



# THE CONTRIBUTION OF THALES TO THE UK ECONOMY

MARCH 2019



Thales's digital signalling has helped increase capacity across London Underground.

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# FOREWORD

Thales in the UK is a key part of a global technology company that employs 65,000 people worldwide. We have a proud heritage in the UK, stretching back more than 130 years, along with a presence in nearly every region of the country. Combining a unique diversity of expertise, skills and talents, our 6,500 people in the UK deliver extraordinarily complex and technological solutions to our broad range of domestic and export customers.

We took the decision to commission Oxford Economics to better assess Thales's economic impact in the UK and to quantify the value we bring to the nation and local economies.

This report shows that, in 2017, Thales contributed over £1.7 billion to the UK's GDP. I am particularly proud that Thales's labour productivity was approximately 40 per cent higher than the national average. We spent £700 million with UK suppliers, and a third of our UK business's domestic procurement was with small and medium enterprises (SMEs). With this extensive UK supply chain, Thales supports 27,200 jobs across the country, a multiple of 4.2 of our direct employment, helping to underpin the prosperity, as well as the safety and security of the UK.

We pride ourselves on delivering the most demanding programmes and capabilities to our customers across key markets – defence, aerospace, transport, digital security and space. All these activities are underpinned by a strong focus on research and innovation. Our £130 million of R&D in 2017, both self-funded and funded by customers and partners, ensures we remain at the cutting edge of technology in all our markets. Critical to this continued leadership is our relationship with academia, where we support and promote the research capability that generates new ideas and nurtures the talent of the future.

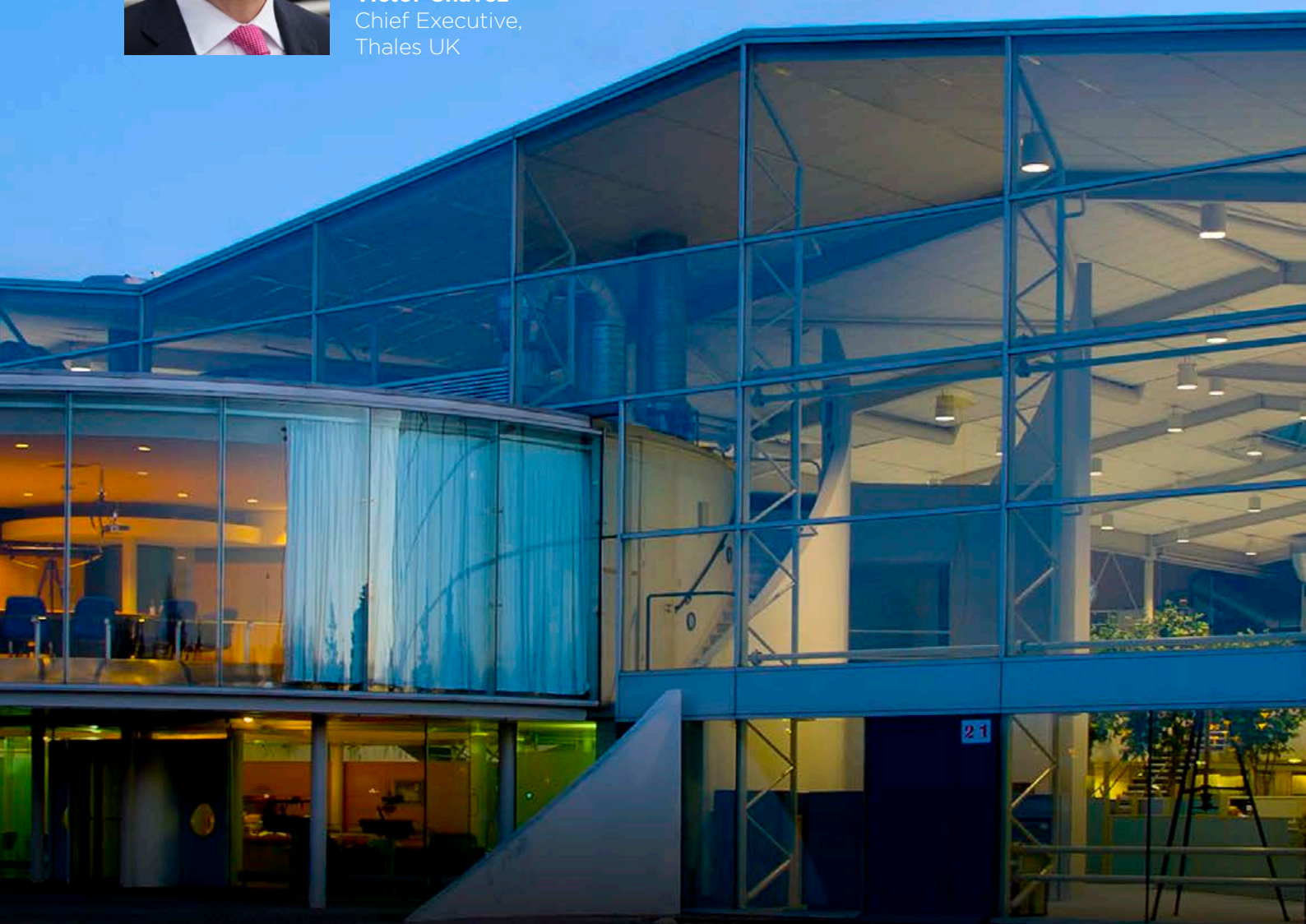
While the benefits that we bring to 'UK Plc' are clear from this report, it is the experience of our employees that I believe best tells the story of Thales in the UK. Our apprenticeship and graduate programmes continue to develop and deliver a stream of diverse young people into our business who are passionate advocates for STEM and next generation technologies. Likewise, our smart working approach focuses on both the wellbeing of our people and the productivity of our teams and, I believe, sets the standard for future working practices.



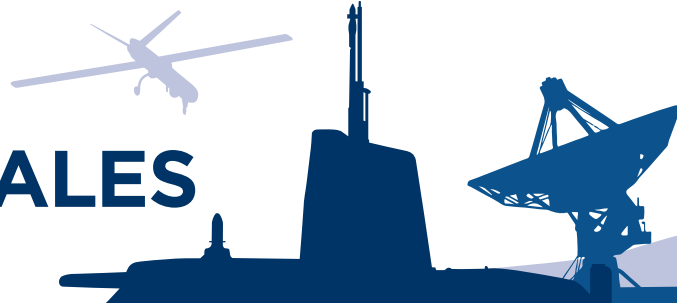
This report demonstrates our economic impact in the UK and our commitment to the development of the skills, R&D and innovation that will continue to support our UK activities into the future. As we look to that future, I am ambitious for Thales to expand and grow our activities in the UK, so that we continue to lead in key technologies, such as digital security, autonomy and big data analytics, which will deliver the security and prosperity of tomorrow.



**Victor Chavez**  
Chief Executive,  
Thales UK



# THE SCALE AND INFLUENCE OF THALES ACROSS THE UK



## UK CAPABILITIES



### Aerospace

- Air traffic management
- Cockpit communications
- Cabin connectivity
- In-flight entertainment services
- Digital services



### Space

- Satellite propulsion
- Satellite payloads
- Earth observation
- Space exploration
- Satellite navigation



### Defence

- Surface ship, mine hunting & submarine sonar
- Advanced weapon systems
- Mission systems integration
- Managed services
- Intelligence, surveillance & reconnaissance
- Training and simulation
- Electronic warfare & countermeasures
- Maritime, land & airborne optronics systems
- Avionics
- Queen Elizabeth-class aircraft carrier
- Unmanned aerial vehicles
- Radio communications
- Air traffic management
- Platform self-protection
- Autonomous systems



### Transport

- Rail signalling systems
- Rail traffic management
- Road information services
- Driverless systems
- Predictive maintenance
- Digital services



### Security

- Digital security systems
- Critical infrastructure protection
- Secure communications

## UK EMPLOYEES

In 2017, Thales directly employed

**6,500**  
UK workers

Engineering & R&D



**3,400**

Customer support



**1,200**

Bid & project management



**700**

Business support



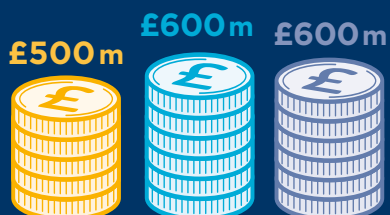
**1,200**

## TOTAL ECONOMIC IMPACT

● Direct ● Indirect ● Induced

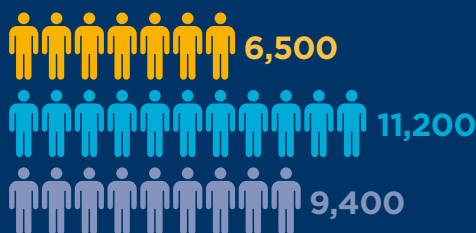
Thales's total contribution to GDP in 2017 was

**£1.7 billion**



Total jobs supported

**27,200\***



\*Total does not sum due to rounding

The average productivity of a Thales worker is

**£77,400**

40% above the national average



£130m  
£140m  
£180m

# REGIONAL IMPACTS



# EXECUTIVE SUMMARY

**£1.7 billion**

Total contribution  
to UK GDP by  
Thales Group in 2017.



*Of this, over £500 million  
was directly contributed by  
Thales's UK operations.*

**Thales Group is a major aerospace, space, defence, ground transport and security company, which generated global revenues of £14 billion in 2017.** With links in the UK dating back to the 19th century Thales has a long-established track record of producing high-tech products and associated services for the armed forces and private sector.

**This report examines several dimensions through which Thales's activities deliver important benefits to the UK economy.** Our assessment covers the operational activities of Thales in the UK; the purchases made by UK and overseas Thales entities with UK suppliers; the spending of workers employed by Thales in the UK and of those employed in the Group's UK supply chains. In addition, this report outlines how Thales contributes to the long-term competitiveness of the UK economy through technological innovation, and initiatives to upskill both its workforce and the wider community.

## CORE ECONOMIC IMPACTS

**We calculate that Thales's aggregate GDP contribution to the UK reached over £1.7 billion in 2017.** Of this headline figure, Thales's direct activities contributed over £500 million to UK GDP. Thales Group procurement spending with UK suppliers was £700 million in 2017. These supply chain purchases contributed £620 million to GDP. A third of spending by Thales's UK operations was with small and medium-sized enterprises. Spending by employees of both Thales in the UK and the Group's UK supply chains supported a further £610 million of economic activity.

**We find that Thales Group supported 27,200 jobs in the UK in 2017.** As well as the company's 6,500 direct employees, its supply chain spending supported 11,200 jobs, and workers' spending supported a further 9,400 positions. This underlines how the company's impact reaches far beyond its own operations.

**Thales demonstrates a high level of productivity relative to the UK manufacturing sector and the economy as a whole.** We calculate that the company's average output per worker stood at £77,400 in 2017—above the manufacturing sector average of £71,400 and far exceeding the UK average of £55,500.

**27,200**

UK jobs supported  
by Thales's activities  
in 2017, including  
via its supply chain  
and consumer  
spending impacts.



*Of these, more than 6,500  
workers were directly employed  
by Thales's UK operations.*

**In 2017, Thales's total tax contribution to the UK reached over £450 million**—sufficient to cover the gross annual salaries of 12,600 secondary school teachers. Nearly £130 million of this tax contribution came directly from Thales in the UK, with the majority in the form of employment-related taxes such as National Insurance Contributions and workers' income taxes.

**Thales's UK export sales rose at an average annual rate of 22 percent between 2015 and 2017.** The company's exports totalled £390 million in 2017.

## INVESTMENT IN R&D AND TRAINING

**Thales carried out £130 million of research and development (R&D) in the UK in 2017.** This includes self-funded research, as well as that funded by industry partners and customers. Innovation is an important factor in driving the productivity growth necessary for long-term increases in living standards, and the UK government has set a target of raising total UK R&D spending to 2.4 percent of GDP by 2027.

**Thales research creates products that help to boost the efficiency of the economy.** For example, system improvements help to increase the passenger capacity of London Underground lines and the Manchester tram network.

**In addition to its financial contributions, Thales enhances the UK's innovative capacity through its involvement in a range of initiatives**—including contributing to Engineering and Physical Sciences Research Council projects, sponsoring 45 PhD students to date, and maintaining strategic relationships with universities across the UK.

**Training programmes and contributions to community outreach schemes underline how Thales is helping to boost the skills of the UK's workforce.** The company employs 279 apprentices working towards accreditations from BTEC to Master's level, as well as 160 graduates in a training scheme recognised by the major UK engineering institutes. Thales makes a wider contribution by sending STEM (science, technology, engineering and maths) Ambassadors to schools to encourage take-up of these subjects, and by hosting an annual competition for university students to design an innovative solution to an engineering problem in Thales Group's markets.

**£130 million**

Value of R&D work  
carried out by Thales  
in the UK in 2017.



*This contributes to the UK  
government's R&D spending  
target of 2.4 percent of GDP.*

# 1. INTRODUCTION

Thales Group is a major global technology company operating in the aerospace, space, defence, security and ground transport sectors. The company achieved global sales of £14 billion in 2017 and employs more than 65,000 people in 56 countries. Some 25,000 of these employees are engaged in technical operations, such as research and engineering, enabling Thales to design and deploy equipment, systems and services to meet complex customer requirements all over the world. The Group spent £797 million globally on research and development in 2017.


Thales has considerable heritage in the UK, having operated here for 130 years—most notably as a major supplier to the UK's armed

forces. Thales's UK operations continue to expand, including through the acquisition of XPI Simulation, which develops technology used in driving simulators, in 2013, and Aveillant, a radar technology company, in 2017.

Thales has asked Oxford Economics to undertake a comprehensive assessment of its contribution to the UK economy. In this report, we demonstrate how Thales directly contributes economic value to the country in terms of annual GDP generated, employment supported, and tax revenues raised. In addition, we consider the role of UK supply chain spending by Thales's UK and overseas businesses, and the impact of wage-related spending by Thales's UK employees and

those in the Group's UK supply chains. (For more details of our methodology, see the introduction to our Economic Impact Analysis, overleaf.)

On top of these quantitative metrics, there are many other channels through which Thales activities contribute to the UK economy. The company boosts the UK's capacity for innovation through in-house R&D, and by engaging with numerous universities and the Engineering and Physical Sciences Research Council. It enhances the skills of the current UK workforce both by training its own workers, and through initiatives to promote the take-up of STEM subjects and careers among school and university students.



Astute-class submarine equipped with Thales sonar, communications, optronics and electronics warfare systems.

These are just some of the perspectives through which the importance of Thales to the UK economy can be assessed. For this report, we have structured our analysis as follows:

- **Chapter 2** calculates the “direct impact” of Thales in the UK on employment, GDP and taxes in 2017;
- **Chapter 3** quantifies the “indirect” and “induced” impacts of Thales Group on the UK economy in 2017;
- **Chapter 4** brings together all these impacts to calculate the total economic impact of Thales on the UK in 2017, at both a national and regional level;
- **Chapter 5** summarises this economic impact by business area;
- **Chapter 6** assesses the wider “catalytic” impacts of Thales on the UK, including through its investment in R&D and training; and
- **Chapter 7** provides concluding remarks.

# INTRODUCTION TO OUR ECONOMIC IMPACT ANALYSIS

**The full impact of Thales on the UK economy is assessed using a standard means of analysis called an economic impact assessment.** This involves quantifying the company's total impact on the UK across three "core" channels:

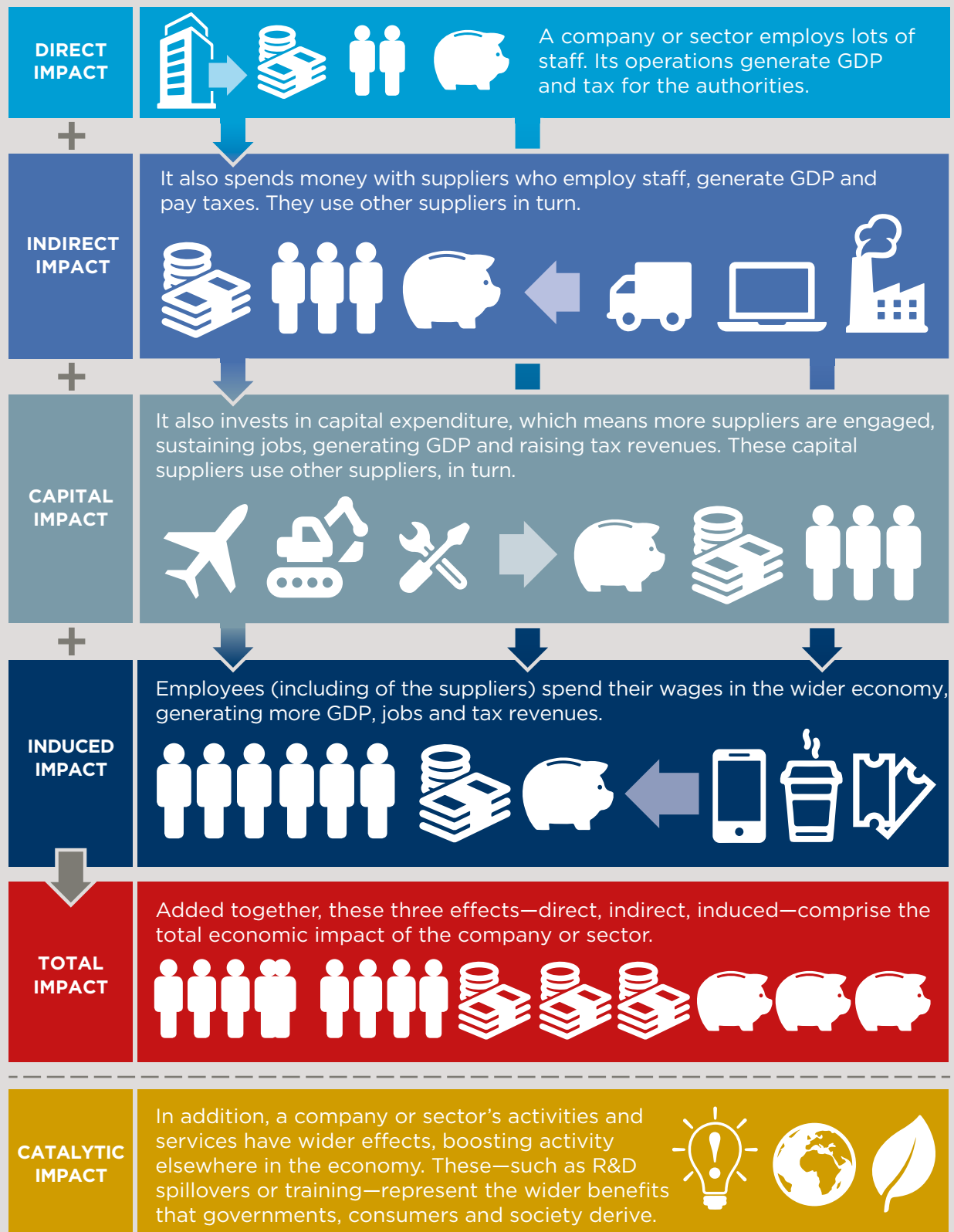
- **Direct impact** encompasses the economic activity, taxes and employment supported directly by Thales's operations in the UK;
- **Indirect impact** encapsulates the economic activity, taxes and employment supported in the UK supply chains of both Thales's UK and international operations, as a result of their procurement of goods and services from other firms. Note: this channel includes the impact of Thales's UK capital investments, such as on new facilities and IT equipment, as well as that of its day-to-day purchases;
- **Induced impact** comprises the wider economic benefits that arise when Thales's UK employees, and those in the Group's UK supply chains, spend their earnings—for example, in local retail and leisure establishments.

This approach enables us to build a picture of Thales's overall contribution to the UK economy across three key metrics:

- **GDP**, or more specifically, Thales's "gross value added" (GVA) contribution to GDP. GVA in simple terms is the sum of a company's profits, employee compensation costs and taxes incurred directly in production, such as business rates. For brevity we refer to this as the "contribution to GDP" throughout the report;
- **Employment**, measured on an employment headcount basis;
- **Government revenues**, including VAT, income tax, corporation tax, business rates and National Insurance contributions.

**Alongside these core economic impacts, we also consider the wider "catalytic" economic impacts through which Thales contributes to the UK's long-term prosperity.** These catalytic effects correspond to a number of the themes identified in recent government publications, such as export growth, skills development, and building future capabilities through R&D.

**The modelling upon which this report is based computes the economic footprint of Thales in the UK for 2017.** Our approach uses financial data for that year from Thales's own accounts, plus the latest economic data available at the time of writing. We show the economic contribution made to the national economy by Thales, as well as its employment and gross value added impacts at a regional level. Fig. 1 (overleaf) presents a schematic diagram of the Economic Impact Analysis model. Additional information on our modelling approach is provided in this report's appendix.

**Fig. 1: The five channels of economic impact in our model**

## 2. THE DIRECT IMPACT OF THALES IN THE UK

This chapter describes the impact of Thales's UK operations on the economy in 2017. We start off by calculating the company's impact on the labour market through both its employment at UK sites and its investment in training, then go on to consider Thales's contribution to GDP and tax revenue that year.

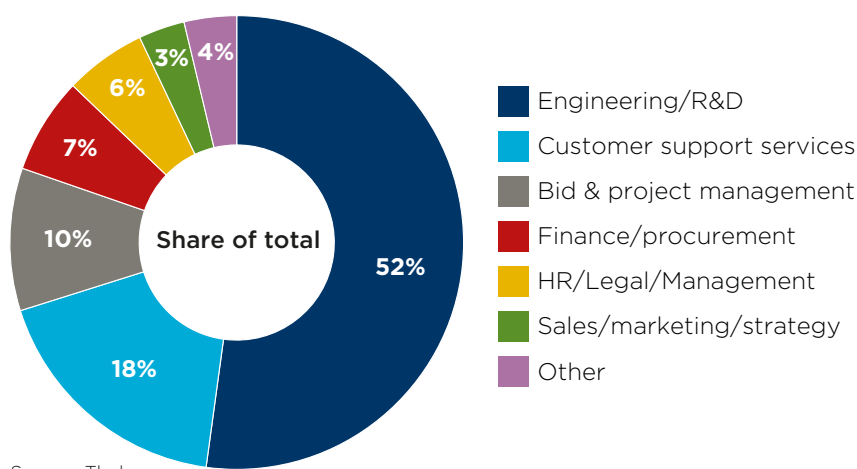
### 2.1 DIRECT CONTRIBUTION TO EMPLOYMENT AND SKILLS

#### 2.1.1 Direct employment

In 2017, Thales directly employed around 6,500 people in the UK.<sup>1</sup> The majority (3,400 workers) worked in R&D and engineering, including IT, cybersecurity and systems engineering (Fig. 2). A further 1,200 worked in customer support services and nearly 700 in bid and project management, with the remainder being business support roles such as HR and finance.

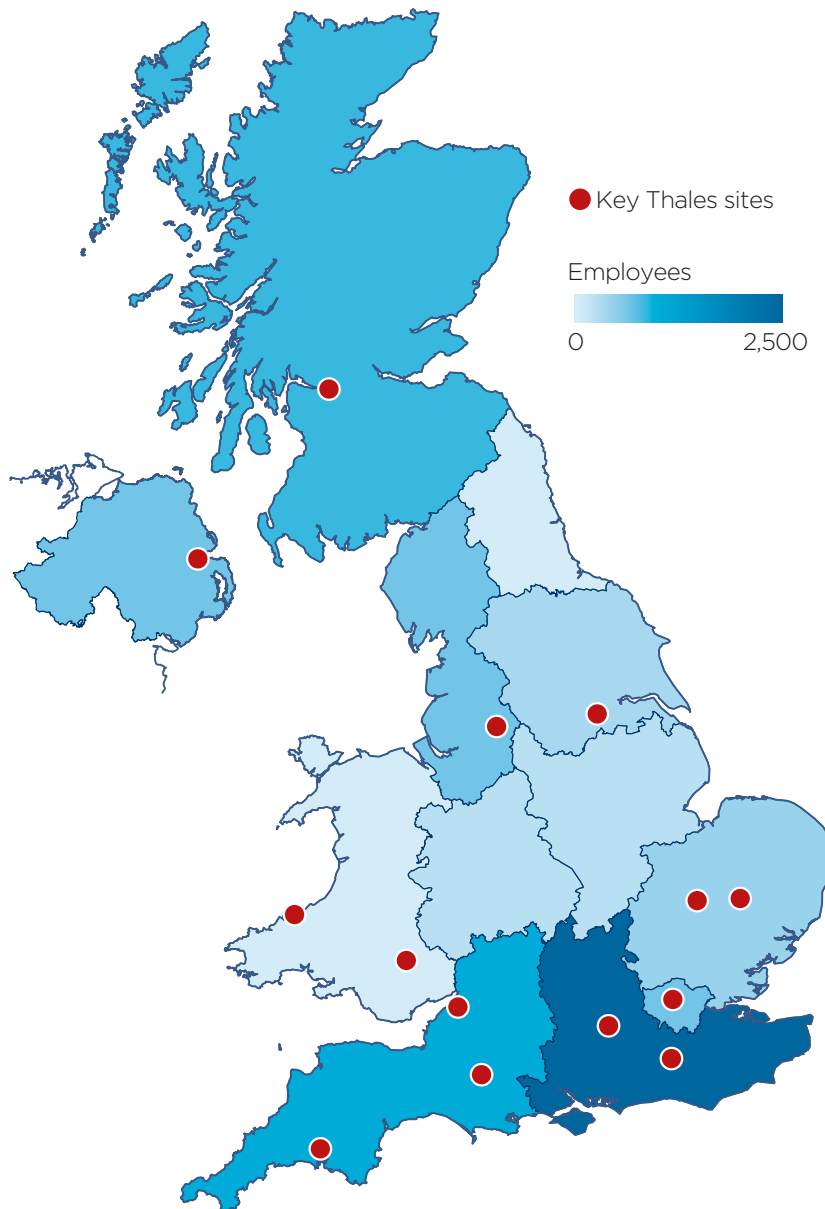
Much of Thales's UK workforce is located in the south of England, with just over one-third (36 percent) in the South East, at the company's two major sites in Crawley and Reading. A further 15 percent are based in the South West, and 10 percent in London. Scotland and Northern Ireland also have significant numbers of Thales employees, with over 700 and 500 workers respectively. We set out the company's main activities in each part of the UK overleaf.

**Fig. 2: Thales's UK direct employment by job type, 2017**



<sup>1</sup>This total of 6,500 does not include contract staff, who operate as semi-permanent Thales employees. These workers are counted as part of supply chain spending for the purposes of this report.

**Fig. 3: Regional breakdown of Thales's direct employment, by place of work, 2017**



### South East

Thales employs nearly 2,400 employees in the South East, located across two main sites. Crawley is the largest office and production facility and has delivered equipment to the Ministry of Defence since 1964, as well as acting as the main

location base for training and simulation. This site is home to several Thales capabilities including military training and simulation, electronic warfare for land and maritime, Unmanned Air Systems and advance communications.

A new Reading site was opened in 2017 following a £23m capital investment, bringing together several business units and serving as Thales's new UK headquarters, as well as housing Thales's UK Digital Security business and Land & Air Systems defence business.

### South West

Templecombe is the primary site in the South West, established in the 1960s and now housing part of Thales's UK Maritime and Air Operations businesses. Over 750 workers are based at Templecombe, focusing on sonar technology; they manufacture specialist systems for naval fleets around the world, including the Royal Navy.

Thales designed the Queen Elizabeth-class aircraft carriers at the site in Bristol, as well as leading on delivering the power and propulsion elements and the communication systems. Although the manufacturing and commissioning of the vessels takes place in Scotland, much of the skilled workforce is sourced from the Bristol office. Bristol is also home to the main UK design development capabilities for Thales Alenia Space.

In addition, a new site in Plymouth was opened in late 2018, following a capital investment of over £1 million. This waterfront facility at Turnchapel Wharf will provide access to trials areas for developing autonomous maritime systems.

**Scotland**

Glasgow is the main site for Thales in Scotland, with over 700 workers. The company's Glasgow links date back to 1888, making this the oldest part of the company in the UK, including acting as the sole supplier of submarine periscopes to the Royal Navy since 1917. The establishment in 2013 of an Armoured Vehicle Centre of Excellence at the Glasgow site built on Thales's decades of experience in delivering complex military vehicles.

Thales employees also work on the Queen Elizabeth-class aircraft carriers at the Rosyth Dockyard, and provide the RAF with jet training at RAF Lossiemouth.

**London**

London is the main base for workers in Thales's UK transport business, with over 600 employees split between a site next to Tower Bridge and an office shared with Transport for London in Stratford. The company's current projects include working with London Underground to modernise and increase capacity on the Circle, District, Hammersmith & City and Metropolitan tube lines, and Thales signalling technology has been in use on the Docklands Light Railway since 1994.

Thales in London operates the "Darwin" real-time train information system for the National Rail network, providing customers with

updates on delays and journey planning information. In addition, Thales's predictive maintenance service supports transport providers by optimising maintenance schedules and reducing downtime through a network of sensors attached to infrastructure components.

**Northern Ireland**

The Thales Belfast site is a centre for Thales's advanced weapons systems for air defence and surface attack, spanning precision short-range missiles and the integration of weapons on to land, sea and air platforms. In addition, the Belfast site is home to the company's Space Electric Propulsion Integration Centre, opened in 2016 by astronaut Tim Peake following a capital investment of £6 million from Thales Alenia Space. The company began working in the Northern Irish capital in 1936 as Shorts & Harland, one of the first companies in the world to undertake volume production of an aircraft.

**North of England**

Thales's Cheadle site specialises in naval sonar and communications systems, as well as hosting a large team working for the UK transportation business. Thales's Tram Management System for Manchester Metrolink was introduced to boost tram passenger numbers and take five million car journeys off local roads each year. The Thales Secure Communications

and Protection business also has a presence in Cheadle, supporting digital and physical security at critical national infrastructure sites across the UK. Thales has been active in the Manchester area since 1949, with collaboration between Thales's predecessor, Ferranti, and Manchester University to develop one of the world's first computers.

The Thales Doncaster site delivers connectivity to the government public services network, as well as supporting internal Thales IT services.

**East of England**

Cambridge is home to Thales e-Security, a specialist in digital trust and cryptography for both public and private sector clients.

With a history dating back to the First World War, the Thales facility in Bury St. Edmunds employs 60 engineers and project support personnel who work for the company's Optronics business. Thales manufactures next-generation threat warning sensors and intelligent countermeasure dispenser systems for both fixed and rotary wing aircraft. Bury is also home to Thales's airborne reconnaissance systems designed for a wide range of applications including defence, wide area surveillance and infrastructure protection.

## Wales

Aberporth, where Thales employs 60 people, is a site specialising in unmanned aerial vehicles (UAVs), including the Watchkeeper surveillance UAV programme. The facility has received £10 million of investment from

Thales in the UK since 2002 and is located in the largest area of segregated airspace for UAV operations in Europe.

In 2019, working alongside Blaenau Gwent Council, the Welsh Assembly and the University of Cardiff, Thales

has established a new National Digital Exploitation Centre in Ebbw Vale. The £20 million site will be used for digital and cyber security training and research facilities, providing lab space for multinationals, SMEs and microbusinesses to test and develop digital concepts.

## BELFAST SPACE PROPULSION RESEARCH

Thales Belfast's journey into space began 10 years ago, as a bid to offer its industrial expertise to a new set of customers. Initially, this involved the production of chemical propulsion thrusters for satellites in partnership with Aerojet RocketDyne, before evolving into a relationship with Thales Alenia Space (TAS), which began in 2015. Thales Belfast is now the industrial hub for the manufacture of TAS' Xenon Propulsion System, which powers the Spacebus Neo satellite—designed to bring internet coverage to isolated regions across the globe. TAS's selection of the Belfast site was because of the availability of high-specification engineering skills among the Thales Belfast workforce and is the first time that work had been moved from France, Thales's home country, to the UK.

Since the initiation of the project in 2015, £6 million has been invested at the Castlereagh site to develop and manufacture the propulsion system—spread across R&D, capital investment, and upskilling existing and new employees.

As the first manufacturing prime contractor moving into the space arena in Northern Ireland, Thales Belfast has acted as a catalyst to promote the development of space capability among local suppliers—most of them SMEs such as Lisburn-based Datum

Design, which completed the tooling for the propulsion system. Some 30 firms have now set up ADS Northern Ireland's Space Special Interest Group to grow the space sector in Northern Ireland—and Dr Leslie Orr, head of ADS Northern Ireland, believes the potential benefits could be even wider, commenting: "Through Thales setting up a space division in Northern Ireland, we see the nucleus of (the) very early stages of a space industry."

Thales Belfast's interest in space is also having an impact on Northern Ireland's education sector. Along with Bombardier, it played a significant role in developing the curriculum for the space science qualification for 14-to-16 year olds in Northern Ireland. The company also sponsors the Northern Ireland element of the Youth Rocketry Challenge for 11-to-18 year olds to design, construct and successfully launch a rocket. As Michael Polson of Invest NI notes, the space sector helps to get schoolchildren involved in science and engineering: "Space still excites people. It's a way of getting young people interested in STEM, and I think that's one of the benefits [of] having one of our big players located centrally in Belfast doing this stuff." As its space centre becomes more established, Thales Belfast sees potential for future collaborations with its local universities, Queen's University Belfast and the University of Ulster.

### 2.1.2 Skills development

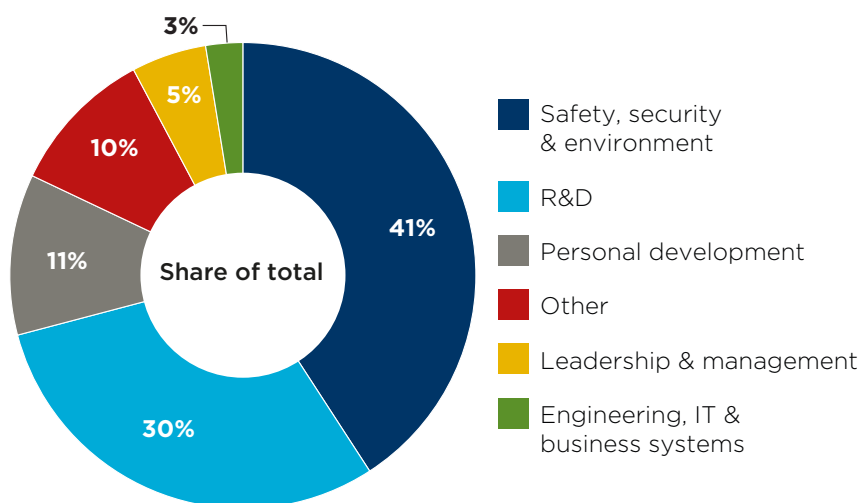
Thales invested £2.8 million in over 75,000 hours for training UK employees in 2017—an average of roughly £430 per direct employee. As Fig. 4 illustrates, around 30 percent (£840,000) of this spending focused on building capability in research and development. Another £460,000 (16 percent) was for employees' 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 offers UK graduate training programmes for both business and engineering, with 160 university graduates on the programme. The business scheme provides direct entry into a business function such as commercial, project management or sales, while engineering graduates start by rotating around the company for two years to gain broad experience. The Thales graduate engineering programme is recognised by many UK technical establishments, including the Institution of Engineering and Technology and the Institution of Mechanical Engineers, leading to chartered engineer status.

Thales contributes to the government's Apprenticeship Levy and runs apprenticeship schemes in engineering and technology, as well as business and finance. Engineering apprenticeships are offered at Advanced, Higher and Degree levels, with the potential for Master's qualifications. Typically, these last from two to four years, while business and finance apprenticeships are offered at Higher level, and cover subjects such as HR, procurement, and project planning. Thales currently employs 279 apprentices in the UK, including 97 new starters in 2018.

**Fig. 4: Thales's total UK training spend by category, 2017**



## DEVELOPING TALENT AND FOSTERING INNOVATION

Thales invests in technical and business apprentices, giving them a strong foundation to progress in the industry—both inside and outside the company. For example, Nadia Johnson is a software engineer apprentice at the Cheadle site, currently working on sonar processing for Astute-class submarines. She has made significant career progress while working at Thales, developing a new automated test system and producing a series of videos explaining how to use this technology.

As well as these technical accomplishments, Nadia has worked with her fellow 2015 cohort apprentice Jessica Wong to create an online engineering outreach programme, delivered through YouTube videos and accompanying packs. Having identified both a gap for this type of material online and the resources available from Thales for outreach opportunities, Jess and Nadia presented their idea to the company. Thales subsequently provided funding for photographic equipment to get the project started, for travel, and for the trademarking process.

Nadia and Jessica said “Thales has been very supportive of our work on the campaign, understanding if we need to work on it during office time if we have meetings with stakeholders. John Peachey, our head of software at the time, was immensely helpful, advising on operational decisions as they came up.”

Thales continues to connect the pair with opportunities to showcase the campaign—they have already been involved with BBC North West, the Institution of Engineering and Technology, and the Manchester Museum of Science and Industry.

Encouraging young people to study engineering-related subjects in this way helps to ensure the UK has a supply of the skills likely to be needed in the advanced economies of the future.

Nadia gives regular presentations at local schools about apprenticeships and women in engineering, and has met with MPs from the Education, Skills and the Economy sub-committee to discuss the impact of apprenticeship schemes. In recognition of her achievements, Nadia was nominated as a finalist for the 2016 Institute of Engineering and Technology Young Woman Engineer of the Year Awards.

“Thales has been very supportive of our work on the campaign, understanding if we need to work on it during office time if we have meetings with stakeholders.”

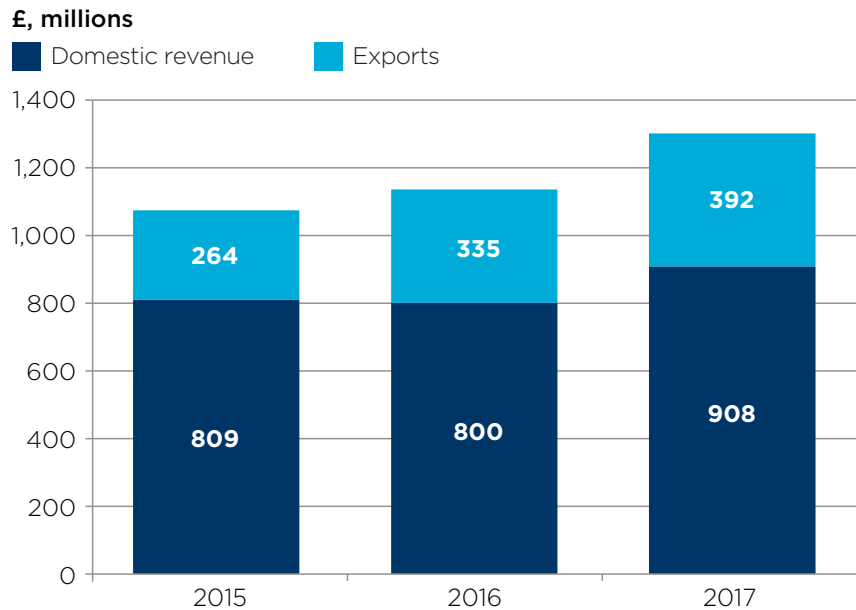


## 2.2 DIRECT CONTRIBUTION TO GDP

### In 2017, Thales's UK operations earned £1.3 billion in revenue, split between

around £900 million in domestic sales and nearly £400 million in exports. Although the bulk of the sales revenue came from domestic customers, export demand has driven growth over the past three years. Annual export revenue rose by 21.9 percent on average between 2015 and 2017, compared to 5.9 percent for domestic sales.

**Fig. 5: Thales's UK revenue from domestic sources and exports, 2015 to 2017**



Source: Thales

### FOCUS ON EXPORTS: STATE-OF-THE-ART SONAR

One product helping to drive Thales and UK export growth is the state-of-the-art Sonar 2087. This anti-submarine warfare (ASW) sonar was demonstrated in March 2018 on HMS Sutherland, a Royal Navy Type 23 frigate, and Thales reports that it was one of the key differentiators which resulted in Australia awarding the significant SEA 5000 contract to the UK Type 26 platform. The Thales system will be installed in the coming years on the Royal Australian Navy's new Hunter Class ASW frigate.

This competition was hotly contested on a global stage. Close cooperation between industry and across government—involving the Royal Navy, the Ministry of Defence, and

the Department for International Trade—enabled a carefully coordinated campaign, demonstrating the power of a collaborative approach. This success will deliver a positive economic impact for Thales sites in Templecombe and Cheadle, supporting jobs and innovation over the lifetime of the programme.

As the UK and Australia continue to develop their strategic ASW partnership, Thales will further develop this capability with both the UK and Australia's involvement. The aim is to have a single strategy designed to meet both partners' future needs, and which is delivered by companies in both the UK and Australia.

**We calculate that Thales's UK activity directly contributed over £500 million to UK GDP in 2017.** This is determined using the "income approach" method of GDP estimation, which is the sum of:

- the income generated by the company for its shareholders, measured in terms of earnings before interest, tax, depreciation and amortisation (EBITDA);
- the income paid as employee compensation, including gross wages, and employer National Insurance and pension contributions; and
- the income paid to the UK government as taxes directly on production, in the form of Thales's UK business rates bill.

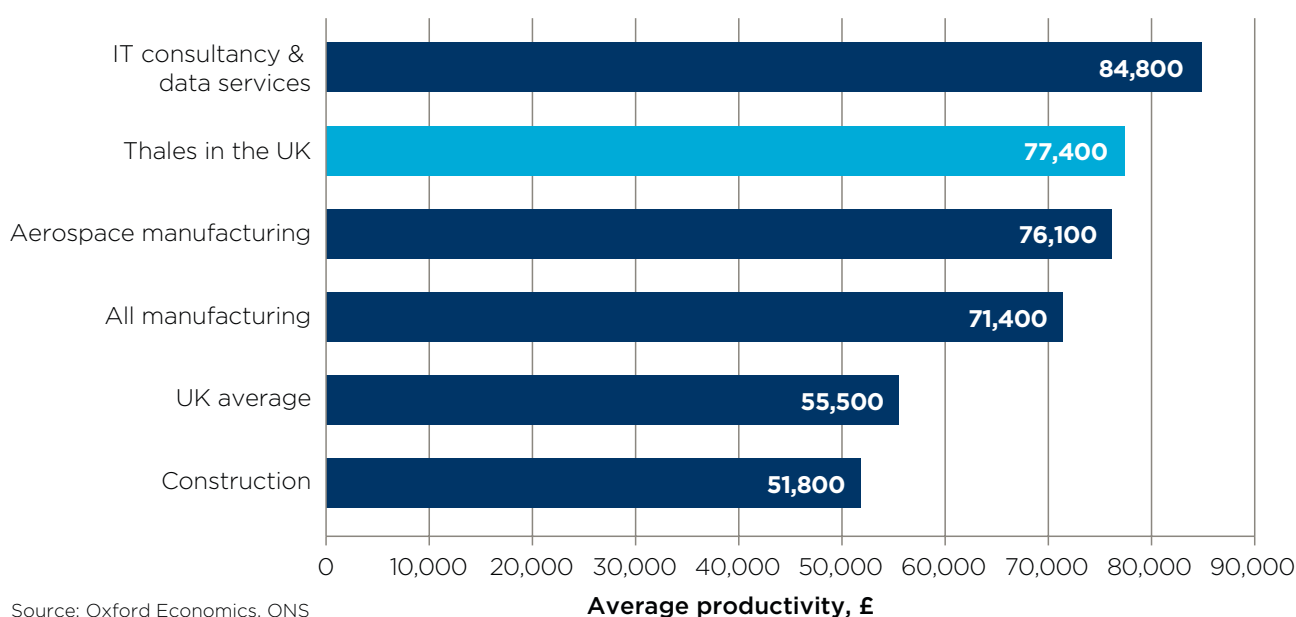
The largest component of Thales's direct contribution to UK GDP comes from compensation of employees, with much of the rest coming from the company's EBITDA.

Combining the direct impacts on GDP and employment, as stated in this chapter, suggests that each of Thales's UK workers contributed an average of £77,400 to the UK economy in 2017. **This means that, on average, Thales's UK labour productivity in 2017 was eight percent higher than the average for the entire UK manufacturing sector, and roughly 40 percent higher than for the UK economy as a whole** (see Fig. 6). Thales's UK productivity is also 27 percent higher than for the overall UK defence industry, which was estimated at £61,000 for 2016.<sup>2</sup>

## 2.3 DIRECT CONTRIBUTION TO TAX

In 2017, the operations of Thales directly contributed £130 million to the UK Exchequer. The majority came from worker income tax and National Insurance contributions, with the remainder from business rates.

**Fig. 6: Average estimated output per worker, selected sectors, 2017**



<sup>2</sup> ADS UK Defence Outlook Report 2017

## 3. MULTIPLIER IMPACTS

In this chapter, we analyse the “indirect” and “induced” impacts of Thales on the UK economy. To do this, we assess the full effect of spending with UK suppliers by Thales’s UK and overseas operations, plus the impact of consumer spending by staff employed directly by Thales in the UK and within all the Group’s UK supply chains, during 2017.

### 3.1 SUPPLY CHAIN IMPACTS

To produce final goods and services for sale, Thales purchases many inputs from the UK market. Through this procurement activity, Thales therefore “indirectly” supports economic output and employment across the UK.

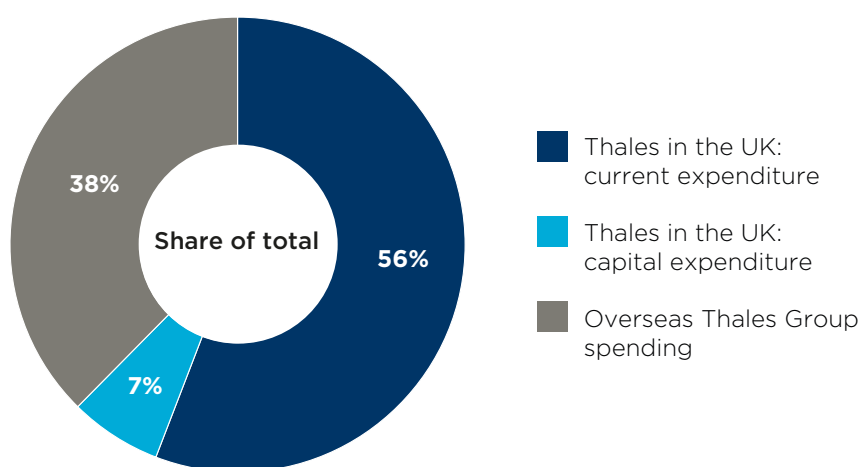
Our study considers the impact of both current and capital expenditures by Thales’s UK operations in 2017. However, this report’s ultimate objective is to estimate the total impact of Thales on the UK economy—which means we must also assess the impact of supply chain spending in the UK in 2017 by Thales Group entities based outside the UK. The full breakdown of this indirect (supply chain) spending is illustrated in Fig. 7.

#### 3.1.1 Procurement expenditures

**In 2017, Thales Group spent around £700 million with UK suppliers.** Nearly two-thirds of this (62 percent) came from the current and capital expenditures of Thales’s UK operations. The UK purchases made by overseas Thales Group entities comprised the remaining 38 percent, largely reflecting purchases made by Thales Alenia Space. Thales’s major UK capital expenditures in 2017 included the fit-out of newly-occupied sites in Reading, Cambridge, and Plymouth, as well as investment in new IT equipment.

Thales estimates that just over 30 percent of its UK business’s supply chain purchases are with small and medium sized enterprises (SMEs).

**Fig. 7: Thales supply chain spending in the UK by source, 2017**



Totals may not sum due to rounding  
Source: Thales

## INVESTING IN THE SOUTH WEST

Thales's connection with the Royal Navy (RN) stretches back more than a century. During this time, Thales has supplied the periscope and optronics mast to every RN submarine; built a strong partnership on naval electronic warfare; played a leading role in delivering the Queen Elizabeth-class carriers; and helped the UK maintain operational advantages in the underwater battlespace.

The October 2018 opening of Thales's Maritime Autonomy Centre, an important new research and development facility in Plymouth, represents the next step in this relationship. The new site at Turnchapel Wharf is a £1 million capital investment in the local area and creates 20 new, highly-skilled jobs, with the aim of furthering the joint UK-France Maritime Mine Counter Measures (MMCM) venture. The MMCM programme will allow the RN to fundamentally change its approach to mine warfare, following the First Sea Lord's 2017 announcement of a challenge to industry to see an unmanned capability for mine countermeasures in UK waters within two years.

The Turnchapel Wharf facility's location provides trials teams access to both shallow and deep water, enabling progressive testing to be done from sheltered bays to open sea. The ambition of the fast-fail, rapid

development and evaluation cycles promoted by the facility is to enable international autonomous vehicle demonstration events such as Unmanned Warrior to take place every month, instead of every few years.

Thales points out that Plymouth is an ideal location for developing world-leading maritime autonomous systems. It has a unique mix of academics, regional organisations like the South Coast Marine Cluster, major prime contractors, and highly skilled SMEs, including Thales's partner M Subs. This local company is installing a system of cameras, radars, and other sensors around Plymouth Sound, to provide situational awareness and communications with the unmanned vehicles operating out of the city's harbour.

Local councillor Tudor Evans said: "We were chuffed to see one of the world's leading marine and air autonomous research and manufacturing companies join us here, and set up facilities on land that was formerly a defence site. Our team worked behind the scenes to ensure the land at the former marine base at Turnchapel was maintained for marine and employment use. Their move here represents the direction we have been taking as Britain's Ocean City, playing to and building on our economic strength and experience in the marine sector."



Halcyon autonomous surface vessel for mine countermeasures.

### 3.1.2 Supply chain spending impact on the UK economy

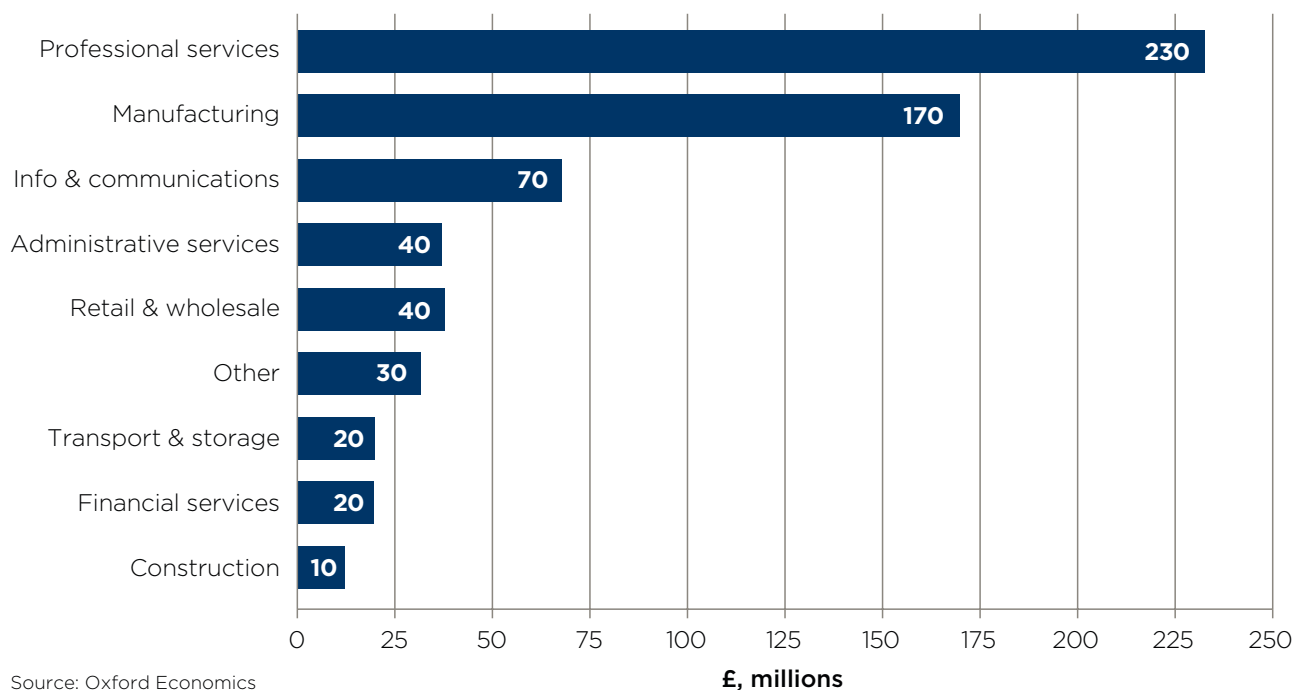
**We estimate that, in 2017, Thales Group's total spending in the UK supply chain indirectly supported a GDP contribution of around £620 million.** Of this, the largest impact was in the professional services sector, where Thales supported £230 million of economic activity, driven by significant procurement spending on engineering contractors and services and management consultancy fees (see Fig. 8). The next-largest impact was nearly £170 million in the manufacturing sector, due to purchases such as space equipment and optronics, as well as repair and maintenance.

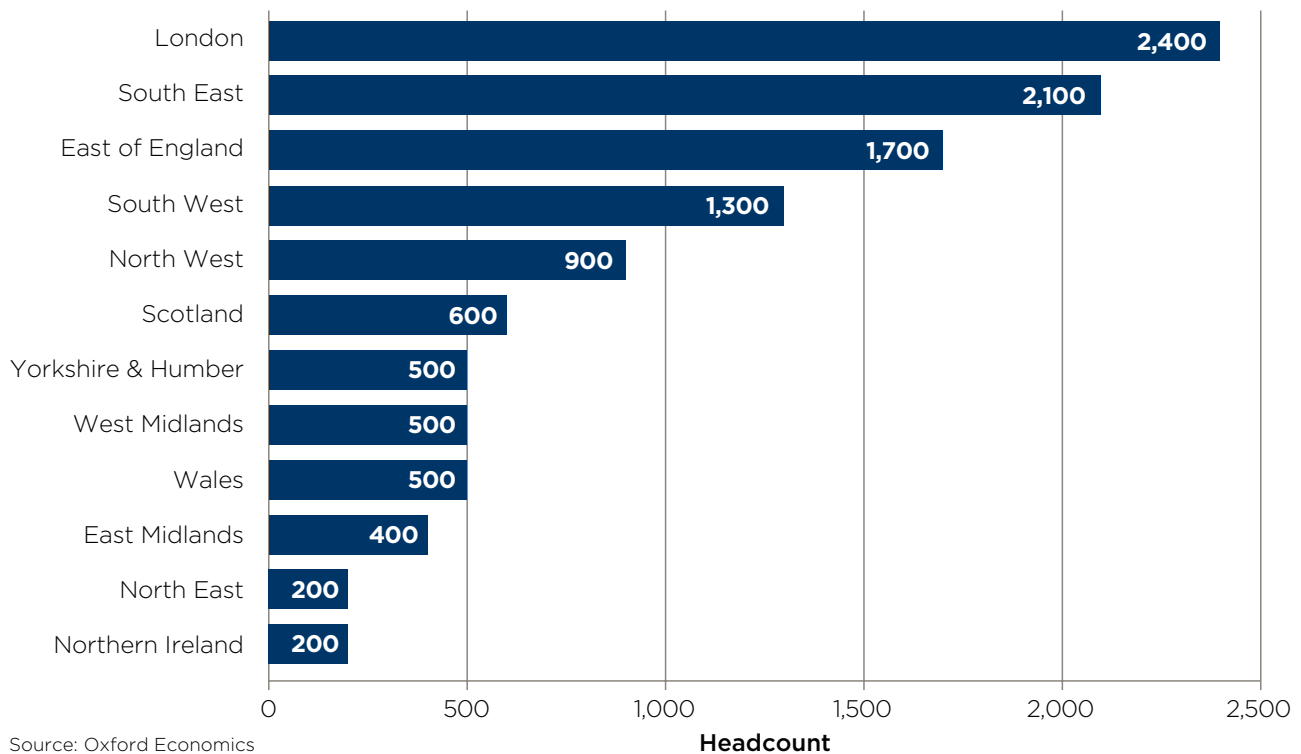
To calculate the total number of UK jobs that were supported by Thales Group's supply chain spending in 2017, we combine the GDP impacts presented above with estimates of productivity for each sector. We find that **Thales Group supply chain spending in the UK indirectly supported 11,200 jobs around the country in 2017.**

We can then use information provided by Thales on the geographical distribution of its supply chain spending to estimate how these indirect jobs are spread around the country. This suggests that the region with the largest indirect

employment impact is London, with over 2,400 jobs supported in Thales Group's supply chain. The South East and East of England see the next most significant effects, with 2,100 and 1,700 jobs supported respectively (Fig. 9).

**Fig. 8: Contribution to UK GDP of Thales Group supply chain spending by sector, 2017**



**Fig. 9: Jobs supported around the UK by Thales Group supply chain spending in the UK, 2017**

### LEADING COLLABORATIONS WITH UK SMES

As well as the purchases it makes directly from other UK companies, Thales is also proactive in leading consortia of companies to jointly deliver major client contracts, particularly for the Ministry of Defence. This approach enables partner companies to contribute to large contracts, in turn supporting further supply chain activity among their suppliers.

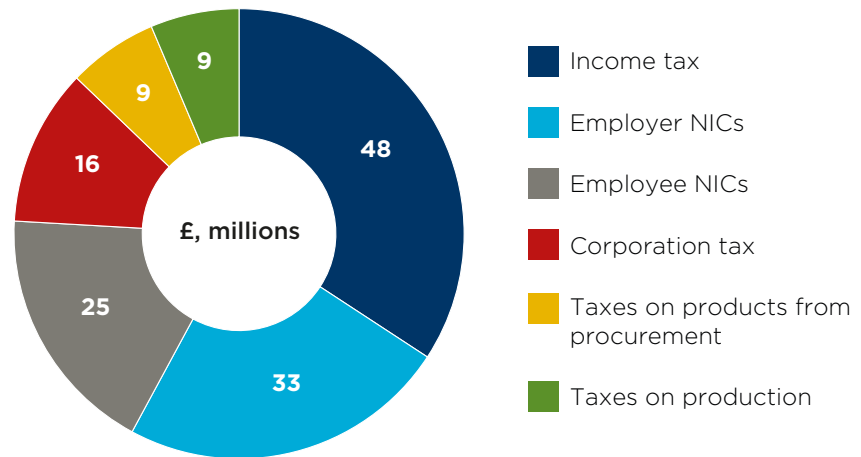
One example is Thales's Biological Surveillance and Collector System (BSCS), designed to protect UK armed forces overseas from chemical, biological, radiological and nuclear attacks by detecting incoming harmful particles in the air. The system is manufactured by a Thales-led consortium comprising 30 organisations, of which 26 are UK-based and 18 are UK SMEs.

The BSCS Delivery Team was recognised in 2017 with a Minister for Defence Procurement Acquisition Award by Harriett Baldwin MP. One of the system's most innovative features is its central lab: state-of-the-art microbiology safety cabinets house the sample identification system, providing a safe analysis environment for operators. This is a unique UK capability which is attracting significant interest from export customers around the world.

The major involvement of the UK SME community in developing this unique capability has demonstrated the effectiveness of this partnership approach when delivering specialist technology to protect the UK armed forces.

**We also calculate that Thales Group's supply chain spending in the UK indirectly contributed an estimated £140 million in revenues for the Treasury in 2017.** Of this, an estimated £106 million came from employment-related taxes such as income tax and National Insurance Contributions at Thales's suppliers (see Fig. 10). The remainder was generated by suppliers' corporation tax, taxes on production such as business rates, and taxes on products such as VAT and import duties.

**Fig. 10: Breakdown of estimated UK tax contribution supported by Thales Group supply chain spending, 2017**

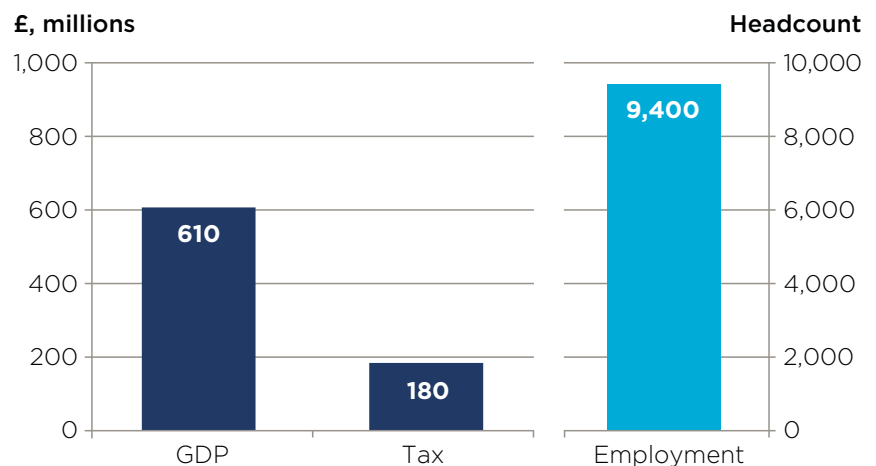


Source: Oxford Economics

### 3.2 WORKER SPENDING IMPACTS

The wages paid to Thales's UK direct employees, plus those paid to workers in all of Thales Group's UK supply chains, support further economic activity, in the form of consumer spending on a wide range of goods and services from UK businesses. This is known as the "induced" impact of Thales Group on the economy. **We calculate that in 2017, this induced impact supported a £610 million contribution to UK GDP, 9,400 jobs, and £180 million in tax revenues** (Fig. 11).

**Fig. 11. Economic impact of worker spending in the UK, 2017**



Source: Oxford Economics

## CASE STUDY: SCIENTIFIC MANAGEMENT INTERNATIONAL

Scientific Management International (SMI) specialises in cable harness systems for hostile environments, supplying the aerospace, marine, alternative energy (including tidal and wind turbines) and transport sectors from bases in the UK, France, Canada and Australia.

Thales was SMI's first customer when the business was founded around 25 years ago, and over time the relationship has developed into a collaborative partnership, with the companies working together in the UK, France, and Australia. SMI products currently feed into several Thales products, including sonar systems in Royal Navy submarines—SMI are the only company worldwide to have held a Ministry of Defence Capability Certificate continuously for 23 years.

Thales has supported SMI in gaining accreditation to the “Supply Chains for the 21<sup>st</sup> Century” (SC21) improvement programme for the Aerospace and Defence Industry. This scheme is based on the principle of continuous improvement, and provides a framework for businesses to identify and realise efficiencies across their organisations. Businesses can submit themselves for assessment in categories such as delivery and quality, with those scoring highly awarded bronze, silver, or gold status, highlighting that company's commitment to an efficient supply chain. Thales is the largest supporter of the SC21 programme, sponsoring 49 companies in 2017.

Thales staff with experience of the programme worked with SMI, enabling it to gain accreditation much more quickly and efficiently than if the company had been working on its own. SMI holds “bronze” accreditation within the SC21 programme, which the company reports has helped raise its profile across the Thales business, and the aerospace and defence industry as a whole, creating the potential for a larger customer base.

“Thales has supported SMI in gaining accreditation to the Supply Chains for the 21st Century improvement programme for the Aerospace and Defence Industry.”

SMI also states that it has benefitted from knowledge through its collaborative relationship with Thales. For example, Thales's knowledge of the Australian market played an important role in enabling SMI to develop export sales to that part of the world.

## 4. THE TOTAL ECONOMIC IMPACT OF THALES IN THE UK

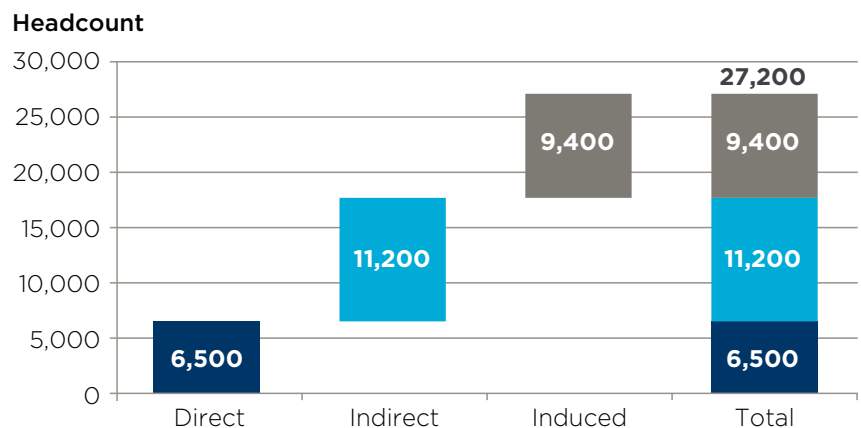
This chapter brings together all three core economic impacts of Thales on the UK, enabling us to estimate the company's overall contribution to jobs, GDP, and tax revenues in 2017—at both a national and regional level.

### 4.1 NATIONAL-LEVEL IMPACTS

**We calculate that, overall, Thales's activities in the UK supported a total of 27,200 jobs in 2017.** Just over 40 percent of these jobs were supported by Thales Group's purchases from UK suppliers; a further 34 percent were supported by workers' spending; and the remainder was made up of Thales's own UK employees (see Fig. 12).

**We find that Thales supported a total GDP contribution of over £1.7 billion in 2017.** The company's direct contribution stood at roughly 30 percent of the total (£510 million), with indirect and induced effects contributing over £600 million each (Fig. 13).

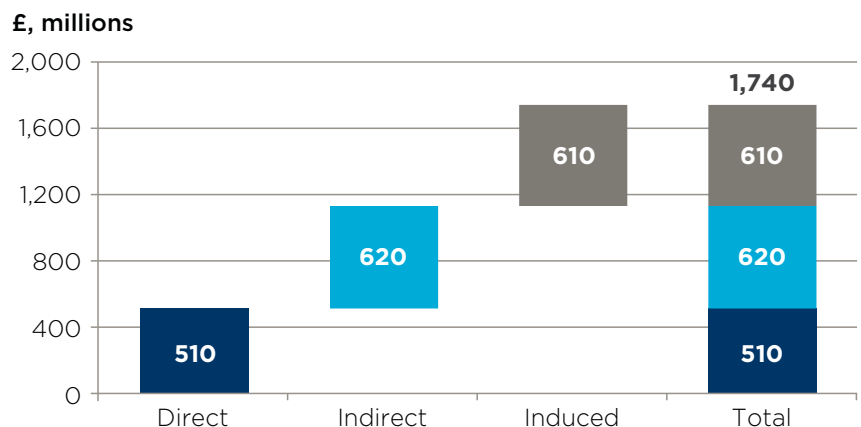
**Fig. 12: Breakdown of jobs supported by Thales's activity in the UK, 2017**



Source: Thales, Oxford Economics

Totals may not sum due to rounding

**Fig. 13: Breakdown of Thales's total impact on UK GDP, 2017**



Source: Thales, Oxford Economics

Totals may not sum due to rounding

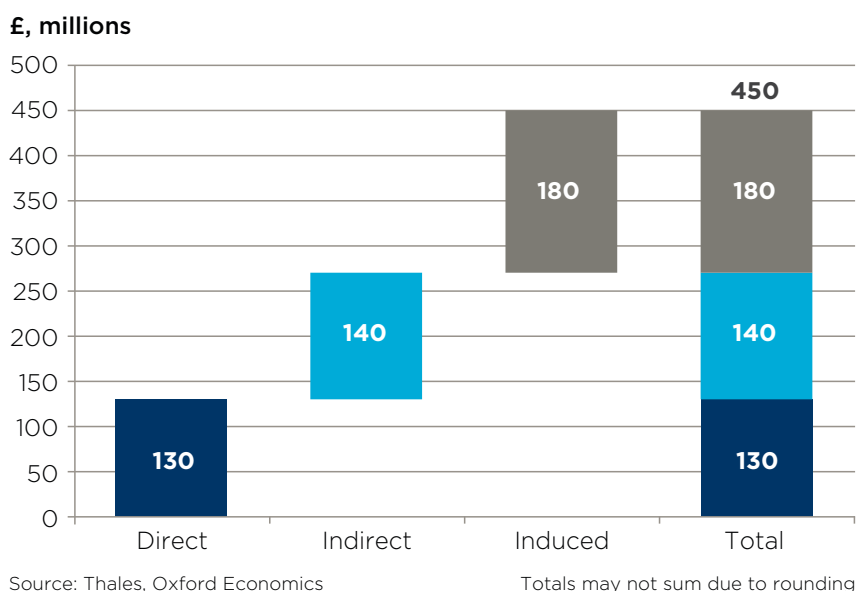


HMS Queen Elizabeth aircraft carrier, designed by Thales and built in partnership with the Aircraft Carrier Alliance.

**Thales's activities in the UK also supported a total tax contribution of over £450 million in 2017.**

For scale and context, this would be sufficient to cover the median salaries of around 12,600 secondary school teachers.<sup>3</sup> The largest share of this, £180 million, was generated through the induced impact of spending by Thales workers and those in the Group's supply chains. The induced tax contribution is boosted by the fact that much consumer spending attracts more VAT and other duties than the intermediate purchases made by supply chain companies and Thales itself.

**Fig. 14: Breakdown of total tax contribution supported by Thales activity in the UK, 2017**



## 4.2 REGIONAL IMPACTS

In Section 2.1, we presented information on the number of people directly employed by Thales in each UK region. Using information on the company's supply chain spending, plus the value of wages paid to Thales's UK employees in each region, we can estimate the indirect and induced effects accruing to each part of the UK.

This confirms that through the direct, indirect and induced channels, Thales supports economic activity in every UK region. The largest concentration of jobs is estimated to be in the South East, where Thales's large sites in Crawley and Reading support

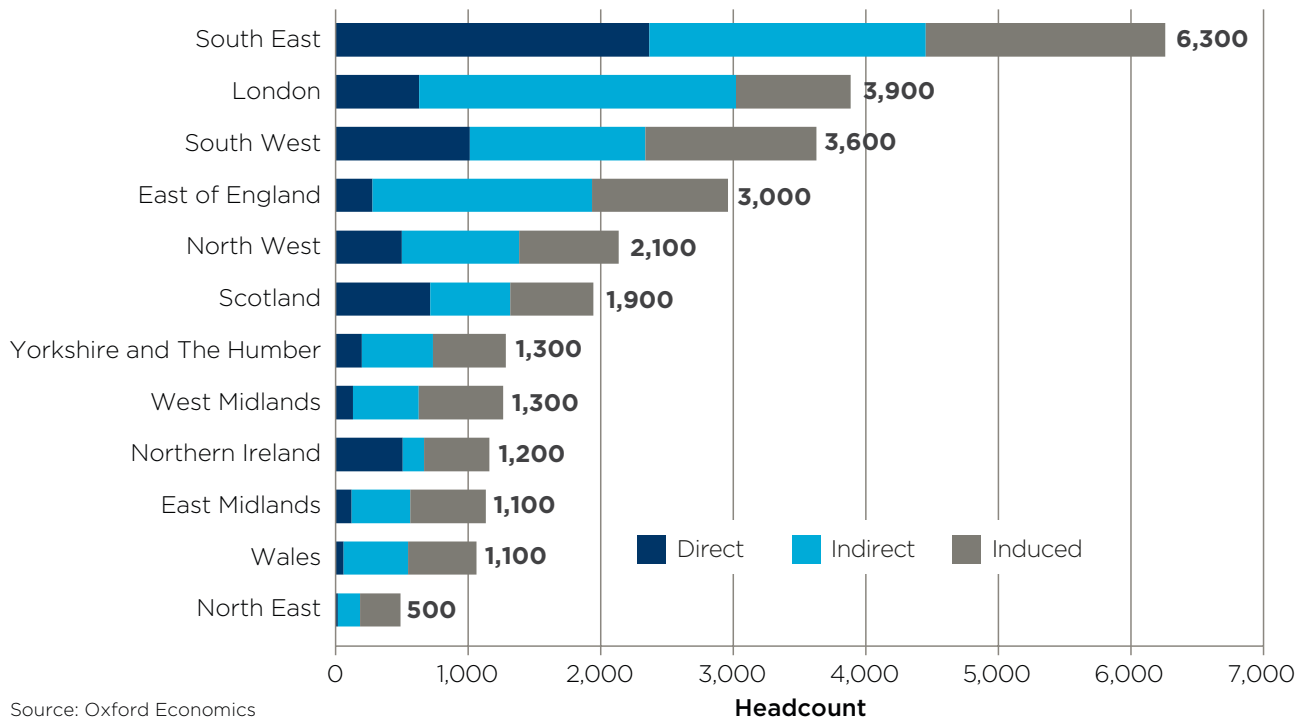
jobs directly, and through the induced channel as workers at these sites spend their wages in the local economy.

The largest indirect contribution to employment is recorded in London, where Thales Group's supply chain purchases supported around 2,400 jobs. London has the largest share of Thales's procurement spending, particularly in systems and software engineering. When combined with those directly employed by Thales, and the London jobs supported by workers' spending, Thales is found to have sustained almost 4,000 jobs in the capital in 2017 (see Fig. 15).

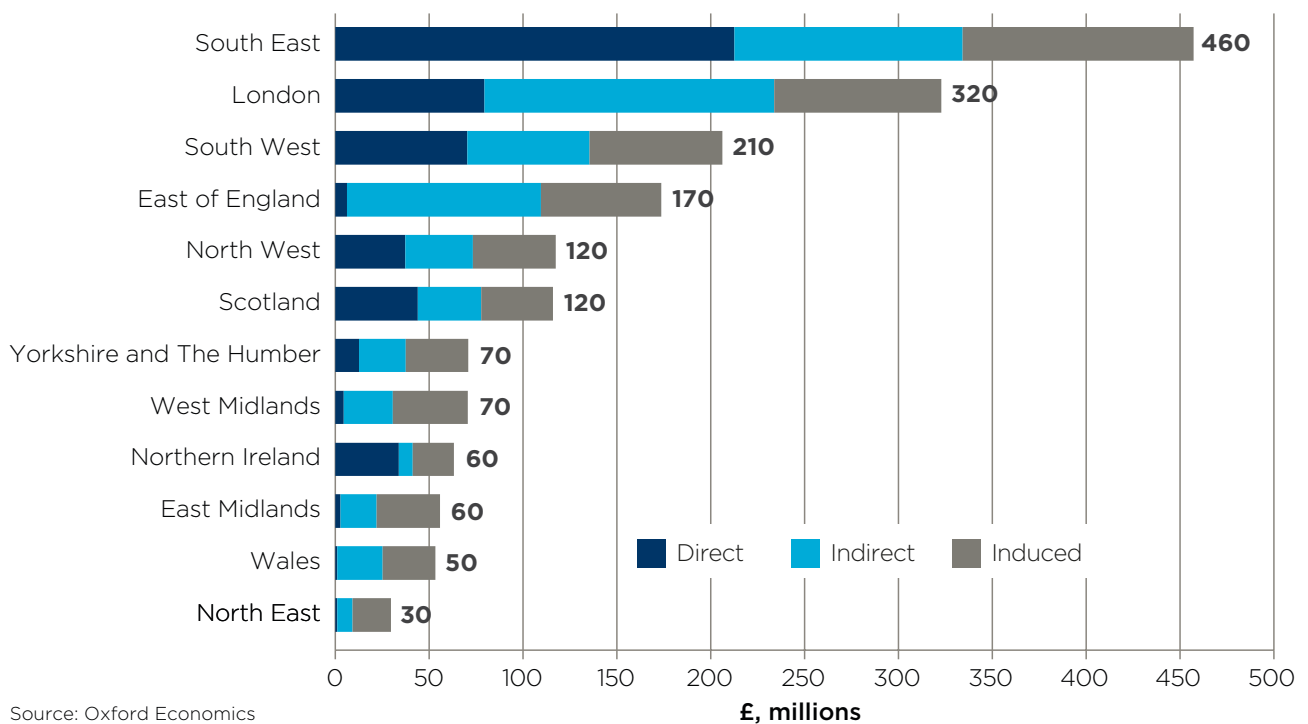
Furthermore, Thales supported a total of 2,000 or more jobs in each of the South West, East of England, and the North West.

Along similar lines, we can also estimate how Thales's total GDP contribution is distributed across the UK. Once again, the largest contribution is found to have accrued within the South East, where Thales supported a GDP contribution of more than £400 million in 2017 (see Fig. 16).

**Fig. 15: Total jobs supported by Thales activity in the UK, 2017**



**Fig. 16: Thales's impact on GDP by UK country and region, 2017**



## 5. THALES'S ECONOMIC IMPACT BY BUSINESS AREA

In this chapter, we analyse the effects of Thales's civil and military businesses separately, and provide estimates for each of their contributions to UK GDP and employment in 2017.

This analysis is based partly on additional data specific to each section of the business, and partly on assumptions based on the best-available knowledge. For instance, we have information on the number of employees and value of wages in each part of the business, but we do not have a breakdown of profits. We therefore estimate the direct GDP contribution based on the respective proportion of total gross wage bill for Thales in the UK.

Thales's UK supply chain spending data were provided with an identifier showing whether each line item relates to the civil or military business. Less detail is available for spending in the UK by overseas Thales Group entities: a high-level split was applied in that case, with the majority relating to the civil business.

Thales's UK capital expenditure was assumed to be split between the two businesses along the same lines as worker headcount, reflecting that much of the capital spending relates to fit-out costs for the premises which accommodate Thales staff.

### 5.1 DEFENCE BUSINESS

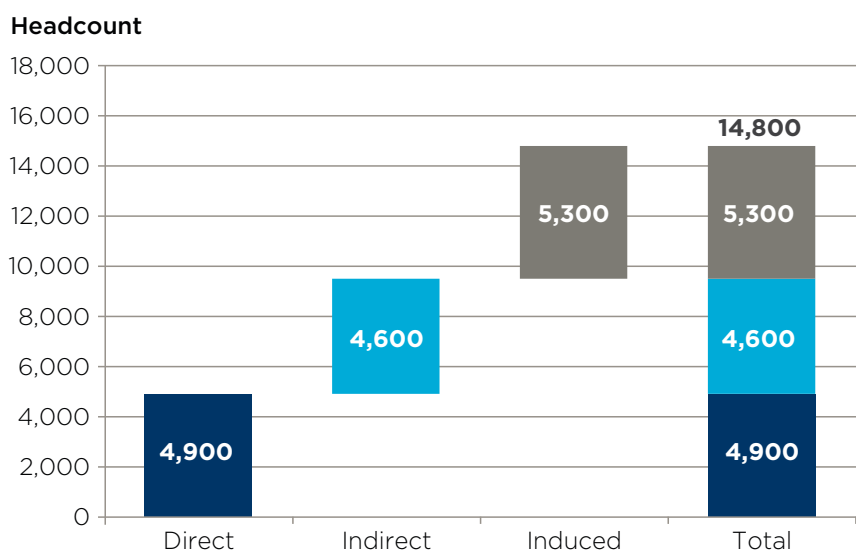
Thales's defence business in the UK directly employed nearly 5,000 staff in 2017—roughly three-quarters of Thales's total direct UK employment that year.

We calculate that the work carried out by these staff directly contributed £380 million to UK GDP in 2017. Again, this is roughly three-quarters of Thales's total contribution to UK GDP that year.

On top of this direct activity, UK supply chain spending associated with Thales Group's defence business is found to have supported 4,600 jobs in 2017. A further 5,300 jobs were supported by the employee spending of Thales's defence business and its supply chain.

**In total, we calculate that Thales's defence activities supported nearly 15,000 jobs across the UK in 2017** (see Fig. 17).

**Fig. 17: Jobs supported by Thales's defence activity in the UK, 2017**



Source: Thales, Oxford Economics

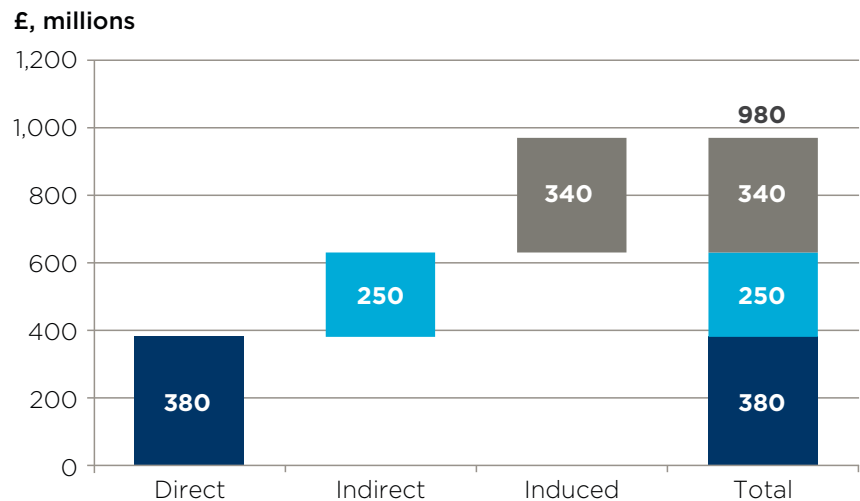
Totals may not sum due to rounding



Thales's Biological Surveillance and Collector System (BSCS).

Taking into account the indirect supply chain effects and induced worker spending impacts, we calculate that **Thales's defence activities contributed just under £1 billion in GDP to the UK economy in 2017** (Fig. 18).

**Fig. 18: GDP contributed by Thales defence activity in the UK, 2017**



Source: Thales, Oxford Economics

Totals may not sum due to rounding

## PROSPERITY THROUGH SOVEREIGNTY

Aside from the measured contributions to employment, exports, and GDP, Thales directly contributes to the land, air, and sea defence capabilities of the UK and its allies. For example, sonar technologies developed by Thales provide a key input into the submarines of the Royal Navy in the UK, as well as those of allies such as the Royal Australian Navy, and the French Navy. Thales has also aided the UK's Ministry of Defence (MoD) in addressing new threats, such as cyber attacks, providing the MoD with software, hardware, and expertise to combat these threats.

Thales's innovation and production therefore contributes to a strong UK defence capability. As discussed in a government review, *Growing the Contribution of Defence to UK Prosperity*,<sup>4</sup> led by Phillip Dunne MP, the defence industry facilitates national security and international order. This in turn promotes a stable and safe environment for trade, investment, and tourism.

Without the certainty that the defence sector helps to provide, business confidence in the UK could not be as strong, reducing the incentive to invest in infrastructure, capital, and research, and limiting the long-term growth of productivity and living standards. The sector cannot stand still, so continued innovation is required to develop modern deterrents—and the research that Thales carries out contributes significantly towards this technological progress.

As well as providing cutting-edge technologies, Thales business process innovations have contributed cost savings to the MoD. For example, in 2013, Thales won a 10-year, £600 million contract to provide in-service support for the Royal Navy's major sensor systems. This new agreement allows for efficiencies by combining several previous contracts, and is expected to deliver around £140 million of savings compared to existing arrangements.

## 5.2 CIVIL BUSINESS

Thales's civil business in the UK directly employed around 1,600 staff in 2017, roughly one-quarter of Thales's direct UK employment. We calculate that the work carried out by these staff directly contributed £120 million to UK GDP in 2017.

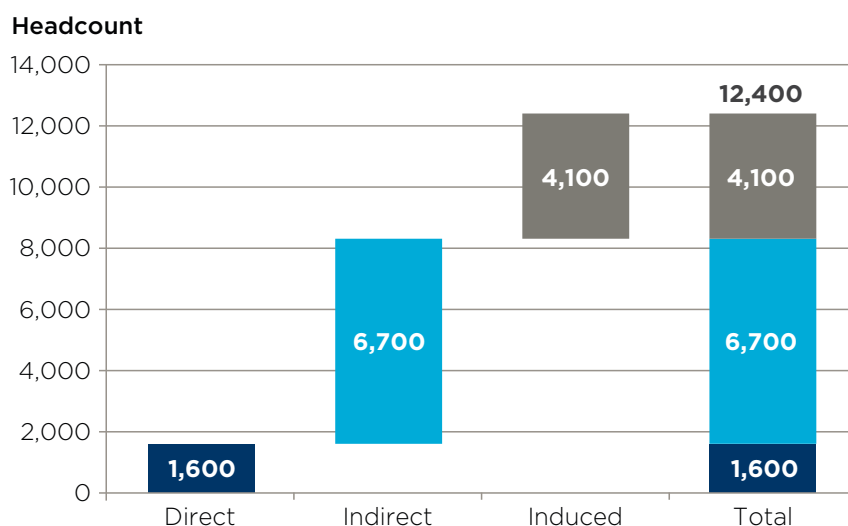
On top of this direct activity, we find that Thales Group's civil business supported 6,700 UK jobs in its supply chains. A further 4,100 jobs were supported by the consumer spending of Thales and supply chain employees.

**In total, Thales's civil activities are therefore found to have supported 12,400 jobs in the UK in 2017** (see Fig. 19).

Taking into account the indirect supply chain effects and induced wage-related spending impacts, in aggregate we also find that **Thales's civil business activities contributed £760 million to the UK economy in 2017** (Fig. 20).

In Section 6.2, we will outline some examples of how the goods and services provided by Thales's civil business contribute to productivity in other sectors of the UK economy.

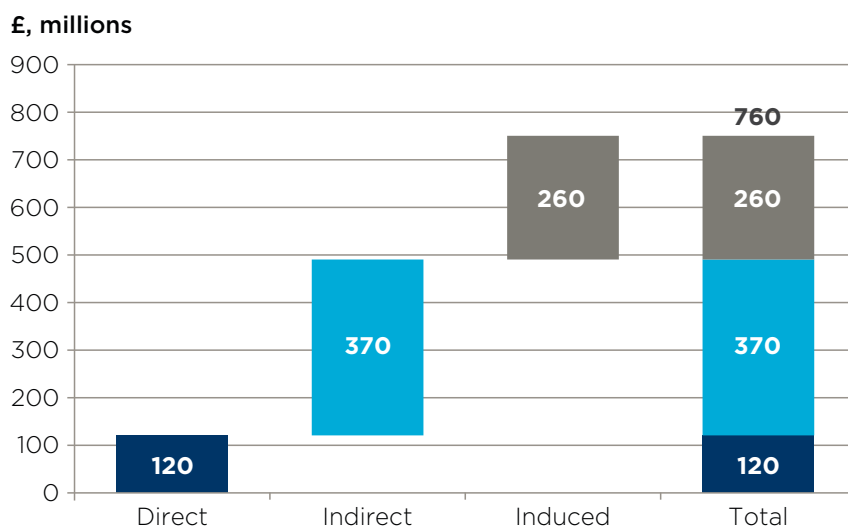
**Fig. 19: Jobs supported by Thales's civil activity in the UK, 2017**



Source: Thales, Oxford Economics

Totals may not sum due to rounding

**Fig. 20: Breakdown of total GDP contributed by Thales's civil activity in the UK, 2017**



Source: Thales, Oxford Economics

Totals may not sum due to rounding

## 6. THE ‘CATALYTIC IMPACTS’ OF THALES ON THE UK ECONOMY

Over and above the “core” economic impacts of Thales outlined in previous chapters, the company also generates a range of broader economic benefits which contribute to the UK’s longer-term economic competitiveness and productivity. These benefits are typically much harder to measure than the core economic impacts, since they accrue gradually and may be dispersed across different sectors of the economy. Nonetheless, they form an important component of Thales’s overall economic contribution to the UK.

**In this chapter, we focus on the two most important types of “catalytic impact”.**

We start by outlining Thales’s contribution to the UK’s innovative capacity through its research and development initiatives, and how the resulting goods and services enhance productivity among those who use them. We then consider how Thales contributes to the UK’s skills base through its engagement in a range of initiatives to encourage the study of science, technology, engineering and maths (STEM) subjects, and to promote careers in these fields.

### 6.1 RESEARCH AND INNOVATION

Increasing productivity is considered “the only sustainable way of improving living standards in the long run”.<sup>5</sup> The UK government identifies innovation as one of the five drivers that can boost productivity.<sup>6</sup>

In light of disappointing recent levels of productivity growth, the UK government is particularly keen that R&D investment increases in the years ahead. It has set a target for the UK public and private sectors to invest a combined total of 2.4 percent of GDP in domestic R&D by 2027—up from 1.7 percent in 2016. The defence industry has a particularly important role in helping the UK to achieve this objective, given its long history of innovating new technologies and the research expertise, networks, and infrastructure which exist within the sector. Indeed, the government has noted that “historically, there has been a strong correlation between defence research and technological advances across society”.<sup>7</sup>

Nonetheless, the latest figures show government funding for defence R&D falling steadily by 2.5 percent a year, in real terms, between 2010 and 2016.<sup>8</sup> There is therefore an increasingly important role for private funding to sustain innovation within the defence sector.

In 2017, Thales carried out £130 million of R&D activity. This includes self-funded research and performing R&D funded by industry partners and customers. Initially, the returns from these investments would be expected to accrue to Thales and its customers, but as the knowledge created is shared more widely, the benefits spread into the wider economy.

<sup>5</sup> UK Office for National Statistics, *Productivity Handbook*, Chapter 3.

<sup>6</sup> For example, as laid out in Budget 2005, Chapter 3 *Meeting the Productivity Challenge*.

<sup>7</sup> Philip Dunne MP, “*Growing the Contribution of Defence to UK Prosperity: A report for the Secretary of State for Defence*”, July 2018.

<sup>8</sup> ONS data series C3VM from Gross Expenditure on Research and Development release [Accessed January 2019].

## ACADEMIC LINKAGES

As well as carrying out R&D work in-house, Thales provides significant support and funding to staff and students at universities and other research institutions.

Thales helps to support projects funded by the Engineering and Physical Sciences Research Council (EPSRC), working alongside partners such as NASA on innovative studies covering topics ranging from autonomous equipment to artificial intelligence and cyber security. To date, Thales has provided £7.4 million of contributions in kind such as providing students with access to data, facilities, equipment and experts, as well as direct spending on new equipment. In addition, Thales has sponsored 45 PhD students, including 15 at the Centre for Doctoral Training for Applied Photonics at Heriot Watt University since 2005.

One doctorate student sponsored by Thales is Hannah Rose, an Acoustics Engineer who is also part of the Acoustics and Materials Team. Hannah is currently studying part-time for a PhD at the University of Glasgow researching next generation piezoelectric materials and how to use them in future sonar devices. As an alumni of the graduate programme Hannah is combining her role at Thales with her studies: "I find my job fascinating. I've worked on many interesting projects and this opportunity allows me to establish work at an internationally competitive level whilst retaining my current position. The work I'm carrying out in my PhD maintains links to universities and scientific communities and demonstrates Thales's commitment to collaboration."

As well as contributing to EPSRC-funded projects and sponsoring doctoral students, Thales has ongoing global strategic partnerships with two UK universities, such as the Thales-Bristol Partnership on Hybrid Autonomous Systems Engineering with the

University of Bristol. This partnership focuses on solving issues associated with running autonomous vehicles alongside human-operated equipment, including in the rail industry, and search-and-rescue missions.

In February 2019, Thales has entered into a major five-year strategic partnership with the University of Southampton, which will help to shape the future of the Royal Navy. The first research project will look at maritime autonomous vehicles – a particular area of interest for the Royal Navy – to develop the technology, processes and procedures needed to empower the next generation of unmanned surface vessels, submarines and aircraft.

Cranfield University is another university that has an important partnership with Thales. The company has committed £8 million over 10 years to be invested in the university's Digital Aviation Research & Technology Centre. This project is seeking to improve digital technology in aviation, to address challenges such as greater air-traffic density and the integration of drones into civilian airspace.

Furthermore, Thales has provided support to the UK Rail Research and Innovation Network (UKRRIN), which will see the development of three new rail Centres for Excellence at universities around the country: for Digital Systems (led by the University of Birmingham), for Rolling Stock (led by the University of Huddersfield), and for Infrastructure (led by the University of Southampton). Thales has committed £1 million to this initiative, alongside government funding and contributions from other industry partners. UKRRIN aims to offer industry access to purpose-built, world-leading facilities and skills, to support innovation in the rail sector and the development of new products and services. The ultimate aim is to build UK rail capacity and increase rail sector productivity and performance.

## 6.2 SUPPORTING PRODUCTIVITY IN OTHER SECTORS

Thales produces goods and services for a wide range of clients outside the defence sector—enabling businesses in many parts of the economy to operate more efficiently, with knock-on productivity gains across the UK. In this section, we focus on two areas where wider productivity benefits are particularly pronounced: transport, and cyber security.

### 6.2.1 Transport system enhancements

Thales's UK Transport business, which has its main centres in London and Manchester, has for many years worked closely with the country's transport infrastructure providers, to increase the capacity and performance of UK transport networks.

#### Rail

In the capital, Thales has been an important supplier for many years to Transport for London. Thales's signalling technology has been in service on the Docklands Light Railway since 1994, and in 2007 was upgraded to allow for an increase in passenger capacity of 50 percent.

Thales delivered signalling upgrades on the Jubilee and Northern lines between 2005 and 2012, increasing capacity by 33 percent and 20 percent respectively, and collectively supporting an extra 24,000 passengers per hour.<sup>9</sup> Similar work is underway on the

Circle, District, Metropolitan, and Hammersmith and City lines in a project known as "Four Lines Modernisation". The project introduces the new signalling system in stages and will be complete in 2023, ultimately increasing the number of trains from 28 to 32 per hour in central London.<sup>10</sup>

In Manchester, Thales (in partnership with M-Pact) delivered the most recent Metrolink extension. This contract covered design, construction, and management responsibilities, as well as the implementation of a new Thales tram management system. The project is expected to take five million car journeys off local roads every year, and to increase the number of passenger trips on the network each day from 55,000 to 90,000.<sup>11</sup>

#### Road

Thales works with infrastructure company Mouchel Group to create and operate the new National Transport Information Service on behalf of Highways England. This £57 million service, based in Birmingham, is responsible for providing historical, real-time, and predictive traffic and incident information to businesses, the travelling public, and Highways England's operations.

The system collects real-time traffic information from over 10,000 fixed sites on the motorway and road network, from electronic loops in the road surface and automatic number plate recognition cameras at the roadside. This information is used to inform Highways England's operations, to keep the network flowing smoothly, and to provide



Thales tram management system on Manchester Metrolink.

<sup>9</sup> <https://www.thalesgroup.com/en/united-kingdom/news/keeping-london-safe-secure-and-move>

<sup>10</sup> <https://www.thalesgroup.com/en/worldwide/transportation/press-release/modernisation-tube-closer-ever-after-successful-weekend>

<sup>11</sup> <https://www.intelligenttransport.com/transport-news/12561/thales-celebrates-launch-of-new-greater-manchesters-metrolink-line-to-ashton-under-lyne-and-success-at-light-rail-awards/>

more accurate information on current conditions and expected journey times to the general public. Improved information on road conditions would be expected to enable road users to plan more effectively and save time.

### Air

Thales helped to pioneer advanced in-flight communication systems for aircraft, beginning with Racal Avionics developing a single channel system for use on small business aircraft. The success of this led to the MCS3000, the first system for providing telephone communications to passengers on commercial aircraft while in flight.

This project launched the Thales Avionics business in this market. In the UK, it now has a turnover of more than £200 million, and boasts a major share of the global airborne connectivity market. The European Aviation Network was launched in 2018, providing 4G in-flight connectivity across the EU. This means passengers can remain in contact with colleagues and access the internet while flying, enabling them to increase their productivity while airborne.

### 6.2.2 Cyber security

UK businesses face an increasing threat from online attacks, with the number of incidents rising according to the National Cyber Security Centre.<sup>12</sup> Cyber attacks damage productivity: the Department



for Health and Social Care estimates the impact on the NHS from 2017's WannaCry cyber attack to have been £92 million in lost output and IT costs.<sup>13</sup> As the prevalence of such criminal activity continues to rise, it is increasingly important for businesses to protect themselves.

To aid this, Thales Group has an established worldwide digital security business. The company employs 10,000 software developers, 5,000 critical IT and cybersecurity engineers—including 120 specialists in the UK—and has five dedicated centres in Europe, Canada, and Hong Kong. Thales contributes to the protection of around 80 percent of all banking transactions globally, and supports the data security of 19 of the 20 largest banks.

In the UK, Thales worked with Williams Martini Racing in 2016 to identify how this Formula One team and engineering

company could be better protected against data threats. Data and information about the performance of the cars and team are secured through Thales's cybersecurity service, to protect the intellectual property developed by Williams Martini. The initial partnership led to further collaboration with Williams Advanced Engineering, the company's technology arm, utilising Thales's expertise in areas as diverse as biological and chemical warfare detection systems.

To help prepare the country against future threats, Thales in January 2019 established a new centre for excellence for digital and cybersecurity in Wales; the National Digital Exploitation Centre is based at Ebbw Vale. Thales will work with the Welsh Government, Blaenau Gwent Council, and the University of South Wales to develop the centre, which will act as a catalyst for digital and cyber educational training and research facilities.

<sup>12</sup> <https://www.ncsc.gov.uk/news/cyber-summit-launches-report-showing-growing-threat-uk-businesses>

<sup>13</sup> <https://www.gov.uk/government/publications/securing-cyber-resilience-in-health-and-care-october-2018-update>

### 6.3 WIDER SKILLS INITIATIVES

In Section 2.1, we outlined the main ways in which Thales develops the skills of its employees. The company's contribution to the UK's stock of "human capital" is not, however, confined to Thales employees. 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.

#### Schools

The government has identified the "need to tackle shortages of STEM skills, as these skills are important for a range of industries, from manufacturing to the arts".<sup>14</sup> Thales is working to help address this shortage, partnering with schools to encourage pupils to take an interest in scientific and mathematical subjects.

As part of the Teach First scheme, Thales has appointed employee mentor-coaches to support teachers of STEM subjects in participating inner-city schools across the UK. In addition, 10 teachers take up summer placements at Thales's Crawley and Reading sites each year to gain first-hand experience of how STEM skills are applied within the industries in which the company operates. Thales also gains from this programme, as the participating teachers are asked to help develop teaching materials which can be used across Thales's various outreach initiatives.

The company has nominated 80 STEM Ambassadors, who work with STEMNET, the UK's largest provider of education and careers support in science, technology, engineering and mathematics. STEM Ambassadors volunteer their time and energy to encourage young people to progress further in these subjects at school, through careers talks, mentoring, and classroom activities. For example, one Thales Ambassador, an employee at the Bury St Edmonds site, has worked with a local primary school to create four interactive sessions, teaching children aged five to 11 about the universe. In one session, the children look at aerial pictures of the school, gradually zooming out until space is reached; in others, they act out solar system dynamics.

Thales also offers school children the opportunity to see what working as an engineer is really like through its work experience programme. The placement comprises a week for 12 students from local schools to experience the different business departments and see how they come together to deliver results. The company's lead for the programme at the Cheadle site reports that it "shows children how there is more to STEM than engineering alone, and perhaps shows the industry in a different light".

#### Universities

To help drive innovation at university level, Thales created Project Arduino. This is a competition that challenges students to use Arduino, an open-source electronics prototyping platform, to build new and innovative products or services that fit into one of Thales's five key markets of Aerospace, Space, Transportation, Defence, and Security. The competition started in 2014 in the UK, expanding to the United States in 2015 and internationally from 2016. To kick off each year's competition, Thales hosts a workshop in various universities, after which the students are given two weeks to build something using the Arduino micro-controller they receive at the workshop.

The students are partnered with Thales engineers who train them on how to work with Arduino, providing an opportunity for students to network with Thales's experts, benefit from knowledge transfers, and learn teamworking and technical skills. Previous winners included 2016/17's Team DroneShell from the University of Embry-Riddle in Florida, who developed a solar-powered drone landing platform, designed to service autonomous delivery and reconnaissance drones in remote locations. Their innovation has potential applications in the fields of smart cities and intelligence, surveillance and reconnaissance.

40 <sup>14</sup> UK Government Industrial Strategy, 2017, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf)

## FUTURE MARTIANS

As part of an outreach programme in the UK called “Future Martians”, Thales Alenia Space runs the MARSBalloon programme, a hands-on project aimed at school students, designed to encourage them and their teachers to learn more about space.

Pupils create experiments that are housed in a protective shell and carried by a weather balloon to an altitude of 30km, where the temperature, pressure and radiation of the atmosphere are very similar to the surface of Mars. Thales Alenia Space's team launch the balloon, monitor its progress, and retrieve it once it has landed, returning the experiments to the schools so that pupils can monitor their results.

The project is open to any UK primary or secondary school and gives students practical experience of designing things to go into space. This demonstrates to students how fun and diverse careers in engineering and science can be, but also engages them with rigorous scientific thinking and processes—the skills needed to compete in a high-tech world.

MARSBalloon team member and Thales Space Systems Engineer Chris Hanbury-Williams said: “We need to encourage and nurture an interest in Science, Technology, Engineering and Mathematics – the so-called STEM subjects. They are essential for our future, and with projects like this, we can do that and have some fun at the same time.”

“We need to encourage and nurture an interest in Science, Technology, Engineering and Mathematics – the so-called STEM subjects. They are essential for our future, and with projects like this, we can do that and have some fun at the same time.”

The Future Martians programme also gives final-year undergraduate students the opportunity to design, construct, and deploy a robotic rover on terrain similar to that found on the surface of the Moon. This enables them to learn about real-world space engineering skills, and encourages them to consider careers in the space industry. As a result of the competition, a number of students have gained internships with Thales Alenia Space.

## THE PRINCE'S TRUST

For young adults, Thales has worked with the Prince's Trust to deliver the "Get into Engineering" programme, to encourage unemployed but work-ready 16-to-25 year olds to become engineers. This programme is based on a voluntary collaboration of UK employers, and aims to tackle youth unemployment through the provision of high-quality vocational training and work experience placements. Thales's Glasgow site played host to nine manufacturing candidates after a successful Taster Day held at the Prince's Trust headquarters. The success of the venture is demonstrated by Thales offering six of these nine candidates either permanent or fixed-term roles within the Glasgow site.

One example of a current employee who joined through the Prince's Trust scheme is Ashlyn, who joined after realising, six months into her aviation degree at Loughborough University, that she wanted a more hands-on approach to learning. Ashlyn joined Thales Ground Transportation Systems as an apprentice in 2018, has worked with the Connect telecoms team that provides radio communications in the London Underground,

and has recently completed a course on signalling. Ashlyn says: "My journey so far at Thales has been amazing, and I've got to work on different projects and with different customers. In the future I can look to go national and international with Thales, including Manchester, Canada or South Africa."



“My journey so far at Thales has been amazing, and I've got to work on different projects and with different customers.”

## Supporting family life through flexible working

Women are particularly under-represented in the UK's engineering sector. The country has one of the lowest proportions of female engineering professionals in Europe,<sup>15</sup> at just 11 percent in 2017.<sup>16</sup>

To try to address this imbalance, Thales has a number of policies and frameworks in place that allow all employees to balance their home lives and career responsibilities. On

top of maternity and paternity packages, Thales's "smart working" policy allows those with caring responsibilities to flexibly work from home or at different times of day as required, and to compress a five-day week into four days.

Thales also recognises the importance of the knowledge built up over peoples' careers in the mentoring of those in their early careers, and offers flexibility to those reaching

retirement. For example, Alan Rae worked as an external stakeholder manager at Thales Glasgow, having joined the company in 1981. After reducing his working week to four days in the months before his retirement, Alan decided that he would like to remain at Thales for two or three days a week. This kind of arrangement ensures that valuable technical and organisational skills are retained within the Thales (and UK) workforce for longer.

<sup>15</sup> The Women's Engineering Society, <https://www.wes.org.uk/content/wesstatistics>

<sup>16</sup> Women in Science and Engineering (WISE), <https://www.wisecampaign.org.uk/statistics/women-in-stem-workforce-2017/>



## 7. CONCLUSION

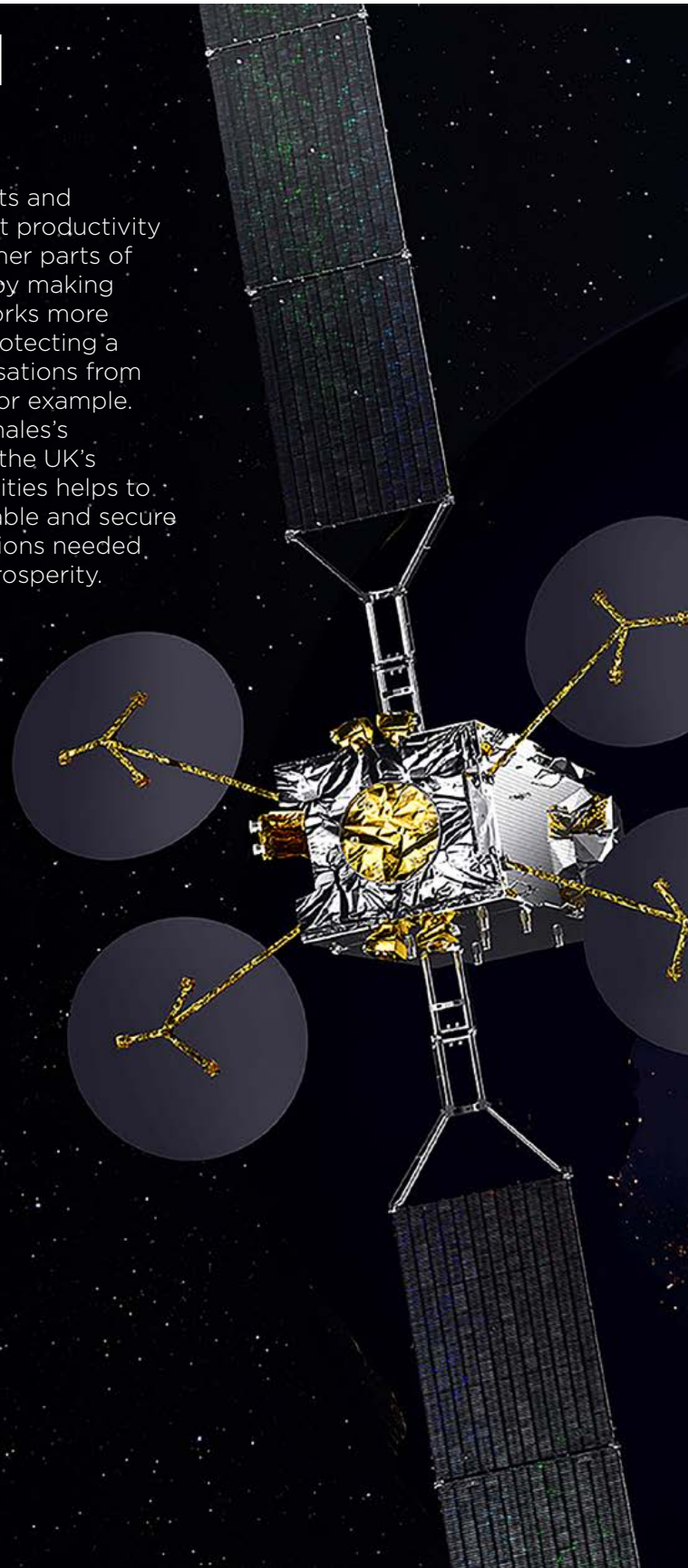
Thales makes a significant contribution to the UK economy through:

- its domestic operations;
- the UK procurement expenditure of both Thales Group's UK and overseas businesses; and
- the wage-related spending of the company's employees, and of workers in its supply chain.

Overall, Thales contributed an estimated £1.7 billion to UK GDP in 2017 and supported 27,200 jobs, as well as generating over £450 million of tax revenue. Of this, Thales directly supported 6,500 UK jobs and over £500 million of economic activity, with the remainder coming from supply chain and worker spending effects.

Thales also contributes to the prosperity of the UK through several other channels. This includes driving innovation through the £130 million of research and development work that Thales performed in 2017, and the strategic partnerships maintained with UK universities and research institutions. Thales's sponsorship of PhD candidates, apprentice and graduate schemes, and schools outreach programmes helps to ensure the future supply of workers with science, technology, engineering and maths skills.

Thales's products and services support productivity across many other parts of the economy—by making transport networks more efficient, and protecting a range of organisations from cyber attacks, for example. Furthermore, Thales's contribution to the UK's defence capabilities helps to maintain the stable and secure business conditions needed for economic prosperity.





# APPENDIX

## ECONOMIC IMPACT MODELLING

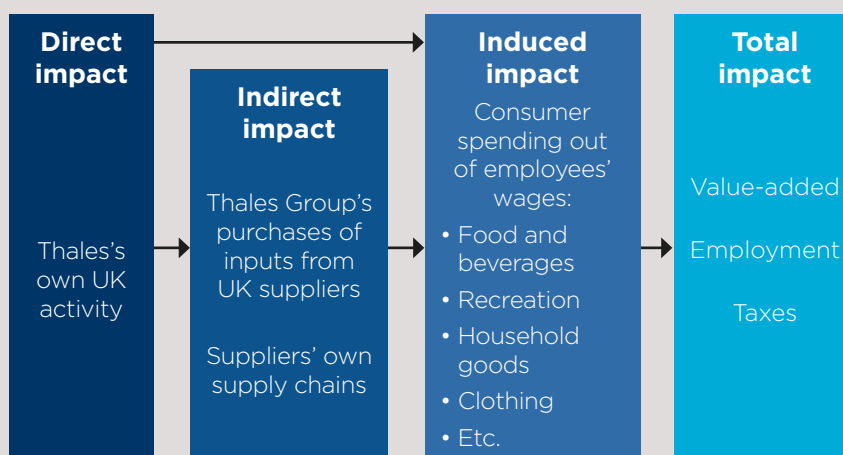
Economic impact modelling is a standard tool used to quantify the economic contribution of an investment or a company. Impact analysis traces the economic contribution of a company through three separate channels:

- **Direct impact**—refers to activity conducted directly by Thales in the UK.
- **Indirect impact**—consists of activity that is supported as a result of the procurement of goods and services in the UK by Thales Group's UK and overseas businesses, plus the further purchases of those UK suppliers, and so on.
- **Induced impact**—reflects activity supported by the spending of wage income by both "direct" and "indirect" (supply chain) employees.

### Direct impacts

Thales's direct impact is calculated using the so-called income approach. This means that we sum the components of income to obtain an estimate of the company's GVA contribution to GDP. For Thales, the relevant income components are its compensation of employees, EBITDA, and payments of business rates. Value added per employee, a measure of productivity, is derived by dividing direct value added by the number of employees.

**Fig. 21: Calculating the total economic impact through the three channels**



### Indirect and induced impacts

Indirect and induced impacts are estimated using an "input-output" model. This type of model sets out the goods and services that UK industries purchase from one another in order to produce their output (as well as their purchases from abroad). These tables also provide detail on the spending patterns of UK households, and indicate whether this demand is met by UK production, or imported products. In essence, the tables show who buys what from whom. Fig. 22 (overleaf) demonstrates a stylised input-output model.

Using details of these linkages from the input-output tables, Oxford Economics constructed a bespoke UK impact model which traces the intermediate consumption impact, and

capital good consumption impact, attributable to Thales (this is known as the Leontief manipulation). This impact model quantifies all rounds of subsequent purchases along the supply chain. These transactions are translated into GDP contributions, using UK-specific ratios of gross value added (GVA) to gross output, sourced from the UK input-output table.

Once we have obtained results for output and GVA, we estimate employment using productivity estimates.

We used the United Kingdom input-output table for 2014, produced by the ONS, for this analysis. This was the most recent input-output table for the UK at the time of modelling.

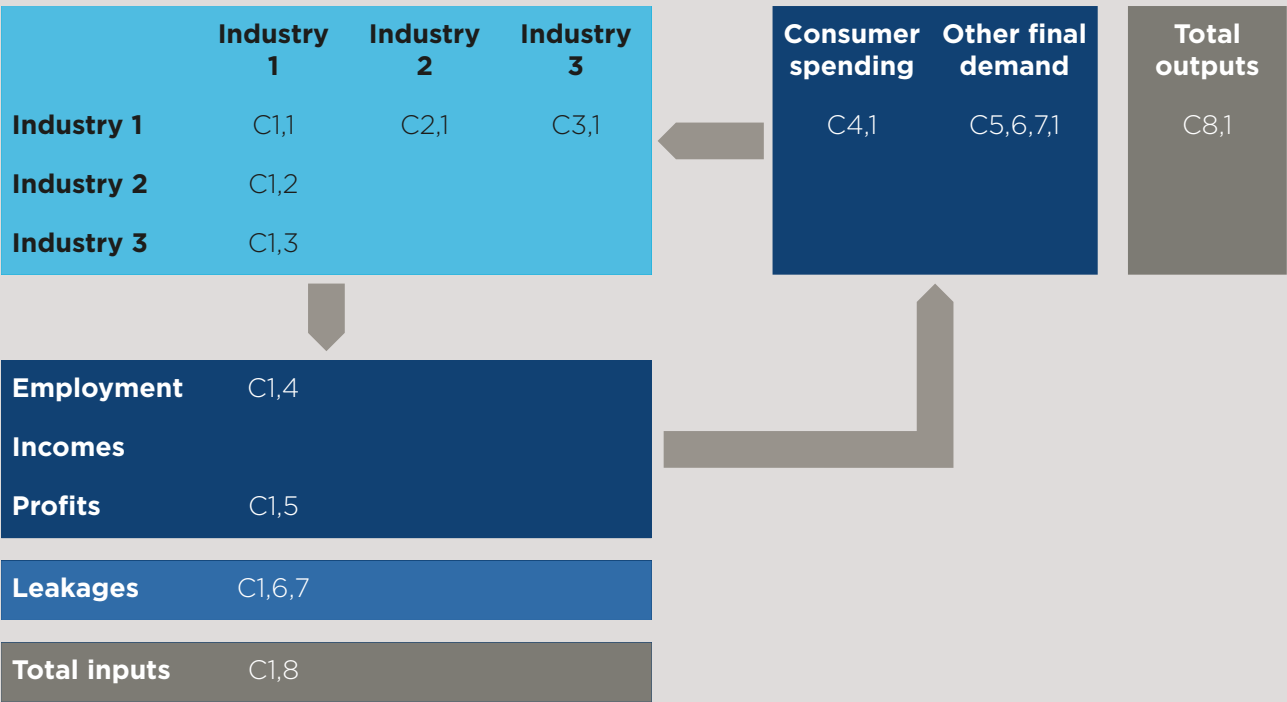
**Industry breakdowns**

The UK 2014 input-output table is divided into 105 different industry sectors, and the table shows how each sector interacts with the 104 other sectors. For purposes of illustration, to show value added and employment supported across different sectors, we have aggregated these 105 different sectors into broad industry categories.

**Regional breakdowns**

Thales’s direct contribution to GDP is calculated based on the split of gross wages by region and country of workplace, which we would expect to correlate very closely to total employee compensation. Thales’s first-round supply chain spending was provided with a regional breakdown: this is fed into the input-output model, which then estimates where latter-round indirect and induced impacts occur.

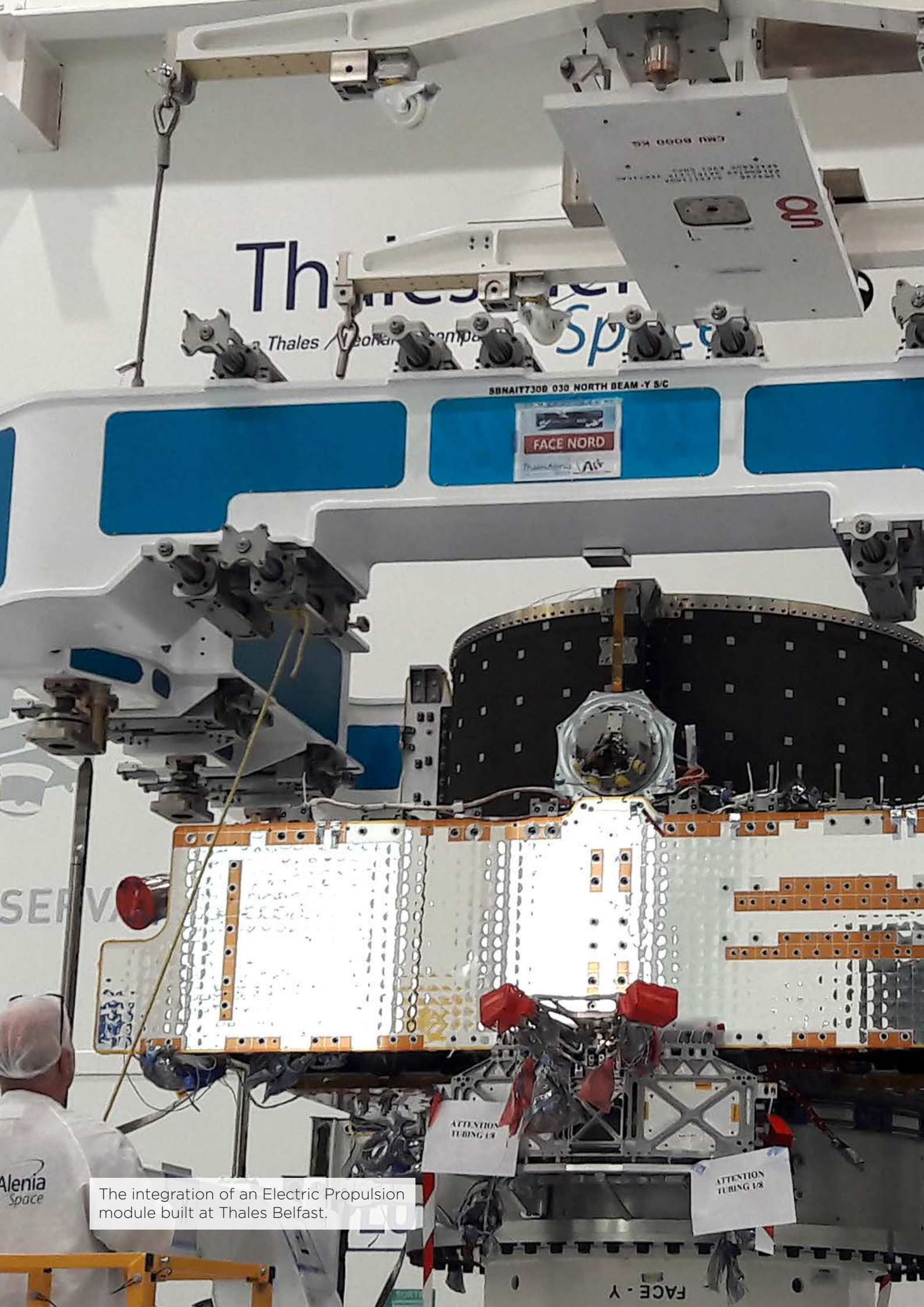
**Fig. 22: A stylised input-output model**



## BESPOKE ASSUMPTIONS FOR THIS STUDY

The previous section sets out Oxford Economics' general approach to economic impact modelling. Bespoke adjustments to these techniques have been made to allow for Thales specific data. These include the following:

- **Treatment of contract staff:** Thales employed over 1,000 UK contract workers in 2017 through an agency. A margin is retained by the agency from the fees that Thales pays, with the rest being passed on directly to contractors as wages. We ran the margin amount through the input-output model as Thales supply chain spending in the employment services category. The remainder was included in the indirect GDP contribution as contractor wages, but was not run through the input-output model under the assumption that any supply chain spending associated with these individuals (e.g. the machinery they use) will be reflected in Thales's own supply chain purchasing. The impact is split across regions based on the distribution of the contractors and attributed to the professional services standard industrial classification based on the job descriptions of the contractors.
- **Allocating procurement categories to national accounts categories:** We were provided with Thales procurement data from internal accounting systems. This provided details of the sums spent with all external companies during 2017, based on the categories used within Thales's system. The data were split by region of supplier. Oxford Economics, with advice from Thales, matched these data on a "best fit" basis with the categories used within the ONS input-output tables, to enable them to be incorporated into our models.
- Supply chain spending with suppliers in the Isle of Man and other non-UK locations was excluded. Where the region of a supplier could not be identified, we assumed that the regional distribution of spending was in line with the "identifiable" spend.
- Based on the advice of Thales, where the type of purchase was unidentifiable, purchases were allocated to the "weapons and ammunition" category for Northern Ireland and to "architectural and engineering services; technical testing and analysis services" for the rest of the UK.
- Thales employees whose usual place of work is in the Channel Islands, outside of the UK or unidentified were excluded from the analysis.



The integration of an Electric Propulsion module built at Thales Belfast.

# OXFORD ECONOMICS

Oxford Economics was founded in 1981 as a commercial venture with Oxford University's business college to provide economic forecasting and modelling to UK companies and financial institutions expanding abroad. Since then, we have become one of the world's foremost independent global advisory firms, providing reports, forecasts and analytical tools on more than 200 countries, 250 industrial sectors, and 7,000 cities and regions. Our best-of-class global economic and industry models and analytical tools give us an unparalleled ability to forecast external market trends and assess their economic, social and business impact.

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