THE IMPACT OF BAE SYSTEMS ON AUSTRALIA

NOVEMBER 2016

BAE SYSTEMS
INSPIRED WORK

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November 2016

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EXECUTIVE SUMMARY

BAE Systems Australia (henceforth BAE Systems) is critical to the nation's defence capabilities, ensuring a continued supply of cutting edge technological solutions and contributing to the country's domestic security and military influence. BAE Systems has a rich operational heritage in Australia. It has grown over more than 60 years to now operate 25 sites around the country, in addition to providing services at a further 16 customer sites. The company utilises its engineering and program management expertise in the sustainment of platforms and systems across the country, ensuring that its defence, security and commercial customers have the capability they need, when and where they need it most.

This report provides a detailed study of BAE Systems' contribution to the national economy during financial year 2015-2016 (henceforth FY 2015/16). Its contribution is assessed via two separate lenses: the organisation's core economic footprint, measured in terms of Gross Domestic Product (GDP), employment and tax receipts; and the wider benefits that stem from its operations— in particular, through training and development, industrialisation, innovation and capital investment. The company's impact is mainly explored at a national level, supplemented with snapshots of state-level activity.

Beyond these readily quantifiable impacts, BAE Systems' active collaborations with other Australian companies generate considerable spill-over benefits to the defence industry, which help to ensure that the sector can remain globally competitive. BAE Systems actively transfers its expertise and knowledge to Small and Medium Enterprises (SMEs), helping them to win business and expand Australia's overall defence capabilities. BAE Systems' collaborative approach to innovation contributes to ensuring that Australia can remain a substantive player in the intensely competitive global defence industry. What has become evident throughout our research is that BAE Systems is committed to a wide set of goals that extend well beyond profit maximisation.

In FY 2015/16, the operations of BAE Systems made a AUD 1.30 billion contribution to Australian GDP and sustained 7,560 Full-Time Equivalent (FTE) jobs. This contribution reflects the sum of three impact channels: direct activity carried out on-site at its 25 operational hubs; indirect activities within its Australian supply chain; and the induced effect that results as its own employees and those of its suppliers spend their wages in the wider consumer economy. Its impact reaches far beyond its own operations: for every AUD 10 in GDP created directly by BAE Systems, AUD 18 is supported across the economy as a whole. Meanwhile, for every 10 FTE jobs on-site, 23 are supported across the economy.

BAE Systems is a highly productive organisation, reflecting its continued investment in its staff, plant and machinery and the use of state-of-the-art technology. The productivity of the company's employees, as measured by Gross Value Added (GVA) per FTE employee, was over 40 percent higher than the national average in FY 2015/16—indeed, if categorised on a stand-alone basis, the company would be the fifth most productive industry in the country.

AUD 1.30 billion

GDP contribution in FY 2015/16

The Group's operations contributed AUD 1.30 billion to Australian GDP in financial year 2015-2016 and sustained 7,560 Full-Time Equivalent jobs.

7,560

FTE jobs in FY 2015/16

AUD 213,000

Value added per employee

At AUD 213,000 per FTE employee in FY 2015/16, labour productivity at BAE Systems was more than 40% higher than the national average of AUD 151,000.

More than 40% higher

National average productivity

BAE Systems supports a further layer of activity via its capital investment expenditure which has totalled some AUD 169 million since FY 2011/12. In terms of the location of the projects, this expenditure was concentrated across three states: South Australia (AUD 58.7 million); Victoria (AUD 40.6 million); and Western Australia (AUD 39.9 million). However, the economic activity sustained by the spending will have been more widely dispersed across Australia's states and territories, as firms all over the country benefit along the resulting supply chain.

In addition to its investments in physical capital, BAE Systems also makes a substantial and prolonged contribution to the domestic economy via its expenditure on Research and Development (R&D). Over the past five years, this totalled some AUD 268 million, implying that the company spent over four times more per employee during this period than the economy average. This spending has helped to underpin the success of some of the company's most successful export products, such as the Nulka missile defence and the High Frequency Sensor systems. BAE Systems leverages its web of contacts across industry, higher education and research institutes to ensure that the investment has the best chance of spurring technological innovation. There is strong evidence that R&D investment supports much wider social gains (in comparison to the private value of expenditure) implying that the overall benefits from this investment, in time, will be considerably larger than this headline figure.

AUD 268 million

Investment in R&D in Australia over the past five years

BAE spends over four times more per employee on R&D than the rest of the Australian economy.

4x higher

Investment in R&D per employee

The company's commitment to developing the talent of its workforce is evidenced by sustained investment in staff training. In FY 2015/16, BAE Systems invested AUD 4.5 million in training and developing the skills of its workforce. Of this, AUD 1.9 million was invested in financing the attendance of BAE Systems' employees on external courses covering leadership, engineering and other areas such as soft skills, project management and human resources.

BAE Systems' emphasis on increasing interest in the Science. Technology, Engineering and Mathematics (STEM) subjects, aligns well with current government policy. This focus manifests itself via support for a group of programmes, which seek to inspire the next generation of engineers. Such actions align with the objectives of the present administration, as evidenced by recent funds set aside to boost the uptake of STEM subjects.

AUD 4.5 million

Investment in training by BAE Systems in 2015

This training supports a range of programmes, promoting the development and productivity of BAE Systems' employees, as well as contractors the business employs.

Going forward, there is recognition nationally that the Australian economy must diversify away from the resources sector in order to sustain strong growth—BAE Systems is ideally positioned to help drive this process. The Australian economy has enjoyed a very successful economic period, with growth rates consistently outstripping those of other mature economies. However, in recent times the outlook has been clouded by the slowdown currently underway in China which has affected the previously predominant resources sector. Sustaining strong growth into the future is likely, therefore, to require a degree of economic diversification. This has created an impetus to enhance the country's capacity in high skilled and technologically advanced sectors, through an increased investment in innovation and skills. BAE Systems' pre-existing emphasis in these spheres makes it ideally placed to help drive the economic rebranding of the national economy that is critical to its future resilience.

1. INTRODUCTION

BAE Systems is a leading supplier of communications, military, mission support, intelligence and surveillance systems to the Australian Defence Force. The organisation has a rich heritage in defence solutions dating back more than 60 years. During this time, the company has developed into a leading provider of cutting-edge technological solutions.

The company offers a wide portfolio of services which cut across multiple dimensions of defence and security. Recent projects that attest to such versatility include its role in the construction of the largest advanced aerospace components manufacturing plant in Australia, the development of the Nulka missile defence system deployed by over 150 Australian, US and Canadian warships and the provision of sustainment services for the Hawk Lead-In Fighter fleet.

Recognising the broader defence and security challenges and opportunities stemming from an increasingly complex, connected world, the breadth of BAE Systems' activity in Australia is further enhanced by the Group's global cyber defence, intelligence and financial crime division—BAE Systems Applied Intelligence. Working with the Australian Government, its agencies and regulatory bodies, industry organisations and the private sector, BAE Systems Applied Intelligence supports measures to boost cyber security preparedness, solve complex data problems, defend networks and critical national infrastructure, prevent fraud and financial crime in financial markets, enable intelligence-led policing and provide incident response in the face of online threats. Indeed, in 2016, BAE Systems' globally-renowned Australian security research and incident response unit was able to successfully combat a new malware strain attacking hospitals and police forces around the world.

This report seeks to provide a comprehensive overview of BAE Systems' contribution to national economic activity. Despite its importance to the Australian economy for many decades, BAE Systems' economic footprint in Australia has not been formally captured. This document seeks to remedy this by providing a comprehensive study of the company's economic impact. This encompasses the firm's own operations on-site, activity that is supported via the company's supply chain and the value that is sustained by the spending of wages by employees. Together with these core benefits, we also describe how BAE Systems contributes more widely to the domestic economy. These contributions are sustained via multiple channels such as direct interventions to develop the capabilities of Small and Medium Enterprises (SMEs), its expenditure on workforce training and its investment in Research and Development (R&D) and physical capital.

The remainder of this report details BAE Systems' economic impact thematically beginning with its contribution to Australian GDP. The proceeding box provides a high-level outline of our methodological framework—further detail can be found in the technical appendix at the back of this report.

THE BAE SYSTEMS GROUP

The BAE Systems Group is a global leader in defence solutions with a rich heritage of driving innovation and ensuring the security of nations, businesses and governments. Since its inception, the Group has grown rapidly to become an industry leader with a turnover of almost £18 billion in 2015. Such success has been built on a dedication to excellence in all facets of its operations alongside a desire to drive cutting-edge industry innovation.

The Group's activities are centred on the manufacture and maintenance of military equipment and systems across land, air and sea, driving research and innovation in new technologies and supplying services to enhance cyber, intelligence and security capabilities. Over time, the BAE Systems Group has evolved to operate to become a highly diversified industrial organisation. At the heart of its operations are design, manufacture, support and upgrade services provided for military equipment and systems across land, air and sea. More recently, the Group has become a leading supplier of cyber and network security services to both government and commercial customers.

The Group works across five principal markets: Australia; India; Saudi Arabia; the USA; and the UK, with a scattering of offices elsewhere throughout Europe, Asia and Latin America. As a whole, the company employs some 83,400 skilled and talented individuals, providing world-class services to clients across the private and public sectors.

The Group's high standards are maintained by sustained investment in its employees, physical capital and research programmes. As an organisation, the BAE Systems Group prides itself on recruiting a highly talented pool of employees whose skills are continually developed by a mixture of on-the-job and formal training. Moreover, this investment in talent is supplemented by sustained spending on new equipment, facilities and technology to ensure that employees have the means to provide world-class service delivery.

The Group places great emphasis on developing the capabilities of its suppliers to ensure that they are able to deliver products and services on time and to a required standard. Such an active role in supply chain management is a far from universal characteristic of Multinational Corporations (MNCs) and implies that the benefits transferred by the company's procurement extend well beyond the monetary value of transactions. This approach was very evident in our analysis of the operations of BAE Systems and is a theme that we draw out in section 5 of this report.

INTRODUCING ECONOMIC IMPACT ANALYSIS

The economic impact of a company or industry is measured using a standard mode of analysis called an economic impact assessment. In this study, we model the contribution of BAE Systems itself. The report quantifies the three 'core' channels of impact that comprise the organisation's 'economic footprint':

- **Direct impact** — the economic benefit of BAE Systems' operations and activities in Australia;
- **Indirect impact** — the economic benefit and employment supported in the company's supply chain as a result of the procurement of goods and services; and
- **Induced impact** — the wider economic benefits that arise when BAE Systems' employees and those employed within its supply chain spend their earnings, for example in local retail establishments.

From these channels, the Group's total economic footprint in Australia is presented, using three key metrics:

- **GDP**, or more specifically, BAE Systems' Gross Value Added (GVA) contribution to GDP;
- **Employment**, as the number of people employed, measured on a full-time equivalent (FTE) basis; and
- **Tax**, representing the tax receipts paid to the Australian Treasury.

In addition to the core economic impacts, this report examines the **wider effects** of the company's services or products in boosting economic activity and developing capability elsewhere in the economy. These are primarily captured in the contribution that it makes to workforce development, investment in R&D and the transfer of industrial capabilities to local companies.

The modelling on which this report is based computes the economic footprint of BAE Systems in FY 2015/16, the latest year for which full economic data were available at the time of publication. Economic contributions are quantified for the whole economy of Australia, with employment, procurement and investment expenditure also presented individually for the Australian states and territories: Australian Capital Territory; New South Wales; Northern Territory; Queensland; South Australia; Tasmania; Victoria; and Western Australia.

2. CORE FINANCIAL CONTRIBUTION

This chapter outlines BAE Systems' contribution to Australian GDP during financial year 2015-2016 (henceforth FY 2015/16). In doing so, we review the different channels of economic impact and examine the company's labour productivity and contribution to export earnings. All monetary figures presented reflect prices during the FY 2015/16 period.

2.1 TOTAL CONTRIBUTION

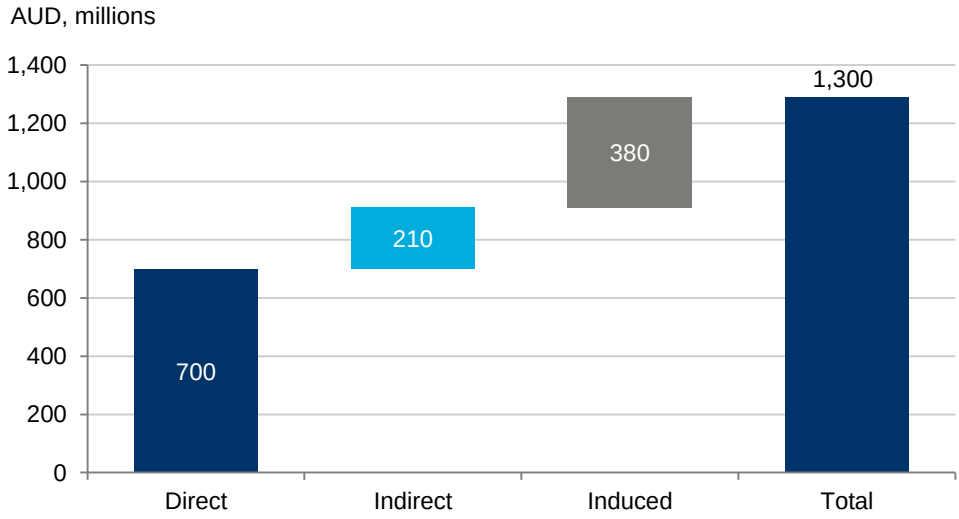
In total, BAE Systems contributed AUD 1.30 billion to Australian GDP in FY 2015/16. This total contribution represents the sum of three types of impact—direct, indirect, and induced as illustrated in Fig. 1.

AUD 1.30 billion

GDP contribution in FY 2015/16

The company's operations contributed AUD 1.30 billion to the Australian economy in FY 2015/16.

Fig. 1. BAE Systems' contribution to GDP, FY 2015/16[1]



Source: Oxford Economics

Our modelling indicates that the company had a GDP multiplier of 1.8 in FY 2015/16 implying that every AUD 10 created directly gave rise to a total AUD 18 contribution to GDP across the economy as a whole. As such, the company's direct GDP contribution of AUD 700 million almost doubled to an economy-wide contribution of AUD 1.30 billion when supply chain, consumer spending and capital impacts were included.

2.2 LABOUR PRODUCTIVITY

Our analysis shows that the labour productivity of BAE Systems' workforce—as measured by value added to the Australian economy per full-time equivalent (FTE) employee—was significantly above the national average. At AUD 213,000 per FTE employee in FY 2015/16, the company's labour productivity was over 40 percent higher than the Australian average of

[1] These figures have been rounded to the closest AUD 10 million.

AUD 213,000

Value added per employee

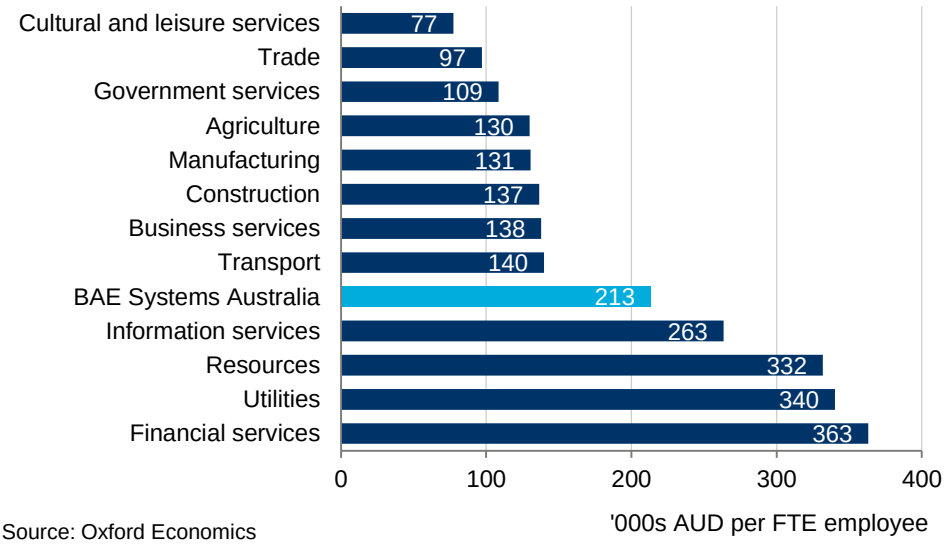
At AUD 213,000 per FTE employee in FY 2015/16, labour productivity at BAE Systems was over 40% higher than the national average of AUD 151,000.

More than 40% higher

National average productivity

AUD 151,000. Indeed, if BAE Systems were categorised as a stand-alone industry, its productivity would have ranked fifth highest during FY 2015/16. Although we cannot decompose the precise contribution of factors that drive differences between sectors, BAE Systems' relatively high productivity is underpinned by its investments in innovation and human capital which ensure that the company's high calibre staff are equipped with cutting-edge technological equipment, enabling them to efficiently carry out their challenging and sophisticated day-to-day tasks. In comparison, the high productivity of the resources sector is partly driven by very high capital intensity—over the past 25 years, the resources sector's investment, measured as a share of GDP, has been significantly higher than the economy-wide average.

Fig. 2. Labour productivity of BAE Systems in context, FY 2015/16[2]



Source: Oxford Economics

AUD 210 million

Supply chain contribution

In FY 2015/16, the company bought AUD 360 million worth of goods and services from Australian suppliers, generating an additional GDP contribution of AUD 210 million.

2.3 SUPPLY CHAIN CONTRIBUTION

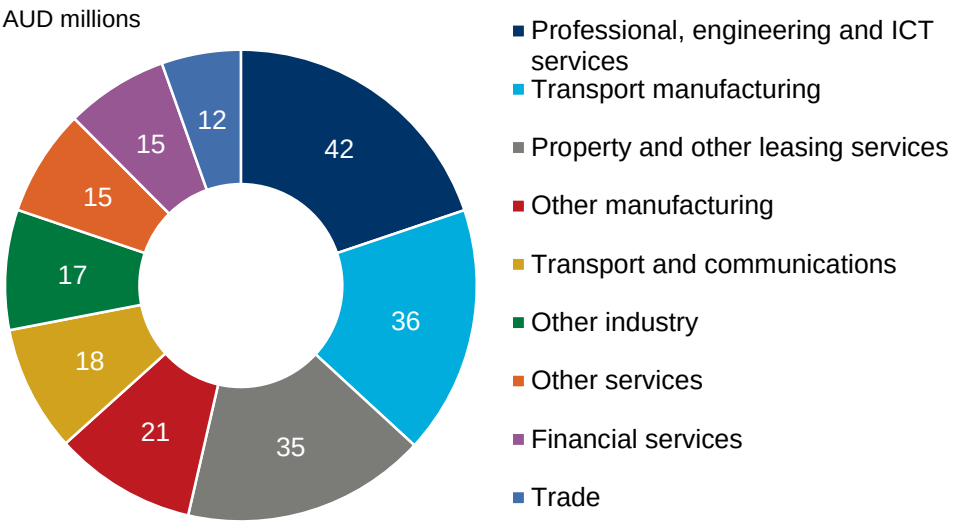
The direct economic activity of BAE Systems feeds through to numerous other related business activities in its supply chain, sustaining economic activity and jobs in the wider economy. During FY 2015/16, the company purchased AUD 360 million worth of goods and services from Australian suppliers which supported an additional GDP contribution of AUD 210 million.

BAE Systems' indirect contribution to GDP boosted a range of sectors across the Australian economy, most notably professional engineering and ICT services, transport manufacturing and property and leasing services. Via its supply chain, BAE Systems supports economic activity in a wide range of sectors. The largest beneficiary (in terms of GDP) was the professional, engineering and ICT services sector (AUD 42 million). In addition, significant demand was created in transport manufacturing (AUD 36 million), in particular the maritime sub-sector. BAE Systems' procurement also boosted

[2] Figures for other industries calculated based on data from the ABS on sector value added (measured at current prices) and employment (disaggregated between full-time and part-time roles). The figures for other sectors refer to calendar year 2015.

the GDP of the property and other leasing services industry by AUD 35 million, reflecting leasing payments for buildings, machinery and equipment.

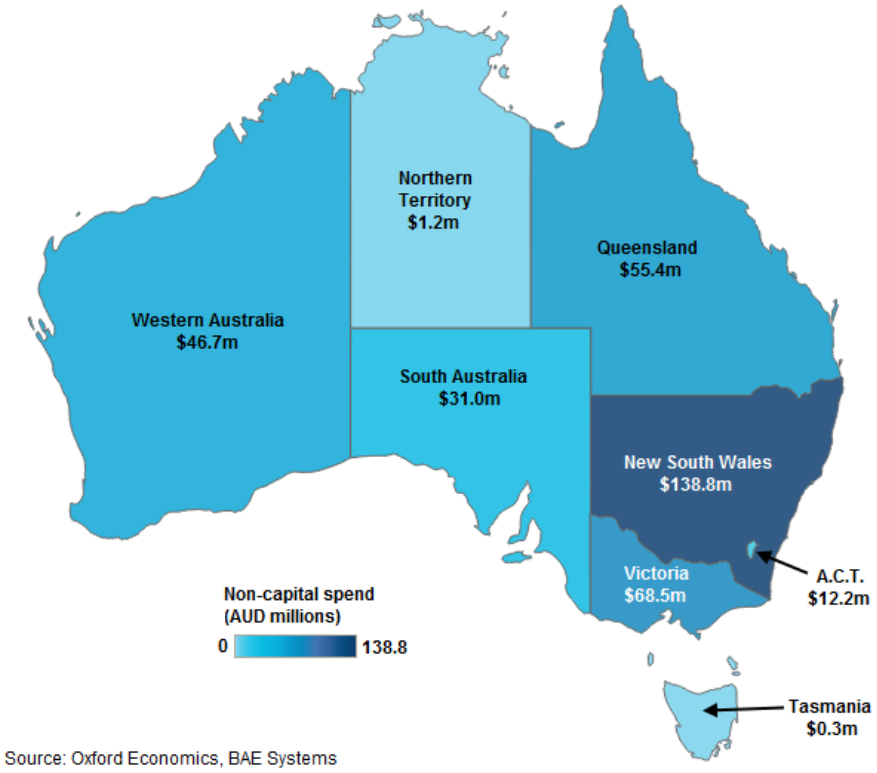
Fig. 3. Breakdown of supply chain GDP by sector, FY 2015/16



Source: Oxford Economics, BAE Systems

New South Wales emerged as the primary beneficiary of BAE Systems' procurement expenditure among Australian states in FY 2015/16. We have not formally modelled how the company's indirect contribution to GDP is allocated across the states of Australia. However, a strong indication can be gauged by assessing how BAE Systems' procurement expenditure (effectively the first round of its supply chain impact) is spread across states. On this measure, New South Wales dominates, being the recipient of around 40 percent (AUD 139 million) of total BAE Systems' purchases in FY 2015/16.

Fig. 4. BAE Systems' procurement expenditure by state, FY 2015/16



Source: Oxford Economics, BAE Systems

BAE SYSTEMS' SUPPLY CHAIN FOR MAJOR PROJECTS

BAE Systems has had a long history of supporting the nation's industrial capacity from its early years to the present day. Major programmes of note are Nulka hovering decoy, Evolved Sea Sparrow Missile, Hawk Lead-in-Fighter, ANZAC class frigate, F-35 and Landing Helicopter Dock. These major programmes span land, sea and air capabilities and have required BAE Systems' supply chain to step up to the challenges of meeting very stringent quality and delivery requirements.

The demands placed on BAE Systems' supply chain to deliver new products to exacting standards require significant investment in skills and processes—a process that the company actively supports. As a result, BAE Systems' impact on its suppliers extends well beyond its role as a customer, with the company acting as a catalyst for the development of the industry as a whole. These effects are discussed in more detail in section 5 of this report.

2.4 CONSUMER SPEND CONTRIBUTION

A further economic stimulus is created when BAE Systems' employees and those in its supply chain spend their wage income—this expenditure supported AUD 380 million in FY 2015/16. In addition to the direct and indirect (supply chain) GDP contribution, employees of the firm and of companies in its supply chain support economic activity by spending their wages on consumer goods and services. This 'induced' GDP contribution from the company's activities was worth an additional AUD 380 million to the Australian economy in FY 2015/16.

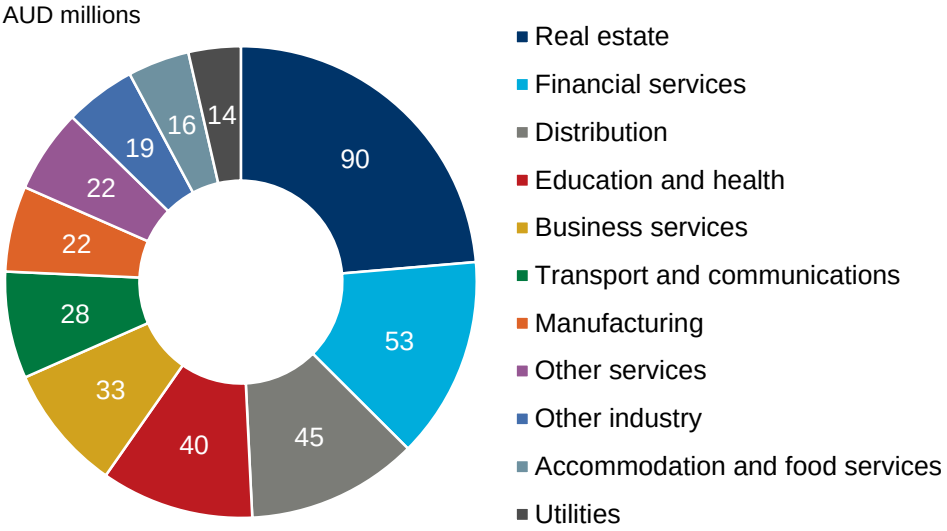
AUD 380 million

Consumer spend contribution

In FY 2015/16, spending by employees of the company and its supply chain contributed an additional AUD 380 million to Australian GDP.

Activity sustained by the expenditure of wage income primarily supports consumer-facing industries such as real estate, education, health and retail. Fig. 5 illustrates how the AUD 380 million of output supported by consumer spending that resulted from BAE Systems' operations was spread around the Australian economy. This allocation largely reflects how Australian consumers choose to spend their disposable income. As such, the real estate sector was a notable beneficiary of this expenditure (AUD 90 million of GDP) as consumers ploughed their wages back into the property market. Elsewhere, financial services output was boosted by AUD 53 million, reflecting the purchase of advisory services and fees earned by pension and investment funds etc.

Fig. 5. Breakdown of consumer spending GDP by sector, FY 2015/16



Source: Oxford Economics

AUD 321 million

Total contribution to tax revenues

The largest share of this, AUD 175 million, is attributed to BAE Systems' direct activities.

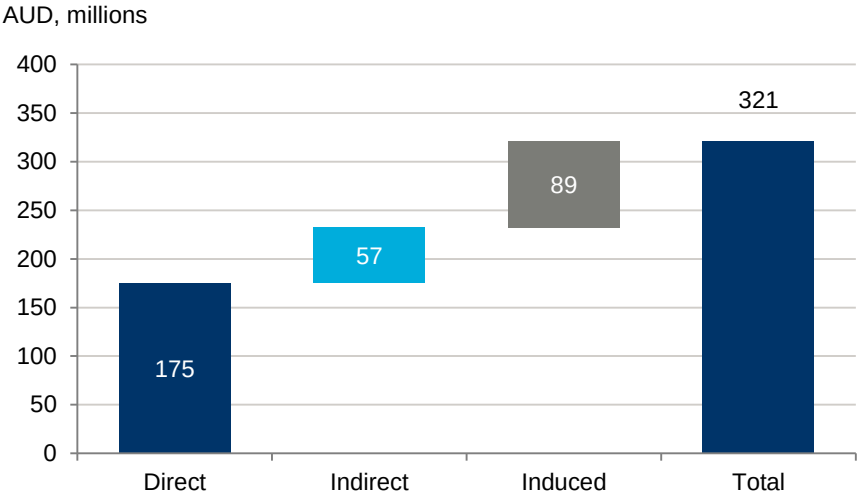
2.5 TAX PAID BY BAE SYSTEMS

Through the direct activities of BAE Systems a total of AUD 175 million in tax was paid in FY 2015/16. Of this contribution, a total of AUD 133 million was paid by BAE Systems itself, including income tax and payroll tax. In addition to this, we attribute a further AUD 42 million to the direct channel, reflecting indirect tax revenue as BAE Systems' employees spend their wage income in the consumer economy.

2.5.1 Contributions via supply chain and consumer spending

On top of the tax contributions made through the direct activities of BAE Systems, further tax revenues were generated through the supply chain and consumer spending activity supported. These came in the form of income tax, payroll tax, corporate income tax and indirect sales taxes. A total of AUD 57 million is attributed to the indirect effect, with a further 89 million in the induced effect. The total tax footprint of BAE Systems therefore stands at AUD 321 million.

Fig. 6. Total tax contribution of BAE Systems in Australia, FY 2015/16



Source: Oxford Economics

2.6 BAE SYSTEMS AS AN EXPORTER

Although the activities of BAE Systems are primarily focussed on providing defence solutions for the Australian military, the company is also a growing force in export markets. Earnings from sales abroad (exports) in FY 2015/16 totalled AUD 81 million or just over six percent of the company's turnover. Almost half of export sales were to the US government, linked to the Nulka Active Missile Decoy, one of the company's most prominent export products, which has been installed in approximately 150 warships across the US, Canada and Australia. Another significant export product in FY 2015/16 was export of major components for the NATO Evolved Sea Sparrow Missile (ESSM), a supersonic surface-to-air missile which is used to defend ships against aircraft and missile attacks. The FY 2015/16 exports were delivered to the US government but, over the years, BAE Systems has supplied the equipment to nine navies across the globe.

The development of foreign markets for sales offers significant potential to grow beyond the constraints of the Australian military demand alone. Achieving this goal will naturally align with the Government's objective of growing Australia's high-tech manufacturing base, helping the economy to diversify away from the resources industries. BAE Systems appears very well placed to help support this goal, whether though the export of new products or more effective overseas marketing of its existing portfolio of goods and services.

THE EXPORT POTENTIAL OF INNOVATION AT BAE SYSTEMS

High Frequency Sensors (HFS)

Australia's High Frequency Sensor (HFS) systems are a crucial part of the nation's defence, surveillance and border protection capabilities. These systems, comprising three Over-The-Horizon Radars and coordination centre, have been developed over a number of decades and allow the Australian military to monitor up to 2,000 km from the Australian coastline, considerably further than traditional radar systems. Given the strategic importance and cost effective surveillance that HFS systems provide, a large amount of indigenous research is conducted to maximise the potential of these technologies and extend system capabilities.

Having been involved in these technologies for more than 35 years, BAE Systems is at the forefront of this research. Today, more than 200 engineers, technicians and support staff work on developing, testing and implementing new technologies in some of Australia's most remote areas. One key area of development that BAE Systems, in conjunction with the Defence Science and Technology Group, have invested heavily in is digital receiver systems technology. This investment has allowed BAE Systems to develop a fourth generation digital receiver that is second to none in its application. Additionally, in support of these systems, the company has developed pioneering reference frequency distribution and calibrations systems that will significantly reduce the cost of future sensor systems. Leveraging on this investment, BAE Systems has also been able to develop other key radar building blocks, such as the digital waveform generator, as well as command and control, data acquisition,
HMI and application software incorporating radar systems modelling and system performance monitoring diagnostic tools.

As the recognised global leader in this field, BAE Systems is well positioned to lead the implementation of these technologies around the world. There is already significant interest from customers in a range of major international markets, implying significant potential for these technologies to act as a key driver of export-led revenue growth going forward. BAE Systems has received "Military in Principle" approval to export HFS systems to the the USA as well as a number of other countries.. BAE Systems' HFS expertise is therefore not just an asset because of the revenues it generates today, but also represents one of the most promising channels for growth moving forward. BAE Systems values the export potential of this technology at circa AUD 100 million, approximately one fifth of which has already been realised, and a further two fifths of which is already in the orders pipeline. In support of these activities, BAE Systems has partnered with a number of Australian SMEs that provide key capabilities and will enable BAE Systems to provide turnkey system solutions to their customers.

BAE Systems has also been recognised by Business SA as the winner of the 2016 Digital Technologies Export Award and is a finalist in the National Export Awards to be held in November 2016.

3. EMPLOYMENT CONTRIBUTION

3.1 TOTAL EMPLOYMENT

7,560
FTE jobs in FY 2015/16

Comprised of 3,300 direct jobs, 1,590 supply chain jobs, 2,660 jobs supported by workforce consumer spend.

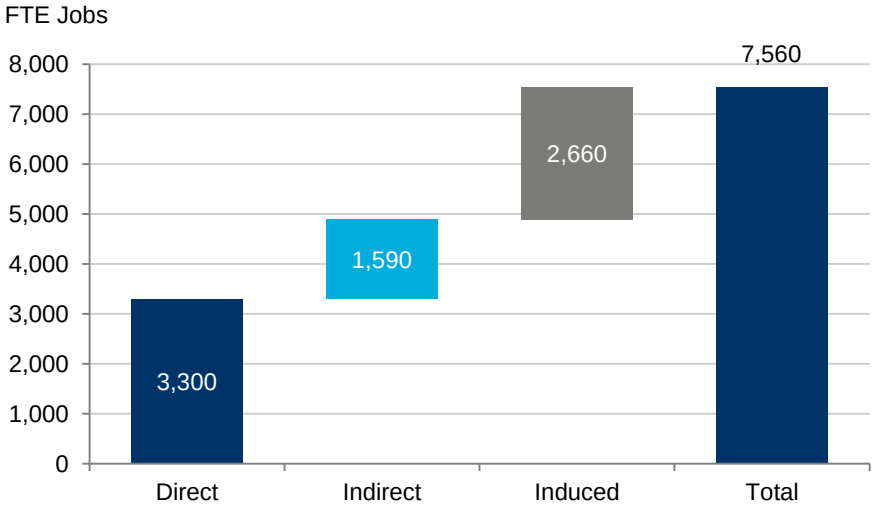
Alongside the substantial impact that BAE Systems had on Australian GDP in FY 2015/16, it also supported nearly 7,600 FTE jobs. The company employs a total of 3,300 FTE employees on-site at its 25 operational branches.[3] This employment contribution was supplemented by 1,590 FTE roles which were supported via the company's supply chain expenditure, and a further 2,660 FTE jobs that were sustained as a result of the spending of wage income by employees.

These findings imply that BAE Systems was responsible for the employment of 1.3 extra FTE jobs per employee, an employment multiplier of 2.3.

2.3
Employment multiplier

For every 10 FTE jobs on-site at the company in FY 2015/16, 23 jobs were supported across the economy as whole.

Fig. 7. BAE Systems' contribution to employment, FY 2015/16



Source: Oxford Economics

In FY 2015/16, BAE Systems accounted for approximately 10 percent of the Australian defence industry workforce. Although not captured within the official Labour Force Survey, a submission to the 2015 Defence White Paper report made by the Australian Business Defence Industry estimated that the sector employed between 29,000 and 37,000 people.[4] We therefore consider the direct employment contribution from BAE to be in the region of one tenth of the employment of the whole private defence industry.

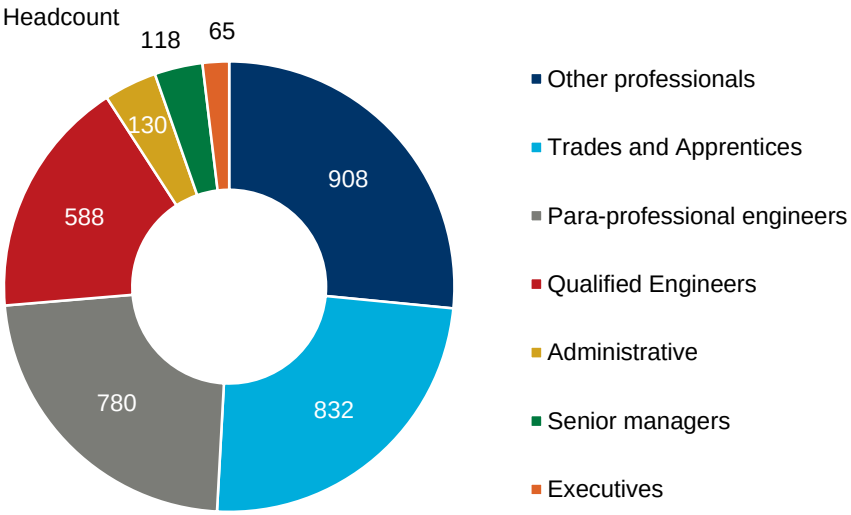
[3] This direct footprint is smaller than the total employee headcount of BAE Systems through 2015 because of its conversion into full-time equivalent jobs.
[4] (Australian Business Defence Industry, 2014)

3.2 SKILLS BASE

BAE Systems' workforce is highly educated and skilled. This can be inferred from the occupational mix of their workforce with a high proportion of employees taking up roles that demand technical skills, most notably in engineering and ICT. The company's highly skilled occupational mix is consistent with the very high productivity of the workforce, as documented in section 2. Moreover, the strong concentration of roles that lean on Science, Technical, Engineering and Maths (STEM) subjects is in harmony with the current policy agenda in Australia—this topic is explored in further depth in section 5.

BAE Systems is a major employer of engineers and highly skilled technicians with a headcount of over 2,200 in FY 2015. Of these 588 were degree qualified in engineering disciplines such as software and systems design/maintenance, electrical/electronics, mechanical and aerospace. The remainder includes para professionals (780), and apprentices and trades (832 positions)."

Fig. 8. Types of roles at BAE Systems, FY 2015/16 [5]



Source: Oxford Economics, BAE Systems

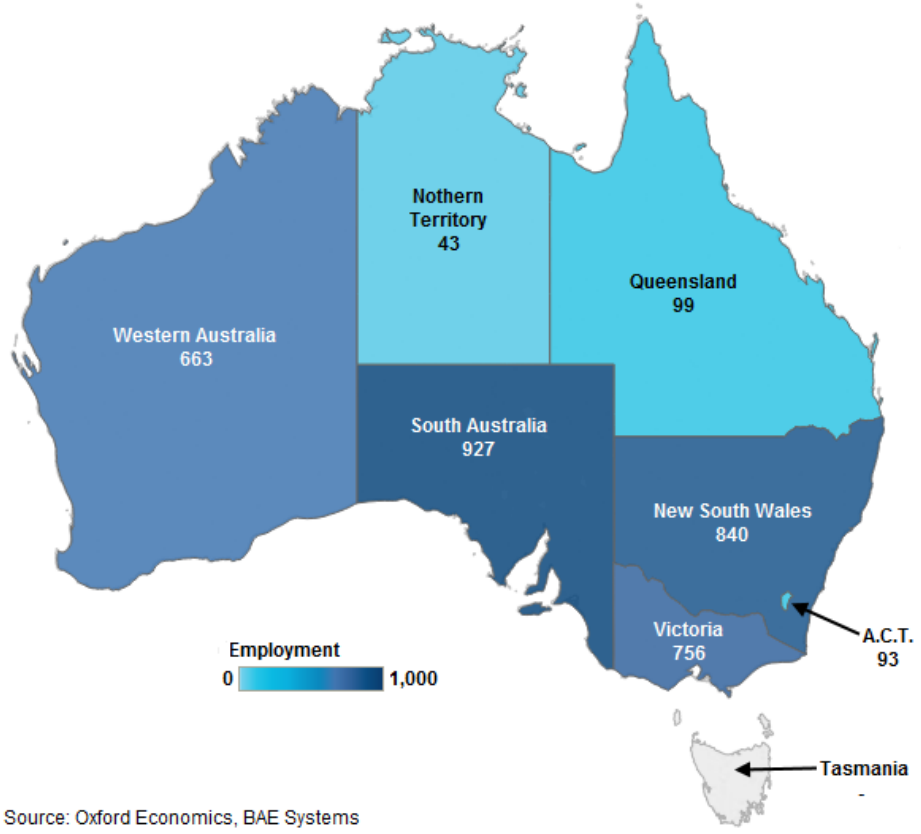
3.3 EMPLOYMENT BY STATE

Across Australia in FY 2015/16, the company controlled a total of 25 sites and operated customer licences on a further 16. As a result this, the direct employment of BAE Systems is spread across nearly all states in the country. As demonstrated in Fig. 9, the largest number of roles were located in South Australia, driven largely by BAE Systems' head office in Adelaide, with a headcount of 927 (27 percent of total company employment in Australia in FY 2015/16). The other major contributors are New South Wales (840 employees,

[5] These figures were only available in headcount terms, rather than being split out into full-time and part-time roles. As a result they will not sum to the numbers presented in the direct employment.

25 percent of the total), Victoria (756 employees, 22 percent) and Western Australia (663 employees, 19 percent).

Fig. 9. Direct employment by state, headcount, FY 2015/16



Source: Oxford Economics, BAE Systems

4. WIDER ECONOMIC IMPACTS

As well as the conventional economic impacts made by BAE Systems that have already been considered, there are a range of broader economic benefits that the organisation contributes in Australia. These come through the value that its investments, research, skills and community investment activities generate outside of its own operations or supply chain. On top of these economic effects, BAE Systems also plays an integral role in maintaining and developing platforms and services for the ADF.

4.1 CAPITAL INVESTMENT

Beyond the economic value sustained by BAE Systems' current purchases along its supply chain, the company also invests significantly in capital expenditure, further stimulating activity in the rest of the economy. These investments will boost BAE Systems' own capabilities and economic footprint in Australia for years to come, as well as reinforcing the strength of the supply chain, including SMEs.

AUD 169 million

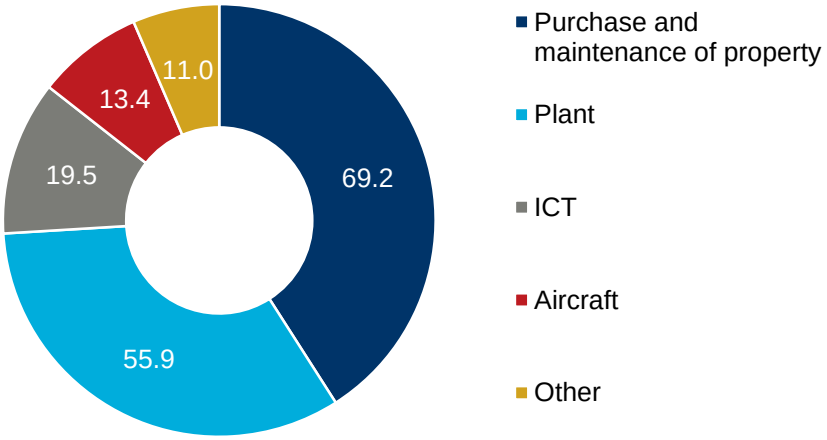
Capital investment in Australia since FY 2011/12

This spending has helped to improve and maintain existing facilities, purchase new machinery and upgrade ICT systems.

Since FY 2011/12, BAE Systems has furnished its own stock of physical capital with a sustained investment programme, totalling AUD 169 million. Around 40 percent of this expenditure has been devoted to maintaining and repairing existing property, to ensure that operational sites continue to match the company's broader standards of excellence. In addition, over this period, close to AUD 20 million has been invested in ICT, either in the form of new hardware of upgrades to existing software systems.

Fig. 10. Capital spending by BAE Systems in Australia, FY 2011/12 – FY 2015/16

AUD millions

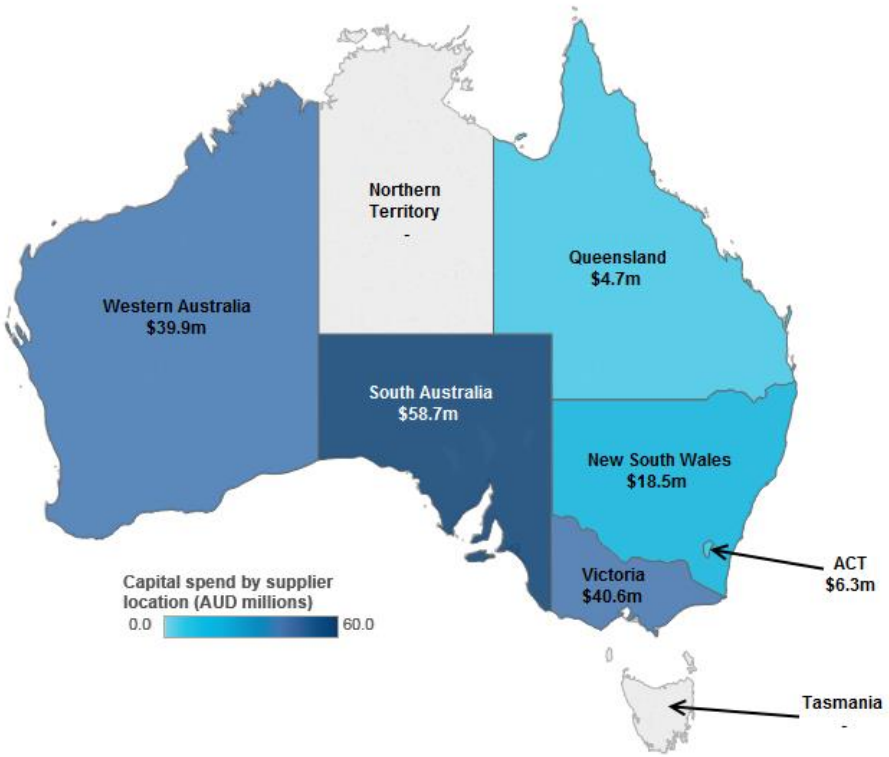


Source: Oxford Economics, BAE Systems

The location of this capital expenditure was concentrated in three Australian states: Victoria; Western Australia; and South Australia. Over 80 percent of these projects (in value terms) were located in South Australia (AUD 58.7 million), Victoria (AUD 40.6 million) and Western Australia (AUD

39.9 million). However, the economic activity sustained by this spending will have spread more widely across Australia via the supply chain.

Fig. 11. Capital spend by location of supplier, AUD millions

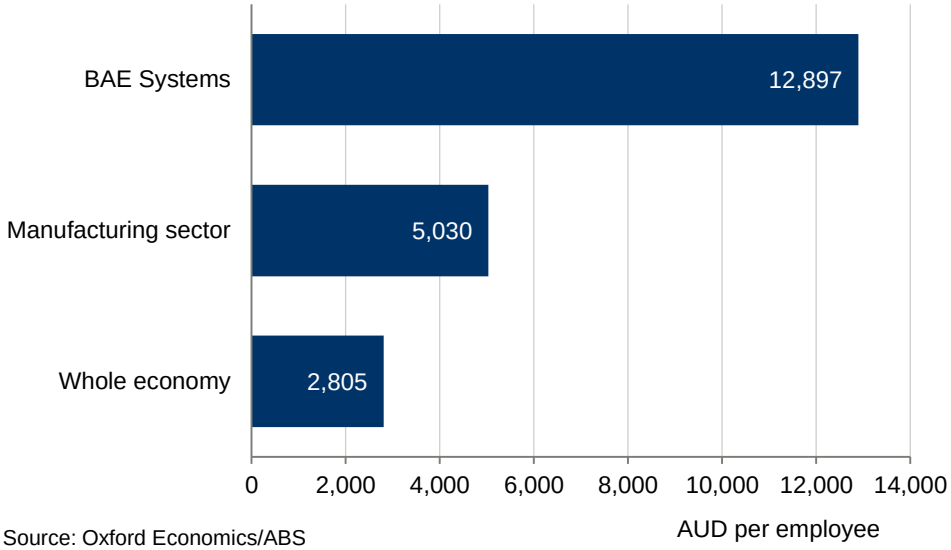


4.2 INVESTMENT IN R&D

Reflecting the emphasis that the company places on driving innovation and technological development, BAE Systems is a major investor in R&D projects. Over the past five years, total spending has amounted to AUD 268 million. [6] Of this figure, a relatively small proportion (12 percent) reflected internal R&D projects, with the remainder a product of customer funded activity. Moreover, the intensity of BAE Systems' activity in this field is clear—spending per employee since 2011 has been over four times higher than the economy-wide average and approximately 2.5 times higher than the manufacturing sector average.

[6] Data on R&D spending by BAE Systems in this document are reported on a calendar year (as opposed to financial year) basis, a reflection of reporting requirements.

Fig. 12. BAE Systems' R&D investment in context [7]



Source: Oxford Economics/ABS

Producing this research leverages BAE Systems' skilled and experienced workforce, as well as key relationships with businesses, universities and research institutes. In doing so, it ensures that BAE Systems remains at the forefront of global defence, and security, solutions, in terms of both the development of existing goods and the innovation of new products and services. These capabilities represent a major asset to the Australian defence industry, which benefits from the resulting cutting-edge defence technologies.

A notable example of this collaborative approach is the strategic alliance that has been forged with the Australian Defence Science and Technology Group. The two organisations collaborate in strategically important areas of defence including submarines, space and cyber security.

Spending on R&D has also been found to lead to improved operating performance for a number of years following the initial investment. The nature of R&D expenditure (as of most types of investment) is that the ultimate benefits are derived over time as the research spurs practical innovations that drive improvements in operational efficiency. Indeed, academic research suggests that these returns are sufficiently large to result in prolonged increases in shareholder returns.[8]

In addition to the value that BAE Systems and its customers derive from R&D, these projects also result in significant spill-over benefits felt across the economy. These can come through a number of channels as other organisations—be they suppliers, customers or competitors—adopt the technologies and techniques that have been developed or are inspired to pursue research of their own.[9] As a result, the social returns to investment can outweigh the private returns, suggesting that the wider value generated by BAE

[7] Data for this chart refer to the period 2011-2014, since no statistics on R&D spending in the whole economy or manufacturing sector were available at the time of writing.
[8] (Siddique, 2004)
[9] (Mohnen, 2009)

Systems' R&D investment will considerably outstrip the headline value of spending. Moreover, a review of the academic literature on this topic found that returns to R&D are greater than returns to capital spending.[10]

KEY R&D PROJECTS

Electronic Warfare (EW) Technologies

EW technologies sit at the frontier of modern military research giving nations unprecedented capabilities in a wide variety of environments. They have a wide, and continually growing, range of applications across land, sea and air.

As the largest developer of EW technologies in Australia, BAE Systems is perfectly positioned to take advantage of this key market. Indeed, the company's investment in EW in Australia represents one of the largest elements of its R&D efforts. At its peak (circa 2008) a total of more than 300 of the company's professional and para-professional staff worked on EW technologies. Currently a team of 30 specialist engineers are developing advanced EW technologies, and the company cooperates with a range of partners to progress the technologies from development to implementation.

One of the most significant outputs of this research in Australia lies in the development of a passive receiver, designed to allow for seamless operation of technology in hostile environments. This miniaturised multi-purpose technology is unique in its capabilities and places BAE Systems in pole position to act as a leading supplier to both the Australian military and to the defence industry in a number of countries around the world.

BAE Systems collaborated closely with potential customers in shaping the technical specifications of the passive receiver. Having designed and proven the concept, the company is now collaborating, under the company's Strategic Alliance with the Defence Science and Technology Group, to test the performance of the system in harsh and complex radio frequency environments.

Hypersonics

One of the most promising areas for research by BAE Systems is in hypersonics – usually defined as any flight over Mach 5 or five times the speed of sound. Understanding the implications of travel at these speeds for systems and high temperature materials relies heavily on BAE Systems' cutting edge system modelling technologies. Furthermore, BAE Systems' guidance and control capabilities secure the company's position at the forefront of the latest developments in hypersonic technologies.

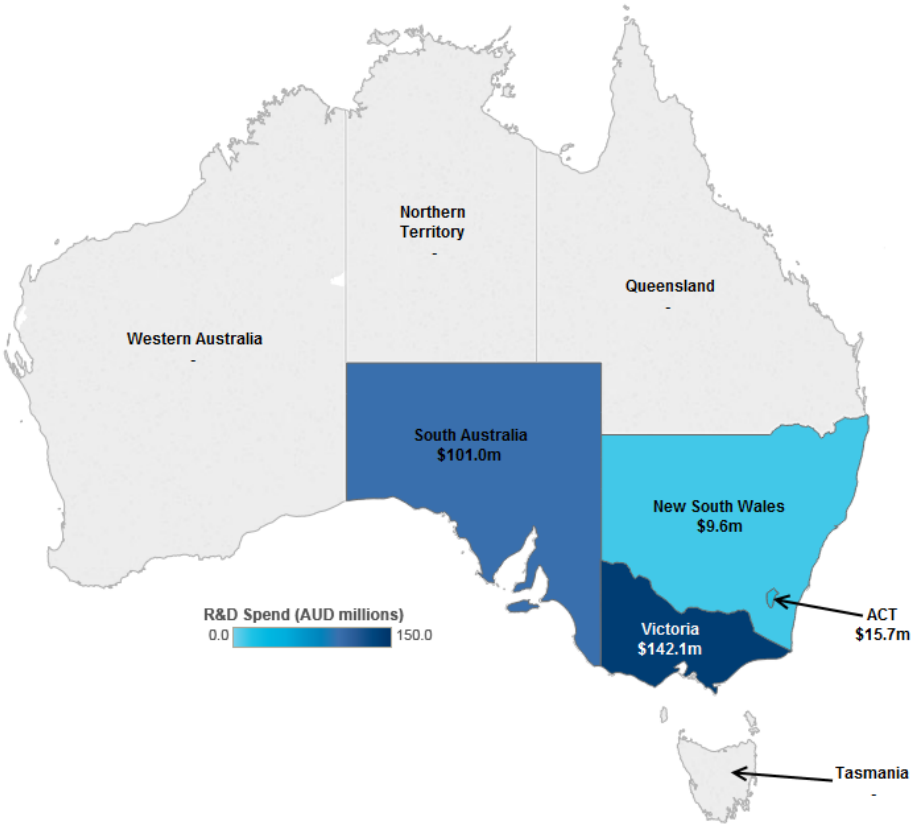
Within this area of research, BAE Systems has supported research by the Defence Science and Technology Group. This collaboration highlights the significant potential for Hypersonic technologies, with BAE Systems uniquely placed at the frontier of a number of key components of this research.

Investment in R&D by BAE Systems in Australia has been predominantly located in Victoria and South Australia. In Victoria, projects with a value of over AUD 140 million have taken place over the past five years, assisting the

[10] ibid

development of some of BAE Systems' highest profile innovations such as the Nulka missile defence system and hypersonic flight capabilities. South Australia has also been a hub of R&D activity with projects worth over AUD 100 million having taken place during this period.

Fig. 13. R&D spend by location of supplier, AUD millions



4.3 SKILLS IN BAE SYSTEMS AND BEYOND

BAE Systems' skilled and experienced workforce is integral to maintaining the company's position at the frontier of its different research areas and the range of defence solutions. This not only matters for BAE Systems internally, it helps maintain one of the most essential components of the Australian defence industry and its ability to operate with a strong degree of self-sufficiency. However, maintaining the quality of this workforce involves a number of challenges. In particular, BAE Systems has to invest substantially in its recruitment processes and training. This section examines these programmes across the breadth of BAE Systems' activities, as well as identifying the broader implications of the ways in which BAE Systems invests in its supply chain and the future of the communities in which it works.

4.3.1 Investment in training within BAE Systems

BAE Systems invests significantly in training and development of its workforce across a wide range of programmes. An analysis of these

AUD 4.5 million

Investment in training by BAE Systems in 2015

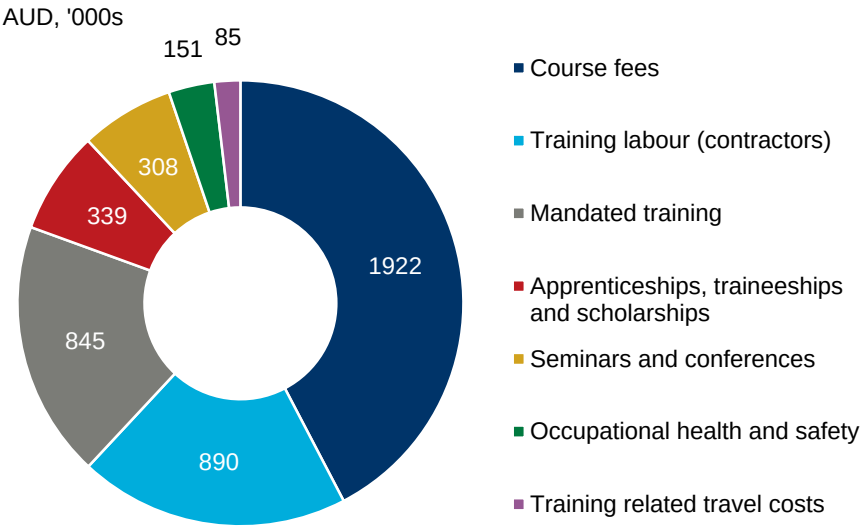
This training supports a range of programmes, promoting the development and productivity of BAE Systems' employees, as well as contractors the business employs.

activities within BAE Systems in 2015 identified AUD 4.5 million of spending on a range of training activities. [11]

The largest element of this spending reflects the course fees associated with the training attended by BAE Systems' own employees. Totalling AUD 1.9 million in 2015 this covers programmes including leadership, engineering and project management training delivered internally, but also services delivered by external providers including programming, soft skills and HR-specific skills, as well as university fees and coaching. Mandated training, covers the essential courses required for each employees' job function. For example, all engineering staff have to complete product safety training before they can be involved in the design, testing or manufacture of BAE Systems' products. In addition to this, a number of courses are mandated for all employees (e.g. code of conduct, export control and security). The total cost of mandated training was AUD 845,000 in 2015, approximately one sixth of the total spending on training activities.

BAE Systems' apprenticeship scheme focuses on the development of new talent, which cost a total of AUD 339,000 in 2015. A further AUD 308,000 was spent organising seminars and conferences, used to share technical skills, acquire further knowledge and provide networking opportunities

Fig. 14. Training provision of BAE Systems, 2015



Source: Oxford Economics

[11] Data on training spending by BAE Systems in this document are reported on a calendar year (as opposed to financial year) basis as a result of internal analysis being conducted on this basis.

INVESTING IN THE SKILLS OF CONTRACTORS

As well as the training for its own employees described above, BAE Systems makes additional investment for hundreds of temporary contractors and agency workers,

These individuals offer specialist skills that BAE Systems requires, whilst offering more flexibility than salaried employees. Training for these staff totalled AUD 890,000 in 2015 ("Training labour" in Fig. 14).

The investment that BAE Systems makes with these individuals will impact on the domestic economy beyond the internal projects that they are employed to work on. The skills and experience that they acquire will have a range of applications on engineering projects with both military and civilian customers, increasing the value that they can offer and the amount that they can earn. On top of this, any accreditations they receive will open new opportunities for them individually, boosting the range of projects that they can work on, helping to provide more choice in the contracting workforce.

4.3.2 Recruiting graduates

In addition to focussing on training of its existing employees, BAE Systems also places great importance in the recruitment of young talent into its business. Between January 2014 and the 2017 intake, a total of 87 new graduate roles have been filled, with these individuals recruited to fill specific vacancies.

As of 2017 a new graduate programme will be in place, with the intent to employ 22 people in its first year to ramp up for future needs. These individuals will be recruited into areas such engineering, project management, finance, ICT or commercial and procurement. This programme will include a system of rotation within these job roles, ensuring that graduates have a robust grounding in their chosen area.

In addition to this form of graduate recruitment, BAE Systems also engages heavily with universities through a range of schemes, focussed on giving students the opportunity to work in the company before they graduate. This not only gives a number of individuals the chance to gain valuable work experience, it also allows relationships between the business and prospective future employees to be nurtured.

ENGAGING WITH UNIVERSITY STUDENTS EARLY

Next Generation School and University Scholarships (NEXSUS)

BAE Systems' site in Newcastle, NSW, is home to an innovative scheme to attract and trial talent, partnering with the nearby Newcastle University. Through this relationship, a number of individuals are selected to work within the organisation for a number of months, with around AUD 90,000 given to support these individuals in their time with the organisation.

The ambition for this programme is to place BAE Systems in to a position where more half of the intake of new graduates have already worked internally, ensuring continuity and helping the company to improve the efficiency of its recruitment programme.

This allows BAE Systems to not only get access to some of the graduates with the greatest potential earlier than their competition, but also allows them to recruit individuals with a high degree of confidence that they will operate well within the business.

4.3.3 Inspiring the next generation

As well as investing in the future of its own workforce through recruitment efforts, BAE Systems also supports programmes which seek to inspire and equip the next generation of Australian engineers and innovators. Its position as a major manufacturer at the forefront of high-tech engineering means that BAE Systems' focus is overwhelmingly on supporting skills in STEM subjects. This is of particular importance for the defence industry in Australia, where the development of a range of talent and fostering their careers will be instrumental to safeguarding the country's domestic capabilities.

The importance of STEM education is also reflected in the focus that it garners from policymakers in Australia. One of the most notable interventions in recent years was put forward by the Office of the Government's Chief Scientist which highlighted the importance of STEM research for "*the continued prosperity of Australia on all fronts–socially, culturally and economically–for all our citizens and for our place in the world.*" [12]

Indeed, on the back of this, and other interventions, investment in STEM subjects has attracted new public funding. The FY 2015/16 budget targeted an additional AUD 12 million on reasserting the focus on and uptake of STEM subjects. [13]

The focus on these issues by BAE Systems is not only relevant as part of a national priority, its position as a lynchpin of the local communities in which it operates means that it runs a number of programmes targeting children of all ages in these communities.

[12] (Office of the Chief Scientist, Australian Government, 2013)
[13] (Australian Government, 2015)

SUPPORTING STEM ENGAGEMENT

FIRST Lego League

BAE Systems sponsors the FIRST Lego League (FLL) in South Australia. This global programme engages with school children between the ages of 9 and 16 in a hands-on competition to design, build and program a robot to complete a range of challenges, based a specified Lego kit. The winning teams go on to represent the state at the National final.

Through the sponsorship that BAE Systems provides, a total of more than 30 teams are able to compete in the South Australia area, with a number of BAE Systems' engineers engaging with the programme directly in schools. The scheme promotes engagement with science and technology skills, as well as encouraging teamwork, problem solving and innovative thinking.

FIRST Robotics

In addition to the FIRST Lego League, BAE Systems also supports the FIRST Robotics Challenge (FRC) competition in Australia. BAE Systems' input involved providing AUD 15,000 each to three teams in 2016, located in Victoria, New South Wales and South Australia. Targeted at an older age group, the challenges that the robot has to complete are of a significantly larger scale, demanding more advanced engineering skills and teamwork.

The challenge is run on a global level, meaning that the winner of the Australian event progresses to the global championships in the United States.

For BAE Systems this represents an opportunity to both promote STEM skills among students and also to develop important relationships with key local universities.

NAMIG Group

The Northern Advanced Manufacturing Interest Group (NAMIG) are collection of organisations whose goal is to raise the profile of careers in engineering and technical subjects in Northern Adelaide. The organisation is focussed on an economically depressed post-industrialised area, with a high proportion of children from low socioeconomic backgrounds and limited exposure to opportunities such as this.

One of the primary components that BAE Systems supports is the sponsorship of two university scholarships per year. These are specifically for individuals from less advantaged backgrounds who might not traditionally aspire to university.

NAMIG also support a range of other activities through their advisory board consisting members from a range of local government, educational, military and industry organisations. These activities include an engineering competition called Concept2Creation (C2C) which is supported by BAE Systems. BAE Systems' engineers help school student build and race a small scale hovercraft to collect and test water samples for impurities.

4.4 EXPANDING CAPABILITIES BEYOND BAE SYSTEMS

BAE Systems' role in supporting the development of the Australian defence industry is underpinned by its active collaboration with other firms. Through a combination of capability transfers and supporting firms to win work, BAE Systems makes an integral contribution to developing the nation's defence capabilities.

As part of these efforts, BAE Systems actively participates in the Global Supply Chain Programme launched by the Government in 2009. The company formally entered into this programme in 2011, when it signed a Global Supply Deed (GSC) to assist Australian suppliers with entry into global markets. As part of this process, BAE Systems provides active training and mentoring to selected firms and helps to identify relevant opportunities for Australian suppliers within the Group's home markets.

In line with this initiative, BAE Systems runs a specialist Global Access Programme (GAP) team, who are tasked with creating opportunities for other Australian firms to become integrated into the company's global supply chains. The services provided by the GAP team include advice around related regulatory issues and support to SMEs to improve their standards and quality of service. Moreover, by acting as a single point of contact into the firm's global procurement strategy, the GAP team assist in streamlining the process of integration.

SUPPORTING SMALL AND MEDIUM ENTERPRISES

F-35 Global Supply Chain

As a component of the global supply chain for the F-35 programme, BAE Systems in the UK selected Australian SMEs in order to be local partners.

This included training in the assembly techniques required to bring together a large number of parts to a very high degree of accuracy.

The first Australian tail fins were installed on an F-35A Lightning II at Lockheed Martin's manufacturing plant in Fort Worth, Texas, USA in late 2014, and included parts created by Australian SMEs.

Ongoing relationships with SMEs have therefore developed a significant amount of business and exports in Australian manufacturing, alongside an important degree of capability transfer.

Trade mission to Japan

BAE Systems has also recently played a key role in supporting SMEs by leading a trade mission to Japan. This event involved planning and cooperation with BAE Systems Inc., BAE Systems' Group Business Development office in Japan, the Japanese Ministry of Defence, the Japanese Ministry of Economy, Trade and Industry, AusTrade and the Australian Embassy. This consisted of 3 full days of intensive networking, presentations and introductions, designed to work with Japanese industry in developing defence industry networks outside of Japan.

Activities of this nature, not only deepen BAE Systems' links with key components of Japanese defence procurement, it crucially leverages against these relationships to open up large new markets. Through this process, BAE Systems is able to share its skills and experience for the sake of the strength of the wider Australian defence and engineering industry.

BAE Systems' collaborative approach is also evident in its willingness to share technologies with suppliers and other firms in the industry. This characteristic was evident in the recent F-35 Joint Strike Fighter (JSF) programme, where BAE Systems teamed up with other Australian firms to deliver critical components. This helped to ensure that a substantial proportion of the work was carried out by Australian businesses, and also facilitated the wider diffusion of best-practice technology across the industry.

In addition to this, BAE Systems helps to strengthen the domestic defence industry's capabilities by collaborating on R&D projects. This sees BAE Systems work with a range of research institutions, government bodies, customers and suppliers as it develops products and technologies. This cooperation enables BAE Systems, and its partners, to use a broader pool of talent and experience, ensuring that more of the global defence industry's research is being carried out in Australia.

DRIVING INNOVATION THROUGH COLLABORATION

Corrosion Prognostic Health Monitoring

For a number of years, BAE Systems has been leading the way in the development of corrosion management systems, including sensors and predictive algorithms, to support aircraft monitoring and maintenance. Drawing on in the region of half a million dollars of funding each year, the programme has been working in collaboration with the former BAE Advance Technology Centres, the Defence Materials Technology Centre and the Defence, Science and Technology Group under the company's R&D Strategic Alliance.

These cutting edge monitoring and prognostic tools allow operators to understand the current and future corrosion status in their aircraft much more effectively. This permits the early-identification of problems and enabling condition-based maintenance of operational defence platforms to be carried out and reducing unnecessary investigative maintenance, a key driver of costs within the industry. The cost of maintenance is reduced, and platform availability increased.

Having been trialled on a number of aircraft, the sensors and algorithms are now being implemented in a large international defence program. This represents a large output for the programme and reflects the strong value that the technology is generating. A commercial corrosion management system has also been developed, underpinned by the sensor and modelling technologies. Known as Environmental Degradation Monitoring and Prognostics this system is now being trialled on Seahawk helicopters. In addition to this, the capability has significant scope for application in the air, maritime and land domains, and broadly outside the defence sector.

5. CONCLUSION

Through its operations, BAE Systems contributed AUD 1.30 billion to Australian GDP in FY 2015/16. In turn, this activity helped to sustain 7,560 FTE jobs across the country and over AUD 320 million in tax revenue. The company's direct contribution to GDP of AUD 700 million was a third larger than the entire internet publishing and broadcasting industry.

However, our research has illustrated that these figures significantly understate BAE Systems' contribution to the Australian economy and defence industry. This report has highlighted numerous channels through which the company supports a much wider set of benefits that are aligned with the current focus of Australian policy makers.

One of BAE Systems' most important wider contributions to the Australian economy comes via its active supply chain management. Its commitment to cooperation with a range of manufacturers and research bodies means that it influences much of the wider defence industry and the supply chain that this supports. This is integral to ensuring that the Australian defence industry produces a wide range of defence solutions, as well as being a core part of Australia's advanced manufacturing industry.

The company is also at the forefront of technological innovation reflected by its extensive investments in R&D. Over the past five years, these expenditures have amounted to AUD 268 million, indicating that BAE Systems is a much more intensive investor in R&D than the average Australian company. Although this investment is vital to ensuring that BAE Systems is able to continue to deliver cutting-edge solutions to its clients, it also serves a wider benefit to Australian society, as this research is gradually replicated in other fields.

Moreover, as a result of its working practices, BAE Systems also naturally supports the deepening of Australia's STEM skills base and high tech manufacturing capabilities—two particularly salient issues for policy makers at present. In terms of STEM skills, BAE Systems goes further, prioritising investment and engagement with young people in the communities in which it works. It plays an essential part in encouraging the next generation of engineers and innovators, both to strengthen the self-sufficiency of the Australian defence industry and to bolster innovation in the advanced technologies and manufacturing that will be crucial to the resilience of the Australian economy into the future. On the other hand, through the active management of its supply chain, BAE Systems significantly boosts the capabilities of domestic high tech manufacturers, therefore contributing to the economic diversification that is likely to be required in the wake of the slowdown in growth of the resources sector.

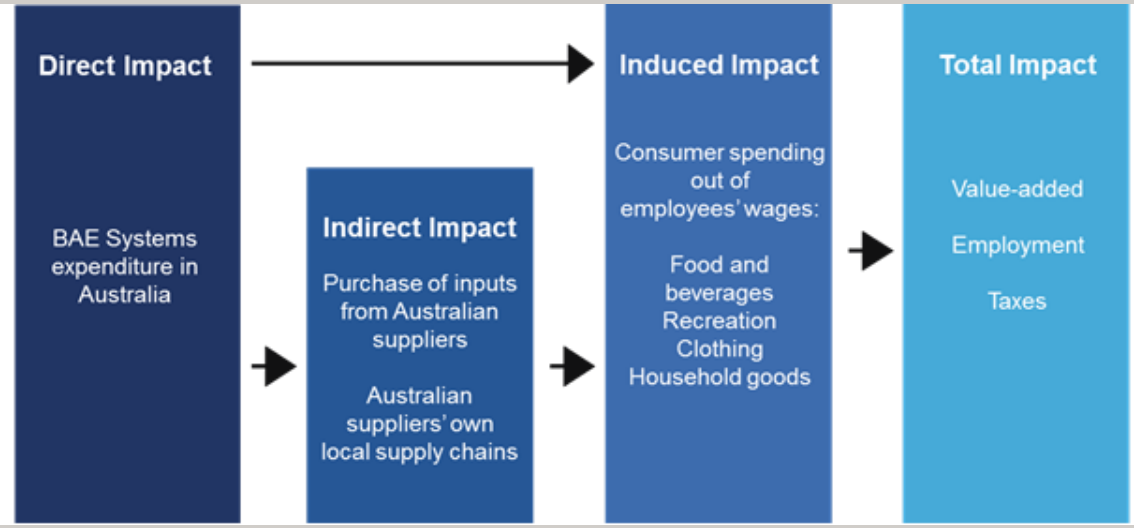
6. TECHNICAL APPENDIX

ECONOMIC IMPACT MODELLING

Economic impact modelling is a standard tool used to quantify the economic contribution of an investment or company. Impact analysis traces the economic contribution of an expenditure through three separate channels:

- **Direct impact** – refers to activity conducted directly by BAE Systems in Australia;
- **Indirect impact** – consists of activity that is supported as a result of the procurement of goods and services by BAE Systems in Australia, purchases by those companies in turn and so on. In this report, the impact of capital and non-capital procurement have been analysed separately and the indirect and induced impacts of capital procurement are reported in aggregate; and
- **Induced impact** – reflects activity supported by the spending of wage income by direct and indirect employees.

Fig. 15. Direct, indirect, induced and total economic impacts



Direct Impacts

The direct contributions to the Australian economy are estimated using a range of data provided by BAE Systems.

- **Gross value added** is the measure used by statisticians to quantify the contribution of a company or a sector to Gross Domestic Product (GDP). It can be calculated by deducting intermediate consumption (purchases of goods and services from other businesses) from total output (or turnover). It is approximately equal to the sum of the cost of employment (including wages, benefits and employee taxes) and company profits (as measured by EBITDA).
- **Full time equivalent employment** is based on data gathered by BAE systems, utilising the numbers of hours worked by part time employees and calculating the equivalent number of full time employees that they represent.
- **Gross value added per employee** measured by dividing direct value added by the number of FTE employees.

- **Tax contributions** reflect the level of tax revenue raised as a result of BAE's activity. This includes a range of taxes on employment, production and corporate profits. The direct tax contribution figure does not include the GST that BAE Systems collected on its sales. However, as highlighted in section 2.5, it does include a portion of the consumption taxes paid by its employees, estimated from an analysis of employees' potential to consume out of their income.

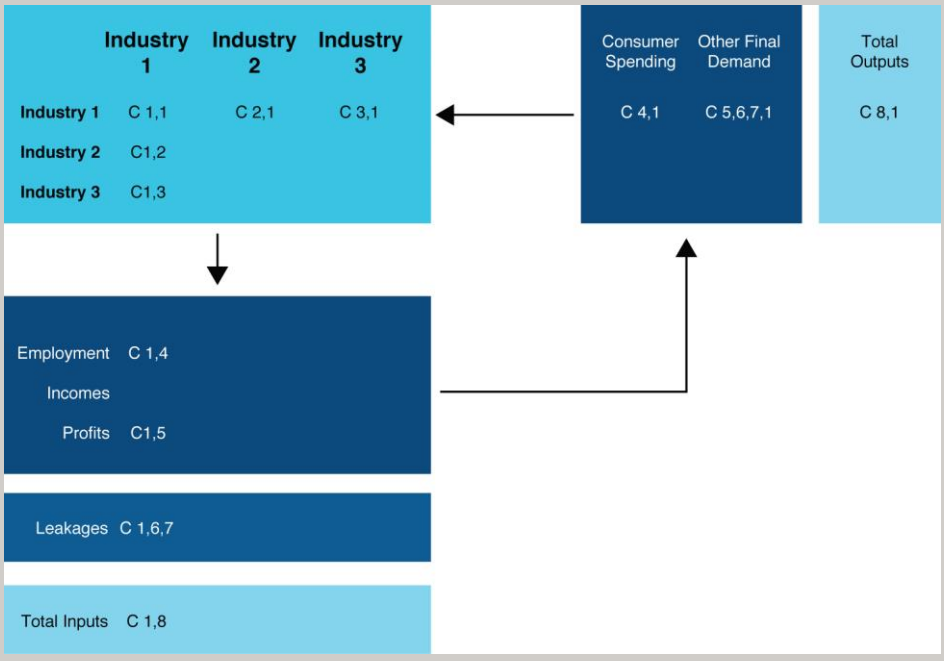
Indirect and Induced Impacts

Indirect and induced impacts for both capital and non-capital procurement expenditure by BAE Systems are estimated using an input-output model. An input-output model gives a snapshot of an economy at any point in time. The model shows the major spending flows from "final demand" (i.e. consumer spending, government spending investment and exports to the rest of the world); intermediate spending patterns (i.e. what each sector buys from every other sector – the supply chain in other words); how much of that spending stays within the economy; and the distribution of income between employment compensation and corporate profits.

An input-output model uses a matrix representation of a nation's interconnected economy to calculate the effect of expenditure shocks by consumers or by an industry on other industries and therefore on the economy as a whole. The input-output tables ultimately measure "multiplier effects" of an industry by tracing the effects of its inter-industry transactions – that is the value of goods and services that are needed (inputs) to produce each dollar of output for an individual sector. These models can be used to measure the relationship between an economic change or "shock," and the final outcome across the whole of the economy.

In essence an input-output model is a table which shows who buys what from whom in the economy. Oxford Economics constructed an input-output table using Australian supply and use tables from 2013-2014 published by the Australian Bureau of Statistics for this analysis. Fig. 16 provides an illustrative guide to a stylised input-output model.

Fig. 16. A stylised input-output model



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