



Digital Economy and Society Index (DESI) 2021

France

About the DESI

The European Commission has monitored Member States' progress on digital and published annual Digital Economy and Society Index (DESI) reports since 2014. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing an EU-level analysis in the key digital policy areas.

In 2021, the Commission adjusted DESI to reflect the two major policy initiatives that will have an impact on digital transformation in the EU over the coming years: the Recovery and Resilience Facility and the Digital Decade Compass.

To align DESI with the four cardinal points and the targets under the Digital Compass, to improve the methodology and take account of the latest technological and policy developments, the Commission made a number of changes to the 2021 edition of the DESI. The indicators are now structured around the four main areas in the Digital Compass, replacing the previous five-dimension structure. 11 of the DESI 2021 indicators measure targets set in the Digital Compass. In future, the DESI will be aligned even more closely with the Digital Compass to ensure that all targets are discussed in the reports.

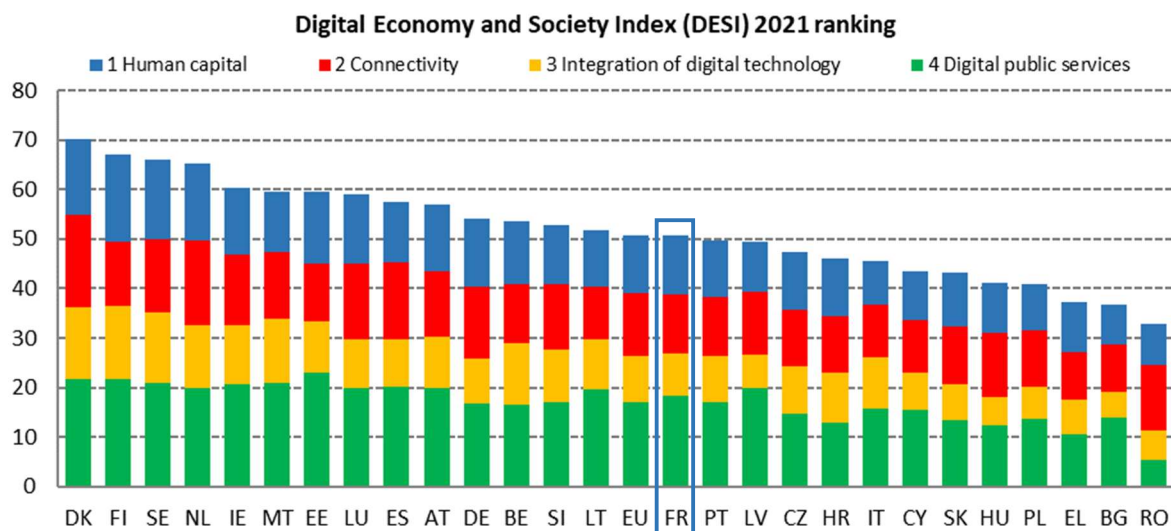
In addition, DESI now includes an indicator measuring the level of support that adopted ICT technologies provided companies in taking more environmentally-friendly measures (ICT for environmental sustainability) and the take up of gigabit services, plus the percentage of companies offering ICT training and using e-invoicing.

The DESI scores and rankings of previous years were re-calculated for all countries to reflect the changes in the choice of indicators and corrections made to the underlying data.

For further information, see the DESI website: <https://digital-strategy.ec.europa.eu/en/policies/desi>.

Overview

	France		EU
	rank	score	score
DESI 2021	15	50.6	50.7



France ranks 15th of the 27 Member States in the 2021 edition of the Digital Economy and Society Index (DESI).

France is in line with the EU average in terms of digital skills, both basic skills (57% of individuals) and advanced skills (31% of individuals), but it is still far from the EU front runners. In 2020, the number of ICT specialists in employment increased to 4.5% of total employment, slightly above the EU average of 4.3%.

France has improved its performance in terms of connectivity: fixed very high capacity network (VHCN) coverage registered a significant increase of 9 percentage points to reach 53% in 2021, and fast broadband networks (NGA) coverage, now at 69%, is up 8 percentage points compared with 2020. Both values are still below the EU average, which is respectively 59% and 87%, and rural coverage remains low.

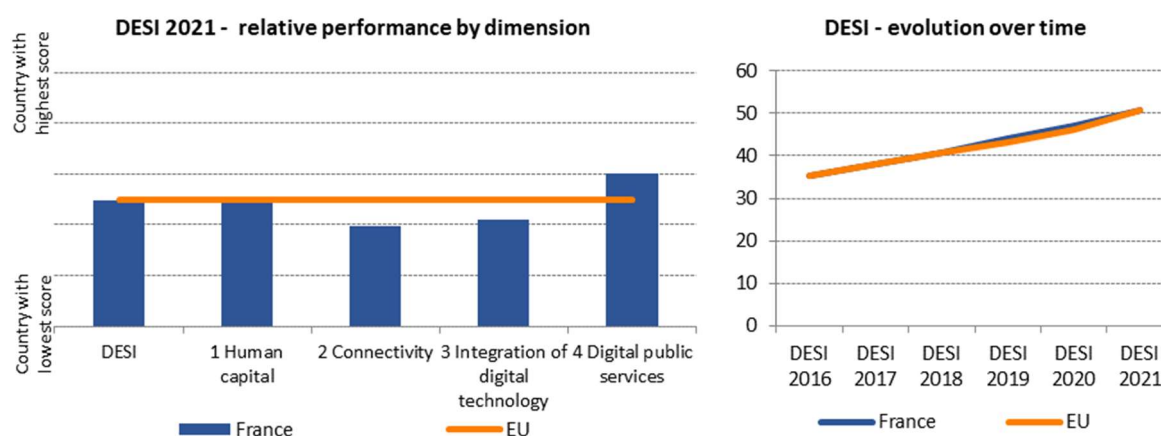
French enterprises have started to make use of digital technologies in their business operations, in particular big data (22% of enterprises using them compared with an EU average of 14%).

France is investing significant resources to improve the resilience of the education system, equipping schools and universities with the necessary digital tools, improving connectivity and supporting innovative ways of teaching with the use of digital technologies. Measures to improve digital skills among the general public are being implemented, such as the additional allocation for individual learning accounts and measures supporting the development of basic digital skills for the most vulnerable. Implementation of the French national broadband plan *Très Haut Débit* continued in 2020¹, with a noteworthy change: the French government decided to set a new target for universal roll-out of new fibre-to-the-home (FTTH) networks throughout the country by 2025.

¹ The overall objective of the national broadband plan is to guarantee that all French households have access to internet connections of at least 100 Mbps by 2025. There was significant progress in Q4/2020 both in FTTH

France is also investing in the development of capacities in key digital technologies, for example through participation in European projects, and it continues to support digitalisation of French companies and the uptake of digital solutions. These investments are expected to have a significant impact, if implemented efficiently and where taking into account the specific needs of SMEs, as they still face some challenges in adopting digital solutions.

A comprehensive strategy is being implemented for the digitalisation of services and to support public administrations in their digital transformation, also making use of technologies such as cloud, Artificial Intelligence (AI) and cybersecurity. Digital health services are also being supported, with significant investments in shared medical records and development of the national health data space.



Digital in France's Recovery and Resilience Plan (RRP)

The French RRP will contribute to supporting the country's digital transition with an overall contribution of EUR 8.4 billion (21.32%), exceeding the 20% target. These resources will also be complemented by national resources as part of the *France Relance* plan.

Digitalisation of health will be supported with an investment of EUR 2 billion, with the aim of improving the sharing of medical records, to set up the digital health platform and to ensure interoperability among software of players in the public and private sectors.

France will also invest EUR 1.8 billion in developing and deploying key digital technologies, such as cybersecurity, quantum and cloud to support innovation in these areas and encourage their widespread use, in line with EU values. France will also participate in two Important Projects of Common European Interest (IPCEIs) in the areas of cloud and edge computing and on microelectronics and communication technologies.

The French RRP will also contribute to improving the digitalisation of public administration, to provide efficient online services and deploy the e-identity scheme. Connectivity will also be

deployment and take-up: there were 10.4 million FTTH subscriptions as of 31 December 2020 and the total number of broadband and superfast broadband subscriptions stood at 30.6 million at the end of 2020. This is 285,000 more than in the previous quarter and 800,000 more than the year before (+2.7% year on year).

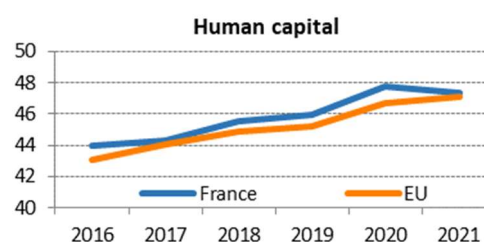
Source: Arcep.

improved in rural areas, contributing to the larger aim of providing access to very high speed networks for all households (100% fibre-to-home) by 2025.

Education and training systems are expected to be further digitalised. In order to improve the use of digital technologies in education, 45,000 classrooms should be equipped with new digital solutions and 1.4 million students in higher education should have access to hybrid learning by the end of 2022. As part of the investment in skills, digital skills development for students and workers will be supported. Finally, 200,000 companies, in particular SMEs, will be supported in their digital transformation under the umbrella of the *France Num* initiative.

1 Human capital

1 Human capital	France		EU
	rank	score	score
DESI 2021	14	47.4	47.1



	France			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills	57%	57%	57%	56%
% individuals	2017	2019	2019	2019
1a2 Above basic digital skills	29%	31%	31%	31%
% individuals	2017	2019	2019	2019
1a3 At least basic software skills	60%	60%	60%	58%
% individuals	2017	2019	2019	2019
1b1 ICT specialists	3.9%	4.2%	4.5%	4.3%
% individuals in employment aged 15-74	2018	2019	2020	2020
1b2 Female ICT specialists	19%	20%	20%	19%
% ICT specialists	2018	2019	2020	2020
1b3 Enterprises providing ICT training	19%	21%	15%	20%
% enterprises	2018	2019	2020	2020
1b4 ICT graduates	3.0%	3.5%	3.6%	3.9%
% graduates	2017	2018	2019	2019

In the Human capital dimension, France ranks 14th of the 27 EU countries and is thus in line with the EU average. Basic digital skills levels are slightly above the EU average (57% against the EU average of 56%), whereas 'above basic digital skills' are in line with the EU average, with 31% of individuals possessing them. The proportion of ICT specialists grew in 2020 compared with the previous year and is now slightly above the EU average at 4.5% of total employment (against an EU average of 4.3%). Female ICT specialists represent 20% of total ICT specialists, 1 percentage point higher than the EU average in 2020. The number of enterprises providing ICT training has registered a significant decrease compared with the previous year, falling to 15%, which is below the EU average of 20%.

Implementation of the national education strategy is ongoing. Significant investment has been mobilised to improve digital infrastructure and connectivity for schools (EUR 2.3 billion over 2013-2017). As a result, the number of highly digitally equipped and connected schools has increased, mostly at higher secondary level (81% in France against an EU average of 71% in 2018), while it remains below the EU average for primary schools². Following the introduction in 2019 of a new computer science course in all upper secondary schools, at present all pupils can benefit from courses in computational thinking, coding, programming and digital science teaching throughout their schooling, from primary school to the end of secondary school. Digital skills of students are assessed and certified at the end of studies in lower and upper secondary school via the Pix tool³, which is developed on the basis of EU Framework for the Digital Competence of Educators (DigCompEdu).

² <https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/countries/france.html>

³ <https://pix.fr/>

During the COVID crisis, to continue teaching activities at a distance, the National Centre for Distance Education (*Centre national d'enseignement à distance* - CNED) provided online learning modules during the lockdown. It also developed online platforms⁴ to provide assistance in French and maths. According to a report of the French government, distance learning during the COVID-19 crisis has likely increased gaps in educational outcomes. It is estimated that 6% of pupils in primary education and 10% in secondary education became disengaged from study⁵.

Between 2018 and 2019, adult participation in learning increased from 18.6% to 19.5%, placing France well above the EU average of 10.8%. The individual learning account (*Compte Personnel de Formation* – CPF), which makes individuals responsible for their learning pathway, is the main vehicle to provide training opportunities for (re)entry to the labour market or occupational mobility. CPF was digitalised in recent years, providing common online access for companies and beneficiaries to training opportunities, including apprenticeships and distance learning⁶.

In 2019, a new digital certification was launched, in addition to the existing *Certification Socle de compétences et de connaissances professionnelles (CléA)*, which gives employees and jobseekers the opportunity to test their competence level in relation to labour market needs.

In order to tackle shortages of digital specialists in key digital technologies, all national technology strategies (Quantum, Cybersecurity, AI, Cloud, EdTech, etc.) systematically include education and training activities. For example, the cybersecurity strategy aims to double the number of employees in this domain, with a target of 75,000 people employed. As regards quantum, the strategy provides for the training of 6,600 people, also via PhDs.

The *Femmes@Numérique*⁷ collective has been created under the patronage of the French Secretary of State for the Digital Economy. It mobilises companies, training institutions and all their partners and associated ministries to make women aware of the opportunities that the digital economy presents for them.

The French Digital Skills and Jobs Coalition runs a number of activities to promote digital skills. At the moment, a project is being implemented in cooperation with the Ministry of Labour, focusing on the use of AI for enterprises, in particular SMEs. This has led to the development of a dedicated website⁸, offering a number of services, such as a self-assessment tool, showcasing AI use-cases by enterprises and providing information on the possibilities offered by AI solutions.

During 2020, more than 130 events linked to EU Code Week were organised in France, involving more than 30,000 people.

Despite improvements, the digital skills of French citizens and workers remain far from the levels achieved by the EU's top performers. An increase in basic digital skills is an imperative to ensure that everyone can access essential online services and avoid social exclusion. At the same time, a higher number of people with advanced digital skills and ICT specialists would contribute to reducing current shortages and help the deployment of digital solutions across all economic sectors.

4 The Homework Done (*Devoir Faits*) and Jules platforms: <https://www.tice-education.fr/tous-les-articles-et-ressources/ent/1353-jules-une-plateforme-numerique-pour-l-aide-aux-devoirs>.

5 DEPP (2020a), Information note n° 20.26 – *Crise sanitaire de 2020 et continuité pédagogique : les élèves ont appris de manière satisfaisante*.

6 Education and Training Monitor, European Commission, 2020.

7 <https://femmes-numerique.fr/>

8 <https://perspectives-ia.fr/>

Human capital in France's Recovery and Resilience Plan

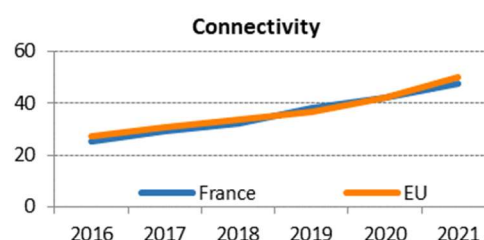
The recovery and resilience plan includes significant investment to support education and employment, including specific initiatives for digital skills development, with a total budget of EUR 1.6 billion. Digitalisation of education will be supported, in particular for primary and secondary schooling, including an enhanced use of platforms and digital technologies for pedagogical purposes. A total budget of around EUR 350 million will be devoted to the “digital teaching” strategy, supporting the development of Education Technologies. In addition, EUR 304 million will be devoted to the digitalisation of training platforms for lifelong learning.

Specific investment is also dedicated to digital inclusion, with a budget of EUR 250 million, aiming to provide citizens with basic digital skills, necessary to have access to online public services, thereby contributing to preventing social exclusion. In addition, the recovery and resilience plan includes a complementary allocation to individual learning accounts to training 25,000 people in digital skills or digital professions.

Finally, a dedicated action aims at supporting the development of digital education ecosystems at all levels of education, from primary school to universities, encouraging the development of structural partnerships between educational and research institutions and businesses (EUR 750 million). These partnerships can be particularly relevant if implemented in the digital area because they offer students the possibility to use state-of-the-art technologies in their training and ensure that school curricula are in line with the rapidly changing demands of the labour market.

2 Connectivity

2 Connectivity	France		EU
	rank	score	score
DESI 2021	17	47.4	50.2



	DESI 2019	France DESI 2020	DESI 2021	EU DESI 2021
2a1 Overall fixed broadband take-up % households	73% 2018	71% 2019	NA 2020	77% 2020
2a2 At least 100 Mbps fixed broadband take-up % households	14% 2018	17% 2019	NA 2020	34% 2020
2a3 At least 1 Gbps take-up % households	NA 2019	NA 2019	NA 2020	1.3% 2020
2b1 Fast broadband (NGA) coverage % households	58% 2018	62% 2019	69% 2020	87% 2020
2b2 Fixed Very High Capacity Network (VHCN) coverage % households	38% 2018	44% 2019	53% 2020	59% 2020
2c1 4G coverage % populated areas	99.3% 2018	99.5% 2019	99.8% 2020	99.7% 2020
2c2 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	33% 2019	33% 2020	59% 2021	51% 2021
2c3 5G coverage % populated areas	NA	NA	0% 2020	14% 2020
2c4 Mobile broadband take-up % individuals	68% 2018	76% 2019	76% 2019	71% 2019
2d1 Broadband price index Score (0-100)	NA	80 2019	78 2020	69 2020

With an overall score of 47.4, France ranks 17th in connectivity for the EU.

France has ubiquitous 4G coverage with 99.8% of households covered. This is linked to the implementation of 4G deployment commitments undertaken by all four market players in 2018. In white rural areas⁹, 4G roll-out has also made significant progress: whereas one third of the relevant sites were equipped with 4G as of 30 June 2020, the main operators reported that a little over 60% of them were equipped as of 30 September 2020¹⁰. France's fast broadband (NGA) coverage stood at 69% (against the EU average of 87%). As of mid-2020, its coverage with fixed very high capacity networks (VHCN) stood at 53% (against the EU average of 59%), consisting exclusively of Fiber to the Premises (FTTP) (against an EU average of 42.5%), as cable networks that cover 27% of households have not yet been upgraded to the DOCSIS 3.1 standard. FTTP covers 18.4% of rural households (against 25% for the EU average)¹¹.

⁹ The coverage programme known as *Zones blanches centres-bourgs* aims to provide mobile coverage in village centres identified as having no such coverage.

¹⁰ However, around 80% of them were equipped in 4G as of 31 December 2020. Source: Arcep.

¹¹ FTTP coverage stood at 60% including 31% of the rural households in December 2020. Source: Arcep

Thanks to the completion of the auction of the 3.4-3.8 GHz band in Q4 2020, France improved its 5G readiness indicator, which stood at 59% as of mid-2020 (against an average of 51% for the EU). Coverage started to increase at the end of 2020 as all four mobile network operators offered 5G services¹². France's mobile broadband take-up stood at 76% (against an average of 71% for the EU) and its broadband price index stood at 78 against the EU average of 69. This suggests that the relevant prices are good compared with other prices applied within the EU for similar services.

Implementation of the French national broadband plan (*plan France Très Haut Débit*) continued in 2020¹³, with a noteworthy change: the French government decided to set a new target for ubiquitous roll-out of new FTTH networks throughout the country by 2025. This objective is to be carried out through the allocation, by the State, of an additional EUR 240 million as part of the national recovery plan. These funds will be added to the EUR 3.3 billion already assigned to the plan *Très Haut Débit* and the EUR 30 million that were allocated at state level in 2020. Fibre roll-out still increased in 2020 in spite of the COVID-19 pandemic crisis.

On 31 December 2019, the awarding procedure for the 3.4-3.8 GHz band was launched by the national Regulatory Authority Arcep. The operators Bouygues Telecom, Free Mobile, Orange and SFR were declared eligible to take part in the dedicated auction procedure and each to receive a block of 50 MHz for EUR 350 million. In addition, they were allowed to participate in the auction for the remaining 11 blocks of 10 MHz still available. The overall result of the 3.4-3.8 GHz band is as follows: Bouygues Telecom (70 MHz), Free Mobile (70 MHz), Orange (90 MHz), and SFR (80 MHz). Each licence holder is rolling out 5G across an increasing number of sites (3,000 sites should be covered by 2022, 8,000 by 2024 and 10,500 by 2025) and has the obligation to provide increased throughput. All four operators started providing 5G services at the end of 2020. Following the reluctance of some municipalities as regards the roll-out of 5G services, in April 2021, the French Agency for Food, Environmental and Occupational Health & Safety (*Agence nationale de sécurité sanitaire, de l'alimentation, de l'environnement et du travail - ANSES*) published a report finding that 5G roll-out for mobile services does not entail new health hazards.

Main market & regulatory developments

The French mobile telecommunications market features a massive use of 4G networks. 55.5 million customers used them in 2020 and, as of Q3 2020, the average monthly consumption of active 4G customers exceeded 10 GB per month (an increase of 37% in one year). The use of mobile services also increased by 30% in 2020 due to the COVID-19 sanitary crisis. According to

¹² As of 31 December 2020, 7,175 base stations were equipped with 5G (using 700 MHz, 2100 MHz and 3.4-3.8 GHz bands). Among these, 1,198 were using the 3.4-3.8 GHz band. Source: <https://www.arcep.fr/cartes-et-donnees/nos-cartes/deploiement-5g/observatoire-du-deploiement-5g-janvier-2021.html>

¹³ The overall objective of the national broadband plan is to guarantee that all French households have access to internet connections of at least 100 Mbps by 2025. Q4 2020 recorded significant progress both in FTTH deployment and take-up: there were 10.4 million FTTH subscriptions as of 31 December 2020 and the total number of broadband and superfast broadband subscriptions stood at 30.6 million at the end of 2020. This is 285,000 more than in the previous quarter and 800,000 more than the year before (+2.7% year on year). Source: Arcep.

Arcep, a major share of FTTH subscriptions (95%) among new subscriptions is for very high speed internet services (>30 Mbps).

On 3 February 2021, a letter of formal notice was served on France for failure to notify complete transposition into French law of national measures implementing the Directive establishing the European Electronic Communications Code. France has notified additional implementing measures since that date. The notified measures are being examined by the Commission.

As to market regulation, after receiving the Commission's observations, the national regulatory authority Arcep adopted several new market analysis decisions for fixed broadband and superfast broadband markets¹⁴ for the period 2021-2023. These aim at three main objectives: facilitating the transition from the legacy copper network to fibre; maintaining pro-investment regulation to make fibre the fixed infrastructure of reference; and creating a truly competitive business market.

Several decisions¹⁵ set up asymmetric regulation that only applies to the significant market power operator *Orange*. They will apply from 2021 to 2023 for the following markets: a separate civil engineering market; market 3 a (passive solutions); market 3b (generalist active solutions); and market 4 (dedicated active solutions for businesses). Secondly, Arcep adopted a decision¹⁶ to complete 'symmetric' optical fibre regulation, which applies equally to all FTTH network operators, and a recommendation that provides additional details on this framework's application. Lastly, Arcep adopted a decision¹⁷ setting the maximum tariffs that *Orange* can charge for accessing its copper local loop. This decision complements those on markets 3 a and 3b.

In December 2020, Arcep launched a new version of its *Wehe* application¹⁸ by expanding the list of services that it can test to include several videoconferencing services and various French video streaming platforms. The new version of *Wehe* also includes a new functionality to detect port blocking.

In addition, in November 2020, Arcep launched a new version of its online platform '*J'alerte l'Arcep*' dedicated to reporting issues notably in the telecommunications field to the authority. The platform is now open to new user groups such as application developers, telecommunication operators or consumer associations who can use a dedicated space to alert the authority. The platform's management tools have also been improved by introducing a specific algorithm for alert classifying purposes.

¹⁴ Market 3a (wholesale local access provided at a fixed location), 3b (wholesale central access at a fixed location for mass-market products) and 4 (wholesale high-quality access provided at a fixed location) under the Commission's 2014 Recommendation.

¹⁵ Decision n° 2020-1446 of 15 December 2020 (market 3a), Decision n°2020-1447 of 15 December 2020 (market 3b), Decision n°2020-1448 of 15 December 2020 (market 4).

¹⁶ Decision n°2020-1432 of 8 December 2020.

¹⁷ Decision n°2020-1493 of 16 December 2020.

¹⁸ The *Wehe* application aims at helping consumers to detect potential traffic throttling on the internet. Since it was first launched, about 145,000 tests have been run in France using the tool and, up to Q4 2020, no differentiation in internet traffic management had reportedly been detected through the application.

The French national broadband plan is ongoing and has been enhanced with the new target of ubiquitous roll-out of new FTTH networks throughout the country by 2025. It has already produced noticeable results in terms of overall FTTH coverage across the country, except in rural areas where coverage is still low but the pace is increasing steadily thanks to this national broadband plan.

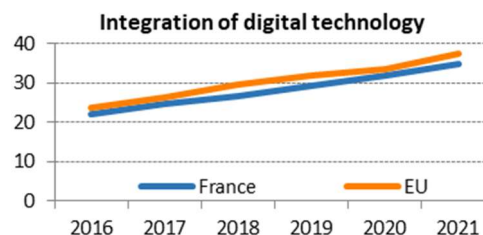
Connectivity in France's Recovery and Resilience Plan

The plan includes an investment to boost connectivity in rural areas with an allocation of EUR 240 million (component 9), part of a total budget for connectivity of EUR 540 million. This sum contributes to a larger effort to improve connectivity under France's *Très Haut Débit* plan, supported by national funds to the tune of EUR 3.3 billion. The objective set in the recovery and resilience plan is to reach 100% ultrafast) coverage by 2025.

Investments in connectivity are also planned for the implementation of 5G and new networks under the communication strategy adopted in February 2021 (component 6). This strategy aims to develop French solutions around telecommunications networks, for technological sovereignty and to achieve end-to-end control of these solutions (sovereignty over exploitation) through support for supply, R&D and training.

3 Integration of digital technology

3 Integration of digital technology	France	EU
	rank	score
DESI 2021	19	34.8
		37.6



	DESI 2019	France DESI 2020	DESI 2021	EU DESI 2021
3a1 SMEs with at least a basic level of digital intensity	NA	NA	55%	60%
% SMEs			2020	2020
3b1 Electronic information sharing	38%	48%	48%	36%
% enterprises	2017	2019	2019	2019
3b2 Social media	16%	22%	22%	23%
% enterprises	2017	2019	2019	2019
3b3 Big data	16%	16%	22%	14%
% enterprises	2018	2018	2020	2020
3b4 Cloud	15%	15%	21%	26%
% enterprises	2018	2018	2020	2020
3b5 AI	NA	NA	19%	25%
% enterprises			2020	2020
3b6 ICT for environmental sustainability	NA	NA	55%	66%
% enterprises having medium/high intensity of green action through ICT			2021	2021
3b7 e-Invoices	25%	25%	23%	32%
% enterprises	2018	2018	2020	2020
3c1 SMEs selling online	15%	15%	13%	17%
% SMEs	2018	2019	2020	2020
3c2 e-Commerce turnover	11%	11%	12%	12%
% SME turnover	2018	2019	2020	2020
3c3 Selling online cross-border	7%	6%	6%	8%
% SMEs	2017	2019	2019	2019

As regards the integration of digital technology in business activities, France ranks 19th among EU countries. More French enterprises are now using digital solutions. In particular, 22% of French enterprises are using big data analysis, well above the EU average of 14%, an increase of 6 percentage points compared with 2018. Almost every second enterprise in France uses electronic information sharing, compared with an EU average of 36%. The use by enterprises of cloud, AI and e-invoices is below the EU average (respectively 21%, 19% and 23%). The percentage of SMEs selling online seems to have decreased by 2 percentage points compared with 2019, thus remaining below the EU average. In addition, the digital intensity of French SMEs remains lower than the EU average: while 55% of SMEs in France attain basic levels of digital intensity, this stands at 60% in the EU as a whole. Also, the intensity of green actions through ICT is 11 percentage points lower than the EU average (respectively 55% and 66%).

France has invested significantly in the digitalisation of its economy over recent years, also focusing on the development and deployment of key digital technologies. A number of strategies were published in 2020 and 2021 to strengthen France's competitiveness in areas such as artificial intelligence, cybersecurity and quantum.

France was one of the first EU countries to adopt an AI strategy, in 2018. As part of the activities launched under the strategy, France has established a bottom-up research network, including both the private and public sector. Four *Instituts Interdisciplinaires d'Intelligence Artificielle* (3IA Côte d'Azur, ANITI, MIAI@Grenoble-Alpes, PRAIRIE) were set up in 2020¹⁹. They gather 137 academic chairs, 8% of whom are international. In the long term, the recruitment target is set at 600 staff. A new AI strategy is currently under preparation. This will focus on the uptake of AI solutions for enterprises and local authorities, to respond to challenges in mobility, energy, smart cities and urban planning, with a particular emphasis on the greening of the economy. It will also focus on the development of frugal AI (i.e. less data and energy intensive) in edge computing.

In February 2021, France published a roadmap on 'Digital and the Environment' to support the greening of the ICT sector and to encourage the use of digital solutions for a greener economy²⁰. One axis of this roadmap is dedicated to the pooling of data in order to design efficient AI systems for economic sectors linked to the environment.

France is an active member of the EuroHPC joint undertaking for high-performance computing. French organisations, both private and public, are directly involved in its ongoing projects.

In order to increase cybersecurity capacities, the French government is setting up the *Campus Cyber*, a national hub that will foster cooperation within the French cybersecurity community. It is expected to be operational as of autumn 2021. It will focus on four main areas of activities: operations (incident detection, incident response, threat intelligence sharing); education and training; innovation; and community animation. About 60 stakeholders covering various areas of expertise are involved in the project, including several public authorities.

In addition, France has a number of Digital Innovation Hubs of varied nature: competitive clusters, technical centres for industry, and local offices of the *Alliance pour l'industrie du Futur* and *La French Tech*, which all aim at encouraging the uptake of digital technologies and solutions across the economy. These structures work in close cooperation with the regions and cities, and with the digitalisation programmes set up at national and regional levels. In 2020, France also launched its European Digital Innovation Hubs (EDIH) preselection process for the forthcoming Digital Europe Programme (DIGITAL). Results are published online: 17 EDIH candidates were selected, with at least one candidate per region, indicating a strong commitment from regional authorities.

The above measures are expected to have a significant impact on the digitalisation of the French economy and on the strengthening of capacities related to key digital technologies. An efficient implementation, combined with a sustained effort to ensure that also SMEs benefit from the innovative digital solutions, will be important to unlock the potential for growth stemming from the adoption of digital technologies.

Integration of advanced technology in France's Recovery and Resilience Plan

As part of the investments in the *Programme d'Investissement d'Avenir*, France is expected to invest EUR 1.8 billion in the development and deployment of key digital technologies, such as cybersecurity, quantum and cloud, to support innovation in these areas and encourage their widespread use, in line with EU values.

- Cybersecurity: EUR 200 million will be devoted to implementing the cybersecurity strategy, launched by the French government on 18 February 2021. This strategy aims at strengthening the state's digital security and safety, and to help businesses and citizens

¹⁹ Highlight DESI 2020.

²⁰ <https://www.economie.gouv.fr/environnement-numerique-feuille-de-route-gouvernement>

increase their cyber awareness and ensure that they can benefit from a secure digital environment. Investments planned in the RRP aim at more than trebling the turnover of the cybersecurity value chain, doubling the number of employees in the sector, and supporting the emergence of three unicorns by 2025.

- Quantum: Investment in the area of quantum computing (EUR 350M) will focus on development of the first prototype quantum computer, training 6,600 PhDs, master's graduates, engineers and technicians, and ensuring France's self-sufficiency in its supply of resources to the development of quantum technologies.
- Cloud: EUR 300 M will be devoted to implementing the cloud strategy, which will focus most of the investment on the development of a French offer for cloud and advanced services. Projects anticipating future uses of the Cloud, including edge computing, are being studied and could enable the emergence of solutions that could be global market leaders. These major projects could be carried out on a European scale through an IPCEI. They will lead to offers that can be part of the GAIA-X project.

France will also participate in the IPCEI on microelectronics and communication technologies, co-funded under the *Programme d'investissements d'avenir*.

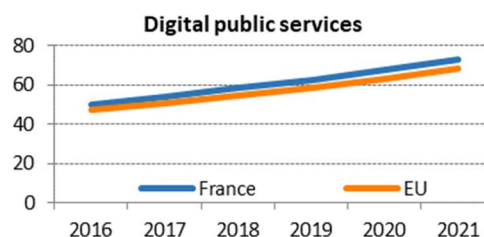
The RRP envisages support to R&D investment in digital areas, increasing the budget for R&D projects under the National Research Agency and supporting the preservation of employment in private research. It is estimated that this action will contribute to the digital objective. From past records, more than 40% of projects selected through competitive calls concerned digital areas, from fundamental research on algorithms to the use of digital technologies (e.g. sensors and modelling) to fight climate change.

The RRP includes investment to use digital technologies in support of the transition to the green economy in key markets. Resources will be dedicated, among others, to the digitalisation of the mobility sector, the roll-out of sustainable farming systems and the decarbonisation of industry. In addition, the roadmap published in February 2021 includes a number of existing and new measures, such as the establishment of an environmental barometer for digital players and support for artificial intelligence projects for ecology.

As for the digitalisation of businesses, the recovery and resilience plan builds on existing initiatives such as *France Num*, with the objective of increasing the digitalisation of 200,000 enterprises by 2024, while providing employees with the necessary support to manage the transition to digital technologies (component 7).

4 Digital public services

4 Digital public services	France rank	France score	EU score
DESI 2021	13	73.0	68.1



	DESI 2019	France DESI 2020	DESI 2021	EU DESI 2021
4a1 e-Government users % internet users	79%	82%	NA	64%
	2018	2019	2020	2020
4a2 Pre-filled forms Score (0 to 100)	NA	NA	42	63
			2020	2020
4a3 Digital public services for citizens Score (0 to 100)	NA	NA	73	75
			2020	2020
4a4 Digital public services for businesses Score (0 to 100)	NA	NA	91	84
			2020	2020
4a5 Open data % maximum score	NA	NA	94%	78%
			2020	2020

France ranks 13th in the EU for Digital public services. France performs particularly well in the field of open data, scoring 94% of the maximum score, and in digital public services for businesses with a score of 91 out of 100. Its performance for services for citizens is in line with the EU average, two points lower than the EU average (respectively 73 and 75). France is not performing well in the number of pre-filled forms, as the score is significantly lower than the EU average (42 and 63 respectively).

To accelerate the digital transformation of public administration, France is currently implementing the *TECH.GOUV* programme, launched in 2019²¹. This includes various actions to encourage the uptake of digital solutions in the delivery of public services, develop an interoperable e-identity framework, including implementation of the 'only once' principle, improve data infrastructure, and better manage collected data.

In particular, the eIDAS Regulation²², establishing one single framework for electronic identification (eID) and trust services in the EU, is implemented in France via the *FranceConnect* service. In 2020, *FranceConnect* registered a significant increase in the number of users, reaching more than 22 million French citizens. On the basis of current trends, the French government estimates that 30 million French citizens will be connected to it, which is more or less 60% of the eligible population. *FranceConnect* is deployed in several hundred digital services, mostly in the public sector but also in the private sector (health industry, banks and insurance). It also plays the role of an eIDAS node: in 2021, it will allow recognition of cross-border e-identifications in French digital public services requiring a substantial or high-level identification.

Implementation of the 'only once' principle (OOP) progressed significantly in 2020 and 2021. To support administrations to implement the necessary provisions for data exchanges, a dedicated structure has been created — in the directorate in charge of digital transformation of the French

²¹ <https://www.numerique.gouv.fr/publications/tech-gouv-strategie-et-feuille-de-route-2019-2021/>

²² <https://digital-strategy.ec.europa.eu/en/policies/discover-eidas>

government — to overcome technical, legal, and operational obstacles. The infrastructures supporting OOP data exchanges are also being strengthened, with the development of an application programming interface (API)²³ data hub for OOP exchange of citizen and business data²⁴ and the DataPass, a digital counter to manage the various requests to connect to existing APIs.

A number of initiatives are in place to ensure the user-centricity of digital public services, such as a review of the 250 most popular services by users, which helps to gather feedback on the user experience. In addition, the project *Commando UX*²⁵ allows public administrations to hire user-experience experts for a limited period to improve their existing and future services and the *Start-Ups d'État* programme helps to build digital services starting from the needs expressed (or problems identified) by citizens or businesses.

Actions to ensure that all citizens can benefit from digital public services are being implemented through the *Inclusion numérique* project, which aims at reaching the most vulnerable and facilitating the use of digital public services.

France is implementing ambitious measures to be at the forefront of a digitally enabled public service modernisation. Full implementation of the country's strategy in this area, including through additional measures to increase user-centricity and inclusiveness, are important to ensure that all citizens can benefit from digital services.

Highlight 2020-2021: Artificial Intelligence for public services – AI Lab

The AI Lab supports administrations to use their data through data science and artificial intelligence²⁶. Since its launch in 2019, the AI Lab has supported the development of 6 projects in 2019 and 15 projects in 2020-2021. Both calls for expression raised a lot of interest, resulting in a high number of applications by central and local administrations.

The winning projects are selected by a panel of experts in AI and digital public services. The selected projects are noteworthy both for their impact in the transformation of public services and the technical solutions.

A number of solutions are already being deployed in various areas: for example, the tax administration is putting in place a system for the detection of fraud, the ministry of health is using AI to detect high-priority alerts about health equipment using data from the portal for reporting adverse health events²⁷, and *Pôle emploi* (the French unemployment agency) has a major programme on using AI to make the public service provision more efficient (*Intelligence Emploi*).

²³ Application programming interface is a software intermediary that allows two applications to talk to each other.

²⁴ API Particulier (<https://api.gouv.fr/les-api/api-particulier>) and API Entreprise (<https://entreprise.api.gouv.fr/> - an API data hub for OOP exchange of business data).

²⁵ <https://design.numerique.gouv.fr/commando-ux/>

²⁶ Lab IA : Datasciences et intelligence artificielle – Le blog d'Etalab : <https://www.etalab.gouv.fr/datasciences-et-intelligence-artificielle>

²⁷ <https://www.etalab.gouv.fr/intelligence-artificielle-decouvrez-les-15-nouveaux-projets-selectionnees>

Digital public services in France's Recovery and Resilience Plan

The RRP allocates a total of EUR 3.2 billion to improve digital public services, including digitalisation of the state and territories (component 7). E-identity (eID) will be deployed with the objective of delivering, in 2022, up to 3 million national digital identity cards and an application for online authentication will be developed. A budget of EUR 136 million is devoted to cybersecurity specifically for strengthening public services whose disruption would have a strong detrimental impact on citizens. It also supports innovation competitions to develop an efficient and competitive cybersecurity offer and make local centres able to respond to cybersecurity challenges.

EUR 2 billion will be devoted to digitalisation of health (component 9), supporting national digital health service infrastructure and project management. The plan will also finance software updates to interoperability standards, upgrades or new software, and the integration, transformation and sharing of data. These measures underpin the introduction and establishment of two digital health flagship projects in France: *health records* and the electronic health data space.