



**Materials  
Processing  
Institute**

## THE FOUNDATIONS OF INDUSTRIAL STRATEGY

A speech given at a meeting of the Mining Institute, at the Literary and Philosophical Society, Newcastle-upon-Tyne.

7th January 2019



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## 1 Introduction

This talk aims to show that the essential foundations for an industrial strategy are energy, raw materials and trade. These aspects are important for environmental sustainability and to assure the viability of the UK to protect its sovereign capabilities, in the current climate of technological and geopolitical change.

## 2 Industrial Strategy

In shaping the future of Britain we need our industrial strategy to deliver the kind of economy and ultimately the society that we want to live in. This industrial strategy needs to be rooted in some hard foundations: energy, raw materials and trade. It is enabled by people, their innovation and skills and it needs to deliver a prosperous, fair, more equal society, in communities throughout the UK. In this talk I intend to focus on these hard foundations of industrial strategy and why securing these resources is fundamental for meeting our sustainability responsibilities to the planet for present and future generations, as well as ensuring Britain maintains its sovereign capability in an uncertain world.

The first and overriding concern is and must be for environmental sustainability. This includes of course the need to reduce carbon emissions, but to do this in a way that has a genuine global impact, not simply by the process of offshoring our own production. Similar weight must be attributed to resource efficiency, where we consider both the environmental and ethical constraints around the production of virgin raw materials and the risk of depletion of scarce resources. Ensuring that our economy is incentivised to achieve the highest standards in resource efficiency, through product design and recycling technologies, must be at the heart of any industrial strategy.

My views here have been shaped by two key recent events, in which I was an active participant and had close, first hand experience. The closure of the Redcar Blast Furnace and associated steelworks in 2015 and the vote to leave the EU in June 2016. From the first of these events I experienced at first hand the lack of appreciation at a national level, of the crucial role of the steel and foundation industries in underpinning our industrial economy.

The contrast between the absence of an intervention in the UK, leading to the closure of the Redcar Blast Furnace, with a £200m intervention by the Italian government to save their steel works in Riva at around the same time, reveals that there is uniquely in Britain, a laissez-faire approach to industrial assets, that in any other country, from Germany, to China, from the USA to Japan, are rightly regarded as a crucial part of our sovereign capability.

The second of these events, the vote to leave the EU, caused me to think far more widely about this issue and about the wider role of Britain in the world. Within days of the vote I had published a paper calling for an innovation centred, industrial growth strategy for Britain. I identified the need for investment in our ports and infrastructure to increase trade, for security of our raw materials base and most of all for a coherent industrial strategy. At the time the paper was widely regarded as too optimistic to publish, although just over a month later we had a new Prime Minister who not only announced a new industrial strategy, but also introduced it into the name of the business department. However, regarding its sections on risks to UK supply chains, with a Parliament apparently at an impasse, my paper reads more like a prophesy of Cassandra.

What both of these events taken together revealed was the great gulf in understanding that exists between the centres of power in London and the lived experience of people in places and regions where I have worked, such as Teesside, the West Midlands and South Wales. Most particularly where I live in Sunderland, where the vast majority of people voted to leave the EU, despite the dominant position of Nissan as the bedrock of the local economy, the real and genuine concerns of people are yet to be addressed.



I spend around half my week in London talking to parliamentarians, opinion formers, officials and influencers about the importance of our industrial base. Continuing to make the case for our key industries, as I will continue to do so in my new role as Chair of the UK Metals Council. I have found many sympathetic and understanding people, particularly amongst the ranks of politicians.

Yet the 'back stop' that concerns me most, regards the default position taken within many of our public institutions that continue to focus on sectors such as financial services and disregard the basic foundations of industry and trade. Until we can create a paradigm shift within government departments, academia, think tanks and the media – and yes within industry itself – then these issues will not be addressed.

For, as much as I welcome the introduction by this government of the first UK industrial strategy in decades, it seems strange that it includes a strategy for creative industries, but not for steel.

### 3 Aspect of Sovereign Capability

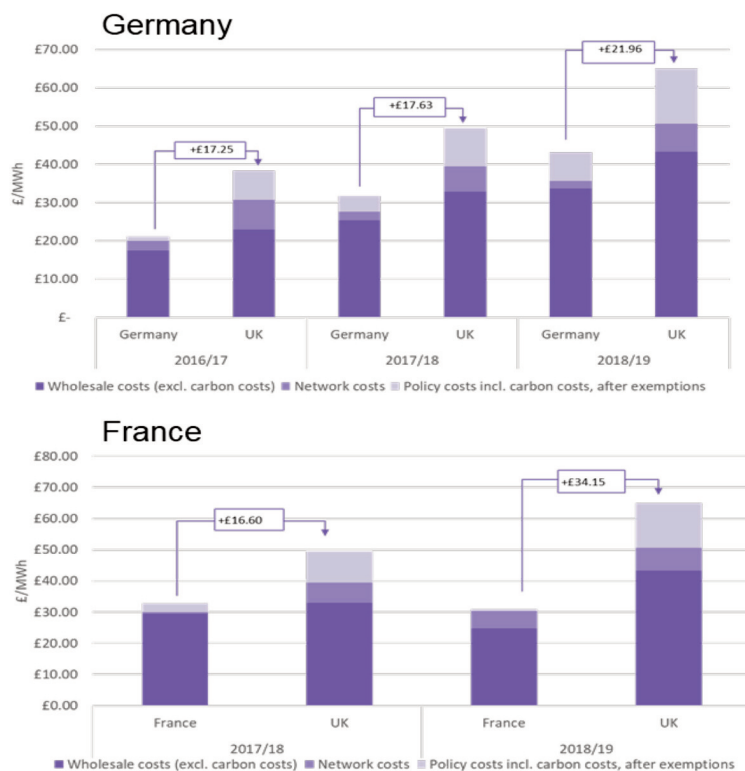
#### 3.1 Energy

The bedrock of industrial strategy is an energy policy that supports international competitiveness. This is a theme I explored in June 2018, when speaking at a policy conference in Westminster<sup>1</sup>, where I looked at the role of energy policy in shaping our economy and its importance post Brexit. Forecasts of energy pricing drive decisions on future investment and the relative competitiveness of energy costs between nations can determine the location of new factories. The difference of a few percentage points in energy prices can tip the balance between profit to loss for energy intensive users, such as steel, glass, ceramics, chemicals and cement.

Fundamental economic competitiveness in this area is important now, but will become far more so as the UK seeks to increase the proportion of trade outside the EU. A level playing field in energy is crucial, but currently energy intensive users in the UK typically pay between £21 and £34 per Mwh more for electricity than their competitors in France and Germany. This disparity is increasing. It is partly due to higher wholesale cost of energy in Britain and partly due to higher taxes, but mostly it is about higher transmission costs.

In other countries, industry receives a rebate, to recognise the wider economic and social benefits of employment. This does result in relatively higher domestic energy bills, the primary reason cited as to why such a policy is politically unacceptable in the UK. To put it bluntly, the UK prioritises giving people lower energy bills, whereas France and Germany prioritise highly paid jobs.

<sup>1</sup> A speech given at a meeting of the Mining Institute, at the Literary and Philosophical Society, Newcastle-upon-Tyne, 7th January 2019.



Source: UK Steel

If Britain is to have internationally competitive industry, then we need a proper debate about how an industrial strategy prioritises a level playing field for British manufacturers against EU competitors, let alone America and China, who currently enjoy a significant competitive advantage. This is currently an area that is absent from UK policy.

Of course, we must acknowledge government's responsibility to ensure Britain meets carbon and climate change commitments. It is self-defeating, after all, to have a thriving industrial sector, if our children live in a world facing climate chaos.

Competitive energy must therefore also be low carbon, and a potential solution exists in the transition from an oil-based to a hydrogen-based economy, a subject I explored recently in an interview with the Financial Times, which was published on 2nd January this year. Here I discussed the urgent need to address the environmental and climate change implications of our energy intensive industrial sectors and the potential for hydrogen to provide the solution.

The Materials Processing Institute is working with industrial companies and public bodies in this field, but recent foreign government-funded projects in countries such as Austria, Germany, Japan and Sweden, risk leaving the UK behind. I am pleased to say that I have met with Claire Perry, the Energy Minister to discuss this and we have made real progress through the recent announcement of industrial strategy challenge funds to accelerate innovation in this area.



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The opportunity here is for Britain to have a secure, carbon neutral and environmentally sustainable energy supply, delivered at internationally competitive costs. We must acknowledge though that we are currently lagging behind other nations in this regard and we need to move quickly to catch up.

### 3.2 Raw Materials

#### 3.2.1 Foundation Industries and Supply Chains

The second fundamental building block of an industrial economy beyond energy, is access to the materials, such as steel, metals, ceramics and glass, from which to engage in manufacturing and construction activity. There is a direct connection between materials and energy, in that the relatively high energy costs in the UK are a significant factor in the offshoring of materials and other energy intensive industries. That 5% of world electricity is used for mineral processing is an example of the energy intensiveness of this sector.

It is important we acknowledge that in Britain, unlike any other country I have experienced, these industries are placed at a unique disadvantage, due to the perception that they are part of yesterday's economy and are no longer needed. What this means is that we all need to make the case for the continued importance of these industries in a modern industrial economy. This is something I have been doing with some success since the formation of the Materials Processing Institute in 2014, working closely with government and civil servants to provide the evidence for the value of these industries.

The importance of the steel industry in the UK economy was the subject of an article I wrote for the Daily Telegraph in 2016<sup>2</sup> in response to Tata's announcement of the possible closure of Port Talbot just months after Redcar's own crisis, but the case was also well made by Nick Reilly, former head of General Motors in Europe, when, also in 2016, he described the steel industry as essential for UK manufacturing supply chains in automotive and aerospace<sup>3</sup>. In the same year the IPPR published a report<sup>4</sup>, which made the case for the wider foundation industries sector and its contribution to the manufacturing economy that runs well into the supply chains, and we have seen more recent championing from the TUC's "All Tomorrow's Jobs" report in late 2018 and the work of Siemens UK CEO, Juergen Maier.

To understand why these foundation industries are so important we need to refocus on the broader impact of relying on UK industry and the wider impact of supply chains – to recognise, for example, that for companies such as Nissan there are eight jobs in the supply chain for every job at the Washington plant.

Perhaps this is where we might even derive opportunity out of necessity, given that with Brexit the UK will soon be acting as a third country to the EU so exporters will rapidly need to fulfil rules of origin requirements of over half the supply chain being UK-sourced to abide by any free trade agreements. Afterall, for example, Colin Lawther, Vice-President of Manufacturing at Nissan, told the House of Commons Business Select Committee just last year that roughly 16% of the Nissan plant's supply chain is paid for in pounds sterling sourced from within the UK – just one-sixth of components. So to reach the UK car manufacturing average of 45% – let alone rules of origin requirements – any free trade agreements will demand that Nissan needs to start sourcing much more domestically; possibly creating tens of thousands of more supply chain jobs.

This opportunity has potentially been lost as a result of decisions concerning the application of rules of origin in the proposed withdrawal agreement, but nonetheless, the jobs are primarily in the supply chain and the supply chain relies on the materials sector for collaboration on innovation, new product development and fundamental materials supply. Indeed, perhaps if we had been doing this years ago then there might have been 135,000 North East workers in the Nissan supply chain rather than 35,000 – and many more might have felt an incentive to vote Remain.

We shall never know, but we must remember that the supply chain companies are often small to medium sized businesses, that are significant employers in their respective regions. In recent times they were expected to benefit from a trickle down effect of public sector investment in the prime manufacturers at the end of the supply chain, but never did and who lacked the direct voice to Government make their case. This crucial part of the economy everybody knows in Germany is referred to as the 'Mittlestand', but which in Britain is not well understood. These companies, that were the most Eurosceptic part of British industry, now have the most to gain domestically from the new industrial strategy emerging from Britain's post Brexit thinking – albeit with mirroring challenges to those who export into EU supply chains – but more than this, they and their success is absolutely essential to the future prosperity of the UK as a whole.

There are also though threats to these supply chains as the transformative technologies for the 4th industrial revolution take hold. Take for example additive layer manufacturing, also known as 3-D printing. This technology has the potential to render obsolete large swathes of the supply chain, from machining to welding and fabrication. Value in the supply chain will collapse to two areas, materials and design. There are UK companies that are well positioned to take advantage of this, Metalysis based in Sheffield and Liberty Powder Metals, who recently announced a £10m investment at the campus of my own research institute, for the development of new metal powders. As this industrial revolution takes hold, we will clearly see the increasing importance of the foundation industries in both driving forward and capturing value from the supply chains of the future.

### 3.2.2 Critical Raw Materials

Another aspect of raw materials supply are those less well known, but still critical materials, where supply constraints are an issue, many of which have been identified by the British Geological Survey and includes materials such as: germanium, platinum and neodymium.

#### Raw Materials Considered Critical by British Geological Survey

<b>Antimony</b>	Antimony Tin Oxide, flame retardant, micro capacitors
<b>Cobalt</b>	Li-ion batteries, synthetic fuels
<b>Gallium</b>	Thin layer photovoltaics, LED
<b>Germanium</b>	Fibre Optic Cable, IR optical technology
<b>Indium</b>	Displays, thin layer photovoltaics
<b>Platinum</b>	Fuel cells, catalysts
<b>Palladium</b>	Catalysts, seawater desalination
<b>Niobium</b>	Micro capacitors, ferroalloys, high speed low alloy steel
<b>Neodymium</b>	Permanent magnets, laser technology

Managing the long term availability of these raw materials was previously considered at the level of the EU, but the territorial bounds on which this now needs to be applied have been reduced to the level of the nation state. This creates a requirement for Britain to unleash the forces of innovation and creativity to understand how these precious materials can be conserved, tracked, separated, reused and recycled, within the bounds of this island. Such an initiative can be part of a much larger drive for a circular economy, with a 'cradle-to-cradle' approach to manufacturing that is not only more environmentally sustainable, but which yields highly efficient and profitable manufacturing.

To achieve these breakthroughs, the UK needs, quite specifically, to create a clear focus on innovation across the multi-metals and materials sectors. This is a cause that has long been championed by the sector in the UK, but has not yet received the full backing of the relevant innovation agencies. In a world with Britain outside the EU, the country can no longer rely on the beneficence of others to undertake its much needed research in materials, processing and recycling.

Part of the rationale from the Leave campaign for Britain departing the EU is to increase the capability of the country to trade with non-EU nations. Something that we might expect to increase anyway due to the relentless rise of China and India as well as other growing economies across South and South East Asia. It is to be expected that UK Government policy will be designed to support and promote such trade. It is worth considering how this shift in trade from Britain's near neighbours to a more globalised approach will change the nature of trade itself. In a physical sense, we would expect an increased proportion of goods to leave the UK, or be landed in the UK through bulk carriers, container ports, or air freight. A reduced portion will arrive by rail, or road transport via continental ferry. Such a shift will require Britain to invest in its infrastructure in airport and port capacity, but also in rail to support the collection and distribution of goods between factories, ports and airports.

As an International trade based economy, the UK will experience fundamental change in the way that goods are physically landed on these shores. Export growth will drive infrastructure requirements in air freight, container shipping and bulk carrier, with associated national rail infrastructure. Trading in this way will increase the length and complexity of supply chains.

Inventory and logistics management will increase in importance, along with working capital financing and insurance.

Investment in the infrastructure to facilitate global trade will have an immediate impact on demand for engineered materials. This will affect all materials classes including ferrous, non-ferrous, light metals and rare metals, partly for construction, but also for electronic equipment. Concrete, glass, ceramics and brick, will also feature strongly. A lengthening of global supply chains for materials and manufactured goods will result in increased inventories, increased working capital and increased vulnerability to supply chain interruption associated with climatic, commercial, or financial interventions. Despite these clear arising needs, the UK has significant gaps in processing capability for many of these important materials classes. These include copper melting, significant parts of aluminium processing and some steel processing capabilities.

Copper sits at the intersection of these factors. Essential for infrastructure investment, its importation requires long supply chains that could be disrupted. The impact of the loss of a cargo of copper billet could be a major disruption to key infrastructure projects. The UK has ample onshore copper resources, from secondary materials, but these cannot be exploited as the UK lacks a copper smelting capability due to high energy prices. It is vital that this is recognised as a key part of our sovereign capability and is re-established.

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### 3.3 Trade

The third foundation for an industrial strategy is trade. Access to markets, technology, skills, innovation and ideas, all stem from trade and countries throughout history have gone to enormous lengths to secure and protect their trading assets. We are living through a time of remarkable change in international trade, driven by a shift in the global balance of power and new, transformative digital technologies.

Considering again the reorientation of economic might to Asia, we have become accustomed, however astonishing, to a situation where economic growth in China has outpaced all expectation. In a period of ten years, China underwent a century of growth and development. We have now reached the point where China is no longer catching up with other advanced economies, it is about to surge ahead.

To be specific, I am not talking about China surging ahead in sheer economic size, or growth rate, I am talking about China surging ahead in defining and developing the industries that will form the future of the global economy. Indeed BMW just premiered its new 7-series in China, where it sells over 40% of the car. Still a Bavarian firm, but China is also now home to the company's most extensive R&D and production operations anywhere outside Germany.

Understanding the technological and economic aspects of the Chinese economy, is though only part of the story. When we turn to the societal and people aspects we can see that it is not all one way traffic for China. With increasing industrialisation and development come some of the social and environmental issues that are also seen in the West. This unprecedented pace of industrialisation is also being rapidly followed by many of the challenges that other developed economies have faced. The global economy is being driven by a series of megatrends, amongst these are a shift of power to the East, increasing urbanisation and an ageing population. However, alongside this, China's medical system is effectively available on a pay as you go basis, but with an ageing population and recent studies in the Lancet suggesting one third of young men will die of smoking relating illnesses, the challenge is huge and a huge response is required. This would not be unusual for China, a country capable of massive collective effort.

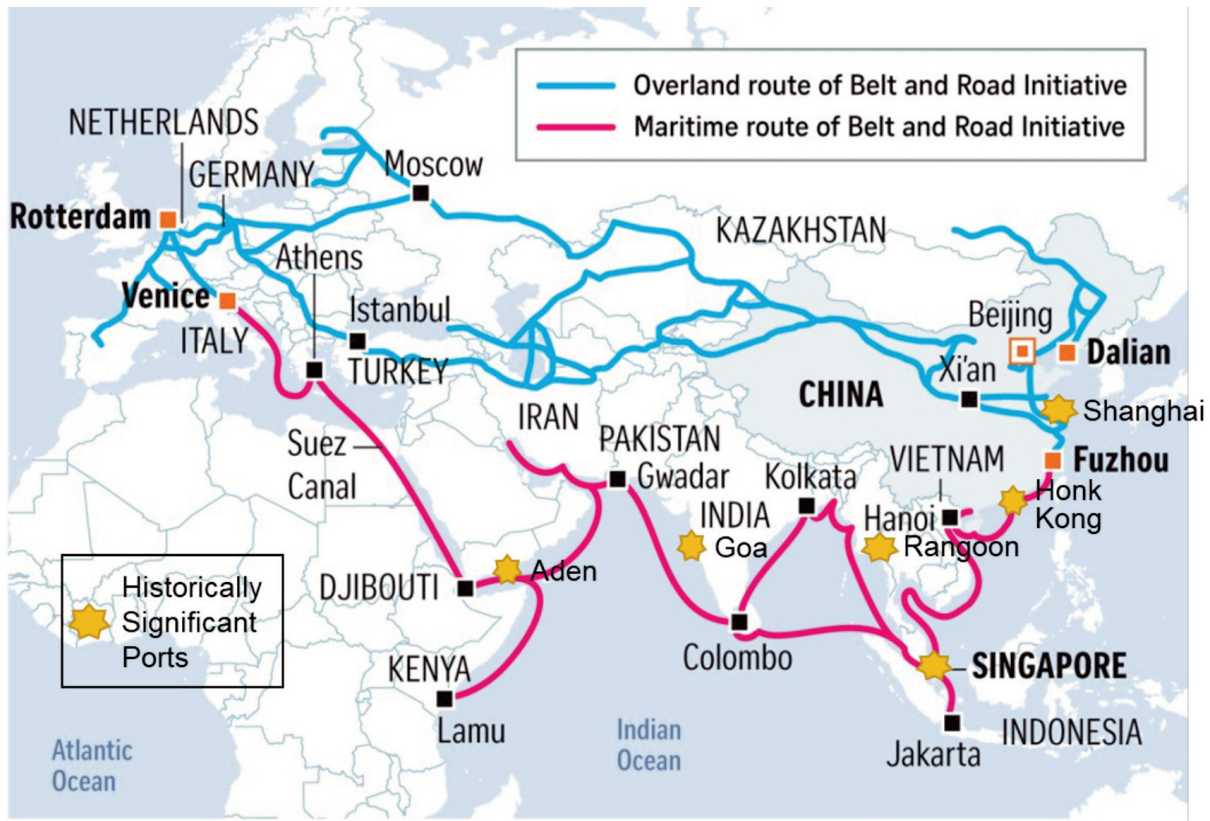
All this could be achieved, not in the almost 300 years it took Britain, but in 30 years of rapid growth. Before the industrial revolution China was the largest and arguably the most technologically advanced civilisation on Earth. After what is, in terms Chinese history, a small period of time, China looks set to regain this position.

China's trade and foreign policy response to this, is the centrepiece 'Belt and Road' policy in its latest five year plan. In early 2016 I raised publicly my concern over the UK's complacency with regard to this policy<sup>5</sup>. My speech at that time followed on from my latest visit to China, where I was able to witness at first hand the rapid pace of growth and development and the complete realignment of industry to support this policy.

The Belt and Road describes investment by China in both sea and land trading routes, stretching across Asia and the Indian Ocean, to Africa, the Middle East and Europe, connecting Chinese industry with both developing and advanced markets. China has developed a sophisticated combination of aid, economic investment and political control, to create and control a network of staging posts stretching from Beijing to Madrid and Rotterdam.

It is and has been UK government policy, to encourage our financial institutions to invest in and support China in developing this new trade infrastructure and yet what short memories we have about the importance of controlling international trading routes. A simple overlay of the Belt and Road development ports, across the formerly British controlled staging posts of Aden, Goa, Rangoon, Singapore, Hong Kong and Shanghai, shows the clear risk to Britain of heading into a global trading backwater.





In the same way that Bruges is a perfectly fossilised example of a Medieval trading settlement, trading internationally until the level of silt in the harbour forced a move of commerce to nearby Antwerp, so the Belt and Road policy risks silting up residual and vital British trading influence, as cargo moves from Goa to Gwadar in Pakistan and so on, throughout the region.

Gone are the days when we can rely on first mover advantage in industrialisation to keep our nose out in front. We are no longer in the position of watching China develop at pace, but along a path well trodden by others. We can longer account for the rapid growth rates, by pointing out that China already knows the direction of travel, because others have been there before. As of 2016, we are now in a direct competition with China to carry out the research, innovation and technology exploitation, that will develop the products, processes and industries of the future and China is able to do this without the legacy infrastructure and regulation which – whilst absolutely right for the protection of British workers – still slows our ability to react and increases our costs.

It is worth reflecting that China's latest five year plan would not be dissimilar to the kind of industrial strategy the UK needs, if we were to articulate how we will achieve our aims of rebalancing the economy and developing capability in advanced manufacturing. The recently established Crick Institute in London will focus on big data. The Sir Henry Royce Centre in Manchester, announced in 2015, will undertake similar activity to the 15 innovation centres that China intends to establish for the steel industry alone.

Whilst there are opportunities for UK companies to sell into China, it will only be on the back of being world leading in our processes, our products and our customer service. In other words, the only sure way to continue to be competitive is to continue to invest heavily in innovation. By the time of the next five year plan, Chinese strategy will be breaking ground that we have not yet considered.

It is interesting to speculate what role the UK will play in this transformation of China from an industrial powerhouse, to an innovation powerhouse. China has been following a clear plan in this area for over twenty years and when it comes to business investment, future certainty of policy is a major advantage. The UK does have a phenomenal resource in embedded knowledge, but it is unlikely that this can be sustained without an advanced manufacturing base to develop it further. For this relationship to produce genuine mutual benefit, the UK needs to prioritise sustainable development, with innovation at the core of its strategy, just as much as China needs access to the knowledge and technology that the UK has to offer. This gives the UK a window of opportunity in which to establish ourselves as a trading partner alongside China, but if we wait too long, our advantage will have been eroded to the point of insignificance.

It is clear from this that market access for international trade is a key part of sovereign capability. A second, important challenge in the arena of trade is that arising from changes in technology. Less than one week after the vote to leave the EU, in July 2016, when I published that paper outlining the opportunity for international trade for the UK and identified specific actions that need to be taken, I also fell into an assumption about trade that is often made: I focused almost wholly on trade in goods.

There is a natural tendency when, considering exports, to focus on trade in goods. These leads to a discussion around the barriers and solutions to increasing trade associated with the movement of physical objects. Consequently, debate is dominated by discussions around important areas, such as logistics, freight capacity and new initiatives, such as free ports. Yet, 45% of UK exports by value are services and this is a concern in a post Brexit world as the WTO is less well developed in terms of services as compared with goods. This shows that it is also important to prioritise the 'soft' infrastructure of trade and this includes the digital tools that can enable small companies, from wherever they are in the UK, to generate global reach.

International trade, with digital technologies cannot only be an enabler of trade through connectivity, but also act as a mechanism of delivery. This is a topic I covered in a speech at Google HQ in London in November 2017<sup>6</sup>, where I explored the increasing blurring between trade in goods and services.

It is a commonly held view that 'proper' exporting, involves 'shipping'. This insight was reached by the FSB during research for a report called 'Destination Export', which you can download from the FSB website and where one member was quoted as stating that exporting was not for them as they do not 'produce, or manufacture goods'.

Yet amongst the SME community, this distinction between the trade in goods and in services is a false dichotomy. Supply of goods in the advanced manufacturing and materials sector inevitably involves an element of integrated service provision. Training, consultancy and other expert services can be delivered effectively through digital technologies. 1 in 8 of SME exporters are already exporting digital services, with a further 1 in 4 considering to do so. The FSB has found that almost half of small business exporters already use digital channels to market, though some wouldn't themselves consider this activity to be exporting at all.

Increasingly, digital technologies also enable the delivery of goods as well as services. Instinctively these goods will be thought of as digital products, software, apps, etc. that can be deployed via the internet. Turning once again to the example of additive manufacturing, if a UK manufacturer were to use this technology to generate bespoke designs, for digital deployment and delivery through a 3-D printer in a client factory located in China, then our whole idea of what constitutes exports of goods and services is challenged.

The rules and regulations for global trade have still not caught up with the expansion in services and financial services of recent decades. They now need to project forward to a situation where the boundary between goods and services is no longer a hard distinction, but a gradual transition from one to the other. This phenomenon is known as 'servitisation' and includes for instance the business models based around the leasing of manufactured goods with intensive after sales support, rather than an outright purchase.

## 4 Summary

In the current climate of environmental crisis, coupled with technological and geo-political change, the UK needs to acknowledge the need to protect its sovereign capabilities, by highlighting the importance of energy, raw materials and trade, including for environmental improvement.

At a time when the UK political and industrial landscape is clouded by Brexit, the seismic changes associated with the 4th Industrial Revolution and a realignment of global economic power, risk being overlooked. Where policy and technology do connect, it is generally in areas that are well understood by the consumer and without due regard for environmental and supply chain concerns. The large and unsustainable investment in lithium batteries for electric vehicles can be seen as an example of this.

As with all previous industrial revolutions, this 4th industrial revolution has the potential to cause significant social upheaval, as well established economic activities become redundant, or obsolete. In the supply chain we will see value increasingly collapsing to two areas: materials and design, as manufacturing technologies create unprecedented churn in methods of manufacture.

All of this has major implications for trade, the blurring of the distinction between goods and services, requires a flexibility of interpretation of regulations. The ethics of trade and international development are becoming increasingly challenging, as China exerts its influence through a foreign policy designed to conflate trade and aid.

In this environment it is important to recognise the crucial role of materials and resource efficiency, in reducing the risk to both industry and defence, of complex and potentially insecure supply chains. As value is increasingly concentrated in scarce materials, policy and technology solutions are required to ensure that the UK's rich resources in this area are not inadvertently lost and national defence exposed by short term decision making.

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## 5 Policy Recommendations

The UK needs to place the foundations of industrial strategy: energy, raw materials and trade, at the centre of policy.

It will be important to UK sovereign capability, particularly in a post-EU situation, that the issue of energy be addressed, to enable the economic reshoring of parts of the metals and materials supply chain, to enable the innovation that will transform our economy through the 4th industrial revolution.

Innovation has an important role to play in designing new and improved processing technologies, improving productivity and yield, reducing energy consumption, designing new integrated energy systems, delivering industrial integration and creating the materials of the future. Crucially it is innovation that can help ensure that that Britain is both competitive on energy and low carbon. Investment by government in new technologies, such as enabling the hydrogen economy, could deliver this result.

We must also wake up to the need to protect our market access, relying as it does on historical and global trading infrastructure and to ensure that our foreign and industrial policy does not allow UK competitive advantage in this area to be eroded.

By acting in this way, to achieve the twin goals of environmental sustainability and protection of our sovereign capability in industry in trade, we will also establish the foundations for an economy that delivers both prosperity and equality.

<sup>1</sup> <https://www.mpiuk.com/downloads/speeches/Speech-2018-06-21-Policy-Priorities-for-Supporting-Productivity-and-Responding-to-Brexit.pdf>

<sup>2</sup> <https://www.telegraph.co.uk/business/2016/04/03/we-cannot-afford-to-allow-british-steel-producers-to-rust-in-pea/>

<sup>3</sup> Steel Closure Could Spell End for UK Car Industry': The Times, 9 May 2016

<sup>4</sup> Strong Foundation Industries: How improving conditions for core materials producers could boost UK manufacturing, IPPR, 2016, <https://www.ippr.org/publications/strong-foundation-industries>

<sup>5</sup> <https://www.mpiuk.com/downloads/speeches/Speech-2016-04-14-China-Industrial-Policy-and-Competitive-Threats.pdf>

<sup>6</sup> <https://www.mpiuk.com/downloads/speeches/Speech-2017-11-01-A-Digital-and-Exporting-future-for-UK-SMEs.pdf>



**Chris McDonald** is the Chief Executive Officer of the Materials Processing Institute. The Institute carries out industrial research and innovation in advanced materials, low carbon energy and the circular economy. Chris's background is in industrial research and manufacturing, where he has worked internationally. He led the divestment and return to independent, not-for-profit ownership of the Institute in 2014, the year the organisation celebrated its 70th anniversary.

In addition to leading the Institute, Chris provides expert consultancy support to companies, Governments and public bodies, in technology strategy and the technical due diligence aspects of mergers and acquisitions. He is prominent in the development of public policy, around innovation, steel and SMEs, where he works to support growth and inward investment. He is the policy chair for Innovation and Enterprise for the Federation of Small Businesses, a member of the CBI Regional Council for the North East and is the Innovation Lead for the UK Metals Council. Chris is also a member of the Steel Advisory Board for UK Steel (EEF).

A graduate of Cambridge University, Chris is a Fellow the Institute of Chemical Engineers and of the Institute of Materials, Minerals and Mining. He sits on industrial advisory boards at a number of universities, including Oxford and Sheffield.

He is often called to commentate in the media on innovation leadership and the steel industry.

**Chris McDonald**  
Chief Executive Officer  
Materials Processing Institute

“Chris provides expert consultancy support to companies, Governments and public bodies in materials, technology and innovation strategy”



## Materials Processing Institute

**The Materials Processing Institute is an independent, open access and not-for-profit technology and innovation centre working with industry, government and academia worldwide. Support ranges from small scale, site based investigations, through to long term collaborative research programmes.**

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