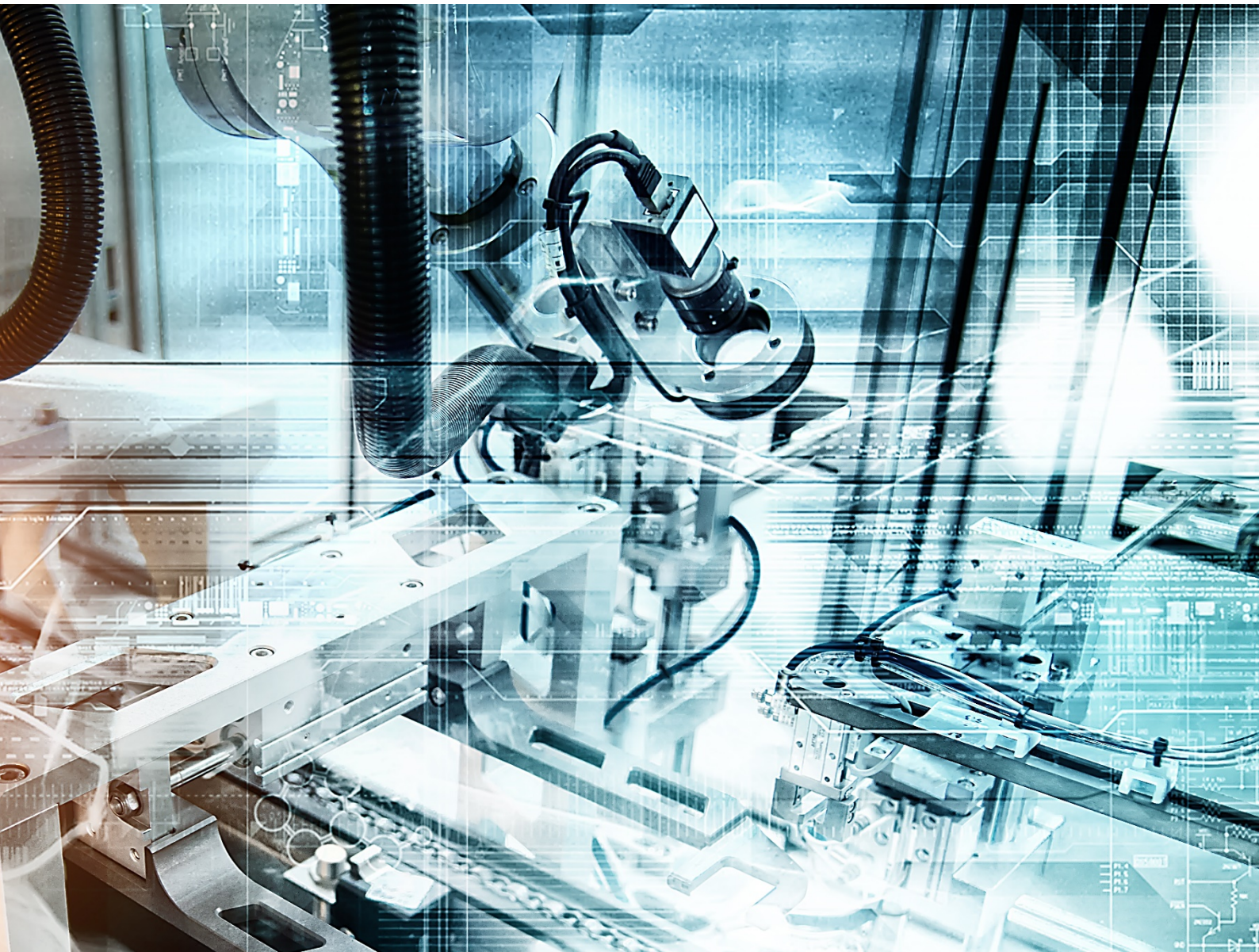


Driving technology diffusion in the UK: Industry 4.0 and the Made Smarter Programme

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The UK's Made Smarter programme

Made Smarter is the UK's national Industry 4.0 initiative. It was set up to drive “innovation, rapid adoption and stronger leadership” in industrial digitalisation to support the UK's ambition of becoming a world leader in Industry 4.0 by 2030¹.

There are two main strands of work in the Made Smarter initiative. The first one is the £28m **Made Smarter Adoption** programme in the North West, North East, West Midlands, and Yorkshire and the Humber, which focuses on adoption of Industry 4.0 technologies. The second is the £147m **Made Smarter Innovation Challenge**, which focuses on the development of industrial digital technologies.

Made Smarter Adoption Programme

The Made Smarter Adoption programme was launched in November 2018. It was initially set up as a pilot aimed at helping up to 3,000 manufacturing SMEs based in North West England to adopt industrial digital technologies by offering specialist technology advice, management leadership training, and access to match funding.

The pilot programme has so far engaged with more than 1,300 SMEs. Over 500 of these have received intensive support and more than 180 have undertaken match-funded transformation projects. In addition, 62 SME manufacturing leaders in the North West are undertaking Made Smarter leadership and management training across five cohorts at three North West universities.

Early results from the pilot programme's independent interim evaluation show that 84% of supported firms surveyed report an increase in productivity. Participation in the pilot is statistically significantly correlated with turnover increase (6.5%) and employment increase (3.9%) against a counterfactual. Based on the first 25 completed projects, £620k of grant funding has helped leverage £2.6m of private investment.² Box 1 presents a selection of case studies on the impact of the Made Smarter North West pilot.

Manufacturing Made Smarter Challenge

Alongside support for adoption, the UK government is also investing £147 million through a Manufacturing Made Smarter Challenge to drive innovation in new digital solutions. The challenge has launched a number of R&D competitions, including a £30m 'Fast Start' which supported projects including the *Digital Sandwich*, a blockchain-based system for food supply chain security. A second £20m competition focused on digitalising supply chains opened for applications in July and closed in October 2021.

The challenge also launched programmes on research centres, innovation hubs and accelerators.

Research centres will develop cross-cutting research across the challenge's four priority themes (smart connected factory; connected and versatile supply chains; design, make test; and adaptable, flexible manufacturing operations and skills).

¹ Made Smarter website: <https://www.madesmarter.uk/>

² Data provided by BEIS.

Box 1. Made Smarter Adoption Programme: Case Studies from the North West Pilot

The following case studies illustrate how both large and small firms have leveraged digital manufacturing solutions to enhance their manufacturing processes and business models. Additional case studies can be found at: <https://www.madesmarter.uk/resources/case-study/>

| Business Type | Project | Impacts |
|--|--|---|
| <p>Bindatex is a manufacturer of advanced materials located in Bolton, Greater Manchester. They have developed a niche market providing a precision slitting service to high value manufacturing industries, such as aerospace.</p> | <p>Using Made Smarter’s digital strategy workshop to identify challenges and potential solutions, Bindatex adopted Total Control Pro (TCP), a cloud-based production data capture system which enabled the business to track products through the manufacturing process.</p> | <ul style="list-style-type: none"> • Estimated increase in overall productivity by 20%. • Reduced unplanned stoppages and machine downtime by 30%. • Reduced lead time by 25%; firm able to deliver all orders on time. • Greater efficiency in energy use could reduce carbon emissions by 20%. • New capacity also gave Bindatex greater agility to reconfigure production to die cut discs for filters used in ventilators for the NHS. |
| <p>Storth is an agricultural machine manufacturer based in Carnforth, Lancashire. The firm specialises in machinery for slurry management which is sold to farmers all over the world.</p> | <p>A UR10 robot welder was adopted to produce the components for its scrapers.</p> <p>Designed for simple and repetitive welding processes, the six-axis collaborative robot (‘cobot’) is programmed using touch screen menus and has the capacity to perform live simulation of welds on a product.</p> | <ul style="list-style-type: none"> • The robotic solution is able to produce 5,000 parts within five months, two-and-a-half-times quicker than it would have taken three full-time human welders. • Two welders have now been redeployed from repetitive jobs to products with higher value and the production team has increased from 9 to 11. • Lead-times on critical orders can be reduced from six weeks to four. • Data provided by the robot allows pricing of products based on actual rather than estimated costs. |
| <p>Nutree Life is a food manufacturer located in Preston, Lancashire. The company produces both its own brand and white label vegan and free-from protein bars, as well as powders and burger mix, which are sold all over the world.</p> | <p>The business adopted a bespoke digital solution that controls the positioning of the product as it moves between the machines to ensure consistent layering.</p> <p>The bespoke solution captures production data and transmits to management in real-time.</p> | <ul style="list-style-type: none"> • Faster and more accurate production and control has resulted in increased overall equipment effectiveness (OEE) – a key measure of manufacturing productivity – from 76% to 89%. • Nutree Life are now able to make more complex products with less handling, reduced waste and energy use. • Real-time data allows for more effective workflow planning and audit activities, which are crucial in the food sector. • Workforce has doubled to cope with the extra demand for its products. |

The Made Smarter programme in international perspective

Considering international comparisons, some features in the UK's approach to supporting Industry 4.0 stand out.

The first one is the lack of a technology diffusion programme with national coverage. Initiatives in countries like Germany, China and Korea have national coverage and are supported with both national and regional government funds.

In contrast, the UK approach has been to establish a regional pilot.³ Despite calls for a national rollout of the Made Smarter programme (see Box 2), the programme has only received £8m in new funding to expand support into the North East, Yorkshire and the Humber, and the West Midlands.⁴

A second feature is the lack of regional institutions for technology diffusion. In the US, for example, the US Manufacturing Extension Partnership (MEP) supports technology diffusion through its network of nearly 600 offices and centres serving firms in all of the US states. This decentralised presence allows the programme to reach over 11% of all SMEs in the country.⁵

Similarly, Germany's Federation of Industrial Research Associations (AiF)'s network, of 100 industrial research associations across the country, is able to reach 50,000 businesses, mostly SMEs.⁶ Japan has a regional network of 60 "Kohsetsushi centres" which support the development of its industrial SMEs, providing them with testing and research services. For other sectors of its economy, such as agriculture and health, there are hundreds more similar centres. In 2016, they received combined funding of around US\$1.5 billion and hosted more than 12,000 researchers⁷ – all working to help SMEs innovate.

In the UK, Catapults de-risk the transition from research to commercial delivery through the provision of R&D infrastructure, specialist knowledge and expertise. The High Value Manufacturing Catapult (HVMC) is the largest in the Catapult network, bringing together seven centres across 17 locations throughout the UK. The HVMC has expertise in a wide variety of manufacturing technologies including metals and composites, process manufacturing technologies, and bio processes. The whole Catapult network receives £1.2bn of direct public funding for the current five-year funding period, of which over half is allocated to the HVMC.

Catapults play a valuable function in the scale up of manufacturing technologies. However, they have not reached the level of coverage across all regions and nations and thus do not support technology diffusion throughout the country in the same scale as their international peers (such as the Fraunhofer institutes in Germany, after which the Catapults were modelled). HVMC support is not easily accessible, especially to SMEs, due to the cost of support and membership (£30,000 to £200,000) and a perceived sectoral focus.

In the UK, significant efforts and time have been necessary to build regional capabilities for the delivery of the North West pilot, with the hiring of specialist technology advisors becoming a constraint to rapid programme delivery.

³ Adoption type business support is a devolved matter. Scotland has established Industry 4.0 technology diffusion activities through its Manufacturing Advisory Service.

⁴ <https://www.gov.uk/government/news/8-million-government-boost-for-manufacturers-across-england-to-go-digital>

⁵ Manufacturing Extension Partnership (2020). Annual Report 2019

⁶ <https://www.research-in-germany.org/en/research-funding/funding-organisations/industrial-research-associations-aif.html>

⁷ <http://www.stat.go.jp/data/kagaku/kekka/index.html>

A recent report by Make UK highlights these challenges⁸: “*Outside the North West of England there is no integrated model for [providing technical, process and change management expertise] in relation to industrial digitalisation. Growth hubs in other parts of the country said that they didn’t have the ability to provide sufficiently expert advice to support this work. Elsewhere a patchwork of local authorities, LEPs, universities and others are trying their best, but with limited resources. They often struggle to locate SMEs who need their help and to interact meaningfully with them.*”

Similarly, a report by the US Information Technology and Innovation Foundation (ITIF), comparing national approaches to Industry 4.0, noted⁹: “*The decision to disband [the Manufacturing Advisory Service] and to rely on LEPs was an intentional devolution to local and regional officials to empower them with taking a greater role in local and regional economic development, but it has left Britain without a nationwide support instrument for SME manufacturers*”.

Box 2: Recent statements on the Made Smarter programme and the adoption of Industry 4.0 in the UK

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| Make UK¹⁰ | “There is widespread enthusiasm for, and commitment to, increasing the pace and scope of our national efforts to promote industrial digitalisation. But to deliver, we need to build on the Made Smarter North West pilot, and replicate its success in other regions.” |
| Royal Academy of Engineering¹¹ | The Royal Academy of Engineering has identified digitalisation, alongside net zero and infrastructure, as priorities to enhance the resilience of the UK economy. The Academy has called for the expansion of the Made Smarter pilot beyond the North West: “SMEs are typically embedded in their communities, and engineering SMEs offer routes to good jobs right across the country. Made Smarter provides advice from specialist technology experts to help identify and implement the right digital tools to deliver everyday improvements to SMEs.” |
| Onward¹² | <p>“As part of the Spending Review, the Government should commit long-term funding for key anchor institutions that would support the growth of manufacturing, such as Catapult centres, mission-orientated translational research centres and initiatives such as the Made Smarter programme. This would echo similar moves made in other countries.</p> <p>In the United States, the Innovation and Competition Act 2021 increased the funding for the Manufacturing Extension Partnerships (MEP) threefold, a further significant increase after its funding was doubled under the Obama Administration. Since the MEP was launched by President George HW Bush, the network of (match-funded) public-private partnership centres has grown. It advises manufacturing SMEs to help improve processes and productivity; expand their capacity; and help them adopt new technologies and management practices.”</p> |

⁸ Make UK (2020). [Make it Smart](#). Policy Paper.

⁹ ITIF (2018). [Why Manufacturing Digitalization Matters and How Countries Are Supporting It](#).

¹⁰ <https://www.makeuk.org/-/media/files/insights/reports/make-uk---make-it-smart.pdf>

¹¹ <https://www.raeng.org.uk/publications/reports/engineering-a-resilient-and-sustainable-future>

¹² <https://www.ukonward.com/wp-content/uploads/2021/09/Making-a-comeback.pdf>

Conclusions

The deployment of new technologies, and in particular Industry 4.0 technologies, is a national priority in virtually every advanced economy. The Innovation Strategy set out by the UK government commitments to an increased focus on adoption, but as things stand, the UK is in a disadvantaged position.

On one hand, the UK has not yet established of an Industry 4.0 diffusion programme covering all regions. On the other, the international experience suggests that simply creating new programmes and initiatives might not be sufficient, as some programmes might only work if certain types of institutions with the required coverage exist in the country. In this context, there is a stronger role for existing institutions, like Catapults, to play in the diffusion of industrial digital technology.

In any case, a debate on the need for long-term investment on institutions for technology diffusion in the UK, especially for SMEs, is overdue.

About us

Cambridge Industrial Innovation Policy is based at the Institute for Manufacturing (IfM), a division of the University of Cambridge's Department of Engineering. CIIP brings together the Centre for Science, Technology & Innovation Policy (CSTI) at the Institute for Manufacturing, the Policy Links Unit from IfM Engage, and the Babbage Policy Forum.

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