Three factors combine to reshape the foundations of the modern economy. First, the digital revolution dramatically augments the reach, flexibility and agility of companies, big and small, creating new economic actors, such as 'micro-multinationals': technology-intensive companies that are born global. Second, international competition draws millions of new workers and consumers into what is increasingly a ‘race to the top’, rather than a ‘race to the bottom’, with emerging countries becoming champions of innovation, engineering ingenuity and skills acquisition. Third, cultural and structural trends change the nature of socio-economic interactions by transforming people’s aspirations and preferences, such as the expectation of instant gratification offered by one-click services or the seamless interoperability between products and electronic devices.

**Blurring Lines Between Products and Services**

A pronounced distinction between product and service markets is fictitious: value creation and innovation increasingly take place at their intersection. Business-related services are often decisive in making products attractive to the consumer and they generate most of the value added in growth and employment.

**Introducing the Interoperable Economy**

A new, horizontal economy is emerging beyond traditional value chains, opening novel opportunities for those who master a more ‘systemic’ presence across sectors such as energy provision, modern transport and mobility, food production or travel facilities. Interoperable data will be the ‘glue’ that connects the different fields, while platforms will be the ‘bridge’ between providers and users.

**A New Paradigm for Investment**

Investment patterns and value creation are changing profoundly: business expenditure in intangible assets – databases, software, design, training or branding – grows significantly in size and importance compared to tangible assets – such as machines, buildings or land. Within intangible investments, innovation levers need to be supported: scientific R&D for instance accounts for only 17% of firm investment in innovation, inviting policy makers to recognise and encourage other types of investments (Figure 5, p. 5).

**A Single Market for Global Advantage**

A modernised single market can place Europe a step ahead of its global competitors by more quickly removing barriers to cross-border exchanges of products and services. But to match the demands of the new economy, the single market needs to become more dynamic and agile, shift the focus from producer to consumer and drive disruptive innovation.
Future historians may well look at our time as equally determinant in redesigning the economic rules of the game as the 19th century industrial revolution. The consumer and user is ever more central to the new economy, by virtue of being more active and responsive, hence shaping the manufacturing value chain and leading the way towards tailor-made, personalised ‘production on demand’ and the emergence of hyperconnected services. If the industrial age was marked by standardisation, the digital era is about customisation. These tectonic shifts go hand in hand with other developments of seismic proportions: the blurring distinction between products and services; the birth of the ‘prosumer’ who combines elements of consumption and production; and the growing importance of investments in intangibles – such as software or design – which increasingly outstrip investments in tangibles – such as machines or buildings – in the leading economies.

**A Hyperconnected Economy: The New Landscape**

Deindustrialisation has moved hand in hand with an increasing importance of services in advanced economies. When incomes rise, demand for services grows at a more than proportional rate. The manufacturing sector, however, remains important:

- as a source of productivity growth, which is higher than in other sectors in most countries;
- as an engine for R&D and innovation, since most R&D investments are concentrated in manufacturing (Figure 1);
- as a strong factor behind the internationalisation of economies through trade and investment.

The EU goal of increasing the share of manufacturing to 20% of GDP by 2020 is a vivid reminder of the importance that policy makers attribute to industry.

What is less often realised is that achieving this target is inherently dependent on making Europe’s services sector more dynamic, productive and integrated. More than ever before, the highest value added of a product comes from service integration (Figure 2). The OECD, for instance, has shown that an increase of 1% in business services content in manufacturing exports is associated with an increase of 6 to 7.5% in prices.

![Figure 1: Share of Manufacturing and Services in Total Business R&D, 2012](source: STAN Research and Development Expenditure in Industry Database, OECD).

![Figure 2: Service Value Added Embodied in Manufacturing Goods](source: Trade in Value Added (TiVA) 2015 Database, OECD)
With the blurring line between goods and services, international and national, on- and offline, an entirely new economic paradigm is emerging, powered by three transformative developments.

**Technological Revolution**

The internet and digital communications are general purpose technologies, transforming economies as profoundly as the printing press, steam engine or electricity have done in the past. Against this backdrop, it is important to understand that there is no such thing as a ‘digital economy’ – the economy is digital. Far from being the exclusive domain of technology startups, every company, particularly in traditional industries, needs to prepare for digitisation. Yet, on balance, European companies have been slow to adapt: 41% of enterprises are still classifiable as ‘non-digital’ – meaning they do not use digital technologies and have no digital strategy – while only 2% take full advantage of digital opportunities. The slow adoption and use of digital technologies has been a drag on Europe’s productivity growth, not to mention its ability to innovate and move up the global value chain. And it has impacted manufacturing and services alike, particularly the integrated, high value-added segment. But the EU is starting to address this challenge: completing the Digital Single Market will incentivize technology adoption through higher network effects, while prioritising areas where competitive advantages can still be reaped, such as Industry 4.0. At the same time, formulating a unified data framework for a market of half a billion consumers can set a global standard, provided it is user-friendly and workable. Speed of delivery and implementation is of utmost importance if Europe is to regain lost ground, and the high-end nexus of integrated manufacturing and services is of particular importance for future growth, sustained innovation and quality jobs.

**The Digital Car**

Cars have become computers on wheels. Software is revolutionising the car industry, until recently one of the most traditional and hierarchically organised industries in the world. For example, Tesla – a company founded as recently as 2003 – has shown that there is no reason why a technology company cannot become a car company, with the design coming from California, modules being delivered by suppliers from around the world and the final product being put together in contract factories. Electronics and automation have become key components of the assembly line.

The cost of the electronic parts of each vehicle are expected to rise from 20% in 2004 to 40% this year, Boston Consulting Group estimates, with a premium class car now containing 100 microprocessors and running on 100m lines of software code. In the future, a car will likely be a combination of mobile office and source of entertainment. The vehicle will interact seamlessly and exchange data with the driver’s electronic devices, and possibly also with the manufacturer or insurance company if the driver wants to document safe driving.

**Competition in the Higher Value-Added Segment**

In spite of the slowdown of growth in emerging markets, the next decades are likely to be marked by a continued convergence process. As emerging countries move up the value chain, they increasingly rival producers and service suppliers from advanced economies. Instead of developing powerful industrial sectors locally, they can now leapfrog more advanced economies by adopting the latest technologies and sourcing products and services globally. As a result, OECD countries’ share in world manufacturing dropped from 82% in 1990 to 56% in 2013 (Figure 3, p. 4).

Tellingly, China’s 12th Five-Year Plan for 2011-2015 explicitly shifts the focus to R&D and high-end manufacturing and services. This means that China and Europe will increasingly compete in the same markets, such as clean energy, aerospace, telecom equipment or broadband networks. Studies have shown that the complementarity of European and Chinese export offers has dropped from 85% in 2000 to 65% in 2010, which means that 35% of exports tended to overlap, compared to only 15% ten years earlier. Intensifying global competition means that competitive advantages are more fluid than they used to be, requiring dynamic approaches to competitiveness and productivity.
Behavioural and Structural Change

The rationale of the emerging new economy is greatly influenced by ongoing cultural and structural shifts, some of which are induced by technology, while others result from broader societal trends. Their effect is profound, from the changing nature of work and its growing fluidity to the emergence of a sharing economy. In particular, the consumer and user perspectives – already central to current economic relations – will become dominant even in business-to-business transactions.

Products are increasingly tailored to individual consumers’ needs and desires through processes such as ‘additive manufacturing’. Consumers will move from being objects of economic exchanges to active agents. This trend is already underway, as exemplified by the growing importance of ‘prosumers’. To illustrate, the energy system is shifting from a centralised, supply-side approach to a demand-oriented model. New digital products and technologies are progressively modernising the energy system by easing the way for a novel nexus between production, transportation, distribution and consumption. Increasingly, energy will become a service and not just a supplied commodity, providing new opportunities for energy service providers and aggregators, and giving life to new digital products, such as smart meters. These developments will transform the business model of energy utilities, bringing new, innovative and disruptive companies to the fore.

Implications: Disrupt or Be Disturbed

From Static to Interactive

The fusion of product and service markets will continue to have a profound impact. The world economy will move from static products and services to smart and interactive ones. This means that new ways need to be explored with respect to the design and labelling of products. Products are becoming ‘smarter’, more capable of autonomously addressing and responding to evolving consumers’ needs. ‘Smart’ coffee machines, for example, have built-in sensors that automatically signal to the local brand store the need for repair. The user therefore does not only purchase a product – a coffee machine – but also a service, the promise of maintenance whenever necessary.
New business models will develop with packaged offers combining the provision of both goods and services in ever more hybrid forms. Network effects will become more important as a result. ‘The sharing economy’ and ‘the circular economy’ are two emerging concepts which reflect the interactive character of modern economic exchanges. They are part of the broader phenomenon of hyperconnectivity, in which different segments interact and many products and services prove complementary.

Technologies such as virtual reality have the potential to radically transform entire industries through the remote discovery of products and services: the ability to ‘touch’ and ‘feel’ products in a virtual store from your living room may well disrupt the sector by making price comparison easy, enabling 24-hour online shopping and compelling companies to offer delivery services.

The ‘Learning’ Thermostat

When home appliances company Nest was acquired by Google for $3.2 billion in 2014, there was much hype about the ‘learning thermostat’, one of its flagship products. But did the value really lie in the thermostat? Hardly, one might conclude, as the real worth that warranted the exorbitant price tag lay in the sensor-driven, Wi-Fi enabled, self-learning and programmable devices the company produces. The interoperability between the device and the internet, as well as a user’s smartphone and tablet, is key to making these types of manufactured goods attractive and can offer considerable first-mover advantage to the pioneering company. Europe, with its sizable single market and strong tradition in manufacturing state of the art products, could be the perfect breeding ground for innovative companies, using the Internet of Things to make devices smarter, more user-centered and interactive.

From Tangible to Intangible Investment

The move from a bricks-and-mortar economy, marked by incremental innovation, towards a hyperconnected world, characterised by disruptive innovation, is mirrored in investment patterns (Figure 6, p. 6). Often referred to as Knowledge-Based Capital, these hitherto marginal areas are becoming key features of corporate success: design, software, data, organisational capital, firm-specific skills and branding and marketing, to name but a few. Within intangible investments, new innovation levers need to be supported: scientific R&D, for instance, accounts for only 17% of firm investment in innovation, inviting policy makers to recognise and encourage other types of investments (Figure 5).

The overriding goal of intangible investments is to live up to a new ‘constant innovation paradigm’ in which enterprises reinvent themselves on a continuous basis to keep track of the technological frontier, user preferences and developments in global value chains. Successful firms make the interplay between constant innovation and targeted investment in Knowledge-Based Capital a key feature of their business models. It becomes part and parcel of their day-to-day operations, with managers persistently fine-tuning processes to ensure that the firm operates at the leading edge in comparison with global competitors. Understanding the centrality of Knowledge-Based Capital is crucial, especially for European policymakers, given the traditional bias of public investment towards physical infrastructure.

From Macro- to Micro-Multinationals

Today’s small and medium-sized companies are often in a different league from their predecessors. Born global thanks to the internet, which gives them instant access to world markets, enterprises no longer have to go through the traditional trajectory of slowly building up a local presence and then expanding over the course...
of decades into a global firm. This fundamentally alters the rules of the game and the very architecture of the corporation – with a definite competitive edge for younger firms, which are often better at pursuing disruptive innovations, not bound by organisational legacy, allowing them to flexibly shift from one business model to the next. The relentless pursuit of productivity and the closer proximity to users complete the picture and explain why many large corporations, especially in manufacturing and industry, feel threatened and insecure about their place in the 21st century economy.

Slow to adapt to the new paradigm of the digital age, many macro-multinationals are now actively pursuing relations with younger firms, hunting for new ideas and trying to import new skills and entrepreneurial talent by acquiring startups. This is not a marginal phenomenon, nor is it an altruistic act on the side of the large companies. More than policy makers realise, the relationship between large, industrial firms and young, tech-savvy startups is becoming symbiotic and of crucial importance for Europe to sustain a global lead in innovation. That is why a modern industrial policy needs to put technology adoption and an innovation-friendly ecosystem at the forefront, a definite departure from the more traditional conceptions. The German Chancellor Angela Merkel picked up on this theme when she used a recent speech at the Day of German Family Firms to warn against ‘digital anxiety’, especially in using big data, and called on participants to occupy the ‘intersection between consumers and the product. That’s where future profit will be made’.

Policy Opportunities: Walk the Talk – and Fast

Traditional policy tools are often obsolete in the face of market integration of products and services. The single market has lost none of its importance – if anything, the growing value of cross-border markets, given product-service integration, makes it all the more valuable. But the single market alone will not guarantee future success. Broader framework conditions – ranging from the ease with which companies can switch from one business model to the next to the user-friendliness of the emerging data protection regime – are under careful scrutiny by companies that have more choice than ever: digitisation gives companies agility in terms of location, outsourcing, and using global value chains to their maximum advantage.

The single market must not be seen in isolation. The European Commission’s flagship initiatives already underway – such as the Energy Union, Capital Markets Union and the Digital Single Market – all add up to more than the sum of its parts. Provided that Europe succeeds in making a quantum leap in unleashing the potential of its product and service markets, there are numerous opportunities to be reaped.

Reshoring of Manufacturing

3D printing – also referred to as ‘additive manufacturing’ – could lead to reshoring or nearshoring of industry, as it increases production speed while reducing costs and meeting consumer demand with more speed and greater influence over production. Both can make production at or near headquarters cheaper than production overseas. What it calls for are decisive policy actions that incentivise technology adoption by all corporate players competing internationally. The picture will not be black or white, since reshoring will take place alongside continued outsourcing and relocation to emerging markets. However, the reshoring of some high-end production processes is likely in connection with building a stronger product-services nexus.

Develop Not-Easy-to-Replicate Innovations

Adding sophisticated business services to advanced manufactured goods leads to innovations that are not easy to replicate by competitors and therefore gives significant competitive advantage. In comparison, it would be difficult to maintain such a competitive advantage with a standard manufactured good void of an additional service component. This story also plays out...
on the jobs front: in advanced economies 30 to 55% of manufacturing jobs have become service functions, and 20 to 25% of manufacturing output is represented by service inputs. In the pursuit of high-quality jobs, the nexus between manufacturing and services offers many opportunities, especially in countries that have world-class training and apprenticeship systems geared towards industry.

Figure 7: High Skills in Services and Manufacturing
Annual growth rate, average 1998-2008

![Graph showing growth rates in services and manufacturing in different countries.]

Source: ANSKILL Database 2011, OECD

Productivity Growth and High-Skilled Jobs in Services
For a long time, services have been perceived as inferior in comparison to manufacturing. Weak in productivity growth vis-à-vis industry, and with jobs that are often seen as low in quality, the service sector has been prioritised by few countries in Europe. Yet, the potential is enormous. Precisely because productivity in services is comparatively low, quick wins could be reaped in terms of growth and innovation by integrating markets and increasing cross-border competition, for instance in business services. And far from being the domain of the low-skilled, the service sector actually employs more highly skilled workers than manufacturing (Figure 7). For policy makers, it is time to understand that a healthy and thriving industry sector is inherently dependent on the quality and integration of Europe’s service markets.

First Mover Advantage Up for Grabs in Key Sectors
While there is much moaning in Europe about lost dominance in certain areas, there are many fields where European companies can lead globally by operating at the intersection of products and services. Industry 4.0 is commonly known, but other areas are up for grabs as well: medical technology, smart cities, the circular economy, ‘learning’ home appliances, and intelligent transport systems. The integration of goods and services is almost always powered by data and enabled by interoperability, making technology adoption by all companies, including in traditional sectors, an urgent policy priority.

Are ‘Great Depression Statistics’ Fit for the Digital Age?
At the behest of Chancellor George Osborne, the United Kingdom is currently undertaking a comprehensive review of its economic statistics. It is led by former Deputy Governor of the Bank of England Sir Charlie Bean, who remarked that the framework of current accounts ‘was developed in the aftermath of the Great Depression’. Using Rolls-Royce, which is ostensibly a manufacturer but in reality generates most revenue with services, as an example, Sir Charlie concluded that speaking about manufacturing and services as distinct concepts ‘is often not a helpful way to think about economic activity.’

Conclusion
Europe has everything going for it in this new, hyperconnected, interoperable economy: traditional strength in manufacturing must now urgently be complemented by world-class services.

As the European Commission ponders the future of the single market, a more holistic and all-encompassing view must guide the upcoming strategy. Building on the global reputation that European goods are superior in quality, there is a unique opportunity to provide additional value – and gain international competitive advantage – by accelerating the integration of technology, services and design.

It is the only way that Europe can succeed and excel in the ‘race to the top’ that leading competitors are pursuing in a quest for sustainable prosperity and high-quality jobs.
Notes

9. Financial Times, ‘UK’s official statistics out of date, says Bean’ August 5, 2015, http://www.ft.com/intl/cms/s/0/69b31022-3ac1-11e5-bbd1-b37bc06f590c.html#axzz3k1Hg8X0