



# The Industrial Strategy Commission

---

## Response to HM Government's Green Paper *Building our Industrial Strategy*

---

April 2017

## The Industrial Strategy Commission

### Response to HM Government's Green Paper *Building our Industrial Strategy*

#### 1. The Industrial Strategy Commission

The Industrial Strategy Commission is an independent, authoritative inquiry into the development of a new, long-term industrial strategy for the UK. Chaired by Dame Kate Barker, the Industrial Strategy Commission is a joint initiative by Policy@Manchester at The University of Manchester and the Sheffield Political Economy Research Institute (SPERI) at the University of Sheffield. The other members of the Commission are Dr Craig Berry, Professor Diane Coyle, Professor Richard Jones, and Professor Andy Westwood.

#### 2. Scope of our response

The Industrial Strategy Commission (ISC) was formally launched on March 6th 2017, and will present its key findings in July 2017. A final report will be published in September 2017.

This response outlines the key lines of inquiry that the Commission has initially decided to pursue; as it takes more evidence other areas and perspectives may be included.

#### 3. On Industrial Strategy

In the past decades there have been many policies for industry, policies for science and innovation, and policies for skills. An industrial strategy, however, should be different from a policy or a collection of policies; it should be informed by a vision of a future destination for the country, and it should be motivated by an urgent sense of national purpose.

The Prime Minister's foreword to the Green Paper begins to set out some of the components of that necessary vision. It talks about "*a stronger, fairer Britain that works for everyone*", and refers to the need to spread wealth and opportunity across the country, beyond London and the South East. It calls for "*a nation that stands tall in the world and is set up to succeed in the long term*", and anticipates "*a country in which future generations have the chance to do better than their parents and grandparents today.*"

These are admirable goals. To serve as the foundation for a strategy they need to be fleshed out further.

The Green Paper states that "*the objective of our modern industrial strategy is to improve living standards and economic growth by increasing productivity and driving growth across the whole country.*" The shape of the UK's economy is not delivering these objectives at the moment, and in the future there will be substantial changes both in the UK's external trading environment and in the possibilities and threats offered by new technologies. How should the shape of the UK's economy adapt to fulfill these objectives in these new conditions?

Ensuring the high international standing of the nation and its long-term success are goals that will attract wide support. But how are these to be measured? What is the balance to be between military power and moral power? What is needed to ensure the resilience of the nation against future shocks – both anticipated (such as those that might arise from climate change) and unanticipated (for example, due to unpredicted geopolitical shifts)?

The hope and expectation of continually improving conditions down the generations is shared by all. But to achieve this, is continued growth in per capita GDP sufficient, or should we be looking at wider measures of well-being, perhaps including improvements to health and social care, and the state of the natural environment?

These are profound questions about the future of the nation and its place in a changing world, and it is right that a government should begin the job of articulating the vision that will motivate the development of an industrial strategy. To be successful, that vision needs to be widely supported across society, so that responsibility for implementing it can be shared between the institutions of the state, private sector bodies and individuals.

What can we say about the characteristics of a successful industrial strategy? As the Green Paper sets out, we can learn from international examples, from other countries that have been more successful than the UK in developing more productive and better balanced economies, though the strategy will need to reflect the particularities of the UK's own situation, the strengths and weaknesses of the UK's economy and institutions, and the character of the UK's political culture.

Having clearly articulated the motivating vision for the country, the strategy will need a long-term time horizon, measured in decades rather than years. This underlines the need to achieve a wide consensus so that the strategy can be implemented consistently, resisting the tendency to introduce frequent new initiatives and changes of direction.

Much will be achieved through coordinating the actions of different agents (including government, public and private bodies) through information, standards and so on. Existing areas of policy development – in research, the skills pipeline, infrastructure, export support – remain important, but require more mutual alignment in support of a wider strategy. However, the scale of the challenges the nation currently faces suggest that existing policies by themselves will not be sufficient.

In particular, the new industrial strategy framework will need to embrace the interdependence of public sector efficiency and private sector productivity, ranging from the sustainability of the NHS requiring innovation and new business models to the growth in high-value manufacturing needing modern infrastructure and updated skills policies. The idea that 'state' and 'markets' are separate domains is a generation out of date in social science, but the policy debate has remained stuck in the past.

The outcomes of the unfolding strategy should be measured against some well-chosen measurable goals. But, unlike the rigid plans and road-maps of more centrally planned economies, the strategy will need to be adaptive to changing circumstances. It will need to focus on creating robust institutions and on keeping future options open, for example through strong competition policy.

In summary, an industrial strategy needs to be motivated by a compelling vision for the direction of the nation. It needs ambition in its goals and consistency in its implementation. The consultation process initiated by the Green Paper is an important first step towards creating such a strategy.

## 4. Detailed response to the consultation

### 4.0. General comments

The announcement of plans to develop an industrial strategy is very much to be welcomed. Beyond any specifics, the importance of having a strategy that is clearly articulated and understood cannot be overstated. The absence of an explicit industrial strategy does not mean that governments do not act to steer and shape the national economy; rather it means that government intervention is ad-hoc and uncoordinated, and thus ineffective.

The need for government intervention is well-understood in classical economic theory. Private firms will tend to under invest in research and development because of their inability to capture its full benefits, and indeed basic research is best thought of as a pure public good. The government has a unique role in risk management given its lower social discount rate and longer time horizons, and it is well placed to mitigate coordination failures, including in key areas such as skills and technical standards. The 'market failure' rationale for government intervention is therefore well-established. But it is not clear whether this test, by itself, is sufficient to identify all the system-level interventions that are needed to repair some of the fundamental and persistent weaknesses in the UK economy.

To be effective, we believe that any industrial strategy needs consistent application over a long period – probably to be measured in decades rather than years. New institutions take a long time to become established and to bed-in, and the success of many interventions – particularly in the support of innovation and new technologies – cannot be measured for some years.

These long time horizons mean that an industrial strategy will need to run for more than the duration of a single parliament to be effective. Such a strategy must, therefore, be supported by a national consensus. It needs to be clearly aligned to a set of aims that are widely supported by society at large and that have support from a wide range of political and economic policymakers. This is not overly-ambitious, as many OECD countries operate an industrial strategy.

As some examples of the strategic goals that an industrial strategy should be explicitly aligned to support, we would cite:

- Achieving an affordable and effective health and social care system appropriate for the changing demographics of the UK population.
- Decarbonising the energy economy, while maintaining the security and affordability of energy for industrial and domestic consumers.
- State security in the broadest sense, including maintaining the effectiveness of our armed forces, protecting the nation against cyber-attacks, and maintaining the resilience of our society against natural disasters.

In a modern industrial strategy, the pursuit of the strategic goals of the state should be harnessed directly to drive the growth of the national economy. This will need to involve partnerships between the state and private sector actors, along with universities and research institutions, and with the balance between government intervention and private actions consciously and carefully calibrated.

The development of an industrial strategy needs to begin with an assessment of the strengths and weaknesses of the UK economy. The candour with which the Green Paper recognises the scale of some of the challenges is to be welcomed, and the ISC will seek to build on this analysis.

An industrial strategy must begin with the economy 'as it is' and so as well as seeking new opportunities it should also focus on existing challenges and 'challenging' industries. It must therefore take account of sectors that are often ignored in debates about industrial strategy, for example, social care and retail – sectors in which a great many people are employed.

The main problems that the ISC will seek to explore in more depth include:

- *The poor productivity performance of the UK economy*, including both its long-term underperformance with respect to competitor nations, and the pronounced slow-down in productivity growth since the financial crisis. Productivity growth is essential for rising living standards and a sustainable fiscal situation.
- *The pronounced regional differences in economic performance*. All core cities outside London, with the exception of Bristol and Aberdeen, have productivity (as defined by GVA / hour worked) lower than the national average. Many de-industrialised areas, often on the fringes of core cities, present apparently intractable combinations of social, educational and economic problems<sup>1</sup>, while some of the most deprived communities are to be found on the coasts and in rural peripheries.
- *Evidence of a weakening of the mechanisms for diffusing new technologies, skills and business practices*, manifesting itself as a growing divide at the firm level between a few, internationally competitive companies at the technological frontier, and a growing long tail of underperforming firms<sup>2</sup>.

Any analysis of the strengths and weaknesses of the UK economy must recognise and anticipate the changing international trading landscape, particularly in light of Brexit. We will need to anticipate any systematic shifts in relative comparative advantage of different sectors of the economy that may follow.

Key overarching issues that the ISC will consider include:

- *Institutional architecture*, which we consider to be currently far from optimal. This includes the structures of decision making and accountability in making policy on spatial levels from the national, the devolved authorities, to the regions and cities. It also covers the specific agencies tasked with promoting skills and innovation.
- *Lessons from other countries*. We believe that valuable lessons can be learned from successful examples abroad, both in established economies – such as Silicon Valley and the German manufacturing Mittelstand – and in fast-developing East Asian economies. However, we do need to caution that the systems of innovation and production differ in specifics, so it is important to look for general lessons, rather than expecting it to be possible to import institutional models (e.g. the USA's DARPA, Germany's Fraunhofer Society, or Japan's MITI) directly into a different historical and institutional context.

---

<sup>1</sup> Pike, A., MacKinnon, D., Coombes, M., Champion, A., Bradley, D., Cumbers, A., Robson, L. and Wymer, C. (2016), 'Uneven growth: tackling city decline', Joseph Rowntree Foundation Report <https://www.jrf.org.uk/report/uneven-growth-tackling-city-decline>

<sup>2</sup> The Future of Productivity, OECD. (2015) <http://www.oecd.org/economy/the-future-of-productivity.htm>

Questions that do not receive enough attention in the Green Paper include:

- *Winners and losers from economic growth.* What are the links between the structure of the economy and the distribution of gains from trade and growth, and how should an industrial strategy take inequality into account?
- *The need for interventions to be at a scale sufficient to make a material impact on the economy.* A case can be made that existing interventions have often been made at too small a scale<sup>3</sup>, and that there has been a tendency to spread the jam too thinly, dispersing many sub-scale interventions too widely across the country rather than creating centres of real critical mass.
- *How do we judge the success of the strategy?* Previous incarnations of industrial strategies have, arguably, not been judged against hard enough targets – or were allowed to continue for as long as necessary, in the absence of milestones along the way to the ultimate goals. We will aim to suggest meaningful success criteria that are related to people's direct experience of the health or otherwise of the national and regional economies.
- *Do we have the necessary data to make good decisions?* We need economic data of an adequate granularity to make good decisions. This granularity needs to be geographical – currently sub-national data isn't adequate, and sector categorisation is too coarse. Rigid and overly coarse taxonomies (e.g. talking about the 'creative' and 'manufacturing' sectors) constrain our thinking and blind us to the richness and complexity of an advanced economy.
- *What are the drawbacks of a sector focus?* There is a strong argument that too much focus on sectors leads to the dangers of 'picking winners' or indeed 'propping up losers' because of lobbying by special interest. We agree that focus in industrial strategy is important, but we would wish to see much more emphasis on identifying problems or challenges as the source of that focus. In addition, competition policy should have a key role as a safeguard against the risk of 'picking winners' in the shape of incumbents who lobby successfully.
- *Persistent lacunae in well-trodden themes.* Some of the problems discussed in the Green Paper are very familiar, but we suspect that some aspects of these issues remain unaddressed. For example:
  - o Skills policy has long focused on supply, but we suspect there to be substantial demand-side issues, as well as persistent issues matching people to jobs. Why do firms not use the skills that are available? Why do reported shortages of programmers and data scientists coexist with high unemployment among computer science graduates<sup>4</sup>? The ISC will seek out new perspectives on these old problems.
  - o Many government reviews since the early 2000s have considered issues around short-termism in UK investment practice. None have led to substantive change. Supporting business growth, especially in high-value industries – one of the key aims of the new industrial strategy – will be difficult unless the role of the banking sector, institutional investors and capital markets more generally in the provision of stable, long-term investment to productive activity is addressed.

Two of the 'pillars' identified in the Green Paper are in fact foundational to a successful industrial strategy, and so run through all the others.

<sup>3</sup> Allas, T., 'Innovation and the Public Sector: From Static and Sub-Scale to Dynamic and Bold.' (2014)  
<https://www.scribd.com/document/233785756/Innovation-and-the-public-sector-from-static-and-sub-scale-to-dynamic-and-bold>

<sup>4</sup> Shadbolt, N., 'Unemployment among computer science graduates – what does the data say?' (2015)  
<http://blog.hefce.ac.uk/author/professor-sir-nigel-shadbolt>



One concerns what institutional arrangements will be needed. Given that the coordination of the activities and decisions of a wide range of public and private sector organisations is a key function of industrial strategy, this is critical. It is also important to find an institutional architecture that will last, and to get away from the all-too-frequent changes in the various public bodies engaging with the private sector.

There are significant open questions, concerning for example what policy decisions will be within the remit of the devolved governments and the English devolved city regions, and how to coordinate the wide range of agencies involved in certain policy areas. There are also genuine trade-offs. A key function of strategic thinking is to give private (and public) investors greater certainty about factors outside their control, and so reduce investment risk and the cost of capital. However, democratically elected governments must also be able to change policies on occasion, including – in a successful industrial strategy – acknowledging failures and closing programmes. There are several possible models for balancing strategic consistency against responsiveness and flexibility, and it will be necessary to think about the institutional arrangements to acknowledge the trade-offs and to reflect the political history, geography and culture of the UK. Institutional questions also include the issue of capacity, both among political decision makers and officials tasked with implementing policies.

The second foundational issue is the recognition of the need to drive economic growth across the whole country. Any economic activity, any sector, is located in specific places, and it is not possible to devise a strategy that increases productivity and growth in the abstract and then considers how to distribute it. The national economic performance is the outcome of specific activities in specific places, each with their own advantages and challenges. UK growth will only increase if the growth rate increases in lower-productivity areas. While an industrial strategy must retain its focus on addressing the strategic aims of the state, and cannot also solve wider social or distributional problems, it will only be possible to implement policies successfully if place is taken into account.

#### 4.1. Investing in science, research and innovation

The Green Paper correctly sets out the context: the UK is a less research and development (R&D) intensive economy than either its traditional competitors (e.g. France, Germany, the USA) or rapidly rising East Asian economies such as South Korea and China.

The Green Paper rightly highlights positive relationship between government support for R&D and business R&D; thus low business R&D intensity is partly explained by low levels of government support for research.<sup>5</sup>

Questions that the ISC will consider include:

- Is a simple target for R&D intensity appropriate?
- If so, what would an appropriate degree of R&D intensity be for an economy of the shape that the UK aspires to be?
- How should we assess the successes and failures of science and innovation policy over the past 15 years?

---

<sup>5</sup> Economic Insight Ltd, for the Department of Business, Innovation and Skills, 'What is the relationship between public and private investment in R&D?' (2015)  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf)

- Are new institutions for R&D required?
- Are new delivery mechanisms for government supported R&D required?

We note that there has been a considerable degree of institutional innovation in recent years. One notable omission from the Green Paper is a discussion of the Catapult Centres, which were a prominent new element in the Coalition Government's innovation policy, introduced with bi-partisan support and continued into the current government.

Other recent new government supported research institutions include the National Graphene Institute, the Alan Turing Institute, the Crick Institute, the Sir Henry Royce Institute and the Rosalind Franklin Institute. The Green Paper suggests another centre, for battery research.

It is probably too early to be able to assess the degree to which these new institutions have been successful, individually or collectively. But such a rapid evolution of this institutional landscape should prompt some key questions:

- An understanding of where each institution sits on the spectrum from basic research to translation, and how each institution and its sponsor would primarily judge its own success (e.g. international scientific reputation and publication of high-impact outputs, assistance given to established technology-intensive companies, technology diffusion amongst less technology-intensive firms, production of de-risked and investable propositions for spinning out and venture capital funding).
- An understanding of the developing landscape as a whole, including relationships with university research, business research, and venture capital funded spin-outs, and how this is likely to evolve.
- The role of research institutions as nodes/anchors of regional innovation ecosystems (see section 4.10)
- The degree to which the business models of these institutions balance an obligation to earn a commercial return (e.g. from commercial contracts and intellectual property licensing) and the degree to which they support open innovation.

The Industrial Strategy Challenge Fund (ISCF) offers an opportunity to experiment with new delivery mechanisms. The Green Paper refers to the experience of the USA's DARPA programme, but it is unlikely that much, if any, of that historically specific, defence-related model can transfer directly to the UK's environment and its different innovation ecosystem.

We should be concerned about the mythic status of DARPA, which ascribes to it sole credit for technologies that were only developed with substantial additional effort – particularly at the development end of R&D – by other agents, especially private sector R&D. This is a more general point: the state is important for innovation, but it isn't the sole actor, and a key issue is to understand the interactions between state and private agencies and to optimise them.

The Green Paper is surely correct to focus on the importance of identifying the best challenge areas for the ISCF. The success of DARPA in certain specific areas of innovation (the internet and GPS) is related to the clarity of its strategic mission – the requirement to maintain the absolute technological superiority of the US Armed Forces – so our initial hypothesis is that the ISCF needs to identify challenge areas which have a high degree of focus and the alignment with big strategic goals of the UK government in the years ahead.



More widely, the key issue for science and innovation policy is to balance three goals:

- Supporting the existing business base to make the most of new technology (e.g. much greater use of digital technology in manufacturing, Industry 4.0).
- Developing the technologies that may be the bases of new industries (e.g. in machine learning, nanotechnology, biotechnology and quantum technology).
- Supporting outstanding individual scientists and groups, often exploring new fields whose potential impact is entirely unpredictable.

The Green Paper highlights the large imbalances in government and business funding of R&D across the different regions of the UK (page 111), and highlights the correlation of low R&D intensity with poorer productivity performance. Of course, the direction of causation is not clear, and this issue requires further investigation.

The issue is a deep-seated one and requires a strategic approach, which the ISC will consider in more detail.

## 4.2. Developing skills

There is a widespread consensus that the development of skills must be one of the central pillars of an industrial strategy. The Green Paper focuses on basic and technical skills; it is plausible that this is an area that in the past has lacked prominence in the national debate, while suffering from inconsistent and arguably ineffective policy-making (according to the Institute for Government, the 'T Levels' announced in the Budget in March 2017 are the 29th major reform to further education (FE) since the early 1980s).<sup>6</sup>

However, a sole focus on FE for the 16-19 age range does pose dangers of losing sight of the skills landscape as a whole. Schools, FE, higher education (HE) and businesses should work together to meet the specific needs of their region, as well as the wider strategic goals that underpin the industrial strategy. Consistency and recognition of standards in qualifications should be part of the consideration of skills, as evidenced by the case of the computer science skills mismatch.<sup>7</sup>

The focus on FE also risks neglecting the importance of part-time and continuing education. There has been a homogenisation in both FE and HE around young, full-time learning (for example, in part-time HE there has been a 61 per cent fall in learners since 2011/12<sup>8</sup>). Yet part-time and continuing education is likely to become even more important in the future in enabling an established workforce to adapt to rapid technological change.

---

<sup>6</sup> Norris, E. and Adam, R., 'All Change: Why Britain is so prone to policy reinvention, and what can be done about it', Institute for Government (2017)  
<https://www.instituteforgovernment.org.uk/publications/all-change>

<sup>7</sup> Shadbolt, N (2015); Wolf, A. 'Review of Vocational Education – The Wolf Report' [see recommendation 24 – p.17] (2011) [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/180504/DFE-00031-2011.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/180504/DFE-00031-2011.pdf)

<sup>8</sup> HEFCE figures on part-time education (2017)  
<http://www.hefce.ac.uk/analysis/HEinEngland/undergraduate/parttime/>

The continuing development of management skills is also likely to be important, in the context of evidence that a wide dispersion in management quality contributes to the long-tail of firm-level productivity performance<sup>9</sup>.

A more holistic view of the skills landscape also holds out the promise of helping to widen participation in higher education, through initiatives such as new pathways to university through advanced apprenticeships. Links between FE, apprenticeship training and universities would also help create 'parity of esteem' of technical education, address specific weaknesses in the UK in the area of 'upper technical' training<sup>10</sup>, and cement the links between skills and innovation.

Finally, important questions are left unasked in the Green Paper about the demand side of the skills picture. Are firms quick enough to recognise the importance of recruiting people skilled in new and emerging areas, such as computer science? Are there effective mechanisms for matching skills and requirements?

### 4.3. Infrastructure

The Green Paper is admirably candid about the shortcomings of the UK's national infrastructure, including a poor capital stock and uncompetitive transport infrastructure, with significant regional disparities that exacerbate regional inequality in economic performance. The Green Paper articulates well the ways in which improving infrastructure will *directly* improve productivity.

The ISC will explore ways in which an industrial strategy could most effectively exploit the strategic need for the UK to upgrade its infrastructure to promote innovation and growth in the UK sectors that will supply that infrastructure.

The methods by which government appraises the relative merits of competing infrastructure projects need further examination. There are serious questions about whether Green Book appraisal methods are adequate for infrastructure projects whose goal is to produce significant and qualitative change. The role of the National Infrastructure Commission in developing major packages of infrastructure improvements that could deliver this scale of change needs to be articulated and developed.

We should take a broad view of infrastructure, looking ahead to future developments and new technologies, and including its interactions with natural capital (such as clean air, water use):

- *Transport*, including the traditional modalities of road and rail, but also seeking to anticipate developments in, for example, autonomous vehicles.
- *Energy*, discussed in more detail in section 4.7.
- *Information and communication*, including both wireless and fibre.
- *Data*, including the open availability of government-owned data and open-data approaches to data harvested by 'Internet of Things' devices.

<sup>9</sup> ONS, 'Management practices and productivity among manufacturing businesses in Great Britain: Experimental estimates for 2015', (2017)  
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/experimentaldataonthemanagementpracticesofmanufacturingbusinessesingreatbritain/experimentalestimatesfor2015>

<sup>10</sup> Cable, V., 'Where next for further and higher education?' (2014)  
<https://www.gov.uk/government/speeches/where-next-for-further-and-higher-education>

The correct balance between public and private funding of infrastructure needs to take account of questions of *control* and *direction* as well as considerations about the government balance sheet. The case of the nuclear new build programme – plagued by slipping schedules and escalating costs – is a salutary lesson. There are many factors contributing to these difficulties, but the complex financing arrangements, with private sector funding supported by non-transparent government guarantees and with future revenue streams guaranteed at the consumers expense, have arguably increased overall costs and at the same time reduced the degree of leverage the UK government has over the projects to ensure maximum benefit to the economy. Many of the complexities have arisen because of the pretence that major infrastructure investments of this kind could ever be a private sector only affair.

#### 4.4. Supporting businesses to start and grow

There are long-established and compelling reasons to associate productivity growth with 'creative destruction' – the process by which new innovative companies displace incumbents. There is some evidence that in the UK the effectiveness of the processes by which resources are reallocated by the entry and exit of firms from the market has declined in recent years; the economy has become less dynamic. This justifies the attention given to business start-up and growth.

A high rate of business start-ups is not necessarily by itself positive; a high rate of churn of poorly performing businesses is not helpful for productivity. There needs to be a focus on the *quality* of start-ups, not just their *quantity*.<sup>11</sup> Only a small fraction of start-ups will have the potential to grow strongly, and these are the firms that attention should be focused on. The attention given by the Green Paper to the difficulties of scaling up is important and welcome.

The international evidence suggests that the UK has a longer tail of low productivity firms than some comparator countries. However, some firms and organisations, despite their intrinsically low productivity, provide vital employment and important services to their communities. The key challenge is to ensure that small firms with the potential to become high-value, high-growth firms are not constrained by unnecessary barriers.

An emphasis on start-ups and scale-ups should not divert attention from the importance of large firms. The very highest productivity firms, operating at the technological frontier operate internationally, and are larger and more profitable than other firms<sup>12</sup>; their importance lies not simply in their own individual contribution to national output and productivity, but through their importance for the diffusion of new technologies and practices throughout the economy. Large companies also dominate the business component of R&D expenditure, with less than 5 per cent of UK R&D being carried out by independent SMEs.<sup>13</sup>

<sup>11</sup> Nightingale, P. and Coad, A. 'Muppets and gazelles: political and methodological biases in entrepreneurship research', *Industrial and Corporate Change*, 23, (2013) pp.113-143.

<sup>12</sup> Andrews, D., Criscuolo, C. and Gal, P. 'Frontier firms, technology diffusion and public policy: micro evidence from OECD', OECD Productivity Working Paper No 2, (2015) <https://www.oecd.org/eco/growth/Frontier-Firms-Technology-Diffusion-and-Public-Policy-Micro-Evidence-from-OECD-Countries.pdf>

<sup>13</sup> ONS., 'Business enterprise research and development, UK: 2015' (2015) <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/businessenterpriseresearchanddevelopment/2015/relateddata>

There is evidence that the long-term performance of large, public companies in the UK has been compromised by short-termism in equity markets, as identified in the Kay Review<sup>14</sup>, and poorly designed management incentives.<sup>15</sup> Reforms to corporate finance and governance are required to address these issues. More generally, a new industrial strategy must encompass opportunities and incentives for financial institutions, such as banks and institutional investors, to increase the volume of long-term investment in productive economic activity; supporting, as denoted above, quality as well as quantity in UK business start-ups, and the maintenance of supply chains in high-value industries. Regulation of and longstanding practice among, for instance, UK banks and pension funds (or the asset management industry) is not conducive to such investment.<sup>16</sup>

Short-termism is also an issue for Venture Capital supported early stage technology companies. It is remarkable and seldom appreciated that this sector relies overwhelmingly on public funding - in 2015, the Venture Capital industry invested £321 million in technology companies at early stage and expansion, having raised £286 million in funds from government sources (including the EU).<sup>17</sup> Outstanding questions include:

- Is the essentially nationalised quality of early stage technology venture capital the result of public sector funding crowding out private sector funding, or does it reflect a genuine shortage of private risk capital, perhaps because of the availability of other, less risky and faster maturing opportunities in private equity?
- If further funding was available for high tech start-ups, would there be sufficient investable opportunities to absorb it - that is to say, projects with a low enough level of technical risk and a well-developed market plan? If there is a shortage of such investable opportunities, are there any interventions that would improve the situation?

A key issue for enabling small business growth will be a strong post-Brexit competition policy that removes barriers to entry and expansion. Similarly, careful thought needs to be given to state aid rules, including in procurement policy. Openness to foreign investment by acquisition or greenfield investment has played an important role in increasing productivity in UK industries, but equally there may be concerns about takeovers that risk asset stripping (by either UK or foreign acquirers), suggesting a possible role for a scrutiny process which might pay special attention to debt-financed takeover bids.

<sup>14</sup> The Kay review of UK equity markets and long-term decision making, Department of Business, Innovation and Skills (2012)  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/253454/bis-12-917-kay-review-of-equity-markets-final-report.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253454/bis-12-917-kay-review-of-equity-markets-final-report.pdf)

<sup>15</sup> Smithers, A., *The Road to Recovery: How and Why Economic Policy Must Change* (Wiley 2013).

<sup>16</sup> Berry, C. 'The final nail in the coffin? Crisis, manufacturing decline and why it matters', in Green, J, Hay, C and Taylor-Gooby, P (eds) *The British Growth Crisis: The Search for a New Model* (Basingstoke: Palgrave, 2015), pp.174-197; Berry, C., 'Pension funds and the City in the UK's contradictory growth spurts', paper presented at CITYPERC/SPERI workshop 'Capital Divided? The City and the Future of the British Economy', November 2014.

<sup>17</sup> BVCA Private Equity and Venture Capital Report on Investment Activity 2015 (2016)  
<https://www.bvca.co.uk/Portals/0/library/documents/BVCA%20RIA%202015.pdf>

#### 4.5. Improving procurement

For many years, the potential for exploiting the power of government in promoting innovation through procurement has been recognised and discussed, without a great deal of evident success in realising that potential.

To make more progress on this front, there needs to be a recognition that innovation through procurement is a long-term process, which is not necessarily consistent with the requirement to achieve immediate cost savings. Indeed, in some domains (such as health) innovation may increase costs while delivering significantly better outcomes. There is often a misalignment between the immediate goals of the organisation doing the procurement and the more generalised aims of promoting innovation and business growth.

Innovation through procurement is more likely to be successful when the imperative for innovation is obvious to the procuring organisation and aligned with its incentives.

One approach to achieve this alignment would be to identify more clearly those strategic goals of the state that can only be met through innovation. Particular attention should be given to those areas where the state is already committed to substantial expenditure, and where innovation is needed to make those commitments affordable.

In some cases it may be R&D directly that is procured directly from the private sector – this is a successful and underappreciated feature of the USA's Small Business Innovation Research programme.

One obvious area that meets this criterion is health and social care. Currently the organisational structure in healthcare is not optimal for promoting innovation. In particular, the interface between health and social care is widely recognised to be the source of major dysfunctionality, and procurement needs to take place across budget lines in this area. This is a critical area for further investigation.

Another important area – touched on in section 4.7 – is energy. Here government isn't in formal terms the main client, but its degree of intervention in markets has become so pervasive that it is difficult to argue that it doesn't have ultimate responsibility, and in political terms the government will certainly pay a penalty if costs aren't controlled.

More broadly the public sector directly and indirectly influences many markets (for example the wider influence of the BBC and Channel 4 on independent producers, through direct commissioning, training, quality benchmarking, technical standards), so procurement should be thought of in the widest terms.

#### 4.6. Encouraging trade and inward investment

Trade and investment has a vital role in driving innovation and productivity, so government support for trade and investment needs to be focused on those areas where it will make the biggest contribution.

For example, the importance of a foreign direct investment (FDI) needs to be judged, not on simple metrics such as the number of jobs created, but on an assessment of the role that FDI would have in boosting productivity and driving up skills and innovation in the region.

Likewise, exports are important to drive innovation through exposing firms to competitive pressures, and allowing them to expand their markets sufficiently to justify increased investment.

However, trade and investment policy needs to recognise the complexity of modern globalised manufacturing. UK based firms are often part of a multinational supply chain, in which components cross national borders many times before a finished product is made and sold. An urgent priority for a post-Brexit trade department should be to ensure that trade arrangements minimise frictions within multinational supply chains involving UK based firms.

#### 4.7. Delivering affordable energy and clean growth

The merger of the Department of Energy and Climate Change (DECC) with the Department of Business, Innovation and Skills (BIS) to form the Department of Business, Energy and Industrial Strategy (BEIS) offers a new opportunity to connect industrial strategy and energy policy much more closely than has been the case in the recent past, and this opportunity needs to be seized.

The problem of ensuring a secure supply of low carbon energy at low cost is a major strategic challenge for the economy. It should, therefore, be an exemplar of the way industrial strategy can be based around pressing problems and challenges. Done right, an industrial strategy for energy should deliver two goals – securing affordable low carbon energy at the same time as improving productivity and economic growth across the country.

The current approach of providing subsidies for the implementation of low carbon energy technologies, through the Renewables Obligation and Feed-in Tariffs, can plausibly be argued to have encouraged incremental innovation and learning-by-doing. However, the degree to which the benefits of that indirect subsidy to innovation have accrued to UK industry rather than to overseas suppliers should be quantified. For offshore wind, there is some evidence that this subsidy regime has led to important new investments in the UK. The Green Paper does not, however, even mention solar power, despite a very rapid rate of growth in recent years and a strong UK academic base.

The starting point needs to be a realisation that new energy technologies do not just emerge. Research into new energy technologies should be focused on driving their costs down and their scale up. The government may need to accept more of a role in de-risking new energy technologies to the point at which they can attract private sector funding for further R&D and introduction to the market. Any new government-funded institute for energy research – such as the institute for battery, energy storage and smart grid technologies proposed in the Green Paper – needs to be based on a very clear understanding of where it would sit in the spectrum from basic to applied research, and on the prospects for creating UK value from that research given the overall global energy landscape.

The UK's nuclear new build programme is an ideal case study of the way energy policy and industrial policy have been connected in the past, and should be connected better in the future. Firm plans exist to build up to 16GW of new nuclear generating capacity in the UK, at a capital cost of at least £60 billion. All of the developers and all the technology vendors involved are based overseas, although the projects will involve large contracts with UK suppliers of other kinds. It is current policy that the UK government will provide no direct finance for this very large capital programme. However, in practice the UK government is directly underwriting the programme with loan guarantees, and, through the contract-for-difference agreements, it is indirectly guaranteeing it through long-term commitments to the price consumers and industry will pay for electricity.

The Green Paper does discuss the opportunity that this new nuclear build programme offers for developing a UK supply chain. However, there will be strong international competition to supply the highest added value elements, and we should ask whether the current arrangements disadvantage potential UK entrants to the supply chain, as a result of:



- Entirely overseas ownership of the developers and technology vendors.
- Funding sourced wholly from overseas organisations, including some with substantial shareholdings by overseas governments.
- Different technologies being chosen for the different sites, each of which will need to develop its own supply chain independently.

Most attention so far has focused on electricity generation, and to some extent on low emission vehicles. But the UK will not be able to meet its carbon targets without substantial de-carbonisation of transport, domestic and commercial heating and industrial processes. We need to join the dots between all the different parts of our energy economy - generation, infrastructure, housebuilding, automotives - and search out ways in which energy policy and industrial strategy can be aligned better in all these areas.

#### 4.8. Cultivating world-leading sectors

We believe that 'horizontal' measures which aim to boost productivity unselectively across the whole economy, while important, are not likely on their own to be sufficient to create the necessary improvements in the economy's performance. Some focus is required, and this tempts policymakers to adopt a focus on measures specific to individual sectors.

The government can have a role in resolving coordination failures, bringing together key actors in a given sector so that key priorities can be agreed. These can be supported by shared resources for innovation and skills, most likely to be implemented as public-private partnerships. Catapult Centres could be an example of such an approach.

Sector based intervention can very plausibly be argued to have worked since the financial crisis for the automotive sector, which has unquestionably enjoyed a real revival over the last decade. It will be important to examine this success story to understand what general lessons can be learnt, and what remains specific to the conditions of that particular industry at one particular (and very challenging) time. An earlier intervention in the auto industry, prompted by the failure of Rover in 2004-5, was less successful (though arguably its failure - which produced a reduction in overcapacity - was a precondition for later success).<sup>18</sup> This example is important at a time when auto technology is evolving quickly, and likely to involve new entrants to the market. Recent success is not guaranteed to continue if policy focuses too tightly on the incumbents.

On the other hand, many economists have been reluctant to fully endorse sector approaches to industrial strategy, preferring non-sector specific, 'horizontal' interventions.

A well-established objection is that sector arrangements are vulnerable to successful lobbying by incumbents. New sector arrangements or deals should guard against this, in particular by ensuring that failing firms are allowed to fail and that new entrants and growing small businesses are able to enter the sector and participate in any arrangements.

<sup>18</sup> Bailey, D., Bentley, G., de Ruyter, A., & Hall, S. 'Plant closures and taskforce responses: an analysis of the impact of and policy response to MG Rover in Birmingham', *Regional Studies, Regional Science*,1(1), 2014, pp.60-78.

Sector arrangements reward the well-organised. Some sectors do not seem to have the visibility or prominence with government that one would expect on the basis of their overall contribution to the economy – arguably, the chemicals sector is an example, while the creative sector has only recently become more high profile. Other sectors, on the other hand, are very well connected with government and may exert a disproportionate influence – to some observers, the financial services industry falls into this category.

More fundamental issues are raised by the recent evolution of the industrial landscape, which perhaps makes the sector metaphor less appropriate to current conditions. In any case, one should be keenly aware of the limitations of these ways of classifying and subdividing the economy, which can obscure key connections and relationships.

We suggest that new approaches to mapping and quantifying the relationships between different actors in the economy, drawing on complexity theory to analyse large scale data sets, may well be fruitful in clarifying the structure of our economy and the interactions of its different parts, and we plan to explore these approaches in our future work.<sup>19</sup>

Over the past couple of decades, the most fundamental division between manufacturing and services has become increasingly blurred. As manufacturing companies have outsourced more functions, activities in design, marketing and other professional services, previously included in the manufacturing economy, are now classified as falling outside the manufacturing sectors, despite being crucial to the creation of value in those sectors.

Conversely, manufacturing firms are increasingly seeking to extract more value from additional services that can be associated with their physical products, in the process of 'servitisation'.<sup>20</sup>

The array of new technological developments associated with the thoroughgoing incorporation of digital technologies in manufacturing – often referred to as 'Industry 4.0' – emphasise and accelerate these trends, in which the line between manufacturing and services becomes ever more blurred, and successful manufacturing firms move their focus from creating physical artefacts to capture more of the value chain.<sup>21</sup>

The so-called 'tech sector' presents a major challenge for government. We do not believe this actually has enough coherence to be usefully thought of as a single sector. A start-up exploiting the latest developments in machine learning and robotics faces a very different set of challenges from an e-commerce start-up or a new media company. While in many cases entry barriers are low, success can be hard in a very highly competitive international environment. Careful analysis will be needed to find areas in which the UK has, or could have genuine comparative advantage, and to identify the correct policies to support those areas.

<sup>19</sup> Hausmann, R., Hidalgo, C., Bustos, S., Coscia, M., Simoes, A., and Yildirim, M. *The Atlas of Economic Complexity: Mapping Paths to Prosperity* (MIT Press, 2014)

<sup>20</sup> Helo, P. et al 'Servitization: Service Infusion in Manufacturing', *Designing and Managing Industrial Product-Service Systems*, Springer Briefs in Operations Management (2017)  
[http://link.springer.com/chapter/10.1007/978-3-319-40430-1\\_2](http://link.springer.com/chapter/10.1007/978-3-319-40430-1_2)

<sup>21</sup> 'Making Value for America: Embracing the Future of Manufacturing, Technology, and Work', National Academies Press (2015)  
<http://www.nap.edu/catalog/19483/making-value-for-america-embracing-the-future-of-manufacturing-technology>;  
'Securing the future of German manufacturing industry: Recommendations for implementing the strategic initiative INDUSTRIE 4.0'. Final report of the Industrie 4.0 Working Group, Acatech (2013)  
[http://www.acatech.de/fileadmin/user\\_upload/Baumstruktur\\_nach\\_Website/Acatech/root/de/Material\\_fuer\\_Sonderseiten/Industrie\\_4.0/Final\\_report\\_\\_Industrie\\_4.0\\_accessible.pdf](http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Material_fuer_Sonderseiten/Industrie_4.0/Final_report__Industrie_4.0_accessible.pdf)

Once again, history can provide some important lessons – for example in the way the UK's highly successful video games industry drew on an advantage in skills, arising from the policy intervention that created the BBC microcomputer, and some highly successful HE courses.

To conclude, a key issue in devising a modern sector-based industrial strategy will be to make sure that it leaves room for the disruptive industries of tomorrow. Policy should certainly be selective in supporting high-value activity and it should be aware of the importance of supply chains; it should strike an appropriate balance between competition and cooperation.

#### 4.9. Driving growth across the whole country

As we discuss in section 4.0, we regard the need to drive growth right across the country, not just in already prosperous and productive areas, as central, and a strand that should run through the whole strategy. The scale of the problem is now so great that it can no longer be ignored or addressed with half-measures.

Many of the issues have already been considered above. But it is important that the problem of the UK's pronounced regional and sub-regional economic disparities is not considered as an afterthought. Instead, the effects that any policy or intervention might have on regional inequality, and the consequences of regional divergence for the success of the policy, need to be considered at the outset.

Some other key problems that also need to be addressed include:

- Disparities in the degree of skills between prosperous and lagging areas, at all levels, from school performance, through intermediate skills, to graduate attraction and retention.
- Inequalities in infrastructure, including transport within and between regions, and digital infrastructures.
- Disparities in R&D intensities between regions, including in both the public and private sectors.

There is a fundamental issue about the appropriate balance between dispersion and agglomeration. The value of agglomerative dynamics in urban development is well established. But government policy in this area has been unduly influenced by a crude understanding of agglomeration, leading to a narrow policy agenda focused on creating metro-mayors in largely convening roles within English city-regions, and transport infrastructure investment concentrated in areas with high levels of private sector density.<sup>22</sup> There needs to be a better understanding of the level at which agglomeration is crucial, the degree to which this can be influenced by government intervention, the role of non-market institutions in supporting agglomeration and the interactions between urban economies. Establishing the appropriate balance in economic activity between London and its hinterland, the core cities and their hinterlands, and the rural and coastal peripheries will involve difficult economic and political choices which need to be made explicit.

---

<sup>22</sup> Bailey, D., Hildreth, P., and De Propris, L. 'Mind the gap! What might a place-based regional and industrial policy look like?', in Bailey, D., Cowling, K. and Tomlinson, P. (eds) *New Perspectives on Industrial Policy for a Modern Britain* (Oxford: OUP, 2015); Martin, R., Pike, A., Tyler, P. and Gardiner, B. *Spatially Rebalancing the UK Economy: The Need for a New Policy Model* (London: Regional Studies Association, 2015)  
[http://www.regionalstudies.org/uploads/documents/SRTUKE\\_v16\\_PRINT.pdf](http://www.regionalstudies.org/uploads/documents/SRTUKE_v16_PRINT.pdf)

Agglomeration is an important driver of productivity and growth and it is not surprising that cities and specific industry clusters are the focus of industrial strategy. There is a political challenge in this economic reality: policies must avoid spreading the jam too thinly or it will all be wasted. Yet compared to other OECD countries, the UK's economy is startlingly centralised around the capital, and has only two cities apart from London with above-average levels of productivity. Given the congestion effects around the capital, it will not be possible for the UK to experience faster growth unless some other major cities see a productivity and growth catch-up.

A challenge in this area is the paucity of the UK's sub-national evidence base, and it will be important to learn more about different regions' and cities' supply-chain and export links at present, to understand how to build on existing know-how and capabilities, and boost the productivity and growth rates of cities and towns across the country.

Industrial strategy at the regional level needs to be both *focused* and *differentiated*. Cities and regions can't be good at everything, so they need to identify those areas in which they have, or can plausibly develop, genuine competitive advantage. On the other hand, it makes no sense for every city and region to aspire to excellence in the same field – not every city in the world can have an outstanding cluster in, say, biotechnology or nanotechnology.

In identifying potential areas of competitive advantage, it will be important to appreciate the history of cities and regions, because it is this history that determines what assets – in terms of existing firms, skills and institutions – the city or region has to build on. But the strategy must look forward, to identify how existing assets can be built on to take advantage of new technologies and new opportunities.

The Science and Innovation Audits are a positive step, but they have been carried out patchily, and they have not been consistent in the degree to which they attempted to characterise all industrial sectors in one geography, or one sector in many geographies. We suspect they also were hampered by the inadequacy of the UK's sub-national evidence base, as discussed above.

#### **4.10. Creating the right institutions to bring together sectors and places**

As discussed in section 4.0, we believe the issue of institutions to be central, and not yet adequately in place. A patchwork of often disconnected (and often changed) institutions currently have some involvement in industrial policy, and this poor institutional structure translates into ineffective strategy formation and delivery.

The relevant institutions include central government departments (such as BEIS, the Department of Health, HM Treasury), free standing agencies (such as Innovate UK and the Research Councils), devolved administrations and their departments, various levels of local government, hybrid public-private organisations such as Local Enterprise Partnerships and Sector Leadership Councils, and non-governmental and civil society organisations such as trade organisations, Chambers of Commerce, and professional bodies.

Among the key questions to be asked about these institutions in assessing their ability to contribute to strategy development and delivery, we believe there should be a focus on:

- *Capacity*, including quality of leadership, and analytical capacity, including their access to a data infrastructure.

- *Legitimacy*, including democratic legitimacy for government bodies and a widely acknowledged degree of representativeness for non-government organisations. The degree to which organisations can claim legitimacy is crucial to their effectiveness in creating and giving effect to their priorities,
- *Resourcing*. The availability of resources commensurate with their responsibilities and their ambitions is, of course, crucial to their effectiveness in realising them.
- *Coordination*. Given this very complex landscape of institutions and the difficulty of the challenges that industrial strategy must meet, success is unlikely unless there is a considerable degree of coordination between them.
- *Stability*. There has been a lack of institutional stability. While institutions that are not working well do need to be reformed, the aim must be to develop a stable institutional landscape in the new strategy.

One very specific issue that will need answering post-Brexit is the question of what will happen, if anything, to replace the regional development funds that have come from the EU's European Structural and Investment Funds. These have constituted a major funding stream to support economic strategy in the poorer parts of the UK; the futures both of the funding streams themselves and the decision making structures that allocated them need to be decided as an integral part of the industrial strategy.



**The Industrial Strategy Commission**

[contact@industrialstrategycommission.org.uk](mailto:contact@industrialstrategycommission.org.uk)

[industrialstrategycommission.org.uk](http://industrialstrategycommission.org.uk)

[@IndStrategyComm](https://twitter.com/IndStrategyComm)