

Spotlight

MANUFACTURING: MAKING IT COUNT

Jonathan Reynolds MP / Professor David Bailey / Alan Mak MP



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Putting things together



Bookshops enjoyed some good news last week: sales of printed books rose seven per cent in 2016, while e-books declined by four per cent. The reasons for this are diverse and not necessarily interdependent, but it's possible to pick out one broad factor: the appeal of reality. The tangible holds an intrinsic appeal that the digital does not. This extends also to work.

In the 1950s, the manufacturing sector provided a third of Britain's economic output and 40 per cent of employment. Britain manufactured a quarter of the world's products. Today, the service sector outweighs manufacturing by almost six times. For a great many British people this has meant a great increase in quality of life – try working in a plastics factory and an office, and see which you prefer – as more people became more educated and joined the knowledge economy. But as low-value mass production shifted to other countries, many people also lost the sense of purpose and stability that comes from making something real.

The disempowerment of losing 'real' work contributed to a sense, in former industrial areas of the West, that globalisation and technological change have emasculated once-proud manufacturing economies – a sense exacerbated by the fact that the jobs lost were not replaced by anything comparable, but relocated into other sectors and other areas, particularly cities.

Only an idiot would wish to return millions of people to the factory work of 50 years ago – and in America, that idiot is now the President – but it is important to remember that making things, even prosaic things in industrial quantities, is to many people a source of identity and of place as well as income. Understanding what was good about our manufacturing past is essential to effective planning of our industrial future.

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UK industry and economy can thrive on exports, according to Jonathan Reynolds MP, Co-Chair of the All Party Parliamentary Group on Manufacturing

The UK must make its own future



No other sector of the United Kingdom's economy holds the same social, cultural and emotional significance with the general public as manufacturing, yet it continues to be in some respects, a misunderstood, misaligned and misrepresented part of our national identity. Britain's imperious past as the workshop of the world, and the definition of whole towns and cities by the factories they hosted, has led to a profound sense of national and local decline as those factories have gone east and the UK's economy has changed.

It is common to hear that "Britain doesn't make anything anymore". This, as readers will hopefully be aware, is actually far from true. However, the

raw figures are indeed stark. Between 1990 and 2009 the percentage of UK Gross Domestic Product attributed to manufacturing fell from 22 per cent to just over 11 per cent. Perhaps more deeply felt in terms of the impact on local areas, employment in the sector fell from 5.2m to 3.1m.

Industrial decline, whether perceived or real, is a significant factor. Owing to certain characteristics of UK manufacturing – the physical footprint of factories, the interconnectedness of industrial character and urban development (many town halls being built by prominent industrialists in the 19th century) – the way in which whole towns across the UK were shaped and survived (or didn't) was a result of their



Food and drink manufacturers, such as the 9,000 companies working in the UK's large sugar industry, should not be left out of the government's industrial strategy

“Industrial decline has hit communities”

NEIL MITCHELL/SHUTTERSTOCK

industrial activity. Industrial decline was, and is, more deeply felt at the community level than decline in other parts of the economy.

There are two caveats I always stress when analysing the data on manufacturing. Firstly, a percentage share of GDP is always a relative figure. The enormous growth of financial services over this period has, by definition, made every other sector of the economy a smaller percentage of the total. Secondly, many of the ancillary functions once included within the definition of ‘manufacturing’ have now been outsourced and hence are recorded more accurately within the service sector (in its heyday ICI once maintained its own conference centre and hotel in Hyde

for the use of its senior managers on business at the nearby plant). It cannot be denied, however, that manufacturing has in recent times become a smaller part of the UK economy, and it would be desirable on many levels if we put in place policies and an Industrial Strategy to help it grow.

A stronger manufacturing sector would offer a number of advantages to the UK. In Peter Mandelson’s memoirs, he talks lucidly of his time as a European Commissioner and his realisation that in government Labour had been too relaxed about where growth came from and whether we had a sufficiently broad and resilient commercial tax base to withstand the downturn (we didn’t). Growth in manufacturing would also certainly help our balance of payment figures and, most likely, our productivity performance. In addition, it would help bridge regional inequality by recognising the strength and competitive advantage that already exists in some parts of the UK.

Some people therefore advocate government setting a target for what share of GDP manufacturing should contribute. I am sceptical of this. It is far better in my view to put in place the right framework and then see what business can do. Top down national government targets, as we will likely see with the export target, are rarely met.

When writing about manufacturing it is also de rigueur to explain that nobody wants to see government ‘picking winners’. It is true that the government would almost certainly be awful at this. Government alone cannot deliver economic growth, but we must understand that government does determine, to a large extent, the conditions under which growth can occur. An industrial strategy is therefore not about the government trying to do the job of business. But what it is about is providing the conditions under which targeted sectors of the UK economy will be as competitive and successful as possible.

For instance, it is well known German manufacturers enjoy lower energy prices than us. This is because in Germany all

“Energy efficiency must inform Industrial Strategy”

of the costs of the transition to renewables are borne by domestic consumers. This means German domestic energy prices are substantially higher than ours, but German households actually have much lower average bills than us because their homes are hugely more efficient than ours. This is the result of many years of successful and consistent policy that has involved grants, loans and planning changes. Whether you like the idea or not, it is a coherent strategy. In contrast, in the UK there has been little visible relationship between energy and business policy since 2010.

So at the heart of industrial policy there must be a coherent and stable policy framework that allows business to make long-term choices on investment in people and plants and equipment. I would like to see a focus on the energy efficiency of UK households and businesses, the development of green gas to decarbonise heating, electric vehicles and the continued roll out of high-speed rail.

We should be looking at fundamental reform of the current system of business rates – exempting new plants and machinery – and work with industry to ensure the apprenticeship levy genuinely delivers the skills training required and isn’t just a payroll tax. But we should also make sure people understand that UK manufacturing isn’t just about aerospace and automotive – areas like food manufacturing are also extremely valuable to the UK Industrial strategy must cover them too.

There is no doubt the UK’s decision to leave the European Union is of profound significance for UK manufacturing. The EU is a major destination for our manufacturing goods, but in addition many UK businesses form part of supply chains for goods exported from other Single Market countries. For the purposes of calculating what is a ‘Single Market product’ (particularly for exporting from the EU under the terms of a free trade agreements) this UK involvement will soon no longer count.

A UK-EU tariff-free agreement for

manufacturing goods is therefore essential for the future of the country’s manufacturing industry. This is on the easier side of what the government needs to do as part of Brexit and should be deliverable fairly quickly.

Our exit from the Customs Union will necessitate considerable investment in our customs system and databases, which will come at a cost, but we have little option but to bear this. If we want frictionless trade with the EU, based on digital recognition of country of origin registrations, then we will have to pay for the systems to do this.

There will be some advantages of leaving the EU. The EU’s external tariff on some raw materials, particularly in agricultural products where the interests of French and Irish farmers have held sway, is unjustifiable. This could have significant benefits for food manufacturers, though at the same time some areas, such as the growing UK wine sector, may face greater price competition with products from the rest of the world if those tariffs go.

I believe the most essential thing to ensure when we leave the EU, other than tariff-free access to the Single Market, is that the UK remains a country open to inward investment. There are some people who maintain that a company like Nissan isn’t a British manufacturing success story because the parent company is Japanese. This is a naïve view which fails to understand the global nature of business.

Inward investment into the UK, perhaps most visibly seen in the car industry, had produced thousands of good quality British jobs with good wages producing valuable exports. There will be some who see our exit from the EU as a chance to promote protectionism. This would be nothing short of a profound mistake.

The romantic view that we can all get a job for life at the factory down the road has long since dwindled. But an outward-looking, diverse UK manufacturing sector could yet thrive outside the EU. We must be bold in laying the foundations.

Rising to the challenge: Industrial Strategy

Bridging the gap between innovation and commercialisation is crucial to the UK economy and UK industry, says Dick Elsy, CEO at HVM Catapult

With Brexit taking shape, and global political and economic landscapes shifting, these are interesting times for the UK economy and for UK industry. Times where a clear strategic direction is key to providing business with a level of stability and the certainty required to enable future planning.

I therefore welcome the government's Industrial Strategy. Its focus on the Industrial Challenges related to this, has the potential to get some serious weight behind big, pressing issues. At the same time, the government has announced extra funding of £2bn per annum by 2020 in science and innovation, starting with an extra £450m in 2017-18. This shows the government's intent to support industry and recognition that in order to be a leading industrial nation we need to invest in science, research and innovation.

UK Manufacturing is resilient, robust and generally in a good position to exploit emerging market opportunities. But several conditions need to be met.

We need the right infrastructure to allow industry to capitalise on advancements in technology. As an advanced nation, having an efficient and fit-for-purpose transportation network is a given. More than that, however, I believe upgrading our digital infrastructure and high-speed fibre network will be critical in driving up our productivity and exploit the opportunities of the Fourth Industrial Revolution.

We will, however, only fully exploit the potential of innovations in technology if there are enough skilled

UK engineers and technicians. We therefore need to create the right conditions for our talented young people to equip themselves with the skills industry needs, in order to build a successful career in engineering.

At the same time, we need to continue to invest in commercialising our innovations. The UK is a world leader in academic research, and we remain a very inventive nation. Translating this into real jobs and economic value is critical to our success as a nation. The High Value Manufacturing (HVM) Catapult – which is part-funded by UK Government through Innovate UK – works with companies of all sizes to bridge the gap between innovation and commercialisation, and it works. In 2015-16 we worked with over 3,000 companies, over 1,700 of which were SMEs. Recent successes include the newly announced McLaren Composites Manufacturing Centre and the Boeing Sheffield Manufacturing Facility. Both companies publicly acknowledge that access to the High Value Manufacturing Catapult's technology capabilities was an important factor in their decision to invest in jobs and manufacturing capability in the UK.

As the go-to place for advanced manufacturing technologies in the UK, the HVM Catapult brings key players together around issues of real importance to the future of UK advanced manufacturing, such as Additive Manufacturing, Energy Storage and Electrification, and Digital Manufacturing. In partnership, we articulate national strategies and action plans that set out the main issues and routes to success.

The Industrial Strategy green paper is out with industry for comment and input. I urge engaged manufacturers to grasp the opportunity of having a say in how we shape our future. We have a government that's keen to listen and appreciates the importance of a rich seam of manufacturing value-add in the economy. Let's not waste this unique opportunity.

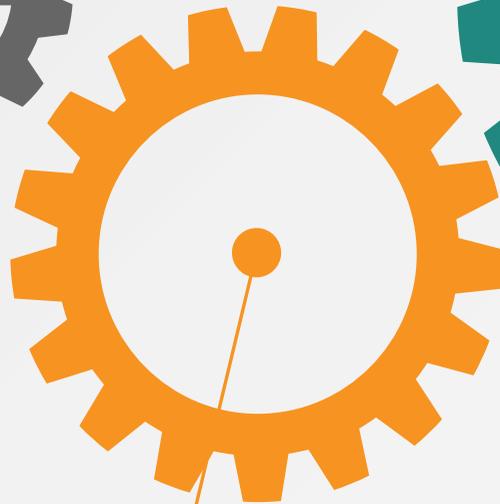
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CATAPULT
High Value Manufacturing

2.7m

Roughly 2.7 million people are directly employed by the UK manufacturing industry, encompassing automotive, aerospace, pharmaceuticals, construction, defence, electronics, textiles, food and drink, and energy among other disciplines.



45%

The UK manufacturing sector accounts for nearly half of the country's total exports, which places it ninth in the table for worldwide industrial output.

BY THE NUMBERS

Manufacturing in the UK: the five most important facts

10%

A new report from the EEF indicated that just one in 10 UK manufacturers feel suitably prepared for the Fourth Industrial Revolution (4IR) in terms of staff awareness and technological capabilities.

64%

Over half of respondents to the Annual Manufacturing Report 2017, published by Hennik Research, indicated that they felt “European political uncertainty” in the aftermath of Brexit would have a damaging effect on UK manufacturing.

43%

The UK Commission for Employment and Skills (UKCES) found that 43% of STEM vacancies were hard to fill due to a shortage of applicants having the required skills or qualifications – almost double the national average of 24%.

Start training now for the factory of the future

The technologies of Industry 4.0 will only achieve their goals if we have people with the skills to use them, writes **Professor Jeremy Watson CBE**, President of the IET



It is easy to dismiss talk of a 'new industrial revolution' as a glib marketing statement. How could a few upgrades to our factories create economic and social change of the same order as those few decades in the 19th century, when canals and railways and factories spread across the land, leaving a remade country in their wake?

To answer that question, consider that for the entire history of manufacturing, the products of organised labour have become increasingly uniform. That is about to change. For the first time, we are able to mass-produce mobile phones, cars and even foods customised to the needs or preferences of individuals, closing the loop between the old craft industries and the modern production line. In light of the change created by the arrival of the production line in the last century, it's hard to overstate the power of the technologies that will remake this process in the decades to come.

This is not all that will change. The

economics of manufacturing also stand to be rewritten by technologies such as virtualisation and 3D printing, which offer the ability to develop, prototype and make products quickly and at low cost. With the huge gains in efficiency offered by advanced manufacturing technologies such as pervasive sensing, data collection and robotics, and with greater consumer research through Big Data mining and new financial models such as crowdfunding, risk will be reduced and investment will become more predictable. The factory of the future will not be an uncertain outlay that can be shouldered only by a large company, but a scalable proposition that is profitable even before it grows.

This is good news, as technological change so often is. But uncertainty remains, particularly in the case of the UK. While our country does not lack the confidence or the ambition to seize these enormous opportunities, we are currently under-equipped to implement

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them. We are not training people to work in the factories of the future.

In fact, we are not currently training enough people to work in the factories of the present. Our most recent survey of skills and demand in industry found that more than half (52 per cent) of UK firms are seeking new engineering and technology staff. In the specialised areas such as electronics that are crucial to the development of 'Industry 4.0', there are significant recruitment shortfalls, and 57 per cent of companies reported having difficulty recruiting the skilled engineers, people with 5-10 years' experience, who are among the most valuable and effective employees in the new manufacturing landscape. Perhaps most worryingly, 68 per cent reported that the education system will struggle to keep up with the new skills required by technological change.

Industry cannot address this issue on its own. For the factory of the future to create the economy of the future, we

need to equip people with skills that parallel the technologies that require them. You cannot have a factory in which people use and work alongside robots to greatly increase their productivity without training those people in 'cobotics' – working with and understanding robots. People cannot use data to make machinery more reliable and effective if they are not trained to interpret that data. Skills are integral to the future of manufacturing.

And of course, closing the engineering skills gap does not only create a more productive workforce. It also creates a more fulfilled workforce, one that values its work. The more highly skilled a person's work, the more likely they are to feel satisfied by it and invested in its outcomes.

This is not an insurmountable challenge. It is one we have overcome in the past, when the 'third industrial revolution' brought digital technology into every sphere of modern life.

Thanks to a programme of education and investment in digital skills, the UK now has one of the world's leading digital economies. The economic gains from this have been transformative, with the digital sector in the UK now worth more than £160 billion to the economy. By closing the engineering skills gap and taking a world-leading position in advanced manufacturing, the UK could not only duplicate this success but dramatically exceed it. After all, we are talking about a sector that already makes up 10 per cent of the economy. And we can on-shore without replicating the inflexible behemoth factories of the last century.

There are steps we can take now in industry to help the UK spearhead the next industrial revolution. We can help to create better communication, both within businesses and down supply chains, to help people in different disciplines work together more effectively. We can spread innovation across sectors, too, so that advances in the pharmaceutical industry inform new techniques in food manufacturing, for example, or new ideas in aerospace can be picked up by the automotive industry. And we must safeguard these new processes by investing in cyber security, to ensure both the safety of manufacturing innovations and the valuable intellectual property that is often associated with it. This discipline implies further capability needs.

More than this, however, we need to train a new generation of engineers in skills that are genuinely relevant to the new industrial drivers – flexibility, agility, technical advance and ongoing innovation. This can only be achieved through a substantial rethink of the curriculum, through promoting the value of engineering in schools, including opportunities for girls, and through work experience placements and apprenticeships. With a better dialogue between schools, universities, government and industry, we can co-create the next generation of engineers for the economy of the future.

Start-ups and sole traders have long struggled for affordable workspace. Building Bloqs co-founder **Arnaud Nichols** talks to Rohan Banerjee about a solution

How a big orange shed became manufacturing's new black



It's odd to think of an industrial estate unit as inspiring, but Building Bloqs, the brainchild of five of co-ordinated creatives, breaks the mould. Located just off the north circular road in Edmonton, north London, an 11,000 sq ft workshop is home to more than 300 different manufacturers. It's that difference, co-founder Arnaud Nichols explains, that is defining. Building Bloqs is not one single factory but a gestalt network of makers and artists, renting a shared space and equipment under the same supporting non-profit banner.

Surrounded by mostly grey hangars, Building Bloqs' carroty paint job suggests it is something unique – and that it is. A tour around the site today, which could look totally different tomorrow, doesn't disappoint, and witnessing 'work' seems anything but. There's even a friendly French bulldog called Hemingway who accompanies his owner to his bay.

"Building Bloqs was born," Nichols begins, "out of a need, more than anything else. It was started by a group of makers. We [the five co-founders] used to have a workshop in Manor House, with a few freelancers and sole traders. It was a small workshop; then gentrification came along and did a good job of getting rid of workshops and replacing them with houses. There was such a large network of freelancers throughout London and they were also having the same problem. We decided rather than trying to just find another space, we wanted to solve the problem."

Sporting sandpaper stubble while sipping at a coffee in Building Bloqs' on-site café, Nichols typifies the relaxed vibe that exudes from the place. The pressures of living and working in London are well-documented. It is Building Bloqs' aim, however, to provide a comfortable headspace as much as a workspace for



its manufacturers.

The plaid-clad 37-year-old continues: “One of the main reasons for setting up Building Bloqs was basically to empower people to access amazing equipment. If you have that all under one roof, then it reduces overhead costs and creates a platform for innovation, new jobs and start-ups.”

Building Bloqs sees collaboration at its core and pooling has themed its organisation from day one. “We started with no funding, just an idea that we wanted to share resources, machines and space. We wanted to reflect the needs of the industry. Five co-founders took out a lease on the building with a few machines and whatever we could scrape out of our pockets. This was the back end of 2012. We put together around £50,000 and our vision was to just get the ball rolling and it’s definitely worked out.”

Asked about a potential loan from

the bank, Nichols rolls his eyes. With piercing sarcasm he adds: “Well as you can imagine, banks were doing a really great job of lending money to entrepreneurs,” before qualifying: “starting a business that needs access to expensive equipment is difficult for the one or two-man band.”

While Building Bloqs might be a non-profit organisation, it still needs to make money in order to make its service sustainable. So, how does the company keep costs down – its key selling point – while doing enough to afford bespoke, first-rate facilities and equipment? Nichols points out that while other rental spaces operate on fixed-term contracts, Building Bloqs has fluidity and its network of freelancers are only charged for what they use, when they use it. “We’re on a pay-as-you-go system. If you have a company rooted to a workspace for, say, six months, that means they’re going

to be not only taking up that space for six months, but also paying for it even on their days off. We do get instances where people work seven days in a week for an extended period of time, but once that burst is over, there’s no obligation for them to keep on paying. By freeing up new spaces at regular intervals, that’s how we attract so many and such a range of clients.”

Renting a workspace at Building Bloqs starts as low as £20 per day, with add-ons for specific machine use. A spray-booth day costs £70, while use of the laser cutter is £120 for the day with half-rate and half-length sessions also available. A report published by Workshop East in 2015 found that the average rental costs for London workspaces across a variety of manufacturing disciplines – including woodwork, textiles and glass-making – were £800 per month. That didn’t account for any machine usage.

The capital’s primacy in many industries is, of course, pronounced. Nichols contextualises much of what he says as “in London” but why is this important? Wouldn’t it be cheaper to relocate a business to the North? “Maybe it would be, but London is where the work is. It’s a hub for business, innovation and invention. It is where the ideas and jobs happen.”

Nichols’ London’s focus might sound flippant but it isn’t entirely without foundation. A recent government investigation into regional and local economic growth found that The Big Smoke’s £378 billion GVA accounted for 22.9 per cent of the UK’s total, with the South-East contributing a further 15.1 per cent. The north-south divide notwithstanding, though, Nichols is right that London is “full of small, freelance, one-off traders” and indeed about a need to protect them. *The Guardian’s* architecture columnist Oliver Wainwright noted recently: “The capital is cannibalising its industry, eating its productive space from the inside out, as the manufacturers and makers are moved to give way for the incessant march of housing. In attempting to solve one crisis, we are walking blindfold

“We’re a community and a support network”

into another.” Nichols agrees and says: “Building Bloqs aims to preserve London’s manufacturing scene.”

Is Building Bloqs a trade union, by another name? Nichols smirks. “We’re a community and a support network for small companies, sole-traders or start-ups. And having all of these different people and disciplines under one roof is massively useful.” How so? “Well, consider that when I had my old workshop, I didn’t have a spray booth so if I wanted to spray paint something, I’d have to finish my work and then travel somewhere that did. That will cost even more. Crucially, though, I think that having different types of manufacturers in one place means there is access to a knowledge pool that you wouldn’t get by working in isolation.”

Rob Quirk, founder of custom bike makers Quirk Cycles, has based his company at Building Bloqs for two years and feels Nichols’ knowledge economy comments are accurate. “Admittedly, I’m quite niche and I do work alone, but that doesn’t mean I haven’t benefited from having people around me. You’ve got two guys in the metalwork section here and between them they have around 40 or 50 years’ experience – that’s invaluable. If I need to know something, say, about a specific tool to use or properties of a material, then I can just turn around and ask them. If you’re working in isolation, sure you’ve got Google on your phone, but you might spend ages trawling through the search results. It’s easier to have that expertise from a real person to hand.”

Joe Buckingham, whose company The Gentleman Blacksmith also rents a bay at Building Bloqs, concurs: “It’s an ecosystem; I’ve made a lot of contacts through Bloqs. If I’ve got 20 regular clients and someone else has the same number in another discipline then suddenly we’re sharing 40 contacts.” Building Crafts College graduate in fine woodwork Ollie Morrion, meanwhile, says: “You’d be hard pushed to find another environment that covers so many disciplines, and with staff so friendly and supportive of whatever your ambitions may be.”

But what happens when a start-up

ceases to be a start-up? Nichols speaks in glowing terms about Duncan Strong, a former Building Bloqs user and proprietor of Bespokea, a designer that specialises in customising IKEA kitchen units. Strong left Building Bloqs when his company grew in 2016 but has not forgotten where he came from. The 50-year-old, whose past clients include Oasis frontman Noel Gallagher and TV talk show host Graham Norton, says: “I came across them on the internet, got in touch and arranged to rent space on a monthly basis. My rental costs went from £1400 per month to just £650 per month, with access to all the equipment I needed to test the potential of the business. I am still a member of Building Bloqs and maintain the friendships and business contacts I made there. I am involved in two projects that will be fitted by other members. My website generates a lot of leads that do not fit my business model and I normally pass these to other members. I am very grateful to Building Bloqs for the opportunity they gave me to explore a new business whilst minimising the risks.”

The Building Bloqs vision became a reality, but what’s the dream? Setting down his coffee on the table which could have conceivably been made a few feet away, Nichols responds: “Scalability is related to space. What we have here is a proof of concept – we’ve been going since 2013 and aren’t letting up – and a very functional space, but it’s not enough.” Not enough for what? “Well we can’t build a bridge in here, for example. That’s why we’re moving to a new building, on the same site, but it’ll be five times the size.”

Building Bloqs prides itself on being the leg-up onto the ladder and a sign of encouragement for those just starting out. It is this that Nichols wants to develop the most. “If the UK is going to be a country of innovation then you need to have the skills to deliver that. We want to bridge the gap between new cutting edge digital fabrication and traditional analogue making. We’d like to have a stronger relationship with the local colleges and universities, and the makers of the future.”

ERP in a post-Brexit economy

Future-proofing manufacturers for life outside of the European Union is key to the UK's industrial fortunes, writes Rue Dilhe, managing director at Exel

The United Kingdom's decision to leave the European Union is shrouded in uncertainty about certain change. But whatever legislative developments affect the movement of goods (import duties, VAT and export tariffs) post-Article 50, any and all British manufacturing companies will unavoidably need the right support to comply. Future-proofing Enterprise Resource Planning (ERP), therefore, must be the focus for the industry.

So, what is ERP? ERP is a software system that helps you to manage different business functions like financials, supply chain and production, bundling them together in one central place. In day-to-day terms, it relates to automating tasks like data entry or report generation. It means boosting data security, improving inventory management and eliminating the need for single-purpose software.

If the digitalisation shift is about the only thing we can be sure about in the modern world – Donald Trump's shock election to the White House will have also altered the trading fault lines in the West – then it stands to reason that ERP and cloud technology should form global businesses' silver lining. Cloud technology has helped businesses realise a mobile-first workforce and concordantly all successful ERP systems have some sort of web interface that allows you to work anywhere, on whatever device.

ERP improves the efficiency of a company's business processes, helping reduce costs and increase capability, whilst keeping customers happy and well informed. ERP provides

unparalleled insight into all areas of your business, enabling you to identify high or low-profit activity so you can make better informed strategic decisions and more educated predictions.

Exel is a leading British software author, and we have been developing the flexible ERP solution EFACS E/8 since 1985. EFACS E/8 is adaptable and scalable and the inherent customisation tools mean that as your business requirements change, so can your ERP.

Brexit doesn't necessarily translate to a lack of internationalism. Even if leaving the EU shifts the goalposts for trade, it will not diminish the UK's significance or potential offering in one fell swoop, unless the UK allows it to do so. There are two impetuses, then. They are to make sure that UK business remains attractive and accessible to both stakeholders at home and abroad.

So, how have we at Exel mitigated towards this aim? We've made it very clear that we're a British company and a British company that isn't dependent on imports for what we sell. Currency fluctuations notwithstanding, we can offer our customers at home consistent UK-based pricing in sterling. That doesn't mean, though, that our reach is domestically exclusive. Exel's EFACS ERP systems have always been developed as multi-currency and multi-lingual, with the latest in use in 30 different countries. How do we propose to maintain that international appeal? The answer is simple: by continuing to make EFACS E/8 the most effective ERP solution possible.

By deciding to deal directly with their ERP solution's author, a manufacturer can make a meaningful reduction to the implementation costs, risks and timescale of their new ERP solution. More than ever, manufacturing companies have to ask hard questions about technology. Is it flexible? Is it web-friendly? Is it mobile-friendly? Is it extendable or customisable? Exel is prepared on all of these fronts, because you can't assume how you consume ERP today will be how you consume it in five years' time.

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The first industry to start making deals with the government over Brexit was the finely tuned and globalised system of automotive manufacturing. **David Bailey**, Professor of Industry at Aston Business School, explains why these negotiations are crucial

Driving away: can the UK car industry survive Brexit?



Giving evidence to a Lords' Committee late last year, Mike Hawes, chief executive of the Society of Motor Manufacturers and Traders said that the UK auto industry faces "death by a thousand cuts" if the big car firms decide to invest in other countries, over the UK, in the wake of the Brexit vote. It's a view I share.

The recent decision by Nissan to invest in building the next-generation Qashqai model – currently the most-produced car in the UK – at Sunderland, was a great piece of news that reflects the underlying competitiveness of the UK auto industry. But the big battles for UK auto are still ahead. Toyota committed £240m to its Burnaston plant last week, but did not make any specific commitment to building future models there. More seriously, Honda and Vauxhall are still at risk of switching production from the UK to Europe if uncertainty over our trading relationship with Europe isn't clarified sooner rather than later.

The takeover of GM Europe by Groupe PSA adds an extra dimension

of uncertainty for the Vauxhall plant at Ellesmere Port, in that the firm will be looking to make significant cost savings. These could come from joint procurement and technology sharing across models and brands, but they could also come from plant closures and job cuts.

Sadly, UK plants look more vulnerable to such cost-cutting than European sites. That's not because they are inefficient. Far from it – workers and management at both Ellesmere Port and Luton have pulled out all the stops in recent years to work flexibly, get costs down and win contracts to build new models, beating competition from across Europe.

Instead it's a combination of the UK's flexible labour markets (it's easier to fire workers here), uncertainty over our trading position with Europe, and the post-referendum Sterling depreciation that leaves British plants exposed.

The currency point illustrates the significance of an international supply chain. Major components such as engines are imported to GM's UK plants from the continent. The weaker pound makes



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“No deal means a bad deal by default”

components more expensive, pushing up assembly costs in the UK.

Groupe PSA has experience of closing UK operations, having shut its (profitable) Peugeot plant at Ryton, near Coventry, almost 10 years ago, when it shifted production of small cars over to Slovakia. Ellesmere Port, which employs 2,100 people, is arguably the most vulnerable in the context of uncertainty over the future of the UK’s trading relationship with Europe. The Astra model assembled there is due to be replaced in 2021, with a decision on where to base production to be made sometime in 2018 – slap bang in the middle of Article 50 negotiations. Key investment decisions will be made in what looks to be at least a two-year window of uncertainty. PSA/GM, like other car makers, will ask if the UK car industry has access to the single market, and if WTO tariffs will apply, before they decide if investing in UK production is worth the risk.

The risk is greatest for these ‘mass market’ producers, who operate on low margins, rely on exports and have new models (such as the next Astra) at the planning stage.

There is a particular concern in the industry over tariff barriers. With margins in the mass volume sector already wafer thin, a ‘hard Brexit’ that falls back on World Trade Organisation (WTO) rules could see tariffs as high as ten per cent for cars and four per cent for components. While the Prime Minister states that “no deal is better than a bad deal”, no deal in this sector would constitute a bad deal by default, raising serious questions about the future viability of several more UK car plants.

Tariffs are not the only area in which agreement is required, either. Non-tariff barriers, such as regulatory differences, can also disrupt automotive value chains. Components can cross borders several times before final car assembly.

All of which brings us back to Nissan and the “assurances” it received over the Qashqai from a government that knew that it couldn’t afford to lose the investment. We don’t know exactly what was offered, but it seems to around be

support for building local supply chains, and on innovation and skills. Nissan has since called for a £100-£140m fund to help rebuild supply chains. Ford at Bridgend and Peugeot/GM at Ellesmere Port will no doubt be looking for similar support, as will other auto makers.

Yet reshoring supply chains didn’t get much mention in the recent industrial strategy green paper, and policies to support this would constitute a U-turn on the policies of the former Business Secretary, Sajid Javid, who axed key policy interventions such as the Manufacturing Advisory Service. These will need to be put back in place – maybe in a more regional approach – if the government is serious about rebuilding the UK’s fractured supply chains.

Greg Clark has repeatedly stressed that different sectors have unique needs, implying that the UK could seek sector-by-sector deals with the EU. This could mean, if certain sectors avoid non-tariff barriers, that parts of the economy will achieve *de facto* access to the single market.

But if the UK really does want to trade without tariffs and non-tariff barriers in sectors like auto, then the EU may well extract a ‘price’ in the form of a contribution to the EU budget, as it does from Norway and Switzerland.

And some form of ‘referee’ will be needed to determine whether the UK is playing by the rules of whatever trade deal is done with the EU, particularly regarding rules of origin. These require 55-60 per cent “local content” to qualify for tariff-free trade under a Free Trade Agreement. This would require regulatory oversight, perhaps by the European Court of Justice (provided this doesn’t cross a ‘red line’ of British autonomy).

As plant location decisions are made in the industry, the UK government will no doubt offer Nissan-style deals to auto makers, and unions and management will pull out all the stops to work flexibly and get costs down so as to make the UK an attractive place to invest. But if a hard Brexit forces the UK to fall back on WTO rules and tariff barriers, such efforts might not be enough.

We must let our future do our history justice

The UK is on the brink of a manufacturing boom if government and industry can work together, says **Professor Rajkumar Roy**, director of manufacturing at Cranfield University

In December 2016 the UK Manufacturing Purchasing Managers Index (PMI) gave the strongest reading since June 2014, contrary to forecasts anticipating decline. I think there are a couple of things working in our favour which might help to explain why we haven't seen a big shortfall yet.

Until recently, the public has seemingly not trusted British manufacturing to deliver jobs and economic growth. But as people have observed the problems coming from the banking sector which let down the economy, and seen the digital/service sector bubble burst, it appears that they are looking in new – or old – directions.

Engineering and manufacturing, areas Britain has excelled in for many hundreds of years, can provide a stable platform to build an economy on; and I believe we are starting to do that.

As a country we now agree we need manufacturing. The public relationship with manufacturing has changed; there is a growing perception that the sector will get business. All of this leads me to believe that we're at the start of the next wave of the mass industrialisation of the country.

At the National Manufacturing Debate at Cranfield in 2014, we discussed the need for a nationally co-ordinated, consolidated approach to promote and support manufacturing. Government and industry are working together closely at the highest strategic levels to think about the future direction of this sector and there is renewed interest in a national industrial strategy.

The government's push to use public procurement as a tool to drive more manufacturing activity within the UK raises the aspirations of our manufacturing companies, leading to a positive outlook and driving them to recruit more people. I believe this has supported the growth that we have seen recently. But we need to remain bold, ambitious and brave and for manufacturing that means looking to the future, reinventing ourselves where necessary and never being afraid to rethink what we do and why we do it.

Looking to the future, I believe there will be a number of changes in this sector – change from the corporate culture that we have now to something more home-based, more befitting of peoples' lifestyle expectations and focused more on the individual.

Large corporations will be challenged to find a high-quality, regimented workforce when there is a cultural move towards people having freer and more flexible lives.

I have a dream that one day we can make one billion manufacturers. People will produce certain products at home, or in their local communities, that will feed their own needs and will also create jobs.

To reach this point will require new skills, new technology, and a new understanding of how to work with new materials. It will also require the leadership to take the manufacturing sector forward.

Taking a hard look at what UK manufacturing will need as it asserts itself at the centre of our country's economy once more is this year's National Manufacturing Debate hosted by Cranfield University in May. Gathering around the topic 'Leadership and Investment for Manufacturing Skills', delegates from business and academia will take a fact-based approach to this subject. I hope you will join us.

For more information please visit:
www.cranfield.ac.uk/manufacturingreport
www.national-manufacturing-debate.org.uk
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You can find more detailed information about what we do at www.sevcon.com

Without change there can be no innovation

New technologies in business needn't be met with fear or suspicion, writes **Nick McGrane**, managing director at K3 Syspro

Change is inevitable, yet we humans find this incredibly hard. This is particularly true in the workplace where the current way of doing things is often seen as the only way, and where organisational change is met with suspicion, especially if it involves technology. There have, of course, been good reasons for this in the past. Man versus machine in the manufacturing sector has always been viewed as a battle over jobs and wages. But today's technological advances could be argued to be saving jobs, creating employment and establishing new businesses.

The reason is that whether you are B2C or B2B, you have to put the customer first. The revolution has been led by the likes of Amazon and eBay. Consider how much power the customer now has with the tools available to be able to write a review; not just of the product, but of the delivery and service from the supplier. In business we expect the same.

The producer of high-quality components for the automotive industry has to know exactly where the product is in the manufacturing process – factory, warehouse or on the road. Customers are no longer happy to accept a vague response. If your parcel can be tracked online for home delivery why can't the same happen in business? If there is a fault in the product you, as a business, will save time and money if you can pinpoint where the problem lies rather than having to implement a wholesale product recall.

All of this has been made possible by technologies like Enterprise Resource Planning (ERP) which collect data

throughout the product journey, from the order through to delivery. ERP allows businesses to optimise manufacturing processes by integrating accounting functions and customer ordering data with Manufacturing Requirement Planning (MRP II).

The data collected can help businesses understand their efficiencies and what they can change to improve. Technology drives the business forward as staff are freed from doing the more mundane tasks leaving them free to provide input into the business – if you let them.

ERP helps with quality control, predictive maintenance and lean manufacturing. It also helps with customer service as staff can easily find the information they need and pass that on to the customer. Being able to respond at the first interaction will keep the customer happy – and the customer expects to come first.

The question now is who will be the winners and the losers in the technological race for increased efficiencies and better customer service? One article about organisational change in the Gallup Business Journal quotes the novelist William Gibson: "The future is already here – it's just not evenly distributed."

Technology used to be expensive. Think back to the price of mobiles, TV and similar domestic appliances even just five or 10 years ago. That is not true today. Small businesses can build up their technology with modules now or take advantage of the other revolution in technology – Cloud ERP.

For many of today's established companies the path to success and the evolution of business management technology have been closely interwoven. Take the example of Netflix v Blockbuster. Cross-platform streaming services would not have worked without the technology behind the scenes to deliver it in the way consumers demand. The early adopters understood progress is impossible without change. No company can afford to think otherwise.

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The next generation of manufacturing

By **Professor Philip Nelson**, Chair of Research Councils UK and chief executive of the Engineering and Physical Sciences Research Council (EPSRC), and **Dr Ruth McKernan**, chief executive of Innovate UK



The national and international importance of the UK's manufacturing sector is clear.

We are the world's ninth-largest producer, while manufacturing accounts for 11 per cent of the UK's total GVA. It provides 44 per cent of our exports, and supports 2.7 million jobs, as well as 69 per cent of research and development.

This would not be possible without UK-led research and innovation, without the pipeline that transforms a brilliant idea into a ground-breaking product or new approach. The Research Councils and Innovate UK are responsible for investing in scientists and businesses to ensure this pipeline is healthy; sustaining and strengthening the UK's capacity to drive growth, deliver societal impact and maintaining our leading position as a place to research and innovate, and for businesses to grow.

Of course the pipeline requires strategic and sustained support, and the

Research Councils and Innovate UK do this in a wide variety of ways, across high-value manufacturing industries such as aerospace, automotive, pharmaceuticals, electronics design and photonics.

Firstly, we support the development of new ideas, predominantly through Research Council funding. The Engineering and Physical Sciences Research Council's Manufacturing the Future theme supports fundamental and applied research in universities, much of which correlates with industry needs. Through Manufacturing the Future, EPSRC currently funds 363 grants totalling more than £470m of investment, enabling researchers to provide vital contributions in high-value manufacturing.

EPSRC is developing the next generation of engineers and scientists through 115 Centres for Doctoral Training established at higher education institutions across the UK. Industry

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Innovate UK

**The University of Sheffield's
Advanced Manufacturing Research
Centre is a world-class facility**



research experts have moved into academia through an EPSRC investment of almost £20m in the Manufacturing Fellowship scheme, bringing with them a different perspective, new working practices, ideas and industrial manufacturing experience.

Secondly, across the country, the Research Councils and Innovate UK work with some of the biggest names in industry, emerging companies and SMEs, providing a bridge between them and the UK's academic community. We support close collaboration to develop technologies and processes, encouraging the exchange of ideas. EPSRC has established eight manufacturing research hubs at universities across the UK, bringing together academia and industry to explore and improve new techniques that could have a revolutionary impact on high-value manufacturing sectors, as well as the manufacturing process itself.

Innovate UK funds businesses to develop innovation technologies, services and processes from single-business projects to collaborative R&D consortia of businesses with academics. The manufacturing and materials sector competition last year, the first in a new simplified approach, provided £25m in funding to around 170 partners across 64 projects. And Innovate UK has supported Knowledge Transfer Partnerships between businesses and research partners to support the exchange of ideas and skills; for example, Cardiff University and Renishaw are developing innovative manufacturing processes for medical and dental prostheses.

Thirdly, collectively the Research Councils and Innovate UK provide the support that business needs to succeed, to grow and create jobs. Innovation and Knowledge Centres, led by expert entrepreneurial teams at universities, are an important component of our ability to commercialise emerging technologies. Working in fields such as advanced manufacturing technologies, secure information technologies and medical technologies, the centres aid the commercialisation of research by providing access to complementary technologies and international quality research capability. Innovate UK's business funding plays a significant role in this area of the pipeline.

Expertise and equipment for manufacturing innovation and commercialisation is available through the High-Value Manufacturing Catapult – a world-class network of seven technology and innovation centres set up by Innovate UK throughout the country. The Catapult has grown over the past five years to some 2,000 highly skilled engineers and technicians, and around £600m of world beating facilities and equipment.

This pipeline shows real promise. McLaren Automotive recently announced that it will open a composites technology centre in Sheffield, creating 200 jobs and supporting future innovations in motor manufacturing and materials. The new

centre is the result of a partnership between McLaren, Sheffield City Council and the University of Sheffield's Advanced Manufacturing Research Centre, part of the High-Value Manufacturing Catapult. Sheffield has also secured Boeing's first-ever manufacturing facility in Europe, a huge win for the UK.

Innovate UK not only funds businesses, it also connects entrepreneurs, researchers, investors and our partners in government to help firms identify longer-term high-value manufacturing and materials innovation and export opportunities. Supporting these businesses is vital in bringing their ideas to market more quickly.

Innovate UK's Knowledge Transfer Network helps businesses to get the best out of creativity, ideas and the latest discoveries, while our Enterprise Europe Network helps ambitious British SMEs commercialise their innovations and grow internationally.

We have achieved much so far, but there is still more to do. The formation of UK Research and Innovation (UKRI) next year will lead to even greater strategic working between the Research Councils and Innovate UK. This close working will help us to match the development of skills and new ideas to industry need, allowing us to strengthen the ties between the UK's world-leading research and innovation for the benefit of the UK economy.

The Chancellor last year announced an additional £4.7 billion of research and development funding by 2020-21, a bigger increase than in any Parliament since 1979. Consultation is continuing on how this extra funding should be invested. It will support a wide range of technologies and allow us to further increase the impact of the UK's manufacturing sector.

Harnessed in tandem, research and innovation have the potential to drive growth, transform many aspects of our lives and prepare for the future. It is our responsibility to ensure the UK delivers on this promise.



www.mta.org.uk



Engineering sector losing millions by failing to protect IP like creative industries, MTA survey shows



Manufacturing is a creative industry on par with the software and gaming industries – consider the drawings, machine optimisation, tooling, dies and moulds being constantly created. Companies must be more aware of the value that is integral in these creations, because it represents millions of pounds – and they own it.

JAMES SELKA.
CEO, MTA

Engineering and manufacturing companies are being urged to exploit the untapped value in their intellectual property to avoid losing money on lost designs, systems and patents, and create new revenues, says the Manufacturing Technologies Association (MTA).

Each year millions of pounds in IPR – intellectual property rights – are being neglected by the UK's engineering sector, because companies do not understand these rights and the IP wrapped up in their designs and processes, the leading manufacturing technology business group says.

British engineering companies including technology companies, sub-contractors, and UK subsidiaries of foreign-owned companies, are less knowledgeable about the value within their IP such as patents, design rights and trade marks, compared with companies in the technology service sector, such as gaming and entertainment, the study shows.

As well as losing IP to competitors from not registering their marks and rights, manufacturers are losing out on new revenue streams from both licensing out their IP to third parties, and from licensing IP from other parties as an agent, to allow them to use IP owned by others.

UK investment in tangible assets protected by IPRs has risen from £47 billion in 2000 to £70 billion in 2014, according to the Intellectual Property Office (IPO). This is partly due to the growth of services like software programming and the knowledge economy, but manufacturing companies are missing out and could boost this number far more, says MTA, CEO James Selka.

The findings come from an extensive survey of MTA members and manufacturers from all fields of manufacturing technology, conducted in 2016 by the MTA, Arvada Marketing and Mathys & Squire LLP. The survey was commissioned to align with the launch of the government's five-year Intellectual Property Strategy, to recognise the global growth in IPR and educate UK plc intellectual property. "There is a major push in the UK to capture value from IP, the government is behind this and manufacturers should be too," said Sean Leach, from Mathys & Squire.

5th

UK's position in Europe for patents and design intensive industries

2nd

UK's position in Europe for trademarks

26.7%

of UK employment is in the IP intensive industries

Spain, Italy, France and Germany,

are ahead of the UK for design intensive industries

Global trade in IP licenses in 2014 was worth more than £220 billion, 1.6% of global trade and rising. And in 2014, firms in the UK market sector invested an estimated £133 billion in knowledge assets, compared to £121 billion in tangible assets.

The survey showed that while nearly all those surveyed had registered basic IP such as a web domain name (94%), only 45% had registered a patent and just 22% owned registered designs. The MTA estimates that many more than this proportion will own a design that could be registered.

Among the key results, 65% of the survey of members had never licensed intellectual property from a third party, and 67% had not licensed out IP to other parties, a high proportion for both given the IP-intensiveness of engineering. And over 65% of the group had never made an application to protect their IP outside of the UK.

81% of the survey used non-disclosure agreements and 24% had been involved in a legal dispute involving IPRs, with the UK and the United States being the most popular locations for the dispute. China was a relatively low proportion.

Collectively the survey results showed that engineering companies, while having better knowledge of IP than the national average, had an inadequate understanding of the range of IP rights and the value, including from licensing, that these rights can accrue for their business, which could represent hundreds of thousands of pounds.

MTA members – largely manufacturers and distributors of technology involved in making components such as machine tools and metrology equipment – scored higher than the 2010 national IP survey on their knowledge of IP, and were broadly similar in knowledge to mid-sized companies across industry with 50-249 employees.

The business group will now set up several IP services to assist engineering companies with exploiting IP fully. These include an MTA-standard non-disclosure agreement, to give all members the same, good level of protection, assistance with making an R&D tax relief claim using online tools and better signposting to higher levels of IP consultancy such as tools provided by its legal IP partner, Mathys & Squire LLP.

“

We are going to give all members and engineering companies which apply the right tools and advice to capitalise fully on this very lucrative resource, that is being neglected.

JAMES SELKA.
CEO, MTA

£607 billion and 22% employment

Contribution of trademarks in industry to the UK economy, over one third of GDP

Driving towards zero emissions

Government regulations have delivered fresh impetus to electrify the on-road transport sector, writes **Stephen Chilton**, global product manager at Sevcon

With a long-standing track record in zero-emission vehicles Sevcon is now deploying this expertise into the on-road transport market where the drive for electric vehicles is gathering global momentum. Sevcon supplies many world-class companies with mission critical components to support a wide variety of hybrid and pure electric vehicle programmes.

These key components are electric motor controllers, DCDC voltage converters and battery chargers are used to reduce vehicle emissions, help them go faster or to generate electricity.

Broad applications

Our customers are highly diverse including motorsports, cars, trucks, buses, motorcycles, fork lift trucks, agricultural farm tractors, aerial lifts, mining vehicles, airport tractors, marine vessels, sweepers and any other electrically powered vehicles.

In industry, zero-emission vehicles have been common for many years and we have almost 60 years of practical experience in this arena. Now, global efforts to reduce carbon emissions, backed by tough government-driven regulations and standards, have added new impetus to the electrification of the on-road transport sector.

Unparalleled expertise

Almost 60 years' unparalleled experience is unique in this industry and puts us firmly at the forefront of the technological race to develop a compact electric drivetrain. Our world-leading

technology, meanwhile, has enabled our customers to deliver huge reductions in emissions.

This is all being driven by the global electrification movement. As electrification impacts more and more vehicles, Sevcon is increasingly called upon to deliver innovative products and solution to customers.

Often these world-class companies see electrification as offering market differentiation. Some people come to Sevcon to de-risk an electrification project when they have insufficient in-house experience, others to speed up development and manufacturing.

As the global market shifts towards electric drivetrain solutions an increasing number of global manufacturers are trusting Sevcon to support their programmes. Sevcon recently secured deals providing electrification for applications as diverse as a British super car company, Chinese city cars, electric taxis, marine stabilisation, bus and truck idle reduction systems and Renault with the Twizy urban vehicle.

Sevcon is a global player with the head office in the UK and sales and support offices in France, Canada, Germany, Japan, Malaysia, South Korea and the United States supported by factories in China, Mexico, Italy and Poland. Research and product development is now a truly global enterprise with development centres aligned with all of our major markets allowing us to deliver customised solutions to companies throughout the world, often based on our range of Gen5 products.

The worldwide electrification movement is prompting our ambitious growth agenda and our product roadmap has puts us in the sweet spot for this transition. The switch from the internal combustion engine to hybrid and electric vehicles is happening now. All the major motor manufacturers are involved and Sevcon's experience and skills are proving vital to this global shift.

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3D printing as a driving force for change

Additive Manufacturing is shaping a whole range of UK industries, writes Richard McKenzie, marketing manager at 3TRPD

The spectacle of Formula One (F1) wouldn't exist without the science behind it; and in terms of speculating what development is going to take the world's most popular motorsport to the next level, Additive Manufacturing (AM) is in pole position. Why is this? AM, also sometimes better known as 3D Printing, is the appropriate name to describe technology that can build three-dimensional objects by adding layer-upon-layer of material, whether that material is plastic, metal, concrete and even, human tissue.

In the context of F1, AM enables engineers to build products with a lower weight and to manufacture products with complex shapes that would not have been possible before using traditional casting methods. The degree of freedom that comes from 3D printing, allied to the speed of production, has opened up a raft of design opportunities for something that was previously limited to prototyping plastic parts for wind tunnel models.

New materials such as copper and others usually found only in aerospace and space industries can now be considered because it is no longer a requirement to manufacture full surfaces. Furthermore, space-frame honeycomb designs for racing car components are possible and bring the advantage of strength while remaining lightweight.

AM, though, is not simply the preserve of elite sport. There is transference of this technology to day-to-day applications too. Today's racing cars are tomorrow's roadcars and it's worth noting that any and all advancements are inextricably linked. The so-called 'trickle-down'

effect represents advantages for any industry which has the need to make large objects, such as a holiday jet and the cars on the street, travel quickly using less fuel without sacrificing strength or security.

The whole, as the adage goes, is far greater than the sum of its parts; and the inherent flexibility attached to AM is illustrative of this. Materials can be moulded into large, singular parts rather than a hodgepodge of several, and redesigned to enhance the aerodynamics of your favourite racing car on the track.

The United Kingdom, the reputational gambit of Brexit notwithstanding, remains a hotspot for technology, particularly in the arenas of aerospace, F1, engineering and complex manufacturing. It is crucial, then, that regardless of Article 50's terms, we ensure that the UK remains an attractive place in which and with which to do business. This can be achieved by two principle means – an assurance that our technology continues to be on the cutting edge and for companies to have a positive attitude towards exporting. Essentially, we must make sure that what we can offer can't be offered elsewhere.

At 3TRPD, armed with nearly two decades' AM expertise and experience, we produce advanced, high-performance, lightweight, AM metal and plastic parts for every stage of the production process, from prototype to final product. We are a UK-based firm and are keen to enhance our global reach. Concordantly, we offer our AM production services across international, multi-lingual platforms online. We are ISO 9001 certified and have been awarded AS 9100 Rev C – an internationally recognised standard for aerospace production. We have been awarded a number of innovation awards by our customers and our production car parts undergo a rigorous Production Part Approval Process (PPAP) ensuring the progression of AM products from the race track to the M25.

The F1 season launches on March 26. The UK public and the UK PLC must realise the potential of AM and 3D printing or risk being stopped in our tracks.

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How the 4IR will turbo charge a national manufacturing renaissance



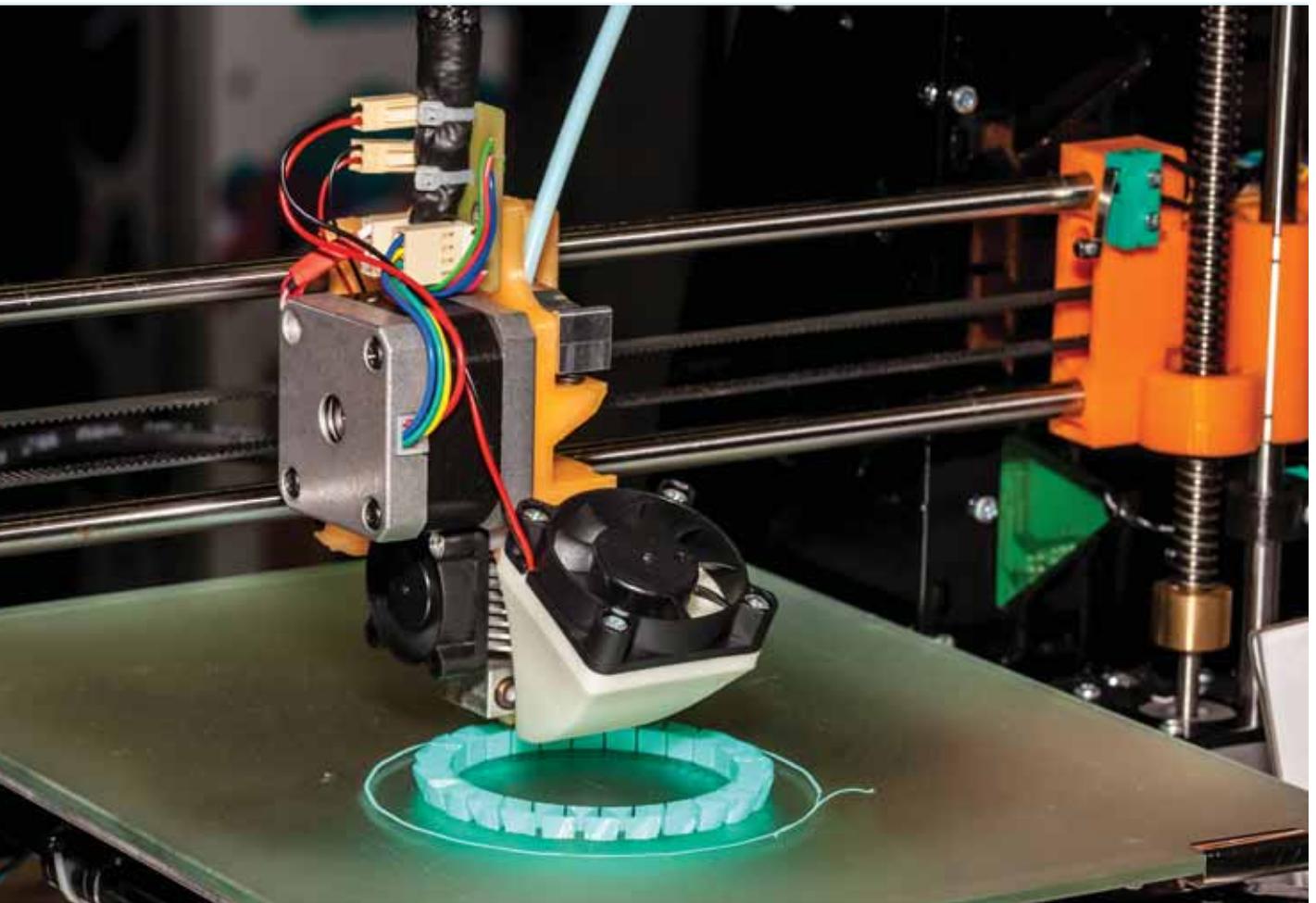
Digitalisation must theme future Industrial Strategy and end the UK's over-reliance on the service sector, writes Alan Mak MP

By 1850 the Industrial Revolution had transformed Manchester from a city of 22,000 at the turn of the preceding century into a booming metropolis of more than a million people. Explosive growth fuelled by textile production led historians to dub Manchester a “cottonopolis” and “the first and greatest industrial city in the world”.

Population growth brought fresh ideas and new inventions. While the Spinning Jenny is perhaps the most well-known, it was Manchester's pro-innovation culture and manufacturing strength that would spread and shape Britain's economy in the decades ahead. What became known as “Manchesterism”, a form of Liberalism which opposed the Corn Laws' high-tariffs and promoted free trade, inspired the likes of Adam Smith and Richard Cobden.

Today's manufacturers and exporters

rely on “Manchester School” thinking as they innovate, embrace new technology, and ship goods around an increasingly globalised world. Breakthroughs in emerging technologies happen at an electrifying rate, from Google's driverless cars and Amazon's delivery drones to thinking computers, internet-connected household devices and 3D printers. The UK already has a strong science and innovation base, with British companies leading the way in ground-breaking fields like artificial intelligence (AI), robotics and materials science. These new products are already redefining our lives, but if we want them to catalyse economic growth and accelerate our manufacturing renaissance, we must take a pro-active, pro-innovation approach to mastering the Fourth Industrial Revolution (4IR), as this new wave of transformative technology is now dubbed.



**“New products
are redefining
our lives”**

ALEXANDER TOLSTYKH / SHUTTERSTOCK

The government’s Industrial Strategy Green Paper issues a clear call to businesses to step up and help shape the future with new ideas, partnerships and investment. Business Secretary Greg Clark sees the new Industrial Strategy as a way to “build on the UK’s strengths and extend excellence into the future” and “ensure we are one of the most competitive places in the world to start and grow a business”.

To really take advantage of this new, Fourth Industrial Revolution, we need to rebalance Britain’s economy away from our over-reliance on under-threat service sector jobs, towards highly skilled technology, manufacturing and engineering roles.

The 4IR is already blurring the lines between the manufacturing and service sectors as networked products, also known as the Internet of Things, make life easier for consumers. Soon AI will

be able to take on previously white collar tasks as well, such as diagnosing health problems or offering legal advice.

This will vastly improve efficiency, cut costs, and radically redefine the contours of the UK economy. In Britain’s future economy, every sector will be a tech sector, and the implications of this data-driven and heavily automated economic model are enormous.

Additive manufacturing will give consumers the power to order bespoke products and decentralise super-factories away from emerging economies with cheap labour. The Internet of Things will give businesses access to real time data on products and services, giving the most innovative companies a significant competitive edge. Cambridge University estimate that firms with a data-driven business model have 5-6 per cent higher output and productivity than similar organisations that do not.

“An opportunity to rebalance our economy”

The government’s Industrial Digitalisation Review will bring together business leaders and academics to see how the “design, development and deployment of digital technologies can drive increased national productivity”. The Review’s conclusions will be a blueprint for a new Sector Deal for manufacturing and industry, outlining how the public and private sectors can work together to boost the take-up of new technologies in the UK.

“It is not yet too late for the UK to take the global lead in this space, but we are in danger of falling behind if we do not take up the challenge now,” says Juergen Maier, the Review’s Chairman and CEO of Siemens UK.

To improve public-private collaboration, I’m calling for a new National Institute for Robotics and Artificial Intelligence to be created. This innovation cluster would be the centre of the UK’s AI ecosystem, combining a national leadership council to facilitate engagement between government and industry on issues of regulation and policy, with a Catapult Centre-style hub for late-stage R&D and commercialised research.

It would replicate the success of Sheffield’s Advanced Manufacturing Research Centre (AMRC) which enticed Boeing to locate its new plant in the city to build high-tech components for the aviation firm’s Next-Generation 737, 737 MAX and 777 aircraft. Dyson are also backing UK manufacturing, with a £2.5 billion investment to support the development of new battery technologies and robotics at its new campus in Wiltshire. Sir James Dyson described the UK as “one of the best places in the world for R&D” but lamented the “continued shortage of engineers”.

The Chancellor has acted swiftly to address this head-on, using his Spring Budget to ensure Britain has the technical skills to capitalise on the 4IR. “I am determined to ensure that Britain leads and benefits from [the 4IR], as we did from the first industrial revolution,” he wrote ahead of his speech.

His Budget included new investment of £500million-a-year for technical education, increasing the amount of training for 16-19-year-olds by 50 per cent to 900 hours-a-year. More than 13,000 existing technical qualifications will be simplified into 15 ‘T-levels’ linked to the needs of employers, helping to build genuine parity of esteem between academic and technical education, backing the UK manufacturing sector, and bolstering the nation’s productivity.

These reforms – the most ambitious since A-Levels were launched 70 years ago – complement the government’s work since 2010 to upskill Britain’s workforce. Demand for these highly skilled technical roles will continue to grow, with 3D printing, automation and robotics set to catalyse a relocation of manufacturing and production back to the UK as the cheap labour advantages of emerging markets are eroded. This has already begun: hydraulics manufacturers Eaton, based in my Havant constituency, say the use of new automated machinery has resulted in some production being switched from China to the UK, bringing back jobs for local people and greater productivity for the business.

The 4IR is a once-in-a-generation opportunity to rebalance our economy away from an over-reliance on the service sector and towards high-value manufacturing; correct the regional disparities in investment, skills, and employment; and pivot from our historic position as a net importer as we sell our manufactured goods around the world. Let’s harness the spirit of modern day Manchesterism and use Brexit as a springboard to open up new, global markets for our manufactured goods – everything from British-designed 3D printers to UK-manufactured driverless cars.

With the right combination of political will, business leadership, and a renewed focus on free markets and innovation, Britain can lead the Fourth Industrial Revolution around the world and turbo charge our manufacturing renaissance here at home.

Is the UK ready to innovate?

The manufacturing industry needs public and private sector support to flourish, says **Simon Barnes**, commercial director at HSSMI

Manufacturing in the UK was for many years the forgotten sector; languishing behind the service sector for both public profile and private investment. We designed products in the UK but even so many were, and still are, manufactured abroad. Why is this? At HSSMI we think this comes down to the inability of the sector to prove to private investors and public government that manufacturing can add value.

HSSMI was born just four years ago to prove this point, established by Ford Motor Company and Loughborough University, the Institute is now a company limited by guarantee, reinvesting in research. Supported by an Olympic Legacy grant, initially hosted at CEME located close to Dagenham, HSSMI is now located in the Queen Elizabeth Olympic Park, Stratford, Birmingham and Glasgow. Its partners include Ford, Jaguar Land Rover, Nissan, CNH Industries and London Taxi Company.

UK manufacturing is at the core of HSSMI's vision; and we have developed a Value Plan to achieve our aims. That strategy has four key elements:

Technology of the product

An innovative, reliable, cost-effective product remains critical to success. Customers demand innovation, reliability, and sustainable products.

Manufacturing processes

Equal focus is needed between product and manufacturing. Today new products can be designed in the virtual environment, have their potential tested and be validated. Manufacturing must

use this depth of information for simulation of process, training, maintenance, bills of materials, factory layout planning and end of life process.

Supply chain

Access to the best technology and world-class manufacturing are not sustainable if the supply chain is not there to support them. HSSMI sees collaboration as critical to build supply chain response, resilience and support. The UK manufacturing supply chain has been weakened by years of under investment; HSSMI sees the need for a new measure of depth and strength to highlight weakness and overcome this.

Digital manufacturing

The ability to adapt data into real-time information – we currently analyse less than five per cent of the data we collect – is paramount. To ultimately match real-world data to a 'digital twin' in the whole manufacturing and supply chain process is necessary. A recent SMMT KPMG report for automotive highlights a 15 to 25 per cent reduction in time to market, 35 per cent reduction in machine down-time and up to a five per cent improvement in overall productivity.

What can HSSMI do?

HSSMI works with its partner companies to build value into their manufacturing by supporting all four elements; no one at the expense of the other. Technology of the product and manufacturing processes are recognised and can be evaluated through Technology Readiness Level (TRL) and Manufacturing Readiness Level (MRL); but on their own these are not enough to deliver value. Developing Supply Chain Readiness (SCRL) and Digital Readiness Level (DRL) are needed for an effective manufacturing business. HSSMI and its partners are developing both new measures.

Through the combination of innovation and experience we help manufacturers assess value, identify weakness through the series of Readiness assessments and put a plan of innovation response in place to address weaknesses.

IN ASSOCIATION WITH





Working to engineer a better world

Engineering is a diverse and exciting industry offering creative and challenging careers. The demand for skilled and talented engineers continues to grow, with industry vacancies far exceeding the number of qualified engineers. The IET is working to address this skills gap by inspiring the next generation of engineers and technicians.

We work to influence government, industry and educators to improve the curriculum and career guidance for aspiring engineers – and to actively promote STEM subjects and engineering careers in our schools. Our programmes provide education resources, competitions and a programme of events showcasing engineering to tomorrow's engineers and technicians.

To find out more about the IET please visit

www.theiet.org