a comprehensive implementation plan.

Annex B - Glossary

Acronym	Abbreviation	Glossary
ADS	Aerospace, Defence and Security	ADS represent and supports over 1000 UK businesses operating in the aerospace, defence, security and space sectors.
ATMP	All terrain mobility platform	The UK All Terrain Mobility Platform is commonly known by the name of its manufacturer Supacat. It is a lightweight, 6-wheeled vehicle used by airborne and air-mobile forces of the British Army.
DASA	Defence and Security Accelerator	The Defence and Security Accelerator (DASA) finds and funds exploitable innovation to support UK defence and security quickly and effectively, and support UK prosperity. Our vision is for the UK to maintain its strategic advantage over its adversaries through the most innovative defence and security capabilities in the world. DASA is a cross-Government organisation, launched in December 2016 by the Secretary of State for Defence.
DCPP	Defence Cyber Protection Partnership	A collaboration between the MOD and its key suppliers to ensure the defence supply chain understands the cyber threat and is appropriately protected against attack.
DE&S	Defence Equipment and Support	We are a bespoke trading entity, and arm's length body of the Ministry of Defence. We manage a vast range of complex projects to buy and support all the equipment and services that the Royal Navy, British Army and Royal Air Force need to operate effectively. We work closely with industry, including through partnering agreements and private finance initiatives.
DGP	Defence Growth Partnership	Through the Defence Growth Partnership, Government and Industry are working together to ensure the UK's Defence Sector grows in the future by strengthening our global competitiveness and inspiring the next generation.
DIO	Defence Infrastructure Organisation	The Defence Infrastructure Organisation (DIO) is the estate expert for defence, supporting the armed forces to enable military capability by planning, building, maintaining, and servicing infrastructure.
DMR	Defence Mapping Research	A term provided by PCC to describe the project and service required

DSIS Team	Defence and Security Industrial Strategy Team	A recently formed team offering a definition of defence used in the DSM to distinguish between capabilities of Defence and Security as well as those with relevance to both
DSM	Defence Sector Map	A tool to match businesses and their capabilities to defence sales opportunities
EU	European Union	Offers a definition for Defence - European Commission's Defence Industry: Comprehensive sectoral analysis of emerging competences and economic activities in the European Union
FAST	Future at Sea Autonomous Technologies	Access to collaborate with leading industrial and academic partners specialising in the delivery of innovative marine autonomous solutions, such as: surface and sub-surface autonomous systems, advanced manufacturing, smart ports and cyber security. The FAST infrastructure includes platforms, sensors, advanced power systems and communication networks to the Smart Sound.
HMBD	Her Majesty's Base Devonport	Her Majesty's Naval Base, Devonport (HMNB Devonport) is one of three operating bases in the United Kingdom for the Royal Navy and is the sole nuclear repair and refuelling facility for the Royal Navy. The largest naval base in Western Europe, HMNB Devonport is located in Devonport, in the west of the city of Plymouth, England.
HOTSW	Heart of the South West	The sponsor of the study and a geographic region covering both Devon and Somerset
HPC	Hinkley Point C	Reuse of nuclear engineering skills and resources from HPC to HMNB Devonport
ISTAR	Intelligence, Surveillance, Target Acquisition, Recce	ISTAR stands for intelligence, surveillance, target acquisition, and reconnaissance. In its macroscopic sense, ISTAR is a practice that links several battlefield functions together to assist a combat force in employing its sensors and managing the information they gather.
JOSCARS	Joint Supply Chain Accreditation Register	JOSCAR is the new accreditation system for the aerospace, defence and security sectors. The system was established following an initiative led by ADS and includes a growing number of prime contractors as registered buyers.
KPI	Key Performance Indicators	A performance indicator or key performance indicator (KPI) is a type of performance measurement. KPIs evaluate the success of an organization or of a

		particular activity (such as projects, programs, products and other initiatives) in which it engages.
LEP	Local Economic Partnership	In England, local enterprise partnerships (LEPs) are voluntary partnerships between local authorities and businesses set up in 2011 by the Department for Business, Innovation and Skills to help determine local economic priorities and lead economic growth and job creation within the local area.
LIS	Local Industrial Strategy	Set out clearly defined priorities for how cities, towns and rural areas will maximise their contribution to UK productivity. Local Industrial Strategies will allow places to make the most of their distinctive strengths. They will better coordinate economic policy at the local level and ensure greater collaboration across boundaries.
MBTC	Marine Business Technology Centre	The Marine Business Technology Centre (MBTC) is the gateway for accessing comprehensive research and development support as well as cutting-edge facilities and expertise. Providing services up to the bleeding edge of advanced marine technology development, the MBTC is supporting Devon-based SMEs through research, testing, proving and production. Through ERDF funding, we are pleased to be able to offer our services free of charge for eligible businesses. Based in Endeavour House at the Oceansgate Marine Enterprise Zone in Devonport, the MBTC gives client access to the Smart Sound Plymouth proving zone, funding programmes, research and development support and links to other commercial collaborative partners to aid the production of cutting edge marine solutions.
MMS (Thales)	Maritime Mission Systems	Templecombe is our primary site in the South West and is one of the main strategic sites for Thales in the UK. Established in the late 1960s, Thales in Templecombe is now home to our Maritime and Air Operations businesses. There are over 750 highly skilled employees on site working together to invent, develop and deliver world leading technology to our customers around the world. With Thales's investment, the site has now become a global centre of excellence in anti-submarine warfare, mine warfare and submarine technology.
MOD	Ministry of Defence	MOD is a ministerial department, supported by 27 agencies and public bodies. Its purpose is described as "We work for a secure and prosperous United Kingdom with global reach and influence. We will

		protect our people, territories, values and interests at home and overseas, through strong armed forces and in partnership with allies, to ensure our security, support our national interests and safeguard our prosperity.”
MRO	Maintenance, Repair and Operations	MRO stands for maintenance, repair and operations. In procurement terms it refers to the products and tools purchased that keep an organisation running. It’s also referred to within the context of ‘indirect procurement’ because these products enable your business activity but are not directly incorporated into any final product you create.
NTDS	Non-traditional Defence Suppliers	Those potential suppliers to defence trading in adjacent markets
PCC	Plymouth County Council	The customer for the project, Head of Economy, Enterprise and Employment, Economic Development.
PDP	Productivity Development Plan	HotSW-Partnership-Productivity-Strategy-Delivery-Plan-Apr19.pdf
RAS	Remote Autonomous Systems	UK Research and Innovation (UKRI) invites outline proposals for the research nodes as part of the UKRI Trustworthy Autonomous Systems programme. Up to £20.5 million funded through the Strategic Priorities Fund (SPF), is available to support seven research nodes (approximately £3 million UKRI contribution each) for 42 months, starting from 1 October 2020 (fixed start date). UKRI expects to fund seven research nodes, each focusing on one of the following research topics: trust, responsibility, resilience, security, functionality, verifiability and governance and regulation.
SIC	Standard Industry Classification	The Standard Industrial Classification (SIC) is a system for classifying industries by a four-digit code. Established in the USA in 1937, it is used by government agencies to classify industry areas. The SIC system is also used by agencies in other countries, e.g., by the UK’s Companies House
SMEs	Small and Medium Enterprises	A collective term used to size businesses as per the EU definition
SWCSC	South West Cyber Security Cluster	Supported by the police, leading universities, industry experts and business organisations, the Cluster exists to raise the profile of cyber security issues and help the region's businesses and organisations take steps to counter the threats

UKDSC	United Kingdom Defence Solutions Centre	Facilitating strong international partnerships and cooperation between UK Government, defence industry, academia and international customer. Created as part of the implementation plan for the DGP and jointly funded by government and industry, the UKDSC works closely with the UK's MOD, BEIS and DIT DSO, the UK defence industry and academia
UKHO	United Kingdom Hydrographic Office	The UK Hydrographic Office (UKHO) is a world-leading centre for hydrography, specialising in marine geospatial data that helps others to unlock a deeper understanding of the world's oceans. UKHO is an executive agency, sponsored by the MOD
UKMO	United Kingdom Met Office	Met Office defence teams have extensive experience of dealing operationally with all service users across the military domains of land, sea and air. Our experience has been gained by supporting UK Armed Forces: on UK bases; at Permanent Joint Operating Bases (PJOBs); on operational deployments and exercises (using the Mobile Met Unit; and through our partnerships at the Joint Operations Meteorology and Oceanography Centre.
UoE	University of Exeter	We have a history of successful relationships with government and industry, working together on security challenges across scientific disciplines including electromagnetic and acoustic materials, photonics, molecular microbiology, materials and manufacturing, structural biochemistry and human and social factors. Exeter also focuses on the broader context of security and conflict, humanitarianism and peace, building on research within the social sciences. We have a rich and varied track record in advising governments, nation states and industry on national security, modern warfare and humanitarian response. Furthermore, we work closely with the Ministry of Defence to develop future military leaders.

Annex C – Work package tasks and output

This annex describes the tasks of the project plan by work package and their output, noting deliverables. In addition to these the project has reported progress and presented to the LEP, each time providing a slide deck to PCC.

Date	Event	Deliverable
18 Oct	Kick off	Presentation Slides
25 Oct	Progress Meeting	WP1
4 Nov	LEP annual Conference	Presentation Slides
29 Nov	Progress Meeting	WP2, 3
13 Dec	Progress Meeting	WP 4
24 Jan	LEP Board	Presentation Slides
13 Feb	Progress Meeting	Draft Final Report

Work Package 1 - Defence sector definition - activity and mapping

There are three components to the deliverable D1

- A document explaining how the tasks of WP1 have contributed to the development of the map and how the map is structured (D1a).
- The set of SICs in a spreadsheet thought to describe the industry capabilities required for defence business (D1b).
- The defence sector map in a spreadsheet – a living document; Its structure connects planned opportunities to a definition of the scope of the defence industry which can be used to "locate" businesses with capabilities in a specific segment (D1c).

Assemble key reference material and project initiation meeting - Reference documentation is an Annex in this report. Project library can be made available via BAR Associates CWE, on request.
Capture Defence Operating Model (DOM) baseline - Slides provided to PCC at progress meeting
Scope review - industry segmentation provided within delivered DSM framework
Assessment and identification of key defence elements: bedrock, defence innovation priorities and defence industrial strategy

Complete gap analysis and coverage matrix - provided within delivered DSM framework
Map sectors to SIC code - provided within delivered DSM framework

Work Package 2 - Supplier relationship assessment

Map nature and extent of scope and relationships through Trade Associations, Prime Contractors and their supply chains, paying attention to key enablers/challenges/barriers to entry for SMEs.

Trade association engagement - ADS, TechUK, Team Defence Information described in report findings and captured within engagement plan
Prime contractor activity - described in report findings and captured within engagement plan
Supply chain review, status and extent - described in report findings
Supply chain readiness review - described in report findings and recommendations

Work Package 3 - HotSW defence sector key capability assessment

Key businesses and capabilities of its defence sector including the key suppliers, supply chain companies by location and size. An analysis of key distinguishing capabilities of the defence sector in HotSW to include regional and localised (Partner) assessment.

Review of MOD Equipment Plan/DE&S Programmes and DIO assets - Used to construct framework of the DSM
Highlight HotSW areas of distinguishing capability - Described in findings of this report and briefed to stakeholders
Assess potential for defence application of HotSW capabilities in relation to Defence Innovation priorities and Defence Technology Framework - Embedded in briefings to PCC; used to characterise future scenarios; described in findings in this report.
HotSW Partner engagement meetings - Devon, Somerset, , Plymouth, Torbay. See Annex

Work Package 4 - Sector economic assessment

Capability review and economic impact assessment to include the estimated current and future value of defence and defence-related activity to the HotSW economy. Use of primary research and the AMORE input-output model;

Mapping of that activity, at a company level to understand the distribution across the HotSW.

There are two components to the evaluation deliverable:

- A documented method
- A current and future evaluation of the defence market to HotSW businesses with all working assumptions made explicit

Populate/complete coverage matrix with current HotSW industrial capability - See DSM, SIC Categories and Evaluation Deliverable
Review against key economic metrics and outline representative scenarios - e.g MOD, defence exports, wider sector potential (transformational sectors) - Reported in Method and Evaluation Deliverable dated 7 Feb 20
Relevance review against UK regional position - UK metrics used in the evaluation method to scale the HotSW growth potential

Work Package 5 - MOD/Prime estate and research asset review

Identification of the impacts of key physical and research establishment assets in the HotSW for potential growth opportunities

Capability review - DIO and DSTL - Qualitative review described in findings
Impact assessment - Embraced within the future evaluation deliverable and described as findings in this report

Work Package 6 - Defence growth catalyst reference for localised economic growth

Describing 3 case studies where Defence activities have acted as a catalyst for economic growth in the broader local economy, Examples will be provided from HotSW if they exist or within the SW or more broadly if not e.g. innovation and non-Defence applications and exports

Identification of case studies - Annex in this report and additional examples included in the findings section of this report
Productivity impact assessment for local economy against examples - direct, indirect and induced impact described in the case studies

Work Package 7 - Future needs and priorities

Identification of the future opportunities for the sector alongside associated needs and priorities for potential support to realise their value. e.g. skills, infrastructure, policy etc. We propose to construct three future scenarios to forecast growth: Innovation led growth; Dual Use (i.e. applicability into non-Defence sectors); Bedrock sustainment and growth. These will be placed in an assessment framework for low (trend), medium, and high projections.

Nature of LEP enabled business support - described in the recommendations of the report
Future evaluation - projected growth described in report and separate deliverable

Work Package 8 – Challenges and opportunities

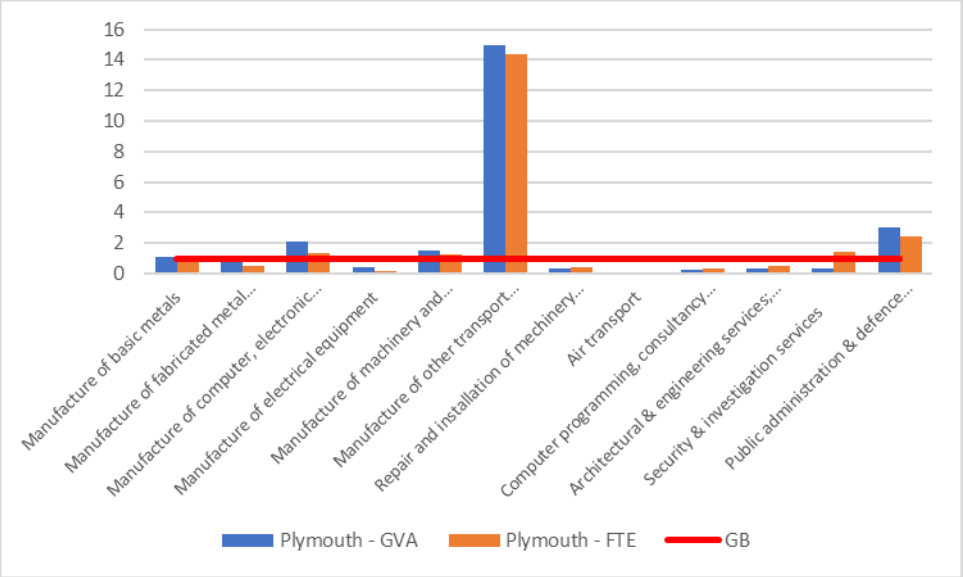
Identification of the key challenges and opportunities that the sector currently faces, using SWOT/PESTLE. Exploitation of the SWOT opportunities is fulfilled by implementing the report recommendations based on a set of strategic objectives

SWOT and PEST assessment - included in this report
Strategic objectives - included in this report

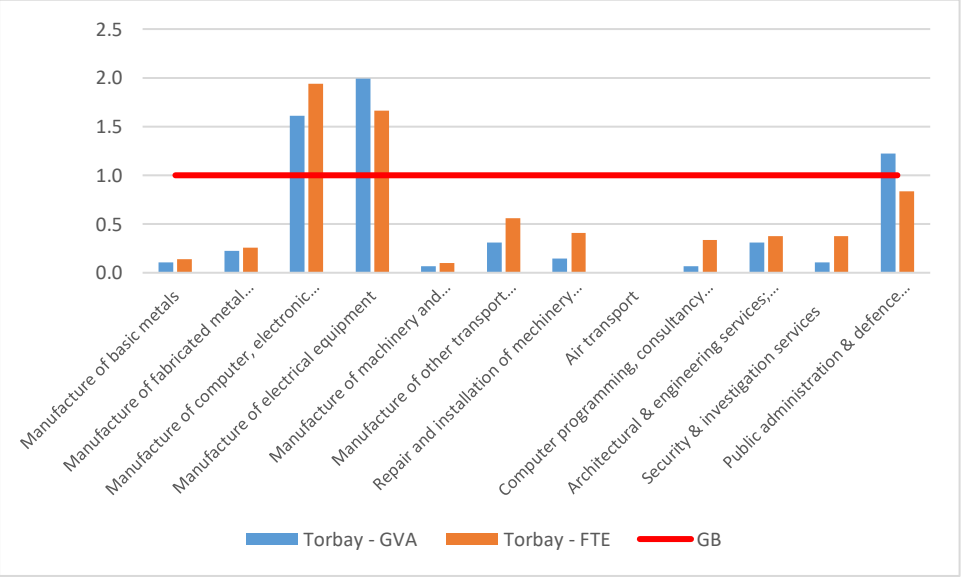
Annex D – Unitary Authority LQs

The charts below add detail to the LQ regional analysis referenced to section 3.2.1 (page 19) of the main report:

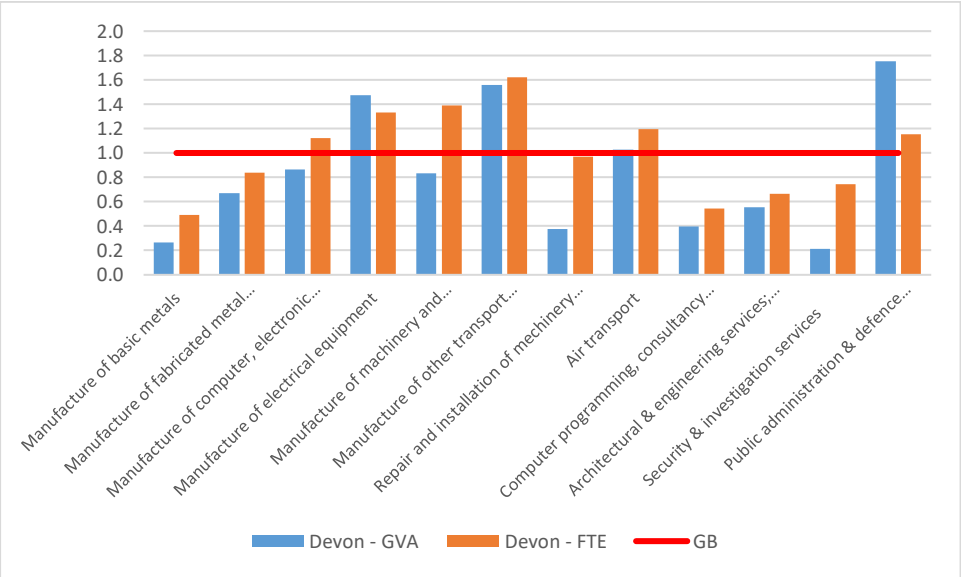
Plymouth



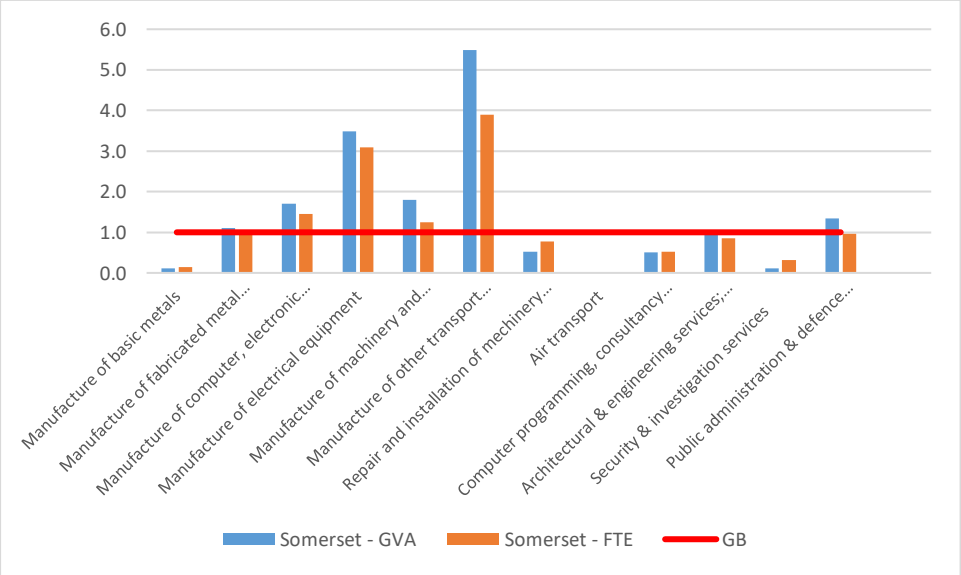
Torbay



Devon



Somerset



References

Defence Infrastructure Organisation (2018). DIO Procurement Plan: What the supply market needs to know to do business with us. Defence Infrastructure Organisation; London.

Defence Innovation Directorate (2019). Defence Innovation Priorities. MOD; London.

Defoe, Collette and Butcher, Josephine (n.d.). Capability Statement: Defence, Security & Conflict. University of Exeter; Exeter.

Department for International Trade (2019). High Potential Opportunity Photonics and Microelectronics. DIT; London.

Dunne, Phillip (2018). Growing the contribution of defence to UK prosperity: a report for the Secretary of State for Defence by Philip Dunne MP. MOD; London.

Engeli, Andrew, Burgess, Anna and James, Dareece (2017). The South Coast Marine Cluster: Marine Inward Investment Evidence Study. Wavehill Social and Economic Research; Ceredigion.

Frazer-Nash Consultancy (2018). Nuclear Sector Capability of the South West of England. Frazer-Nash Consultancy; Bristol.

HM Government (2015). National Security Strategy and Strategic Defence and Security Review 2015 A Secure and Prosperous United Kingdom. HM Government; London.

HOTSW (2018). HOTSW Prospectus. Heart of the South West Partnership.

HOTSW (2018). Stepping up to the Challenge: Productivity Strategy 2018. HOTSW LEP.

HOTSW (2019). HotSW Partnership Productivity Strategy Delivery Plan. HOTSW LEP.

House of Commons Committee of Public Accounts (2019). Defence Equipment Plan 2018–28 Seventy-Seventh Report of Session 2017–19 Report, together with formal minutes relating to the report. House of Commons; London.

Lincoln, John R. (2015). Microelectronics and Photonics Cluster in Heart of South West Region. Harlin Ltd.; Salisbury.

Lincoln, John R. (2017). The Heart of the South West Microelectronics & Photonics Cluster: World class experts in designing and developing solutions in photonics and microelectronics technologies for key industries. HOTSW, Harlin Ltd.; Salisbury.

MOD (2010). MOD Corporate Environmental Protection Manual. MOD; London.

MOD (2015). How Defence Works. MOD; London.

MOD (2017). Future force concept (JCN 1/17). MOD; London.

MOD (2018). Defence Equipment and Support Corporate Plan 2018-2021. MOD; London.

MOD (2019). Corporate Plan 2019-2022 Defence Equipment and Support. MOD; London.

MOD (2019). DE&S Organisation Chart. MOD; London.

MOD (2019). Defence Technology Framework. MOD; London.

MOD (2018). Joint Concept Note 2/18: Information Advantage. MOD; London.

MOD (2019). Ministry of Defence Annual Report and Accounts 2018– 19. MOD; London.

MOD (2018). Mobilising, Modernising & Transforming Defence: A report on the Modernising Defence Programme. MOD; London.

MOD (2019). MOD Area of Research Interest. MOD; London.

MOD (2019). Small and Medium-sized Enterprise Action Plan. MOD; London.

MOD (2019). The Defence Equipment Plan 2018: Financial Summary. Version 3. MOD; London.

National Audit Office (2017). A Short Guide to the Ministry of Defence. NAO; London.

Somerset District Council (2017). The Importance of Aerospace Research, High-Value Design and Manufacturing to the Somerset Economy. Somerset District Council; Somerset.

Transport Systems Catapult (2017). Market Forecast for Connected and Autonomous Vehicles. Transport Systems Catapult; Milton Keynes.

White, Edward and Buseong, Kang (2020). Trump dents UK hopes for South Korea helicopter deal. The Financial Times (online) Available at: https://www.ft.com/content/458747f0-4187-11ea-a047-eae9bd51ceba.a

Whorwood, Henry (ed.), Scott, Ava, and Halmari, Ella (2019). The Scale-up Index 2019. Beauhurst, Scale up Institute; London.

Williamson, Gavin (2019). Update on Defence Prosperity Programme: Written statement - HCWS1411. www.parliament.uk (online) Available at: https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2019-03-14/HCWS1411/ (last accessed 25th October 2019).