**2017 2027**

# CAPITALIZING ON THE DIGITAL REVOLUTION

*The text that follows is an English adaptation of the working paper on the digital revolution and how France and Europe can best capitalize on it. You can read the original on the "2017/2027" French-language website here.*

In less than the span of a decade not only has digital technology transformed the way we access information and go about our daily lives, it has also reshaped entire sectors of the economy.
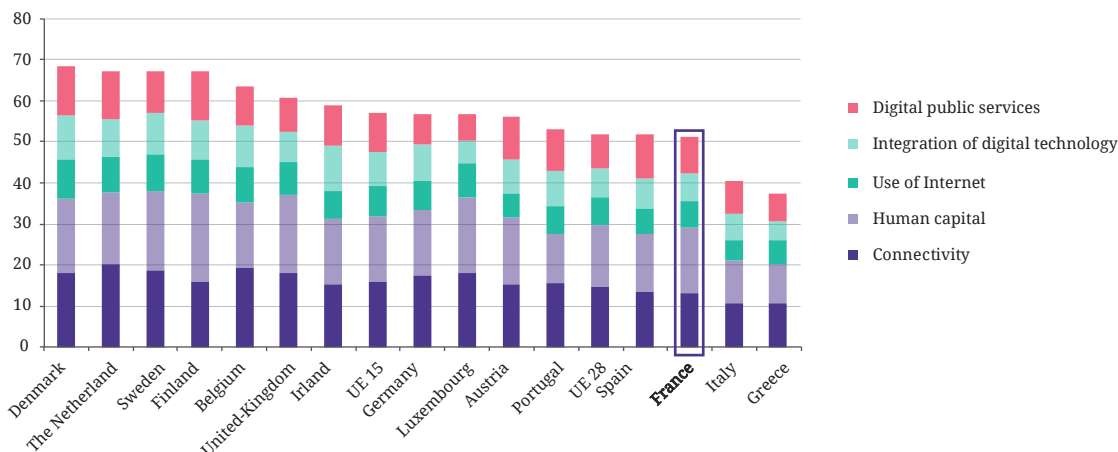
The question is what will happen in the coming decade, from 2017-2027. Information and communication technologies (ICTs) will likely continue to refashion our societies, impacting an increasing number of goods and services, including in the public sector. They will keep simplifying, optimizing, and transforming organisations across the board.

The consequences of this are vast, and the stakes are high for the French economy. **France needs to be a catalyst for digital change** if it is to lead and not follow. Yet the country finds itself in a potentially tricky situation: despite its infrastructure, engineers and high user penetration, it is third from last when it comes to digital development in the EU-15 (Graph ❶).

To turn this situation around before it becomes a handicap, France needs to lay out collective goals and principles and provide a framework that fosters innovation and backs new developments.

The digital economy's potential places it at the nexus of French society in the 21st century, making it a crucial issue to be debated in 2017.

❶ THE DIGITAL ECONOMY AND SOCIETY INDEX (DESI)



Legend:
- Digital public services
- Integration of digital technology
- Use of Internet
- Human capital
- Connectivity

SOURCE: European Commission, https://ec.europa.eu/digital-single-market/en/desi.

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# THE DIGITAL ECONOMY WON'T WAIT

According to the World Bank, more than 40% of the world's population had access to the internet in 2014. People are more interconnected than ever. But the digital revolution is far from over: it is certain to profoundly transform many aspects of our economies and societies in the years to come in ways unthought of today.

## The dominance of online platforms

ICTs have radically changed the way companies can reach customers. From search engines to online platforms providing a host of services to end users, digital technology has given rise to powerful new intermediaries who are present in a number of sectors worldwide.

Even higher education has felt the impact, with the development of MOOCs (Massive Open Online Courses), which have become direct competitors of traditional professional training programmes. ICTs will continue to shake up hitherto sheltered sectors such as medicine and law.

Online platforms are today capturing the lion's share of the value created. Whether it's Google, Airbnb or Uber, they have become emblematic figures of the digital revolution. Despite this seeming hegemony, their role as intermediary providing end users with products and services may not be as entrenched as it appears. ***Technological progress may lead to the development of more decentralized peer-to-peer ways of supplying products and services, precluding the need for centralizing intermediaries.***

The Israeli ride-sharing app La'Zooz exemplifies this. Its premise is a decentralized community owned by the people who use the platform. People who initially contribute to building the network – by driving around with the app on – are rewarded a digital currency (Zooz), which is based on Bitcoin's blockchain technology. Once a critical mass is reached, users can then use the Zooz to pay for ride-sharing services, the goal being to maximize the occupancy of cars already on the road.

## More fluid and splintered production

Beyond services, digital technology is changing the way we produce goods.

Smart manufacturing is already changing the way industry operates. Companies are implementing technologies to automate systems and use data to create intelligent networks along the entire value chain.

But it is more than simply upgrading production. Industrie 4.0, the German government's high-tech strategy that alludes to the fourth industrial revolution, illustrates it well. It seeks ***to break down the barriers between manufacturing and services***, allowing companies to customize products by using digital technology to enable highly flexible production. It aims "to meet the growing need for individualisation of products and address the fear of seeing the internet giants attain an exclusive relationship with customers and monopolize access to their user data."[1]

In addition to this, collaborative working has revolutionized the production of intangible goods. This has been in large part possible thanks to the ***trust created through online communities and ranking systems***.

This trust fosters an increasing number of exchanges, leading to the creation of common knowledge-based goods such Wikipedia and OpenStreetMap. These are outside the traditional economic cycle but create many positive externalities, in particular in spreading knowledge.

The so-called ecological transition is also set to draw on digital technology, whether it's for reducing resource use and fostering the circular economy or reducing energy use through the development of smart grids.

The rise of ***3D printing*** may modify production itself by allowing the final product to be customized. The implications are value is transferred from the factory to digital modelling. And production systems, which today are increasingly splintered, can be located closer to consumers.

As a result of this, companies are likely to call more and more on outside skills – and indeed they already do – which will be part of the production processes. Firms will therefore be more integrated in local ecosystems. This link between companies and external skills may take the form of the traditional subcontractor model, with online platforms used for small tasks, or gigs.

The other possibility is more disruptive and would consist of non-monetary voluntary contributions from users (e.g. Amazon or Booking.com relying on users reviews) or ***digital labour*** (i.e. the data internet users unknowingly generate when using the internet) as a form of work. This is currently the case with companies such as Facebook and Google, which use digital labour to target ads and generate revenue.

Companies that employ these techniques are more agile and innovative and are able to personalize their goods and services according to individual use. They undoubtedly represent a challenge to traditional companies.

This new way of producing goods and services is part and parcel of the development of the Internet of Things, which aims to connect everyday objects. It encompasses both the public and private sectors, including factories. In the automobile industry, for example, digital technology represents no less than 35% of the value of high-end vehicles, which make use of an increasing number of electronic components. The figure should rise to 50% by 2020[2].

Moreover, ***this transition to focusing on services rather than the material goods themselves is nothing short of a game-changer for industry***. The disruption that Uber and Airbnb have wrecked in transport and tourism could be replicated in other sectors where regulation stifles innovation, such as healthcare, education and banking and insurance.

Faced with this perspective, we need to rethink our social model, which, based as it is on salaried employment, has to be adapted to new forms of more independent work.

## The ever-increasing importance of data

The proliferation of objects embedded with electronics, software and sensors is allowing the internet and data to become an integral part of the public domain. Virtual reality is merging with the real world to form what is termed ***augmented reality***.

Progress in artificial intelligence and robotics will gradually lead to the automization of more and more tasks. Cars are a good example. Within ten years, the first self-driving vehicles will be on the road, with powerful processing, analysis and communications capabilities.

Though they may initially be restricted to certain areas – as urban shuttles, for example – the stakes are enormous for the industry. Aside from producing the actual vehicles, manufacturers must develop the driving software, ensure images, traffic information and other data generated are networked and used efficiently.

Today, private corporations for the most part hold the monopoly on gathering and exploiting data that is largely personal. This may change in coming years, with end users having more of a say in how their data are used thanks to increasing regulation and privacy being taken into account in new services from the get-go (e.g. the Privacy by Design approach to systems engineering).

As data increasingly become perceived as a powerful tool for individuals, new links to public institutions are likely to be developed. ***Personalized services*** allowing citizens to access information will make interacting with organizations and government more simple and efficient.

One example of how this could play out is France's proposed individual activity account (*compte personnel d'activité*), which would allow employees to manage their accrued job benefits and use them for things such as training.

The Blue Button initiative in the US also illustrates this trend, providing patients with online access to their personal health records. Data can be collated to create portable medical histories, making it easier to share information between healthcare professionals.

Ultimately, digital technology may very well reshape our democracy, allowing government to ***engage citizens*** and get them to participate in the democratic process. The city of Paris has undertaken such an initiative by launching its *Paris Budget Participatif* (Paris Participatory Budget) project in 2014, whereby Parisians can decide on how 5% – or €500 million – of the city's investment budget is used by submitting project proposals online, participating in workshops to develop the projects and then voting for them digitally.

One thing is certain, irrespective of how the power of data is harnessed, European countries need to take the lead in the digital economy to be able to shape the flow and use of data, ensuring both security and freedom of expression.

## FRANCE AND EUROPE BEHIND THE DIGITAL CURVE

ICTs will be an integral part of ensuring industries remain competitive in the 21st century – regardless of whether their core business is in the digital economy or not. Nothing short of France's place in the world economy rests on its ability to keep pace with developments in digital technology.

❷ INTERNET USERS (PER 100 PEOPLE)



Legend: France, United-Kingdom, European Union, OECD countries, United-States, Germany
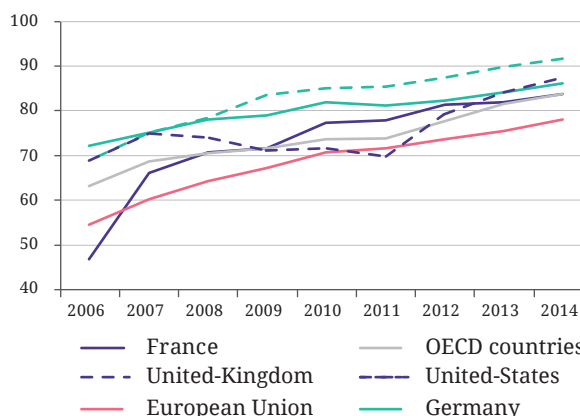
SOURCE : International Telecommunication Union, World Telecommunication/ICT Development Report and database, and World Bank estimates.

### Individual use greater than professional use

Demand for digital services and goods is what pushes organisations to adopt ICTs. But this means employees must have digital skills and know-how.

In France, 83% of the population uses the internet, roughly equivalent to the average rate among developed countries (Graph ❷). Yet while the country is above average in daily online habits, companies invest little in their employees' digital skills. According to Eurostat, only 20% of French companies organize digital training for their workers.

Digital tools are often seen as a constraint rather than as something that improves working conditions. They are often used to increase employee productivity, decrease payroll or monitor work carried out. A statistics and research unit of France's Ministry of Labour published a study in 2014 showing the percentage of salaried employees whose work is subject to computerized checks increased from 25% in 2005 to 35% in 2013.
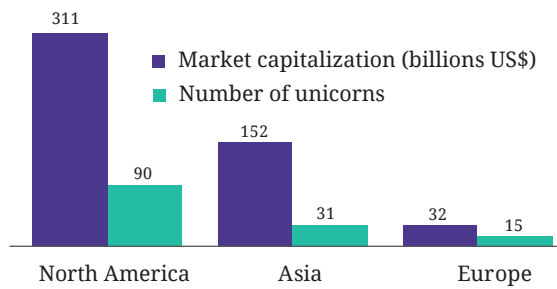
*It is clear that unless France invests in basic and continuing training in digital skills it will remain essentially a consumer of digital products and services and not a producer.* The country needs talented and trained individuals to both innovate and allow it to successfully navigate the digital transformation underway, in particular in terms of the public services it offers.

### Europe's digital ecosystem still weak

The US has long funded the development of ICTs, largely through defence spending, which was instrumental in making Silicon Valley the high-tech powerhouse it is today. The ARPANET (Advanced Research Projects Agency Network) illustrates this perfectly. Funded by the Department of Defense's Advanced Research Projects Agency (ARPA) in the 1960s and 70s, it helped lay the basis for what was later to become the internet.
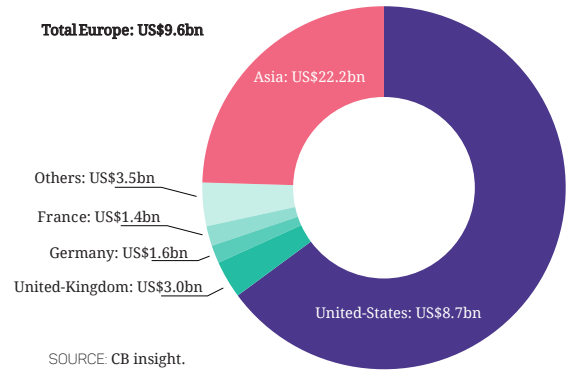
China for its part has developed alternatives to the SECTOR'S dominant American players in the space of a few years (e.g. Baidu, WeChat, Alibaba and Alipay). Drawing on its extremely high-potential domestic market – where according to the World Bank only 50% of inhabitants use the internet – China could well win over other countries' markets. The online world is dominated today by these two countries, with Europe clearly lagging behind (Graph ❸).

**❸ MARKET CAPITALIZATION AND NUMBER OF "UNICORNS"* BY GEOGRAPHIC AREA**



- Market capitalization (billions US$)
- Number of unicorns

311
90
152
31
32
15

North America   Asia   Europe

*Private companies valued at US$1 billion or more
SOURCE: http://fortune.com/unicorns/2015/.

**❹ VENTURE CAPITAL BY REGION, 2015**

Total Europe: US$9.6bn



Asia: US$22.2bn
Others: US$3.5bn
France: US$1.4bn
Germany: US$1.6bn
United-Kingdom: US$3.0bn
United-States: US$8.7bn

SOURCE: CB insight.

Regulations in the EU have not helped spur investments. Innovators need financial support, which is often provided by venture capital financing. This is clearly lacking in Europe when compared to the US and Asia (Graph ❹).

France, for instance, has a regulatory framework that doesn't always foster innovation, even though it can be adapted on a per case basis (an example of this is the National Assembly's decision to authorize tests on self-driving vehicles as part of the 2015 law on the energy transition and green growth).

On top of this, as mentioned above, when it comes to the average company, France is a laggard: only 16% of French companies employ ICT specialists, compared to an average of 20% across the EU.

But despite these shortcomings, France and Europe do have a dynamic ecosystem of start-ups, made visible and consolidated in France by its French Tech label. France was also among the countries most represented in 2016 at Las Vegas' iconic Consumer Electronics Show (CES). Two cases in point are the wireless networks company **Sigfox** and the **LoRa Alliance**. Both are at the forefront of developing dedicated networks to lay the foundation for the Internet of Things (IoT).

The staying power of start-ups and their ability to grow are key to France and Europe being well positioned in the next wave of digital innovations, including with respect to the IoT. At the same time, the ability of non-digital companies, small and large alike, to adopt ICTs is paramount if France and Europe are to remain competitive globally.

**Mixed results for public sector initiatives**
While France is far from a leader – like South Korea – when it comes to public investment in the digital economy, the government has mobilized to foster digital innovation. Some €20 billion in private and public investments are planned, for example, by 2022 to lay a very high-speed fixed broadband network across the country.

Furthermore, it has undertaken initiatives to make public data accessible, namely through the creation of the open data portal **Etalab**. That said, its refusal to open access to things such as land registries and geographic data saw its ranking by the Open Knowledge Foundation slip to 10th in 2015, down from third in 2014.

Regarding the computerization of public services, it ranks sixth in the EU, according to the DESI, with 52% of users taking advantage of online forms, particularly to file taxes. But the French government has struggled to adopt digital technology. The shared medical file, personal training account and the military's payroll software are but three examples.

Overall, a weak digital culture and lack of training makes the French government ill prepared to tackle important challenges such as personalized services, participatory democracy and competition from private operators. There is too little room for innovation and experimentation with new services for users.

**Key issues to be addressed**
Important policy choices are necessary if France is to chart its course in the digital economy and take full advantage of ICTs while overcoming the difficulties the digital revolution poses for its economy and society.

But to make the right choices, four fundamental questions must be addressed:

- How can data and algorithms be managed effectively, ensuring personal security without stifling innovation?
- What institutional framework can be developed for the digital economy to foster up-and-coming innovators while dealing with established players in a fair manner?
- How can the citizenry be best prepared to take full advantage of ICTs?
- How can be public services harness digital technology, including for sustainable development initiatives (e.g. transport and energy)?

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