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# What is 'tech sovereignty'?

Since COVID-19, EU leaders are pushing for greater independence from US and Chinese technology. Industry and researchers warn against closing Europe's arms to the rest of the world. This special report decodes the debate On 8 September, Science|Business organised an online conference: 'Industrial R&D: Europe first?' It captured, at an important juncture, the state of play in EU policy for a potentially momentous change in the way Europe funds, manages and regulates its markets for technology in healthcare, energy, aerospace, digital systems and many other fields.

This report incorporates Science|Business' independent news-gathering on the topic, as well as commentary delivered at the conference.

It is the opening of a series of events, white papers and news coverage that Science|Business is launching to explore this policy trend over the next year.

If your organisation would like to join our initiative, email gail.cardew@sciencebusiness.net.

Science|Business would like to thank the sponsors of our 8 September conference. The views expressed herein are those of Science|Business, and do not necessarily reflect the views of the conference sponsors or of Science|Business Network members.



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### Decoding Europe's fascination with 'tech sovereignty'

As political memes go, "tech sovereignty" has become a viral phenomenon among European leaders in the past six months. Since the COVID-19 crisis started, politicians across the left-right spectrum have started pushing to reduce Europe's dependence on US or Chinese-origin technologies. From vaccine development to artificial intelligence, billions of euros are now being mobilised across the European Union; and the rhetoric has gone nuclear.

"If we don't build our own champions in all areas — digital, artificial intelligence," French President Emmanuel Macron recently said, "our choices will be dictated by others."

One question, first: What is technology sovereignty, anyway? The answer depends on whom you ask. There are many agendas around this label, which is applied in dramatically different ways. And it's not even one label – it's interchangeable with several similar terms that have also developed great political traction over the past year. There is "strategic autonomy", "regulatory sovereignty" and, increasingly, "digital sovereignty".

The scaled-up rhetoric speaks to a growing recognition that Europe must compete better in key areas, put an urgent focus on security of imports of vital goods, and limit the reach of US and Chinese technology. This aspiration has grown during the COVID-19 pandemic, which cruelly laid bare the fragility of international supply chains.

In her November 2019 inauguration speech, European Commission President Ursula von der Leyen set technology—along with climate change—as a top EU priority for the next five years. Von der Leyen said the bloc "must have mastery and ownership of key technologies in Europe," including quantum computing, artificial intelligence, blockchain, and chip technologies.

Thierry Breton, the EU's internal market commissioner whom many regard as the key animating force behind these ideas, has told Politico that Europe needs "to be more self-sufficient, to be more independent, autonomous. Some say sovereign. We need to identify our own resources. We have some very good partners but we are dependent in some areas."

The EU political elite argue that tech sovereignty is also about protecting "European culture and values". Officials talk about "human-centred" autonomy, with which individual citizens are personally sovereign over their own data and interactions with AI.



'The EU needs to respond to foreign protectionism without becoming protectionist itself and serving protectionist interests.' Ilham Kadri, Solvay



Simone Mori, Enel Group

# Europe First will 'hamper green energy transition'

Europe's energy sector is gearing up for a long and complicated green transition that is dependent on keeping the market open for research and innovation. Rather than Europe First, the strategy should be Europe Smart, said panellists at a green energy workshop.

Closing off markets to others would endanger European competitiveness, said Teresa Ponce de Leão, president of Portugal's National Laboratory of Energy and Geology. Her concerns can be seen as pushing back against the EU's new focus on technological sovereignty, which has bounded up the agenda since the COVID-19 pandemic.

However, the energy industry is not convinced a protectionist approach is best for its global competitiveness. "The European energy market is a fantastic open lab," said Simone Mori, head of Europe at the Italian energy company Enel Group. "For us, it seems quite natural ... to catch and mix technologies coming from different parts of the world and valorise them."

Instead of 'Europe First', it should be a 'Europe Smart', said Ponce de Leão. That would better reflect what is needed in terms of the transition towards a carbon neutral Europe by 2050, which will require a lot of effort in terms of research, investment and regulation.

In the next 30 years, Europe is planning to largely transition to generating electricity from renewable sources where possible, and replacing fossil fuels with clean hydrogen in transport. Batteries, hydrogen and fuel cells will be at the core of this transition.

"Across industry, we have to work together to make sure Europe can be a lighthouse in this process, by applying itself to the medicines we are prescribing here," said Cahn von Seelen, chief of global regions at car manufacturer Škoda. This will also help Europe stay on the top rung of knowledge generation.

However, large-scale innovation requires an adequate budget, said Ponce de Leão. She is worried about cuts to the budget of the EU's next research programme, Horizon Europe. "This seems to be a contradiction to the priorities."

For Simone Mori, head of Europe at the Italian energy company Enel Group, the ambition and the targets already set are adequate. Now, it is time to finance the development of key technologies and separate shortterm goals from the long-term ones.

Cahn von Seelen emphasised that the focus in Horizon Europe should remain on a wide approach to the green transition. While many individual initiatives have sprung up, a full transformation requires a joint and integrated effort from all players, he said.



Izabela Milewska, Amazon web services training and certification

#### 'Nowhere near' enough digital skills in Europe

Universities should set up joint training programmes with industry to boost teaching of digital skills needed in the knowledge-intensive economy, participants at a SciencelBusiness workshop said.

An increasing number of companies depend on cloud computing and need people with the skills to work at the interface between these outsourced services and digital technologies such as artificial intelligence and machine learning.

"Because cloud has really changed the paradigm of how we provision ICT infrastructure, it has also changed the skill set that is required in the labour market," said Izabela Milewska, digital skills global leader at Amazon web services training and certification. The number of people with the skills needed for a digital economy, "is nowhere near where we need to aim for," Milewska said.

Amazon and other large technology companies have in house education programmes to train cloud technicians and systems administrators, and are trying to reach people with aptitude who are willing to learn how to apply digital technologies, without having to spend years studying for a computer science degree. "We acknowledge the fact that there's just not enough ICT professionals on the market and, frankly speaking, universities are also not producing those graduates fast enough," said Milewska.

While companies complain they cannot find enough people with the right digital skills, universities say there is not "a consensus about what constitutes a shortage," said Thomas Jorgensen, senior policy coordinator at the European University Association. "We simply don't know that, and the data is not there." Tracking of what happens to graduates is not granular enough, said Jorgensen.

Most universities do not track where their graduates go and what new skills they may need a few years after graduation.

Jorgensen said universities have a duty to ensure their students understand digital technologies will be required in all jobs, no matter what sector they are employed in. Universities could, for example, encourage more interdisciplinary work, helping history students understand how text mining can be used for history research. "They don't need to learn to code, but they need to learn how to ask the questions," said Jorgensen.

Céline Carrera, education director at EIT Health, noted her organisation has developed upskilling programmes for executives and professionals in the sector. It has also has a series of degree programmes that help masters and PhD students acquire digital skills. "We try to nurture those skills from the early stage in their career," said Carrera. But hidden underneath all this rhetoric, some fear, is a new protectionist zeal. Alexandre Affre of the BusinessEurope industry association says, "The common understanding [of tech sovereignty] needs to be improved. There are merits in discussing this further, but there are fears as well that the concept could be misused for unilateral, protectionist approaches."

Indeed, Europe's business elite are anxious. Ilham Kadri, CEO of Belgian chemical giant Solvay, warns against a protectionist vision, which she says could endanger European competitiveness. "It's unrealistic to design and produce all components of a product, or use only European technology," Kadri said. "The EU needs to respond to foreign protectionism without becoming protectionist itself and serving protectionist interests."

Speaking at a Science/Business conference 8 September, Kadri urged EU officials to focus on policies to boost competitiveness. The COVID-19 crisis has exposed Europe's heavy reliance on foreign supply chains and demonstrated the continent cannot rely solely on its own technology, she said.

"Any re-industrialisation of supply chains...could reinforce the trend towards economic nationalism and deprive European companies of their international business space," Kadri said.

### 'Don't be a sucker'

It wasn't so long ago that there was a very different message coming out of Brussels. Former Research Commissioner Carlos Moedas, who was replaced by Mariya Gabriel in late 2019, memorably called for EU research programmes to be "open to the world".

This mantra hasn't aged particularly well. The message has shifted – access to the next EU research programme will only be extended to countries that respect that openness themselves. This shift can be seen in the larger, evolving EU approach to all things digital and technological, where the new mantra may as well be: Don't be a sucker.

Jean-Eric Paquet, EU director general for research and innovation, says Brussels would now be more selective in the areas it seeks cooperation. "In the last decade, we have not necessarily been analysing deeply enough where cooperation may not be in our interests," Paquet said. EU officials would "calibrate the research areas in which we will engage", in line with a broader political push to reduce Europe's dependence on US or Chinese-origin technologies.

In practice, Paquet told the Science|Business conference, that means some funding calls under Horizon Europe, the EU's next research programme, will not allow the

'In the last decade, we have not necessarily been analysing deeply enough where cooperation may not be in our interests.' Jean-Eric Paquet, European Commission



participation of certain countries "for reasons linked to security." This does not necessarily refer to China, Paquet noted, though he conceded that working and sharing research results with the superpower might not always be "in our obvious interest". Brussels will consider limiting international research in strategic areas including cybersecurity, sixth generation wireless and quantum technologies, the director general said. "We need to have a careful and deep look to see what we'll leave fully open."

An arms-open approach, as well as a narrow focus on fundamental rights and market regulations, is "naïve," says Breton, who is the former CEO of the French tech firm Atos. His is a hard-headed take on the world - one that concedes that Europe missed the boat on building giant Internet platforms, and now has to search elsewhere to find its niches.

"We missed the first wave on personal data," Breton has said. "It's not rocket science to build a platform but you need a large market. Facebook, Twitter, Baidu all have a large market. We have one too but there's barriers, and [different] language[s]."

### The shape of things to come

Whatever the motivations behind Europe's sovereignty push, the gearshift is visible in several mega-political projects.

Gaia-X, launched last year by leaders in Paris and Berlin to create a 'federated' computing network with specific European security standards, is regarded by some as the most concrete manifestation of European tech sovereignty.

It was conceived as a way to resist the dominant position of US cloud service providers, such as Amazon, Microsoft and Google, by agreeing on open technical standards, permitting customers to switch easily away from the Americans. The underlying concern is the lack of control; the fear of being 'locked out' of US-based cloud systems, as America takes its own turn toward nationalism under Donald Trump.



'We don't want to be vulnerable, like the Death Star, where if you blow a shot into one hatch, the whole thing blows up.' Tuure Parkkinen,

Meru Health

"We have to have alternatives when it comes to technological infrastructure," says Tuure Parkkinen, vice president of partnerships in Europe with Meru Health, a digital mental health platform. "If Google shuts down, there needs to be another cloud service we can revert to. We don't want to be vulnerable, like the Death Star, where if you blow a shot into one hatch, the whole thing blows up," he said.

The EU-wide effort is a so-called Important Project of Common European Interest (IPCEI), a relatively new kind of legal creature in the EU that gives companies



Kathrin Brenker, Optobiolab

#### 'Deep tech' firms need help in funding 'jungle'

If the European Commission is serious when it says it wants to achieve "tech sovereignty," then it must help build strong networks of companies and researchers to lead in breakthrough technologies, or "deep tech," argued panellists at a SciencelBusiness workshop on 8 September.

"There is a lot of funding out there, but it's truly a jungle if you're a young start-up," said Kathrin Brenker, CEO of Optobiolab, a German biotech start-up supported by ATTRACT, a Horizon 2020 deeptech project. "It would be nice if we had a higher organisational structure to tell start-ups where to go."

One way to achieve that is to create more and bigger platforms where investors and entrepreneurs can securely share information — enough to build trust without exposing young firms to unnecessary commercial risks, said Martijn de Wever, CEO of Floww, a fintech company in London.

But alongside this networking, start-ups also need to be made aware of the importance of protecting their intellectual property from those who might steal their ideas, said de Wever. "In the US building up your IP portfolio is a natural thing to do as part of your company. But over here it's not something that's part of the culture," he said. "People are quite open about it and sharing ideas, and don't actually get to the state of protecting their technology."

The discussion was chaired by Cinzia Da Via, professor of physics at the University of Manchester and cochair of the independent committee for research, development and innovation at the ATTRACT project. She said the EU must "focus on becoming a global leader in technological and economic innovation – not just in regulating the socio-economical, legal and ethical aspects of it."

To that end, participants in the workshop suggested several recommendations for policymakers, including:

- Pay more attention to deep technologies that may not have well-defined commercial applications yet, but will need early funding before they can reach that stage.
- Create networks of innovators, funders and investors. Startup founders often don't know what grants to apply for or how to find private investors and commercial partners. New platforms to create networks across European nations could help address that problem.
- Organise multi-stage funding for technologies at different levels of development. Multi-stage support would help move technologies towards market quickly and prevent them from running out of money after succeeding at earlier stages



Gareth Macnaughton, EIT Urban Mobility

#### Can European transport go its own way?

European cities cannot rely on global Internet players' mobility data and algorithms, a SciencelBusiness conference hears.

Although Google, Apple, Uber and others are accumulating vast amounts of data about how Europeans move around their cities, these Internet platforms aren't necessarily going to resolve the transport challenges facing the region's congested urban areas.

Gareth Macnaughton, innovation director for EIT Urban Mobility, argued that algorithms developed for commercial purposes may not deliver universal service provision and inclusive public mobility. "Currently the algorithms used by some of [the ride hailing] companies tend to have the driver circling around [affluent] districts," he said. That could mean when someone in a more deprived neighbourhood requests a ride, they are a low priority, even though it is likely to be an important journey. Macnaughton also noted that commercial considerations mean that algorithms developed by the private sector are generally not transparent, making it difficult to ensure that they would fulfil European policy objectives of ensuring transport is inclusive and accessible for all.

Macnaughton also noted that European cities tend to be more dense and compact than cities in North America, meaning that transport planners cannot necessarily employ "off the shelf solutions" or services from private companies. In a similar vein, Niels Wiersma, responsible for the data and platform strategy for smart mobility for the City of Eindhoven, said that the major Internet platforms are not supplying the very detailed data the city needs. "We are having significant trouble on getting it on a city-scale," he said. "You can imagine we want it on a very granular level because we want to say something about patterns on specific work locations."

More broadly, Europe may need to develop an artificial intelligence approach that reflects the continent's values and is distinct from that being pursued in North America and East Asia. "There are a lot of advantages that we can take as a European – diversities and also the power of the intelligence that we have and also the university outreach and collaborations," said William Wu, an AI researcher at Imperial College Business School. He called for Europe to do a better job of commercialising the in-depth AI research being conducted in the region's universities.

an exemption from competition rules to work together, with their governments' support, on strategic projects.

If Brussels has conceded the battle on building GAFA-equivalents using mountains of personal data, the "big fight" for industrial data is still there to be won, Breton has said. He is pledging investment in components, processors and microprocessors, chips and sensors, which are at the start of many strategic value chains such as connected cars, phones, Internet of Things, high performance computers, and edge computers.

"We must invest massively, with the objective to produce in Europe high performance processors and reach 20 per cent of the world capacity in value," said Breton. Today, Europe accounts for less than 10 per cent of global production.

Another big EU tech sovereignty mission is in batteries, including financing raw-materials extraction and processing, under the umbrella of the European Battery Alliance. The partnership, another IPCEI, sees public money go directly into the hands of large private companies, although some of the profits from the investments will be reclaimed for public coffers.

According to a 2014 Commission report, Asian companies have an 88 per cent share of global lithium ion manufacturing capacity, with more than 50 per cent in China alone. If Europe doesn't master battery technology, then there won't be a car industry in Europe, tech experts say. There is deep concern that Germany is missing its moment on autonomous driving and electric vehicles – foreign batteries can account for about half the cost of an electric car – and the country's big auto companies are losing market share.

The European Investment Bank aims to increase backing for battery projects to more than €1 billion in 2020. That will match in one year what it has offered the sector over the last decade. At stake is control over a new kind of data. Modern vehicles generate around 25 gigabytes every hour. Autonomous cars will generate terabytes of data that can be used for new services and for repair and maintenance, Breton has said.

A further industry-led group, the European Raw Materials Alliance, was announced in Brussels on 3 September, to build supply chains around metals and rare earths – elements used to make batteries and renewable energy equipment. Again, Beijing dominance is the focus: as much as 93 per cent of the EU's magnesium comes from China, according to the Commission. Commission Vice President Maroš Šefčovič, in announcing the alliance, said: "A secure and sustainable supply of raw materials is a prerequisite for a resilient economy. For e-car batteries and energy storage alone, Europe will for instance need up to 18 times more lithium by 2030 and up to 60 times more by 2050. As our foresight shows, we cannot allow to replace current reliance on fossil fuels with dependency on critical raw materials. This has been magnified by the coronavirus disruptions in our strategic value chains."

Nathalie Errard, senior vice president and head of Europe and NATO Affairs for Airbus, told the Science|Business conference that the new tech sovereignty push "is about building excellence in Europe. It means we need to be clever, and strategic. We are not lagging in aerospace here because we collectively invest in the sector," she said.

"So 'Europe First' is not necessarily bad. It could be a very good thing. But it shouldn't be 'Europe Only'. And industry [still] knows best where to localise [its investments]. I don't think politicians should take the helm of the investment or production side of things," she added.

#### Choosier on research partners

Following the shift in thinking around technology independence, the EU's Paquet said there is "a legitimate conversation" to be had on whether non-EU countries should be admitted to particular innovation programmes under Horizon Europe. "There's very good arguments to say innovation is nurtured in Europe with help from other big countries. On the other hand, this area is rather tightly correlated to our future productivity and competitiveness," Paquet said.



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'So 'Europe First' is not necessarily bad. It could be a very good thing. But it shouldn't be 'Europe Only." Nathalie Errard, Airbus

Australia, Canada, Japan, Singapore and New Zealand are some of the rich non-EU countries with which the commission has raised the possibility of a deeper research partnership from 2021. Paquet said the first step is to check back in with these countries to assess their interest in joining the EU's research programme as associate members.

"Then we'll see how our members see it," he said. Some member states have proposed keeping the European Innovation Council, a new instrument for backing market-ready ideas, open for EU states only. Paquet suggested there won't be a blanket ban on non-EU countries accessing funding from EIC, or similar programmes. "What would not be smart is to say, 'this is how it is for everyone'. No, we will have flexibility," he said.

Research Commissioner Gabriel, also at the Science/Business conference, said researchers and entrepreneurs participating in Horizon Europe would still gain "access to the best knowledge and networks" in the world. "There is no sovereignty versus cooperation [debate]. There is sovereignty plus cooperation," she said. While Europe cannot afford to be "naïve" in the global technology race, it will continue to seek collaborations with "like-minded partners", Gabriel added.



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'Researchers and entrepreneurs participating in Horizon Europe would still gain "access to the best knowledge and networks" in the world'

Mariya Ivanova Gabriel -European Commissioner for Innovation, Research, Culture, Education and Youth



Francesco Sette, European Synchrotron Radiation facility

#### Frontier science must be 'at the heart of' Europe's digital sovereignty push

The pandemic brought Europe's weakness in digital technologies into stark relief. Now policymakers need to confront the question of how to 'build back better', promoting the translation of the EU's world-leading fundamental research to get the innovation pipeline working, says Francesco Sette, director general of the European Synchrotron Radiation facility.

"Let's not forget that fundamental science is what fuels innovation," Sette said. "Europe has been able to create some unique organisations (to answer questions) which a single country can't address alone," said Sette.

Building digital sovereignty has to begin at home, and from the bottom up, suggested Sette.

Antoine Petit, president and CEO of the French National Centre for Scientific Research (CNRS), agreed the innovation pipeline "is fuelled by fundamental research." However, the quality of research is not guaranteed. "I'm very worried about a possible decrease in the European Research Council budget – it's bad for science and innovation," Petit said.

In addition to preserving its excellent fundamental research, Europe needs to fix gaps in the pipeline, providing support to progress science to market, through initiatives such as the European Innovation Council. "We have got to translate research into products and jobs," said Petit.

For Maria-Manuel Leitao Marques, MEP and vice chair of the European Parliament's Internal Market and Consumer Protection committee, Europe needs to strengthen the route from research to products. "We need to invest in skills to increase digital sovereignty, and we have to push digital research networks," she said. New technology commercialisation models and public private partnerships are needed to attract skilled people. "We need resilience more than ever."

Digital sovereignty is seen by some as antithetical to the key principle of openness in science. But, said Leitao Marques, lack of independence in digital technologies is unrelated to open science or open data. "Europe is good at fundamental research and we need to continue to invest. Our problem is after fundamental research and how to translate to innovation, it's not a problem of open or closed science," she said.

Petit said while open science "is a priority for CNRS", open science and innovation should not be seen as mutually exclusive. "You can have an open science but keep results (confidential) for the amount of time needed to patent or transfer to industry," he said.

Sette agreed the process of translating fundamental science to innovation would be held back by any restrictions on sharing research findings. "Science belongs to humanity," he said. "Openness is the best way to harvest the benefits."



Pierre Meulien, Innovative Medicines Initiative

# COVID-19 pandemic prompts shift in EU research funding

It was a "big test" as the Innovative Medicines Initiative (IMI) was thrust into the "incredibly high profile environment" of the COVID-19 crisis, said Pierre Meulien, executive director of the publicprivate partnership. In the event, he said, IMI quickly repurposed programmes and mobilised resources to help mount a pan-European response.

Key to success is the way in which IMI balances interests, Meulien said. "There is value for the public side in getting access to industry expertise, and value for industry, which is incentivised to do things it would not normally do – and especially not in collaboration with competitor companies," he said.

While none of the IMI programmes or structures were specifically designed to deal with COVID-19, they could readily be repurposed, said James Eshelby, vice president of global public-private partnerships at Pfizer. "Historical projects have been adapted because they provide really important platforms and networks, and pull together all the best researchers," Eshelby said.

Examples include work IMI has done to harmonise clinical trial data, the setting up of a network of clinical research sites to carry out research on antimicrobial drugs that is now being used for COVID-19 testing, systems and standards that have been agreed for the collection of real world evidence, and work IMI has done on other zoonotic viruses that have crossed from one species to another.

IMI also got a number of new COVID-19 specific projects off the ground — one involves 37 partners across the EU.

The European Commission is now laying the ground for the successor to IMI, in which the partnership will be extended to other sectors, to pull in medtech, digital health and diagnostics companies.

The new initiative will also involve the members of four other pan-European industry bodies, Europabio, Medtech Europe, Vaccines Europe and COCIR, an association representing medical imaging and radiotherapy companies.

The breadth of EU research and innovation policies and instruments makes an essential contribution to ensuring Europe is more prepared and more resilient, said Maria Pilar Aguar Fernandez, head of the health innovations unit at the commission. Classical health research is central, but other areas such as behavioural sciences and supporting development and scale-up of manufacturing processes are essential to pandemic responsiveness too. "One lesson learned [from the pandemic] is that all areas of research can contribute to being better prepared," she said.

### **Strong Berlin-Paris tandem**

The eurozone's two leading economies, France and Germany, have thrown their considerable political heft behind this more assertive digital and industrial approach.

A strong emphasis on sovereignty is the most striking feature of the German plan for its six-month presidency of the Council of the EU, which runs until the end of the year. In the European Parliament in July, German Chancellor Angela Merkel further highlighted this point, saying, "It is very important that Europe enjoys technological sovereignty, particularly in key areas such as artificial intelligence and quantum computing, also in securing a secure, trustworthy data infrastructure."

With the big American tech platforms moving rapidly into the space of AI, biotechnology, digital currencies and so on, there's growing political appetite for the EU taking a more active role in nurturing technology champions of its own. Germany's economic minister Peter Altmaeir has mused about the creation of an "Airbus for artificial intelligence". And at the risk of overusing the Airbus tag, in Brussels Šefčovič has proposed an "Airbus for batteries".

France and Germany have pushed harder for an interventionist industrial policy in the wake of the Commission's move last year to block the proposed tie-up between Siemens and Alstom – a decision that left politicians in both countries fuming. The merger had its sights on helping European train makers compete with CRRC, the Chinese railway group. The French and German governments are now among the main advocates for an easing of EU competition rules to allow states to create mega-companies. Several member states are also seeking powers to step in to acquire high-tech companies if they are about to be taken over by statebacked predators. The most prominent example was a German-led demand this spring for EU investment in a local vaccine company, CureVac, that the Trump Administration was said to be seeking to control. Within days – light speed for Brussels – the company was presented an €80 million EU finance package.

### Caught between the US and China

Indeed, much of the political momentum for this European shift can be credited to two men: Donald Trump and Xi Jinping. The tech sovereignty push is a way for Europe to hedge against an unreliable US embodied by a president openly hostile to the EU, and the rise of Beijing's authoritarian system, now more widely seen as a cause for fear.

China is gaining ground in a range of technology fields that experts say could give the country an economic and military edge, including AI, microchips and quantum computing. Von der Leyen's administration has signalled stronger willingness to confront Chinese protectionism, which some argue poses an existential threat to a vibrant digital economy and the EU's future prosperity.

China restricts most foreign competitors to its tech businesses. Few foreign companies are allowed to reach Chinese citizens with ideas or services, but the world is far more accommodating to China's online companies. Admittedly, this is beginning to change. US moves against the popular TikTok app could be the start of wider restrictions on Chinese internet platforms. And a number of countries, including Australia, the US and the UK, have blocked, or are in the process of blocking, China's Huawei from supplying equipment to their next-generation mobile phone networks.

Europe's tech sovereignty push is a reaction to the global, rules-based trading system breaking down, says Parkkinen of Meru Health. "America First, China First and now Europe First: the outcome is less common rules," he said.

But the new "Europe First" zeal looks quite different to similar moves in the US and China, says Luc Soete, honorary professor in international economic relations at Maastricht University. He gives the recent example of how four European countries, France, Germany, Italy and the Netherlands, clubbed together to pre-order their own stock of COVID-19 vaccine candidates. They were spurred into action by a flurry of moves in the US to secure vaccines under development, but the approach was criticised for its lack of solidarity with other EU members.



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'The EU is a guarantee for limiting the way in which Europe First becomes Germany First, or France First.' Luc Soete, Maastricht University

"Immediately you saw the European Commission responding, saying they'd stand up for all of Europe," Soete explained. Brussels officials began negotiating COVID-19 vaccines contracts on behalf of all 27-member states, to "avoid harmful competition between each other," as von der Leyen described it.

"This showed that the EU is a guarantee for limiting the way in which Europe First becomes Germany First, or France First," Soete said.

### Magnified by the virus

The broad reassessment of supply chain security in Brussels is magnified, of course, by the ongoing COVID-19 crisis.

The outbreak has revealed innumerable frailties in the world economy, and drawn painful attention to an overdependence on others for key technologies and supplies of crucial materials. As the crisis deepened in the spring, Breton said that Europe may have gone "too far in globalisation" and become too reliant on "one country, one continent."

Governments caught cold by the pandemic are now shifting their attention to bolstering medical supply lines. EU officials say as much as 90 per cent of basic chemicals required for generic medicines are sourced from India and China. After a hapless chase for tests, masks and protective equipment during the early days of the corona-crisis, many politicians feel it's just too risky to rely on other countries for these things again.



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'When we have economic crises, regions tend to be inward-looking.... It would be a pity if Europe closed itself up.' Blade Nzimande, South African Ministry of Higher Education, Science and Innovation



Sandra Bour Schaeffer, Airbus demonstrators and Airbus UpNext

#### COVID-19 crisis threatens Europe's aerospace R&D strengths, industry warns

The COVID-19 pandemic has upended commercial aviation, but industry executives still see the need to push on with large-scale research projects if Europe is to remain competitive in global aircraft markets.

"We were heading to a very important transition before COVID," said Sandra Bour Schaeffer, head of Airbus demonstrators and CEO of Airbus UpNext, the aviation group's innovation lab. With Airbus planning to roll out a zero-emission aircraft by 2035, "We need to continue on that path," she says, making a call to the European Commission to "maintain funding" for aerospace in the next big EU research programme, Horizon Europe.

Other executives, speaking at a SciencelBusiness workshop, concurred – adding that unless Europe pushes ahead with long-term R&D it risks losing talent and standing in global markets.

The worldwide economic downturn heightens the risk of expertise – for instance in helicopter development – leaking out of Europe, or going on the market for cheap, said Giorgio Gulienetti, head of research and development at Leonardo, Italy's largest defence and aerospace company.

"Rotorcraft expertise is something we have; but in the medium to long term, it may be taken away from us. We're not innovating in Europe with local supply chains, with local capabilities. COVID has shown... that Europe has to be able to maintain leadership in strategic areas," he said.

The EU's growing willingness to challenge US and Chinese dominance in strategic parts of the economy is a good pursuit, said Schaeffer, provided it doesn't result in rules that are "too directive" for companies. Brussels' push on "technological sovereignty" follows the concern in European capitals that the EU will be weakened by the market dominance of the big international companies, particularly in areas like storing and analysing data, and battery and medical supply development.

Joeri De Ruytter, ambassador for R&T business development and partnerships at aerospace giant Honeywell, said the crisis has exposed the industry's supply chain gaps, but has also allowed politicians and industry to reappraise the continent's strategic strong points. "Sometimes it needs to be dark before you see the stars," he said. "When we have economic crises, regions tend to be inward-looking," said Blade Nzimande, South Africa's minister of higher education, science and innovation. "For Europe, continuing to expand beyond its borders is a very necessary condition for its own development. It would be a pity if Europe closed itself up."

### Sovereignty doubts

What does all this amount to?

Some doubt there is a coherent vision, or common understanding, for tech sovereignty, and argue that it's not clear how much Europeans will gain from the strategy. "The precise meaning of sovereignty or autonomy in the realm of technologies remains ambiguous," concludes a report from the European Centre for International Political Economy (ECIPE), a Brussels-based think tank.

"Sometimes it feels like more attention is given to the branding rather than the actual substance of EU foreign policy," says Niklas Nováky, research officer at the Martens Centre, a think tank affiliated to the centre-right European Peoples' Party. The continent's path towards tech sovereignty remains an aspiration and the ad hoc policy toolbox that has been presented so far may well prove inadequate to build the co-ordination needed for a forceful European strategy. Moreover, European governments, facing massive fiscal deficits, are still struggling bitterly over the size of the bloc budget, meaning the best-laid investment plans could still come a cropper.

So nobody knows yet what will come of the EU effort. You can reach into the past and find some successful European state-sponsored attempts to compete with the US, such as Airbus and the Galileo satellite navigation network.

You can also find plenty of half-baked attempts. Indeed, EU Framework Programmes for years have tried and failed to jump-start serious EU competition in computer technologies – from memory chips in the 1980s to social media platforms today. Policy makers advocating tech sovereignty "tend to ignore failed industrial policy initiatives, including sunk public investments and protracted subsidies for industrial laggards," according to the ECIPE.

The results aren't always pretty. One initiative was Quaero — the €400 million search engine aimed at breaking Google's search stranglehold. It was cooked up by France's President Jacques Chirac and Gerhard Schröder, then German chancellor, in 2005, and eventually put to bed in 2013. Surveying the effort, engineer Nick Tredennick wrote that: "Going head-to-head with Google with a project involving

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Thomas Rachel, German Federal Ministry of Education and Research



well-funded, energetic entrepreneurs would be foolish. Attempting the same with a multi-government collaboration is beyond description."

Andreas Tegge, head of global government relations at SAP, Europe's largest software company, says that government-led investments can work for aerospace but "because the digital sector is so dynamic, it's probably a recipe for failure and a waste of taxpayer money."

Already, there are doubts around the feasibility of the Franco-German GAIA-X project. It looks good on paper but it "doesn't work", said Christian Ehler, German member of the European Parliament, who criticises the effort for excluding other European countries. "We should understand that there is no longer national sovereignty," he said.



'We should understand that there is no longer national sovereignty' Christian Ehler, German member of the European Parliament

The importance of European sovereignty has "yet to convince some politicians and a large part of the general public," says Antoine Petit, president and CEO of the French National Centre for Scientific Research. Many people don't long for European equivalents of American technology like Facebook and Amazon, he says. "Some people have more faith in the GAFA companies than their own states."

Global industry players express concern over the fuzzy, nationalist rhetoric around sovereignty and they fear arbitrary, politically driven decision-making. The tech sovereignty push is ostensibly on behalf of European manufacturing. But it could prove a drag on competitiveness if it increases prices for components and incites foreign retaliation. Some politicians recognise this risk. "We do not want to be dependent on other continents in the world. But Europe has to also be the most open economy in the world. German companies will be the first to suffer if we were banned from other countries," said Thomas Rachel, parliamentary state secretary in Germany's Federal Ministry of Education and Research.

The coronavirus crisis "could be used to justify more EU or national government interference in Europe's digital transformation," says ECIPE. "Indeed, for some the debate about European technology sovereignty is largely about designing prescriptive policies, which paradoxically risk reducing Europeans' access to the innovative technologies, products and services that helped Europe through the crisis."

A Europe newly obsessed with growing its own strategic assets may not sound like an environment that encourages big foreign investment, either. "There's the risk of falling into the trap of building walls and barriers; trying to protect sectors that are weak and prone to disappear. There is a risk as well of becoming transactional, a la Trump, rather than keeping a holistic view [on trade]," said Philippe Tanguy, president of Polytechnique Montreal. From Canada, Tanguy has been able to see from close quarters some of the early results of America First policy. "It has

# Europe's bioeconomy can form basis of green recovery

To deliver Europe's green transition from fossil fuelto bio-based industries, regions must be active and involved in the process, said panellists speaking at a SciencelBusiness workshop.

"The local dimension is essential," said Catia Bastioli, CEO of bioplastics producer Novamont. "It's important to transform peripheral areas into innovation centres."

Bio-based industries use renewable land and sea resources to produce food, materials and energy. In 2017, they made a total contribution of  $\epsilon$ 750 billion to the European economy.

But although using renewable resources, many of the processes are energy-intensive or use raw materials that must be transported from diverse locations, adding to greenhouse gas emissions and making it difficult to operate at scale.

Now, in common with all other sectors, bioindustries must aim to become carbon neutral by 2050. Work is starting, and one of the key steps on the way is the formation of a new Horizon Europe public-private partnership, Circular Bio-based Europe (CBB).

As the successor to the Horizon 2020 Bio-based Industries joint undertaking, the new partnership will look for ways to turn biomass into products, without contributing to greenhouse gas emissions.

Developing these processes is only the starting point. To make a difference they must be deployed and replicated at scale. "All the partners are convinced that we need a system in place to accompany the deployment," said Philippe Mengal, executive director of the Bio-based Industries Joint Undertaking (BBI JU).

For Mengal, the key is to create "a coherent system" of tools and instruments where industry can get access to investment.

Dirk Carrez, director of the Bio-based Industries Consortium, the association linking the current and future bio-based industry partnerships, agreed. While the BBI JU public-private partnership model is unique, more is needed to stimulate the deployment of its innovations in Europe. Regions will play a crucial role here, and Carrez believes a digital platform to connect companies to the regions will prove vital. That would allow regional policymakers to describe the value chains they want to create, while companies can set out which areas they would like to invest in.

Such a mechanism could help close the funding gap across Europe, bringing western venture money to bear in developing significant bioresources in the east of Europe. "We have to continue investing in bringing these two parts of Europe together," said Carrez.

For Bastioli, regions need to invest in creating local value chains, rather than focussing on production of one crop or product. Currently, the industry is fragmented, and to become circular, end-to-end integration is needed. The industry "cannot continue with the system of the past," she said.

"Working in silos is thinking of yesterday," agreed Carrez. To create a true circular bio-based economy, different sectors, regions, and small and large companies must all cooperate in setting up local value chains. triggered a trade war with China and Europe. The attractiveness of [US] universities has taken a hit. It's damaging US competitiveness," he said.

Europe's strategic autonomy goal could complicate relations with Washington and Beijing at a perilous juncture in global political relations.

A reshoring of selected critical industries, particularly medical supplies, has been mooted in Brussels, though how it would work in practice is yet to be defined. Will we see a wave of factories returning to Europe? Many multinationals may decide that the benefits of outsourcing will still prevail beyond the virus. According to some trade analysts, supply chain resilience is improved by spreading out production around the world, not concentrating it in Europe. A more attainable goal, they say, is diversification away from China.

There are also political obstacles to the sovereignty goal within the bloc, with smaller nations wary of Franco-German firms getting unfair advantages. The virus has cratered the world economy, but the huge sums mobilised in Berlin and Paris to aid recovery are a reminder that the pair are better positioned to come out stronger than many of their neighbours.

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